

# Volume 1

## FINAL REPORT

Regional Investment Strategies (RIS) and Coastal Catchments Initiative (CCI) project alignment to Great Barrier Reef Water Quality Protection Plan

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This evaluation is a joint initiative of the Australian Government and the Queensland Government Department of Natural Resources and Water, agreed to by the Joint Queensland/Australian Government NRM Steering Committee and approved for distribution by the IOC

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## Acronyms

AIMS	Australian Institute of Marine Science
AquaBAMM	Aquatic Biodiversity Assessment Mapping Methodology
BM	Burnett Mary
BMP	Best management practice
BDT	Burdekin Dry Tropics
BSES	Bureau of Sugar Experimental Stations
CCI	Coastal Catchments Initiative
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DPI&F	Department of Primary Industries and Fisheries
EPA	Environmental Protection Agency
FB	Fitzroy Basin
FNQ	Far North Queensland
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
GLM	Grazing Land Management program
JSC	Commonwealth Queensland Government Joint Steering Committee
MAT	Management Action Target
MW	Mackay Whitsunday
NAP	National Action Plan for Salinity and Water Quality
NRW	Department of Natural Resources and Water
RCT	Resource Condition Target
ROC	Regional Organisation of Councils
the Trust	Natural Heritage Trust
WQIP	Water quality improvement plan

## Preface

The Great Barrier Reef Water Quality Protection Plan (the Reef Plan) is a joint initiative of the Australian and Queensland Governments. The Reef Plan aims to progress an integrated approach to natural resource management planning by building on the existing partnerships between the different levels of government, industry groups, the community and research providers within the Reef catchments, principally through partnerships with the regional natural resource management (NRM) bodies.

This wide variety of institutions and players contribute to progressing activities which support the goal and objectives of the Reef Plan, including:

- industry initiatives which will play a vital role in delivering the objective of the Reef Plan such as best management practice programs.
- implementation of improved agricultural practices by individual landholders.
- community groups, including Waterwatch, catchment management, Landcare and Coastcare groups, which play a significant role in raising community awareness and implementing actions.
- regional NRM bodies, which play a key role in developing initiatives and implementing actions.
- local governments, which have a strong role in water quality improvement and ecosystem protection.
- the Queensland and Australian Governments through programs and initiatives designed to improve water quality in Reef catchments.

While acknowledging the valuable efforts of all contributors to achieving Reef Plan objectives, this evaluation was commissioned to identify and assess how activities of the regional NRM bodies that are currently funded under the National Action Plan for Salinity and Water Quality and the Natural Heritage Trust are contributing to the achievement of Reef Plan actions and objectives. In addition, the evaluation considered only those activities and initiatives approved and funded at the beginning of the evaluation in March 2006. As a result, a number of initiatives which have since been progressed are discussed here from the viewpoint of March 2006.

## 1.0 Executive summary

The Great Barrier Reef Water Quality Protection Plan (the Reef Plan) aims to halt the decline in water quality entering the Reef within ten years. The Reef Plan places responsibility on the regional natural resource management (NRM) bodies within the adjacent Reef coastal catchments to implement several actions towards achieving this outcome.

This report has identified and assessed how currently funded regional NRM body activities are contributing to the achievement of the Reef Plan actions and objectives. It has addressed the scope, adequacy and likely effectiveness of the funded regional body activities; identified a range of 'good news stories' exemplifying successful and innovative approaches; identified gaps, constraints and opportunities; and discussed a reporting mechanism to enable Reef Plan activities to be collated within existing and proposed NRM reporting arrangements.

The report is focused on five regional bodies: FNQ NRM Ltd; Burdekin Dry Tropics NRM; Mackay Whitsunday Natural Resource Management Group; Fitzroy Basin Association; and Burnett Mary Regional Group. Cape York region was not included because investment decisions regarding activities aimed at water quality had not yet been made at the time of the evaluation. The regional NRM plans, regional investment strategies and Coastal Catchments Initiative's projects for each region were examined to identify the main activities, management action targets and resource condition targets that related to Reef Plan strategies and actions. This was followed by one-day workshops in each region and subsequent discussions to ensure accuracy.

The 'big initiatives' identified included:

- initial steps being taken to develop water quality improvement plans.
- significant uptake of an innovative range of self management approaches which focus on grazing and cropping industries.
- successful implementation of education and extension efforts across a range of funded initiatives.
- incentives that are promoting best practice and have the dual benefits of enhancing production outcomes and improving water quality.
- research and development which underpins the promoted best management approaches.
- developing partnerships with key stakeholders, including universities and other research providers, industry, local government and Traditional Owners.
- region-wide monitoring of water quality.

The 'big insights' revealed included:

- the regional approach that has been adopted is working well in relation to improving water quality.
- there are high levels of enthusiasm and commitment to the delivery of NRM outcomes, particularly in relation to water quality improvements.

- priority setting within the regions is influenced by their differing cultures and histories.
- the regions have developed a wide range of differing approaches to self-management at the property level in order to achieve Reef Plan objectives.
- while the same management tools and processes may be implemented within the regions, the outcomes being achieved are likely to be different, as exemplified by the voluntary water quality monitoring projects that have been established in the regions.
- cooperative approaches, co-funding and institutional capacity building are essential to achieve NRM outcomes.
- the question of effectiveness is difficult to gauge and is dependent on the further development of adaptive management frameworks that incorporate monitoring and evaluation and action learning strategies.
- identifying potential areas within high-risk areas of the Reef catchment where protection of vegetation might be secured under a regulatory framework is not a key priority for the regional bodies, their focus being on voluntary, incentive based self-management approaches.

The activities of regional NRM bodies were identified as spanning a spectrum from an initial level of achievement, representing the implementation of preliminary and pilot projects, to a more comprehensive level of achievement where a solid foundation existed and there was capability to achieve at a higher level. However, despite this variation in achievement, all regional bodies were, without exception, working hard to 'cover all bases' of the Reef Plan requirements.

The main challenges, gaps and opportunities identified included:

- a critical need for a science-planning-community framework to be planned for, at the Reef lagoon level, to provide a comprehensive picture of Reef lagoon imperatives in relation to resource condition protection and rehabilitation.
- data acquisition, management and exchange, ensuring that data and information are collected and monitored at multiple scales, and is appropriately sequenced and has a clear set of agreed priorities.
- the use of surrogate targets which reflect the requirements of the Reef Plan and the existence in all regions of processes to refine these targets as improved data become available.
- the evolving nature of water quality improvement plans (WQIPs) in the regions, though they are being further developed to identify issues, set environmental values and water quality objectives, and define priority actions to address risks and will be a prime vehicle for regional NRM bodies to bring together a number of Reef Plan strategies and actions.
- going beyond the pilot project and moving beyond 'working with the willing'.
- utilising a wider range of economic incentives as a key tool to increased uptake of best management practices, with current gaps identified in the use of philanthropic investment, use of pilot auction programs, covenants and the linking of planning to preferential access to government financial support.
- the need to identify and target on-ground works and education to high risk catchments.
- expanding efforts to share knowledge and the lessons learnt from the initial pilot projects.

- a common and agreed framework for sustainable NRM.
- ongoing involvement of Traditional Owners in NRM planning and management and the noted absence of regional body involvement in the development of Indigenous land use agreements.
- providing opportunities for the integration of a wide range of knowledge frameworks.
- issues at the operational level relating to the refinement of priorities; continued research and development partnerships; refinement of the incentives programs and effective monitoring of 'adoption rates' in relation to desired changes; appropriate resourcing to deal with existing shortfalls in monitoring and predicted shortfalls in extension staffing; more comprehensive research and development and regional body uptake of social and economic as well as ecological aspects of NRM; and incorporation of urban and coastal priorities with the predominantly rural agenda of NRM.
- effective strategies to manage the regional NRM bodies' perceptions of their 'uncertain futures'.

The key recommendations are:

- continue collaborative approaches between government, rural industries, research organisations and regional bodies to progress building the understanding Reef lagoon resource condition targets.
- continue to refine priorities to deliver a landscape-wide approach to water quality improvement based around high risks and priority areas.
- provide adequate support and funding for data provision, interpretation and management and agree on sequencing and priorities of tasks relating to data.
- provide appropriate resourcing to deal with existing shortfalls in monitoring and predicted shortfalls in extension staffing.
- provide adequate support for implementation of WQIPs currently being developed and for further development and implementation of plans for remaining waterways within the Reef catchment.
- continue to develop, through research and development and partnerships, the framework of best management practices and property level plans for different regions and different capacity levels.
- with regional bodies and industry groups, monitor the spatial distribution of the uptake of best management practices to ensure that identified hot spots that are contributing to poor water quality in the Reef lagoon are being actively addressed.
- in collaboration with lessons from other jurisdictions, continue to develop strategies to improve engagement of those landholders and resource managers not actively involved in the early phases of regional body activities.
- continue to refine incentives programs and effective monitoring of 'adoption rates' in relation to desired changes.
- retain the flexible approach by regional bodies to incentive programs to reduce the impact of extraneous factors on the uptake of programs.
- evaluate level of alignment of regional body initiatives against other programs e.g. wetlands program.
- incorporate urban and coastal priorities with the predominantly rural agenda of NRM.

- facilitate transfer of knowledge and experience regarding strategies for engaging with Traditional Owners amongst regional bodies, and between regional bodies and government agencies.
- continue to support regional bodies to integrate information from a wide range of knowledge frameworks.
- continue to work with local governments to ensure capacity to integrate NRM issues into strategic plans and other planning and development assessment instruments.

In essence, while regional NRM bodies are in their initial stages of Reef Plan implementation, they vary in their level of achievement of Reef Plan actions and this may relate to funding differences, with Fitzroy Basin, Burdekin Dry Tropics and Burnett Mary being National Action Plan for Salinity and Water Quality (NAP) funded regions. This initial implementation stage is characterised by a focus on understanding landscapes and cause and effect and engaging key players as well as the broader community in collating information and setting the priorities for action. Most planning, research and development, and investment processes are in the initial phases. Knowledge gained in this phase will form the basis of more comprehensive achievement of results for Reef Plan. The next era is best to be based around comprehensive planning (preferably through widespread application of water quality improvement plans), targeted monitoring and science that is based on high risk catchments and high risk activities, and a toolbox of incentives for better practices and continuous improvement at all scales.

## 2.0 Introduction

The Great Barrier Reef Water Quality Protection Plan (State of Queensland and Commonwealth of Australia 2003) (the Reef Plan), is part of a comprehensive strategy to protect and preserve the Reef. Its focus is to halt the decline in water quality entering the Reef within ten years through reducing diffuse sources of pollution and conserving and rehabilitating areas that have a role in reducing water borne pollutants. The Reef Plan identifies nine strategies and a range of actions to improve Reef water quality. Through the actions responsibilities have been identified for governments, industries and regional natural resource management bodies (regional bodies). The regional NRM bodies within the coastal catchments adjacent to the Reef are particularly responsible for setting water quality targets and implementing management actions to achieve those targets.

Funding for these initiatives is provided primarily through the Natural Heritage Trust Extension (the Trust) and National Action Plan for Salinity and Water Quality (NAP), as well as the more recent Coastal Catchments Initiative (CCI), which includes the development and implementation of water quality improvement plans (WQIPs). Two of the regions included in this report – FNQ NRM Ltd and the Mackay Whitsunday Natural Resource Management Group are funded largely through the Trust, while the remaining three regions are identified as priority catchments and funded in addition through the NAP program. The level of funds available to implement the regional NRM plan priorities, including activities aimed at improving water quality, differ among regions.

### 2.1 Terms of reference

The terms of reference for this project are included in Appendix 1.

### 2.2 Aims and objectives

The aim of this report is to identify and assess how currently funded regional NRM body activities will contribute to the achievement of the Reef Plan actions and objectives.

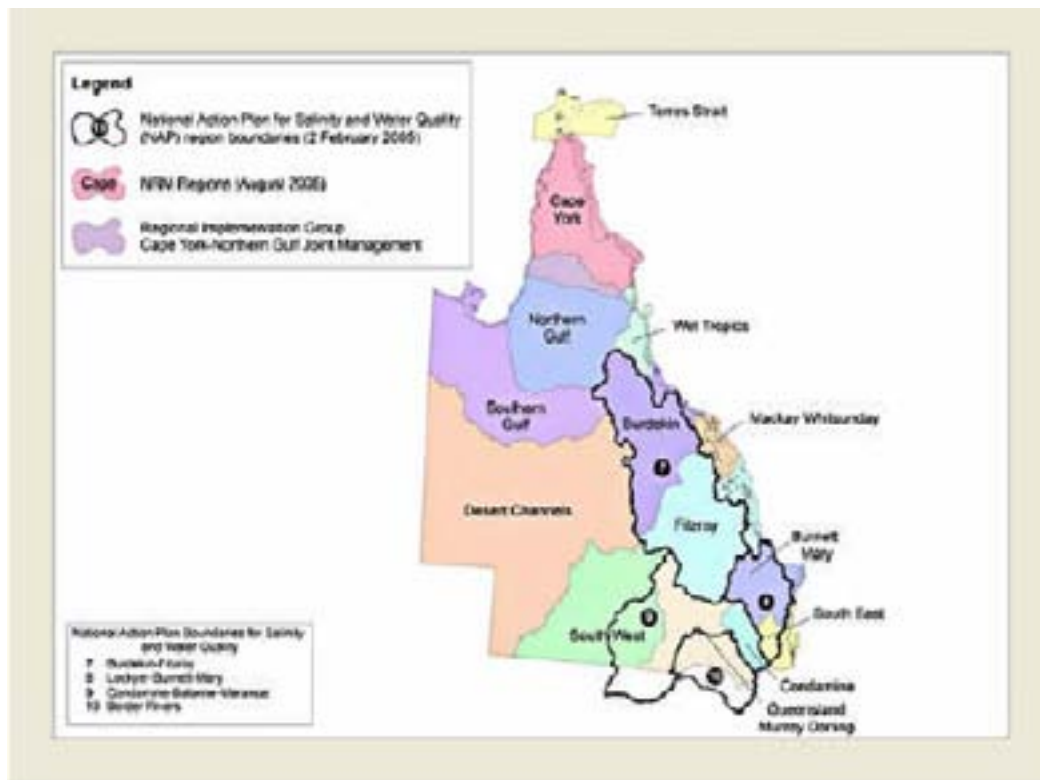
The specific objectives are to:

- assess the scope, adequacy and likely effectiveness of the funded regional body activities in achieving Reef Plan actions and objectives.
- identify the 'good news stories' of successful and innovative approaches to achieving the Reef Plan's outcomes.
- recommend improvements in relation to any identified gaps, constraints and opportunities.
- identify a reporting mechanism to enable Reef Plan activities to be collated within existing and proposed NRM reporting arrangements.

### 2.3 Methodology

Five regional bodies were examined in this report – FNQ NRM Ltd (FNQ NRM), Burdekin Dry Tropics NRM (BDT), Mackay Whitsunday Natural Resource Management Group (MWNRM), Fitzroy Basin Association (FBA) and Burnett Mary Regional Group (BMRG) (Figure 1). All regions have an accredited regional NRM

plan and regional investment strategy (RIS). This is the first iteration of regional NRM plans and RISs since the release of the Reef Plan in 2003.



**Figure 1: NRM Regions in Queensland**  
(Source: Australian Government 2006)

The key steps undertaken for this report included:

- an initial review of regional NRM plans, to identify the main activities, management action targets (MATs) and resource condition targets (RCTs) that related to Reef Plan strategies and actions.
- an initial review of RISs and performance reports to identify the actions that regional bodies were currently funding to achieve Reef Plan strategies and actions.
- an initial evaluation of:
  - the degree of the adequacy and alignment (e.g. high, medium, or low) between the funded activities and the Reef Plan objectives.
  - the current gaps between funded activities and Reef Plan objectives.
- one-day workshops with key stakeholders involved in regional NRM planning and delivery in each of the five regions to identify and confirm:
  - the main funded activities being undertaken to achieve Reef Plan outcomes.
  - gaps and inconsistencies between the funded initiatives and the Reef Plan objectives.
- ‘good news stories’ which highlighted the success of the regional bodies delivery of Reef Plan objectives.
- issues of concern for regional NRM bodies in relation to their ability to meet the Reef Plan’s objectives.
- opportunities to improve regional NRM delivery of Reef Plan goals, strategies and actions.

- a review of the existing reporting arrangements for regional NRM bodies and discussion of future strategies to enable Reef Plan activities to be collated within existing and proposed NRM reporting arrangements.

## **2.4 Scope and limitations**

The review was spatially limited to the five NRM regions (refer to Methodology). Cape York region was not included because investment decisions regarding activities aimed at water quality had not yet been made at the time of the evaluation.

While the terms of reference required a focus on the 10 actions where regional bodies have been identified as the lead contributor, it was apparent following the initial desktop review of regional NRM plans that regional bodies were involved in a wide range of activities that supported the Reef Plan outcomes. In many cases, these activities went beyond the 10 actions where regional bodies were identified as lead contributor and the 23 actions where regional bodies had supporting roles. Thus the scope of the report was significantly widened to reflect the broad range of activities currently being funded and undertaken by regional bodies to support the outcomes of the Reef Plan.

This report also recognises that regional bodies are at differing stages in the implementation of their funded actions and hence it does not seek to judge current achievements, but rather to report on the diversity of approaches that are being implemented to achieve the Reef Plan's objectives.

For ease of reference the ten Reef Plan actions for which regional bodies have sole or shared primary responsibility and the 23 actions for which they have supporting responsibility are outlined in Table 1.

**Table 1 Selected Reef Plan strategies and actions**

<b>A – Self management</b>	
A4	Promote sustainable land management & best practices – high risk catchments (e.g. BMP, PMP, EMS)
A5	Industry supported quality assurance schemes (chemicals/pesticides) and involve community groups
<b>B – Education and extension</b>	
B1	Education & extension programs, trial practices to increase voluntary uptake by agricultural practices (wetland/riparian awareness; sediment/ nutrient/ chemicals – grazing, measurable increases in uptake)
B2	Integration & coordination of research information & extension services
B3	Facilitate information exchange between Traditional Owners, government, industry & landholders
B4	Community awareness raising campaign (e.g. Healthy Waterways) in relation to water quality/wetlands
B5	Promote benefits – management plans, conserve agreements, covenants to landholders
<b>C – Economic incentives</b>	
C1	Promote existing incentive schemes in relation to sustainable management practices & property management plans
C5	Potential of planning systems to be linked to preferential access to government financial support, leasehold arrangements, funding from regional bodies and other incentive options
C6	Programs to establish conservation agreements & covenants (vegetation, riparian, wetlands)
C8	Pilot auction program – target/conservate wetland, riparian, remnant vegetation
C9	Philanthropic investment e.g. Trust for Nature
<b>D – Planning for NRM and land use</b>	
D4	Local WQIPs – high risk high priority catchments, interim water quality projects, WQIP (Douglas Shire)
D8	Nutrient sensitive zones – extension, PMP, funding focused; what mechanisms to apply?
D11	<b>Negotiate Indigenous land use agreements – links land water, marine; mechanisms for involvement</b>
<b>E – Regulatory frameworks</b>	
E2	Potential areas within high risk areas where declarations under the <i>Vegetation Management Act</i> might secure vegetation
<b>F – Research &amp; information sharing</b>	
F3	<b>Investigate better coordination future resource condition monitoring to meet stakeholders needs</b>
F4	<b>Coordinated research &amp; development programs (e.g. best practice, chemical use practices, field studies etc.)</b>
F8	<b>Facilitate exchange of information and experience between catchments with WQIP and others</b>
<b>G – Partnerships</b>	
G1	<b>Work in partnership with NRM bodies to determine water quality environmental values &amp; objectives &amp; develop aspirational &amp; short term RCTs &amp; MATs</b>
G2	Traditional Owners involved in consultation & support involvement in protection

	& healing
G3	Create research & development program with research institutions & regional NRM bodies – develop modelling tools to support target setting
<b>G4</b>	<b>Work with research organisations – develop sustainable production systems (CSIRO, AIMS etc.)</b>
<b>G7</b>	<b>Regional NRM bodies &amp; river improvement trusts – closer links (compatible, coordinated planning, actions/work programs)</b>
<b>H – Priorities and targets</b>	
<b>H1</b>	<b>Water quality targets for catchments waterways – improve water quality; invest in remedial action</b>
<b>H2</b>	<b>Incorporate water quality targets established by regional NRM bodies into evaluation process of RWQPP</b>
H3	Identify waterways, riparian, wetlands in good condition & which should be preserved
H4	With regional NRM bodies – identify sub-catchment hotspots responsible for sediment, nutrient & pesticides
H5	With regional NRM bodies –make wetland & riparian rehab high priority in high risk reef catchments
<b>I – Monitoring and evaluation</b>	
I3	Incorporate goal RWQPP into state, Commonwealth evaluation processes for NRM planning
I5	Implement coordinated water quality monitoring program in high risk catchments
<b>I6</b>	<b>Support &amp; improve community &amp; industry based water quality information collection programs in high risk catchments (expand Waterwatch)</b>
I8	Monitoring & implementing of local WQIPs & environmental flow objectives – reviewed & addressed in other planning processes

(Where: bolded actions are those for which the regional NRM bodies have sole or shared primary responsibility; unbolded actions are those for which the regional NRM bodies have supporting responsibilities).

## 2.5 Report structure

The report has seven key components. First, regional profiles are summarised providing background information on the region and an overview and discussion of progress to date. Second, cross-regional activities are documented. Third, the ‘big initiatives’ that are currently funded across all regions and which align with Reef Plan outcomes are described. These highlight the priorities that are evident across the five regions and identify some of the different approaches being taken between regions. Fourth, the ‘big insights’ into how the regional bodies’ activities align with the Reef Plan are discussed. Fifth, the ‘big challenges’ for the regional bodies are described and the opportunities identified. Sixth, issues relating to reporting procedures are briefly addressed and last there are brief recommendations and conclusions.

## 3.0 Regional profile summary

The purpose of this section is to briefly summarise the main activities that are being undertaken by the regional bodies in relation to improving water quality in the Great Barrier Reef. The data that underpins this summary is synthesised from a comprehensive review of the regional NRM plans, RISs and CCI funded initiatives and subsequent discussions with regional body staff and their key partners in each region (Appendix 2 identifies the participants who provided input to the workshops).

The supporting data is attached in Appendixes 3 and 4. An evaluation of each regional NRM plan and RIS in relation to the Reef Plan strategies and actions is tabulated in Appendix 3. In particular, the table identifies the main themes addressed in each regional NRM plan (this corresponds to the relevant MATs) and the corresponding Reef Plan strategy and action. An assessment of the degree of alignment of regional body activities was undertaken by using a scale of high, medium and low and any gaps and inconsistency identified. In addition, the key funding initiatives were identified.

Appendix 4 summarises the degree of alignment between the Reef Plan and the funded regional NRM activities in each region. The table identifies the 10 Reef Plan actions for which the regional NRM bodies have prime responsibility and the 23 actions for which they have secondary responsibility. The current status of regional body activity against each Reef Plan action is recorded. The status falls into one of four categories – (A) having been completed, (B) currently underway, (C) not yet being done but planned for future action and (D) not envisaged to be done in the near future (<5 years). This supporting information formed the basis of the summary regional profiles, which identify for each region, important contextual information concerning the environment, society and economy and key issues in relation to water quality management. This is followed by a summary of the funded activities that are proceeding well, activities that are funded and underway and those that are challenging for the regional bodies to initiate or implement.

### 3.1 Far North Queensland

#### 3.1.1 Background

FNQ NRM comprises the catchments of the Daintree/Mossman, Barron, Russell/Mulgrave, Johnstone, Tully/Murray and Herbert Rivers and associated coastal and marine areas. The Wet Tropics catchments are estimated to contribute approximately one third of the nitrogen load to the Great Barrier Reef (GBR) lagoon. Of the Wet Tropics' catchments, the Johnstone and Herbert Rivers are the largest source of sediment and nutrient discharge (FNQ 2004). The region includes 91 per cent of the Wet Tropics World Heritage Area, as well as part of GBR World Heritage Area, GBR Marine Park and extensive areas of national park and other protected areas. Tourism is the region's largest economic earner. Natural resource based industries, particularly cropping (e.g. sugar, horticulture and bananas) and livestock production and associated transport, marketing and processing activities are also economically important. Key issues for the region relate to the volatile biophysical and economic production environments and susceptibility of cropping and grazing enterprises to external climatic factors (e.g. prolonged drought and cyclonic events).

### 3.1.2 Progress and discussion

Table 2 presents a summary review of progress in FNQ NRM. Some of the key factors that impact on Reef water quality are high pollutant runoff and erosion rates, riparian and floodplain modification within parts of the region and coastal urban and tourism development pressures.

FNQ NRM is addressing the management and minimisation of diffuse sources of nutrients into the Reef lagoon through several initiatives. One approach to date has been to identify the key best management practices across different rural industries in the Wet Tropics that have the potential to minimize diffuse pollution. In collaboration with industry organisations including CANEGROWERS and Tully Cane Productivity Services and the Department of Primary Industries & Fisheries (DPI&F), field days and farm walks have showcased the results. FNQ NRM has also funded an incentive program aimed at improving land management practices including placement, rate and timing of fertiliser use (refer to Box 1). Associated education and extension activities have included running of nutrient management courses for landholders to support changes in land management practices. Key links have been made in the delivery of these initiatives with DPI&F Reef Extension Initiative (see cross-regional initiatives for more information on the Reef Extension Initiative).

Research is occurring into the isolation of nitrogen fixing bacteria in sugarcane based on 10 years of trials which could potentially have large impacts on fertiliser use requirements and significant outcomes for water quality. Further work into the species that occur in sugarcane growing areas and threshold soil nitrogen levels would be needed before the relevance across regions is known (refer to Box 2).

Devolved grants for sustainable agriculture are aimed at improved land management that affects water quality, for example minimum tillage, cultivation technology and riparian repair initiatives. One criterion for granting projects has been the suitability as a demonstration project for the region/catchment. Funding has been made available for minimum tillage implements.

The three-day grazing land management (GLM) workshops are being delivered by DPI&F in the region, with a follow up one-on-one extension with graziers in collaboration with DPI&F Beef Team staff. Field trips, access to GIS mapping and resource material are provided. There is currently keen interest in the upper Herbert for follow up. FNQ NRM Ltd is working with Burdekin Dry Tropics across the Upper Herbert and Upper Burdekin catchments for GLM delivery. This addresses the dryland grazing, however further work is being done to address use of coastal wet tropics areas for beef fattening.

#### **Box 1** **Working with the sugarcane industry**

FNQ NRM is actively engaged with the sugar industry working currently with canefarmers in Ingham as it is a priority area for achieving a better match between fertiliser use and soil types. The focus is on a fertiliser-based BMP for the sugar industry. The program is the *Six Easy Steps in Sugarcane Nutrition*. The steps involve educating farmers on what soils are; training farmers in interpretation of soil analysis and then deciding on appropriate fertiliser applications – types and amounts – based on the soil types. The focus is on achieving more balanced usage through customizing the fertiliser application process to the soil types, saving money and the environment in the process. The manual is in preparation. The Ingham pilot has been completed based on three workshops. The estimate is that possibly 30 percent growers have adopted the approach. The project will shortly extend into the Johnstone catchment..

Work with the dairy industry has focused primarily on irrigation efficiency which is strongly linked to diffuse source management. Up to 50 percent improvements in distribution efficiency is possible from addressing irrigation equipment alone.

The CCI program funds are currently focused on finalising and implementing the Douglas Shire WQIP and developing a new WQIP and associated structures for the Tully catchment. There has been a thorough evaluation of the strengths and weaknesses of the approach and this has informed the management structures, tasks and community engagement framework for the Tully WQIP (refer to Box 3). The results from this work are also shared with other WQIP regions.

**Box 3**  
**Water quality in Tully catchment**

FNQ NRM Ltd is working with catchment communities to progress a more management-focused approach to water quality. A WQIP has been completed in the Douglas Shire, while work has commenced in the Tully catchment. These plans allow real partnerships to emerge at the catchment level to address water quality and achieve significant outcomes.

The Tully WQIP is being delivered in partnership with CSIRO's Water for Healthy Country program and Cardwell Shire's Floodplain Plan project. Three action teams are operating with a focus on: (1) production and water quality; (2) riparian and wetland management, pest and weeds; and (3) social and cultural issues. Each action team has a chair and facilitator. The teams report to the steering committee which has membership from AgForce, Growcom, CANEGROWERS, CSIRO, Traditional Owners and Cardwell Shire, and link into the WQIP and Water for Health Country projects.

Key activities in the WQIP are best management practice evaluation and water quality monitoring. Several components of water quality monitoring are being addressed including a review of past data, monitoring of land use at sub-catchment scale, assessment of potential for end of river monitoring alliances (e.g. with GBRMPA), and water quality modelling to determine sediment and nutrient transport on floodplain.

The Tully WQIP is using the lessons learnt from the Douglas project in ensuring organizational framework is established, the tasks and their sequencing are well defined and there is extensive engagement with the community.

**Box 2**  
**Research findings huge potential for reducing fertiliser needs**

Recent price increases for sugar present a risk of greater rates of fertiliser being applied to cane crops. FNQ NRM Ltd is undertaking work to demonstrate the ability of some cane varieties to source the majority of nitrogen requirements from the atmosphere using nitrogen-fixing bacteria. This work builds on ten years of trial work. FNQ NRM Ltd is negotiating with BDT for a cross-regional project to collect and analyse soils to determine nitrogen reserves and soil responsiveness. On the horizon, there is a body of knowledge developing around the role of bacteria and nitrogen availability. There is a high potential for rapid implementation if this method is further validated. This technique has relevance across regions. Three species of the desired bacteria have been identified but there is a need for more understanding of conditions which influence the amount of nitrogen fixed.

The two WQIP projects are part of a coordinated water quality monitoring program that is being established across the Wet Tropics. Activities include involvement in the Reef community water quality improvement program.

Specific initiatives focused on the mapping and protection of wetlands that are underway include \$100,000 to Cardwell Council to map wetlands in more detail in the Tully catchment and some specific wetland investments in the Douglas Shire. Water quality outcomes from wetland management and repair are addressed as part of the general sustainable agriculture and significant waterway and floodplain management programs. An example from Douglas Shire is the creation of deposition areas on the

floodplains to reduce sediment transport into the Reef. The Douglas WQIP confirmed the coastal floodplain as a significant source of sediment entering the Reef lagoon. In the Barron River catchment, sponsorship and support for rejuvenation of 140kms of degraded riparian areas along the Barron River have been secured over the next 20 years. Complementary funding programs are delivering in the region for wetland management, for example, the Reef Coastal Wetland Protection program and Queensland's Wetland program (wetland mapping being undertaken by EPA; a decision support system; and funding for local government wetland management activities).

FNQ NRM's partnerships with the Traditional Owners and their organisations continue to build upon the sound framework of the Aboriginal Cultural and Natural Resource Management Plan and processes developed in its preparation. Negotiations for a MOU with the Aboriginal Rainforest Council are occurring through the Traditional Owner Advisory Committee as well as consideration of a regional partnership agreement with the Commonwealth Indigenous Coordinating Committee. Initiatives are being undertaken at both the on-ground and the strategic planning levels. A framework is being established for 'country-based planning' which will support Traditional Owners to undertake their own planning for traditional lands (refer to Box 4).

**Box 4**  
**The next phase in Caring for Country and Culture: country-based planning**

The Traditional Owners of the Wet Tropics area, with the support of the Indigenous Technical Support Group, developed their own plan for looking after Country. This aboriginal plan and the regional NRM plan identify the need for Traditional Owners to develop their own plans for traditional lands. These plans will enable Traditional Owners to implement relevant management actions from the regional NRM plan.



Staff from FNQ NRM Ltd, Girrigun, Aboriginal Rainforest Council and State and Commonwealth agencies are supporting each of the 18 Traditional Owner groups to progress these planning activities. A key activity is the cultural mapping project that is underway and will support the development of the country-based plans.

Linkages with local government have been established at a regional level through partnership arrangements with the Far North Queensland Region of Councils (FNQROC). Long-term collaboration will focus on three critical areas including water quality and use efficiency. Collaborative arrangements are already in place in Douglas and Cardwell Shires through the WQIP projects which is indicative of the future direction. Shared appointment of positions with local authorities has occurred (for example, the Douglas WQIP Coordinator is jointly appointed by FNQ NRM Ltd and Douglas Shire Council).

Table 2 Progress at a glance in FNQ

<b>Going well</b>	<p>Completion of the Aboriginal Cultural and Natural Resource Management Plan by the Traditional Owner groups of the region as a companion document to the regional NRM plan.</p> <p>Caring for Country program well underway with a focus on establishing a framework for Traditional Owner groups preparing country-based management plans, documenting Aboriginal values for waterways, promotion of cultural significance of natural resources and inclusion of customary management techniques for land and sea country.</p> <p>Detailed BMP measures for each major cropping industry and grazing have been developed.</p> <p>Work with BMPs for sugar industry is well underway.</p> <p>Investigations into irrigation efficiency for dairies on the Tablelands are also underway.</p> <p>Douglas Shire WQIP has been completed and currently being implemented. This project provided key lessons for the Tully WQIP.</p> <p>Trial of market-based incentives to improve water quality is underway in the Douglas Shire. Part of a broader suite of incentives including devolved grants that are targeting improving sustainability of land management practices and water quality outcomes.</p> <p>Community awareness raising campaigns are being undertaken including articles in 'Hands On' (FNQ's newsletter), Cairns Post environment page spot 'Natural Resource Matters' and media releases that cover NRM generally, with articles focused on links between catchment management and water quality entering the Reef; new projects aimed at Reef Plan goals.</p>
<b>Underway</b>	<p>A coordinated water quality monitoring program is being established in the Wet Tropics.</p> <p>Tully WQIP is underway. Environmental values and water quality objectives (or targets) will be established for the catchment's waterways in this process. Work with industry to define nutrient/fertiliser management zones is being undertaken.</p> <p>A monitoring alliance has been established in the Douglas Shire with representatives from Council, Department of Natural Resources and Water (NRW)<sup>1</sup>, Environmental Protection Agency (EPA), CSIRO, Great Barrier Reef Marine Park Authority (GBRMPA) and FNQ NRM Ltd.</p> <p>A draft monitoring plan is being developed for the Douglas Shire monitoring alliance.</p> <p>Participation in the CCI Program Leaders workshops to facilitate exchange of information and experience between catchments with WQIP projects has occurred.</p> <p>Works in riparian areas and coastal management plans on public lands in collaboration with local governments has commenced. Landholders fencing priority riparian areas and wetlands.</p> <p>Education and extension programs include trial nutrient reduction practices on cane farms.</p> <p>K12 Environmental Education Program aimed at introducing natural resource management issues to school children is funded and commenced. A partnership with Education Queensland has been established and a pilot program will be undertaken in the Barron River catchment.</p> <p>Work with Johnstone Shire is underway looking at the benefits of conservation covenants.</p>

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<sup>1</sup> Previously the Department of Natural Resources, Mines and Water (NRMW)

**Challenging**

Industry-supported quality assurance schemes for chemical use have not yet commenced.

Education and extension programs that include trial practices in cropping lands (except cane farms) that lead to reductions in nutrients still to be developed.

Linking preferential access to financial support on basis of established property level planning.

Establishing philanthropic investment into natural resource management activities.

Attracting funding for WQIP projects within other Wet Tropics catchments and to implement finalised WQIPs.

There is a need to capitalise on the willingness of landholders as well as meet the focus on high-risk catchments.

Investment in future activities to ensure coordinated R&D programs to occur.

Identifying potential areas within high-risk areas of the Reef catchment where protection of vegetation might be secured under a regulatory framework is not occurring.

## 3.2 Burdekin Dry Tropics

### 3.2.1 Background

Burdekin Dry Tropics comprises the catchment of the Burdekin River and associated coastal and marine areas. The Burdekin River is the largest source of sediment and nutrient discharge into the Reef lagoon (NRW 2000). The region's economy is reliant upon natural resource based industries particularly agriculture and grazing. Key issues for the region relate to its low productivity (from dryland agriculture), decreasing rural populations, volatile biophysical and economic production environments and its susceptibility to external factors (e.g. cyclones).

### 3.2.2 Progress and discussion

Progress to date is illustrated in Table 3. Some of the key pressures in the region which impact on Reef water quality are low ground cover, excessive grazing pressure, salinity, soil and land degradation, riparian and floodplain modification, modification to wetlands, coastal development, catchment water quality degradation, and water availability, poor data acquisition and monitoring, limited community engagement and capacity.

Research and resource condition assessment play a major role in guiding planning and on-ground works in the region. There are several cooperative research projects which focus on assessing land condition (e.g. photo standards), identification of lands for rehabilitation, contribution of sediment and erosion from areas to waterways, salinity risk mapping, application of fertilisers (CCI, SRDC and AgSIP), impediments to the uptake of best management practices and incentives targeted to agricultural industries.

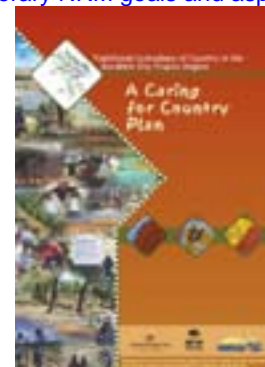
As 90 percent of the region supports grazing, there is a high emphasis on strategies to achieve more sustainable land management in this sector. The other important land use is cropping (e.g. sugar cane). The extension activities integrate knowledge and data from related research and resource assessment and the focus is on improving production systems (e.g. grazing pressure, soil health and condition, green cane harvesting, crop rotation, fertiliser management and water management), capacity building for sustainable rangelands management (e.g. grazing, fire and pasture management), vegetation management, and water use efficiency.

As diverse value systems underlie the various stakeholders' perceptions of issues and problems, environmental education is an important mechanism that will reduce conflict and promote consensus-building. Thus in BDT, education and extension play a major role in improving understanding and acceptance of NRM.

Variability in farm incomes and resultant levels of profitability across the region also influences the extent of adoption and investment in new practices. Hence financial incentives are an important component for the delivery of NRM outcomes and are a

#### Box 5 A Caring for Country Plan

To better address Traditional Owner issues and aspirations in NRM planning, a Traditional Owner NRM Plan was developed. The plan facilitates the involvement of Traditional Owners in decision making in relation to cultural heritage and NRM in the Burdekin Region. The Caring for Country Plan links the contemporary traditional owner generation's aspiration for looking after country with contemporary NRM goals and aspirations.



necessary tool to attract interest in implementing best management practices. Because of the importance of agriculture to the region, investment in strategies that improve the viability and productivity of properties as well as improve resource condition are likely to be the most important. Existing incentives focus on adjusting stocking rates to reflect carrying capacity, providing off-stream watering points, and increased water efficiency (especially for irrigation cropping).

The RIS places a high priority on achieving a better 'whole of system' understanding of water quality issues. While processes of soil erosion are better understood there is a significant gap in understanding in relation to cost effective remediation strategies for land degraded by erosion. Extension activities at the property level are also hindered by effective information on pasture condition at this scale.

Strong partnerships are developing with several state government agencies, GRBMPA, research organisations (CSIRO, ACTFR), and industry (sugar, Meat and Livestock Association, fruit and vegetable growers, fertiliser, grazing, irrigation sector, and Australian Prawn Farmers Association). A Traditional Owner management group has also been formed and a Caring for Country Plan developed (refer to Box 5). Mapping of sites of cultural significance is underway as well as documentation of the uses and values of water resources.

A conceptual framework for CCI implementation and preparation of a WQIP has been developed for the region. This framework identifies the major policy drivers, inputs, processes and outputs. The grazing lands and cropping (sugar lands) component activities and the development of component work plans are underway and work has commenced to collate and synthesise data and information in support of identified best management practices (BMPs) for grazing lands and sugar lands. For example, the BMPs for grazing lands focus on riparian and wetland management using modeling tools. Hotspots have also been identified and efforts initiated to confirm these findings. The identification of water quality BMPs for sugar lands is also well underway and will have particular relevance to the lower Burdekin cane growing region. The sugar lands BMPs will provide a coherent, accessible information source to assist in the preparation of property level management plans. The use of BMPs and industry initiatives are seen as surrogates for end of system water quality load based targets.

#### **Box 6** **Water quality event monitoring project**

This is a collaborative activity that is coordinated by ACTFR and involves AIMS, CSIRO, DPI&F, GBRMPA, NRW and community volunteers. To determine how sediment and nutrient transport and delivery varies between different parts of the Burdekin catchment, the monitoring project is targeting wet season events at end-of-catchment locations for about 25 major waterways. The baseline data will help to: better understand trends in delivery over time; validate modelling (e.g. SedNet); and benchmark information for the Coastal Catchments Initiative and for the development of the water quality improvement plan.

Water quality samples are collected from the start of a flood event as this represents what is coming off the land. As this can be dangerous work the volunteers are carefully selected, trained and supported to ensure their safety. Approximately 25 volunteers sample over 25 waterways. Current results show variation in sediment concentrations between catchments, ranging from high concentrations in the Bower and upper Burdekin sub-catchments, to low concentrations in the Cape-Campaspe sub-catchment.

ACTFR, in collaboration with CSIRO, AIMS and GBRMPA, is expected to coordinate the preparation of the benchmarking reports that will provide input to the development of a WQIP.

Collaboration with the DPI&F Reef Plan extension officers for the upper and lower Burdekin has been established and a collaborative communication and extension strategy for grazing and sugar lands BMPs is in preparation. It is anticipated that this communication and extension strategy will support the Bowen-Burdekin Integrated Floodplain Management Committee to raise awareness of water quality issues, establish networks (communications and water quality monitoring) (refer to Box 6) and provide access to information on innovative sugar cane farming systems and their benefits.

A water quality issues analysis is being undertaken to (a) summarise the condition of the current water quality; (b) identify the key pollutants; (c) identify critical source categories for key pollutants; and (d) determine and prioritise water quality issues for the region.

While salinity is currently limited in the region, it is likely to become serious in some areas if no action is taken. However, research is needed into dryland salinity to provide information on water table depth, water quality, landscape salt storages, landscape water balance to improve assessments of salinity hazard and information to assess the options available for reducing salinity hazard in cleared areas. Irrigation salinity is also important and there is a need to better understand water and salt dynamics and to develop management strategies for effective and more environmentally sustainable management of drainage systems (refer to Box 7).

A whole of catchment assessment and prioritisation of wetlands and waterways has been undertaken through collaboration between the ACTFR, BDT, EPA, CSIRO, and NRW. This program has contributed to a greater recognition of the importance of wetlands and waterways to the region's ecosystems and the need to protect and manage these areas for water quality and maintenance of key ecological processes. Wetland mapping and assessments provide a valuable resource for basic broad-scale ecological and water quality information.

Linkages or partnerships with local government are in the initial stages of development. Two positions recently have been established to provide enhanced links. This work will focus on community capacity building, planning and development assessment tools (e.g. stormwater code in Townsville City Council), on-ground projects and sharing information through the local government network.

### **Box 7** **Understanding dryland salinity in the Belyando Suttor**

This collaborative project between the DPI&F, NRW, the BDT Board and State and Commonwealth Government gained new levels of understanding regarding dryland salinity in the Belyando Suttor sub-catchment. The project involved the community to ensure that the results were locally relevant. EMI surveys and associated deep soil sampling helped to identify a wide range of salt loads in the soil and upper regolith over the different landscapes. Chloride profiles also confirmed that deep drainage had changed after clearing. Salinity risk was identified using three different tools. All three approaches improved the level of understanding of salinity risk in the Belyando Suttor sub-catchment. The outcomes provide a strong base for planning future work and investment. The results also indicated that there was sufficient salt in the soil and regolith to warrant further salinity investigations in this region.

**Table 3 Progress at a glance in Burdekin Dry Tropics**

<b>Going well</b>	<p>Research is a priority with results integrated into planning and on-ground works.</p> <p>Guidelines for water quality indicators (e.g. salinity, nutrients, and pesticides) are established.</p> <p>Land and resource condition studies undertaken at several scales (e.g. photo standards for ground cover, which are used to target lands for rehabilitation to increase soil health).</p> <p>SedNet modelling used to indicate potential for soil loss from hill slopes, gully formation and stream banks and to determine hazard areas.</p> <p>High risk catchments (contaminants and pesticides) identified.</p> <p>Groundwater mapped and assessed, dependent ecosystems identified, models developed and input into groundwater management plans.</p> <p>Integrated, multi-stakeholder water quality monitoring (region-wide) in place.</p> <p>Mapping of wetlands (and condition assessed), aquatic weeds, coastal assets (condition report, threats, priority areas), salinity risk areas (and land use options being identified) undertaken.</p> <p>Property planning capacity building implemented.</p> <p>Communication and education strategies and consultation to improve the understanding and acceptance of NRM issues.</p> <p>Capacity building and action learning through community-based monitoring programs involving schools, local governments, community groups, landholders, and various industry groups.</p> <p>Partnerships are strong with industry (e.g. BSES, AgForce and Growcom), Traditional Owners, and the community to deliver property planning and on-ground works.</p> <p>BMPs in place (e.g. soil erosion and sediment control, water use efficiency in urban, rural, and industry sectors, grazing lands).</p> <p>Traditional Owner management group established and Traditional Owners are involved in most aspects of NRM planning (e.g. documentation of uses and values of water resources).</p>
<b>Underway</b>	<p>Links with local government (e.g. urban stormwater management plans).</p> <p>WQIPs initiated (e.g. Townsville and Thuringowa.).</p> <p>Water quality environmental values to be identified in five coastal catchments.</p> <p>State of riparian areas being investigated (pilot projects only).</p> <p>Delivery of incentive schemes (e.g. fencing riparian areas, off-stream watering points).</p> <p>Codes of practice (e.g. Fruit and Vegetable Production).</p> <p>Data sharing arrangements with landholders (e.g. free licences provided).</p>
<b>Challenging</b>	<p>Research e.g. understanding of linkages between surface and ground water and management responses; salinity (contributors to dryland and irrigation salinity and rehabilitation methods).</p> <p>Gaps in engagement with extractive, refining and mining industry (gold mining in fragile areas, coal and tin), fishing and tourism and Department of Defence.</p> <p>Assess the cost effectiveness of a range of land use practices and monitoring and evaluation of the level of adoption of best management practices.</p> <p>Lack of funding to accelerate uptake of property management planning.</p> <p>Data sharing arrangements with state agencies and data management, access and integration.</p> <p>Strengthening Reef water quality partnerships to better coordinate planning across regions.</p> <p>Formal 'Healthy Waterways' community awareness type program in place with report cards etc.</p> <p>Formal property management plans not a priority.</p> <p>Not involved in identification of nutrient sensitive zones, although may target management actions to these areas.</p> <p>Identifying potential areas where vegetation protection might be secured under a regulatory framework is not occurring and promotion of conservation agreements and covenants for vegetation, riparian areas and wetlands has yet to fully commence.</p> <p>Not linking preferential access to funding with planned approaches e.g. property level plans.</p> <p>Establishing philanthropic investment into natural resource management activities.</p>

### 3.3 Mackay Whitsunday

#### 3.3.1 Background

Several major river systems drain from the region's western ranges across the narrow coastal plain into the Reef lagoon. There are abundant surface and ground water resources, although there is extreme surface flow variability due to the distinct wet and dry seasons. Three catchment groups have formed in the region: Whitsunday Rivers Catchment Management Association, Pioneer Integrated Catchment Management Association and Sarina Landcare Catchment Management Association. The main agricultural activities are sugar, horticulture, beef and grain. Past land use practices and current coastal expansion have resulted in a significant loss of vegetation, particularly wetlands on coastal plains.

#### 3.3.2 Progress and discussion

Table 4 illustrates current progress in the region. Extension programs are a key to the delivery of improved water quality outcomes in the region and efforts focus on cane and grazing lands and stormwater activities across all land uses. The aim is to implement BMPs at the property level. This work focuses on reducing soil and nutrient loss from cropped and grazed lands, assessing pasture condition, pasture and stock monitoring and management, improving ground cover and condition, undertaking waterway and riparian management, providing off-stream watering systems, and improving the physical condition of soils through minimum tillage, controlled traffic systems, stubble retention, water management and rotational cropping.

The use of incentives (refer to Box 8) is a key strategy to assist land managers develop and implement best management practices. The incentive payments consist of capital grants (e.g. for stormwater and fish ways activities) and staged grants (e.g. for grazing, cane and native vegetation activities). MW's approach is to direct funding to land managers who volunteer to become engaged in property management planning. Projects which are assessed as addressing identified regional priorities receive a higher percentage of the allocated funding.

Property management plans are based on holistic, long-term planning and involve training, by MW staff, of land managers and ongoing support to implement their

#### **Box 8** **Sustainable Landscapes Incentive Program (SLIP)**

This program is the region's primary mechanism for encouraging sustainable land management. It offers cash incentives to assist land managers to develop and implement activities that will improve the condition of soil or water or vegetation on their property.

The first round of incentive grants, which can cover up to 40% of the cost of implementing an activity, attracted about 200 applications and by June 2006, \$1.5 million will have been distributed. The value of the incentive depends on the type and priority of the activity. About 190 land managers are currently running projects under the program. It has received a good response from both cane and grazing land managers, although the program is also open to councils, schools, private residential and community groups.



Incentive payments are available in the form of capital grants for stormwater and fish ways activities and these are paid in full on completion of the work, and staged grants for grazing, cane and native vegetation activities, which are paid in instalments over a set timeframe.

The application process is easy, with land managers being required to complete a one page expression of interest, and have the ability to meet the remaining costs of the project. Applicants are then visited by a MW officer, who helps the land manager to develop a holistic long-term management plan for the property. The program offers land managers training to help create these plans and provides ongoing support in their implementation.

plans. Funding of on-ground works is prioritised to activities that are 'above and beyond' the requirements of current industry approved best management practices. This approach has proved successful with 200 land managers receiving payments and 500 different projects being funded in the first year. This is seen by the MW extension staff as an effective mechanism for the delivery of funds as the land managers have volunteered and are willing participants, who are then able to spread the information and knowledge gained to other land managers.

Retention of ground cover is a key objective to minimising sediment runoff in major flow events. Regional pasture condition is being assessed through the identification of monitoring sites and the focus of the Sustainable Landscapes Program is on improving the ground cover in class B and C condition lands<sup>2</sup>. This approach represents a fundamental management shift – from 'managing cows to managing the land'.

Urban initiatives are being undertaken in conjunction with local governments (e.g. erosion control guidelines, performance of septic tanks, and water quality monitoring in catchments with active development). Linkages with local government are identified as an area where further effort is needed to enhance strategic planning and development assessment processes.

The Healthy Waterways Initiative is undertaking collaborative research to identify land use activities (e.g. cane and grazing) that are the key contributors to sediment and nutrient input (especially dissolved pesticides and other chemicals). The Integrated Monitoring Program (IMP) (refer to Box 9) is developing an integrated water quality monitoring framework, based on collecting both ambient and event monitoring samples. It aims to better understand the movement of sediments, nutrients and pesticide

### **Box 9 Healthy Waterways Integrated Monitoring Program (IMP)**

This program aims to design a water quality monitoring framework that will ensure linkages between all current and future water quality monitoring programs, reduce duplication of effort, fill gaps in data collection and provide a central system for the storage and analysis of data.

The foundation of the IMP is the Healthy Waterways Volunteer Network, which provides the capacity to collect samples in short duration events. There are about 50 volunteers, who include landholders, council and government staff, integrated catchment management associations, and interested individuals. They collect both ambient and event monitoring samples using standardised quality assured procedures and good quality equipment.

A key learning from the program is a better understanding of the transport and fate of sediments, nutrients and pesticide loads exported from the region's major river systems in seasonal flow events to the Reef lagoon. The community volunteer water quality monitoring also provides important scientific data to improve natural resource management planning.



(Photo: K. Rohde)

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<sup>2</sup> The ABCD framework for land condition classes land into one of four categories between A (good condition) and D (very poor). Various indicators of condition are used to assess individual properties or land types. The framework defines condition in terms of grazing productivity (i.e. the capacity of land to respond to rain and produce useful forage). A condition land that has at least four or five times the productivity of land in D condition (DPI&F 2006).

loads exported from major river systems in seasonal flow events to the Reef lagoon. This will help to define the current condition and variability in sediment and nutrient input and is providing baseline data which is being used to develop best management practices (e.g. cane and grazing land and bushland catchments as well as flow impacted and point source impacted waterways). The IMP is undertaken in collaboration with state agencies and a technical water quality report was released in January 2006. It is also responsible for training and supporting its volunteer network.

NRW are preparing a water resource plan for the Whitsunday area. For those catchments not included in the water resource plan, the WQIP will set flow targets. The water resource planning process provides an opportunity to examine the impacts of water flow on water quality and to undertake relevant research that is specific to this region. Water quality targets are to be set for priority water bodies and these will be based on the environmental values of community and EPA's assessment of highest ecological value waterways. The proposed WQIP provides an opportunity to aid the understanding of the whole of system movement of water, sediment and nutrients throughout the region and its various land use systems and will be a more effective mechanism for disseminating information to a wider range of land managers. However, as this system is dominated by major flow events, it is seen as important to focus research and on-ground works on changing and improving awareness and implementing best land management practices and to model the achievements of these improvements rather than rely on water quality targets.

Clearing of vegetation on the coastal plain has elevated the conservation importance of all remaining wetlands. Riparian and wetland vegetation management focuses on weed control, fencing, and off-stream watering points and is mainly delivered through the Sustainable Landscapes Incentive Program. The development and effective implementation of supporting legislation and policy at state and local government levels is seen as an opportunity to enhance the protection of remaining wetlands.

Communication and capacity building is an important component of several funded programs (e.g. Healthy Waterways Volunteer Network, Coastal and Marine Capacity Building Program and Sustainable Landscapes' property management planning). Specific awareness raising projects are targeted at engagement of the broader community and young people in particular. Seagrass Watch and the Mangrove Health programs aim to engage the community and in the process raise awareness of NRM issues, while providing early warning systems for ecosystem health and management effectiveness. Effective education and extension services that work to modify attitudes and values play a central role in MWNRM's activities. Several education and awareness raising strategies are targeted at schools and the broader community (e.g. Healthy Waterways Month) (refer to Box 10). Effective Traditional Owner engagement strategies are also being

#### **Box 10 Healthy Waterways Month**

In May 2006, the MWNRM Group and associated catchment management organisations hosted an extensive range of free events and activities that focused on water. Its purpose was to encourage the community to join in and spend some time learning about water in the local area. Its theme was Achievements and Challenges, focussing on a source to sea, holistic overview of NRM issues in the region.

The program included a BSES Field Day, community forums, a nursery open day, guided walks, field trips, local government activities, bird watching and water quality monitoring, photo competition and science forum.

It was an opportunity for the NRM related organisations to recognise the work of its dedicated volunteers and to also provide information to the community and to encourage greater participation in sustainable land and water management activities.

developed, including the establishment of a Traditional Owner reference group and the appointment of an Aboriginal land management facilitator. Several sector projects involving Traditional Owners have also been funded (e.g. Traditional Owner knowledge recording).

Cross-regional coordination is developing among agencies, community and industry through the alignment of activities and the establishment of common goals (e.g. water quality monitoring, Seagrass Watch, and regular meetings to discuss issues). Improved cross regional engagement is needed to minimise duplication of effort, to draw on the knowledge and experience of other regions and to provide more cost effective monitoring, reporting and overall NRM outcomes.

Research and development effort is limited in the region due to an inability to attract research funding and this may be related at least in part to the absence of regional universities and large research institutions. However, good science is required in several areas to underpin improved practice and to ensure that education, extension and training efforts yield the best outcomes for water quality. In particular, further research is needed in understanding groundwater, diffuse sources of water pollution, land capability and suitability analyses which link land management activities to sediment and nutrient output, and quantification of the benefits of current land use practices. There is also a need to ensure that the information derived from this research can be presented at a scale that is relevant to individual land managers.

**Table 4 Progress at a glance in Mackay Whitsunday**

<b>Going well</b>	<p>Property management plans are based on holistic, long-term planning and are underpinned by current BMPs (e.g. reducing soil loss from cropped and grazed lands, assessing pasture condition, pasture and stock monitoring and management, improving the physical condition of soils through minimum tillage, controlled traffic systems, stubble retention and rotational cropping, waterway and riparian management, off-stream watering systems, sustainable forest production).</p> <p>Incentives available to assist land managers develop and implement best management practices (e.g. capital grants and staged grants).</p> <p>Regional pasture condition (e.g. identification of Stocktake monitoring sites) being assessed.</p> <p>Developing an integrated water quality monitoring framework based on ambient and event monitoring samples.</p> <p>Community based monitoring of seagrass and mangroves established.</p> <p>Riparian and wetland vegetation management focuses on all remaining areas and implements a range of incentives (e.g. weed control, fencing, and off-stream watering points).</p> <p>Focus on community capacity building (e.g. Healthy Waterways Volunteer Network, Coastal and Marine Program, Sustainable Landscapes Program which trains land managers and provides ongoing support to implement property management plans.</p> <p>Education and extension services and products to raise awareness (e.g. land managers in cane and grazing areas, industry, local government [stormwater activities], schools, wider community and young people) developed.</p> <p>Developing partnerships with industry groups and local government (e.g. erosion control guidelines, performance of septic tanks, water quality monitoring in catchments with active development)</p>
<b>Underway</b>	<p>WQIP being developed.</p> <p>Land management guidelines (being developed for cane and grazing lands, bushland catchments, and flow impacted and point source impacted waterways) being developed to improve water quality.</p> <p>Water quality targets (for priority water bodies) being developed.</p> <p>Collaborative research and monitoring frameworks being developed.</p> <p>Traditional Owner engagement strategies (e.g. Traditional Owner reference group, the appointment of an Aboriginal land management facilitator, some sector projects [Traditional Owner knowledge recording]) underway.</p>
<b>Challenging</b>	<p>Sourcing adequate funding for research activities</p> <p>Limited funding to implement Healthy Waterways Integrated Monitoring Program and to accelerate the uptake of property management plans.</p> <p>Recommendation of high-risk areas for protection under a regulatory system e.g. declarations under the Vegetation Management Act to secure vegetation is not occurring.</p> <p>No linking of preferential access to funding with planned approaches e.g. at property level.</p> <p>Programs to establish conservation agreements and covenants for vegetation, riparian areas and wetlands yet to fully commence</p> <p>Establishing philanthropic investment into natural resource management activities.</p>

## 3.4 Fitzroy Basin

### 3.4.1 Background

This central Queensland region has the largest river system draining to the east coast of Australia and into the Reef lagoon. It includes the Fitzroy Basin, Boyne and Calliope catchments. Unlike other regions, the Fitzroy is characterised by a large estuary and coastal low lands, with contributing catchments tending to be flat and thus producing long duration of flows (>1 week). It has a tropical to subtropical humid to semi-arid climate. Heavy summer rain and cyclones can produce major flooding in all parts of the catchment and impact on the Reef. The Fitzroy and Burdekin catchments deliver about one quarter of the freshwater flow to the Reef. Almost 90 percent of the region is under agricultural production, primarily grazing.

### 3.4.2 Progress and discussion

Progress is indicated in Table 5. Some of the key pressures in the region which impact on reef water quality are low ground cover, salinity, episodic events, riparian and floodplain modification, modification to wetlands, coastal development, water contaminants and water availability.

FBA's prime focus is providing information to enhance its stakeholders' understanding of NRM issues, to modify their attitudes, raise awareness and provide relevant training. Its primary delivery mechanism for achieving more sustainable outcomes is through the use of the Neighbourhood Catchments approach (refer to Box 11), which targets support and incentives to these areas to enhance the adoption of sustainable production systems for grazing, cropping and irrigation. Sub-regional groups work with these land managers to undertake property management planning, provide training and technical support and invest funds in achievement of desired catchment outcomes. The approach is holistic, addressing a range of land management issues at the Neighbourhood Catchment level and relies on voluntary uptake. Priority Neighbourhood Catchments now cover more than half of the region and are supported by two research Neighbourhood Catchments at Gordonstony (cropping) and Spotswood Creek (grazing).

#### **Box 11** **Priority neighbourhood catchments**

The Neighbourhood Catchment Approach is the principal NRM delivery mechanism in Fitzroy Basin. Neighbourhood catchments (NCs) are the geographical focus and they represent a group of properties located in a common catchment, where the neighbours work to address production and natural resource concerns as individuals on their own properties and as a group at the NC level. Specific issues that are well addressed at this level include water quality, salinity, weeds, and biodiversity. Boundary definition for the NC is flexible, with sizes varying from about 300km<sup>2</sup> to 2000km<sup>2</sup>. They are of a size that is relevant to the local people, with most NCs containing over 200 landholders, although some have fewer than 10.

Approximately 53 NCs have been identified as priority neighbourhood catchments (PNCs) and are the focus of current on-ground efforts. A NCs plan is developed for the PNCs to identify issues of specific, shared concern, while the farm-specific plan contributes to the NCs plan by identifying practical on-ground management options to achieve improved resource condition. This approach is efficient and effective in providing information and technical advice to underpin best management practices and makes good use of local and experiential knowledge.

Past projects have established more than 150km of riparian zone fencing, created more than 100 off-stream watering points and improved sustainable farming systems for more than 20,000ha.

Landholders make a great contribution to this program and receive incentives targeted at changing practices and protecting regional assets. The program offers farmers property planning incentives such as mapping resources, workshops and on-farm expert advice. Followed by a one-on-one visit to a farm, discussions can include creek fencing, mapping different land types and property infrastructure like dams and potential watering points away from creeks, identifying biodiversity areas, examining potential for regenerating corridors and planning to take their properties forward.

The whole NC then forms part of the sustainable landscape and regional plan. Projects are designed with people to achieve 'win win' outcomes.

In the Fitzroy Basin, the export of fine grained sediment is the main concern for the estuary and Reef lagoon. Runoff from episodic storm events following dry conditions that have denuded the landscape transport greater soil loads than the quantity transported following regular wet periods that have sustained vegetative growth. Consequently, a key focus of several programs undertaken in the region is to minimise the impact of episodic events by ensuring adequate ground cover, appropriate timing of cropping activities and management of stock movement. Efforts are directed at reducing hill slope erosion through rotational grazing (spelling and cell grazing), pasture monitoring and matching stocking to available resource (feed budgeting), pasture introduction, managing woodland thickening, managing seasonal variability (selling cattle, short term feed-lotting and supplementation), weed control, fencing to land type, providing off-stream watering points and opportunity cropping in response to rainfall.

As one of the main pressures in the region is low ground cover, retaining ground cover is a key to several regional investment programs. At the property level programs such as GrassCheck and Stocktake are providing land managers with the necessary tools to assess cover and standing feed. On cropped land, the Sustainable Farming Systems project and Controlled Traffic Farming assist land managers to use practices consistent with retention of high ground cover. Irrigators are also working to provide groundcover in summer when high intensity rainfall is most likely (e.g. through mixed or double cropping systems for cotton and beans and wheat rotation).

An important aim is to retain a minimum of 30 percent cover on 50 percent of all land in the region within five years. To this end targets are being developed and refined for ground cover on different soil types, slopes, average rainfall areas and land uses in the region. Ground cover assessment, based on photo-standards, is used to identify areas with lower than average ground cover and this helps to prioritise on-ground extension works in these areas. Extensions officers indicate that land managers are now carrying less stock and are better able to adapt to unseasonable weather and storms and lower grass cover and hence reduce their impacts on the region's assets. Early results indicate up to a 40 percent reduction in soil loss through retention of ground cover. In addition, a methodology is being developed to assess ground cover at a regional scale through the use of satellite imagery.

While research and on-ground works focus on retaining ground cover, it is important to note that there is a significant amount of sediment already in the system and that reductions in sediment export to the Reef lagoon may not be evident in the immediate future. However, ongoing monitoring will be used to help indicate the effectiveness of current land use practices at the neighbourhood catchment scale. The Sustainable Landscapes program is achieving more sustainable, productive and profitable agricultural land management, as well as improving land condition and enhancing water quality. It has been responsible for raising awareness about best land management practices. Incentives are built into the program mainly via the neighbourhood catchments approach, to help people with on-ground projects that have broad community benefit. In particular there is a focus on: conserving remaining riparian vegetation through incentives to protect these areas from stock and cropping; rehabilitating wetlands (>5ha); enhancing riparian connectivity; preventing the outbreak of new weeds; addressing salinity; improving cropping practices; and

achieving water use efficiency. A major benefit of the neighbourhood catchments approach is that while incentives funding may be contracted to a smaller number of landholders, field officers are in contact with every landholder in the catchment, many of whom are involved in capacity building activities (for which no individual contract/incentive is provided and many more who simply communicate with the field officer regarding improved practices. Thus a multiplier effect is produced, through the spread of information to other landholders. The very important role of incentive funding is to start the conversations happening, and thus leading to improved practices. Hence extension activities are a vital component of the program and require increased and ongoing funding to accelerate uptake.

Partnerships with several industry groups have been crucial for enhancing the delivery and uptake of sustainable land management practices. Key partnerships have been formed with Growcom, AgForce, and Cotton Australia. Formally agreed BMPs are in place for cotton. However, given the lack of formally recognised BMPs for the grazing and broad acre dryland cropping industries, the focus in FBA is on introducing improved practices at the property level. Partnerships also have been established with local government to assist with the development of strategic pest management plans, and the incorporation of NRM issues into planning schemes, policies and development assessment.

The Healthy Waterways program is specifically addressing the decline of water quality in the Fitzroy Basin and the Reef lagoon by protecting and improving riparian zones and wetlands. Water quality monitoring (refer to Box 12) at strategic sites is undertaken and catchment targets are being developed based on levels of salinity, nitrogen, phosphorus, sediments and suspended particulate matter. Involving people in the monitoring projects is increasing awareness of the causes and impacts of declining water quality. Surrogate water quality targets are in place and will be refined following baseline monitoring and modelling (SedNet).

Education and extension efforts are substantial and are linked to all major programs undertaken by the FBA. Particular efforts focus on extension efforts in relation to sustainable production systems and neighbourhood catchment processes, healthy waterways advertising, salinity and acid sulfate workshops, involvement of Traditional Owners in the transfer of traditional knowledge and general capacity building and action learning through community based monitoring programs. These initiatives are aimed at developing a 'whole of system' understanding of NRM issues in the region.

**Box 12**  
**Priority neighbourhood catchments**  
**Water Quality Monitoring Plan**

The Water Quality Monitoring Plan was released in March 2006 and 25 monitoring sites have been selected from the priority neighbourhood catchments (PNC) to monitor sediment, salinity and nutrient (nitrogen and phosphorus) parameters. The monitoring focuses on event sampling and it captures data for basic load calculations. The aim is to provide baseline data and trend information to identify changes brought about by stakeholders in each neighbourhood catchment and to engage and involve landholders and thus raise awareness.

Property managers who live near the strategically selected sites are contracted and paid to sample floodwaters and are trained and supported in the monitoring. Sites are usually in the lower end of the sub-catchment, need to be representative of the water leaving the PNC, have ease of access (including safety) to monitor the water in a flow event and be relatively close to a sampler's house. The monitoring results are input to a regionally coordinated, catchment based monitoring evaluation reporting and review framework and the data will be used to help accelerate practice change.

A water monitoring instruction manual has been developed to improve the rigour of water testing by landholders and others, and training courses on its use have also been undertaken.

**Table 5 Progress at a glance in Fitzroy Basin**

<b>Going well</b>	<p>Best management practices developing at the neighbourhood catchment and property level (e.g. reducing soil loss from cropped and grazed lands, assessing pasture condition, stock management, improving the physical condition of soils through minimum tillage, controlled traffic systems, stubble retention and rotational cropping, waterway and riparian management, off-stream watering systems, sustainable forest production).</p> <p>Focus on education and extension services to raise awareness (land managers, industry, local government, urban stakeholders).</p> <p>Effective management systems are increasing ground cover (e.g. rotational grazing).</p> <p>Property planning capacity building is a priority.</p> <p>Developing partnerships with industry groups (e.g. QFF, QFVG, Cotton Australia, AgForce, Meat and Livestock Australia) with a focus on water use efficiency, property resource management planning.</p> <p>SedNet modelling used to indicate potential for soil loss from hill slopes, gully formation and stream banks and to determine hazard areas is in place.</p> <p>Mapping and monitoring of acid sulfate soils, salinity hazard areas, erosion hazard areas.</p> <p>Incentives underpin work in priority Neighbourhood Catchments (e.g. to protect remnant vegetation, particularly riparian areas from stock and cropping, fencing, and off-stream watering points).</p> <p>Supporting 'conservation with production' e.g. Land for Wildlife, nature refuge initiative</p>
<b>Underway</b>	<p>Research and development (e.g. understanding links between agricultural production and salinity) activities are being identified.</p> <p>Encouraging the use of decision support tools (e.g. Rainman, Feedman, and Howwet) to assist decision making in relation to stocking rates, crop needs and potential yields).</p> <p>Trialling landscape-scale modelling of the costs/benefits of resource use, investment and degradation.</p> <p>Action learning strategies (e.g. low salinity risk production systems) are being developed.</p> <p>Exchanging information with decision makers and stakeholders outside the region.</p> <p>Processes to engage Traditional Owners are not well developed, although there are projects underway to increase the use of Aboriginal knowledge in land planning and management.</p> <p>Engagement of Traditional Owners is currently under review.</p> <p>Industry based BMPs (e.g. cotton) are developing.</p>
<b>Challenging</b>	<p>Assessing ground cover levels on a regular basis.</p> <p>Lack of understanding of ground water flow systems and the effects of land use change on soil types and local scales.</p> <p>Identification of areas likely to be affected by salinity due to changed land use.</p> <p>Indigenous rights with respect to waterways are at an early stage of recognition.</p> <p>Limited funding to accelerate uptake of property management planning.</p> <p>Identifying potential areas within high-risk areas of the Reef catchment where protection of vegetation might be secured under a regulatory framework is not occurring.</p> <p>Not linking preferential access to funding with planned approaches e.g. property level plans.</p> <p>Programs to establish conservation agreements and covenants for vegetation, riparian areas and wetlands yet to fully commence.</p> <p>Establishing philanthropic investment into natural resource management activities is not occurring.</p>

## 3.5 Burnett Mary

### 3.5.1 Background

The Burnett Mary region covers the catchment areas of Baffle, Burnett, Burrum, Kolan and Mary Rivers. At the southern end of the Reef, the coastal and marine areas of the region include the Great Sandy Straits Ramsar-listed wetland and World Heritage area of Fraser Island. Key issues for the region include the predicted doubling of populations in several coastal shires that have high percentages of aged people and, during the same periods, significant declines in inland rural populations. Economic activity in the region relies heavily on sustainable use of natural resources particularly primary production and recreation and tourism.

### 3.5.2 Progress and discussion

Table 6 highlights the current progress within BMRG. Some of the key pressures in the region which impact on Reef water quality are high erosion and sediment and nutrient transport rates, riparian and floodplain modification within parts of the region and coastal urban and tourism development pressures, in particular in the shires of Miriam Vale, Burnett, Tiaro, Hervey Bay, Maryborough and Cooloola. Cleared lands are the main contributor of sediment and nitrogen entering the Reef from the Burnett and Mary catchments. Substantial modification of waterways has occurred through the construction of impoundments. The impoundments serve to distort processes and interrupt the system flows and transport of sediments and nutrients.

There is a strong focus on monitoring and research and development work with partners, for example AIMS and DPI&F aimed at characterising the point and diffuse sources of sediments, nutrients and other water quality problems such as salinity and pesticides. In the proposed Woongarra Marine Park Monitoring network (still awaiting approval) five nodes of community water quality monitoring will be developed with support from BMRG (refer to Box 13). On the coast and inland, training in water quality monitoring is aimed at building community understanding and interest in the waterways and their condition.

Extensive mapping work is underway for nutrients and pesticides. Using a range of work on classifying degraded land, stream reach condition, SedNet modelling, stormwater work from nine Councils and work by CQU, a series of 'hot spots' have been identified for the Burnett, Baffle, Mary and Burrum catchments.

Interim targets were not able to be established from the 2005 SedNet modelling. This modelling however was used to target on-ground action (in the absence of targets), to characterise the type of

#### **Box 13** **Community water quality monitoring**

BMRG has taken different approaches with community groups across its region depending on the levels of capacity, interest and past experience with water quality monitoring. The programs have sought to complement and fit within the existing activities being undertaken by agencies and community groups.

In the lower Mary, for example, the Coastal Water Quality Alliance is actively addressing the monitoring of water quality for those areas. The focus is on building capacity to undertake monitoring and on-ground activities to improve water quality. A new water quality officer has been appointed, co-funded by the Wide Bay Water Corporation. This is a significant contribution from a water supply organisation which sees supporting community monitoring programs as the way forward for water management.

The Woongarra Marine Park Monitoring and Education project is active in the marine park located between Burnett and Elliot Heads east of Bundaberg. Monthly water sampling is one focus of the monitoring activities and sites include the mouth of the Burnett River.

pollutants and the locations of the sources of these loads. The WQIP process will define targets by September 2006 working from environmental values to water quality objectives to load targets.

The technical framework for target-setting in the WQIP process will be the NWQMS framework incorporating a combination of:

- ANZECC water quality guidelines.
- local reference sites.
- historic data e.g. baseline data for dams.
- modelling data.
- input of Traditional Owner data including the EPA work in the Mary and Sandy Straits, work in Cherbourg on Barambah, CQU Source to Sea stories and sounds of Burnett River country Envirofund project over entire Burnett system.

Aquatic and riparian weed management is considered a major water quality issue. Aquatic weeds are a strong indicator of nutrients. Weeds also create barriers to water movement and in big events, are dislodged and flushed out into the Reef lagoon causing disturbance in the process.

Integrated area-wide management in cane is the approach adopted for coastal Burnett sub-catchments. Market-based instruments are being developed for working with the dairy industry through the Queensland Dairy Organisation. Management changes are sought for reducing nutrients in effluent run-off. The competitive tender processes for funding are employed with capital funding geared to the level of change sought in sediment and runoff control.

Sustainable land management initiatives are being packaged for collaborative work with dairying ('Dairying Better 'N' Better for Tomorrow'), the wine industry, cotton producers and forestry.

As in the northern Reef regions, the grazing land management (GLM) program has been implemented with beef producers. In the Burnett Mary, a small pilot project has been undertaken on two creek systems in the Mary and Burnett. This has delivered good results with high adoption rates and 23 out of 25 properties have responded positively to the program.

Most landholder level investment by BMRG is focused on weed management, salinity and promoting best management practice where improvements are sought in groundcover, off-stream watering points and riparian vegetation.

While there has been limited mapping of inland wetlands, greater focus has been on mapping coastal wetlands which is reaching completion. Pilot projects have been undertaken on Splitters Creek and a wetland near Mon Repos in collaboration with Burnett Shire and Wetland Care Australia. These projects have involved landowners and devolved grants to improve management of riparian vegetation and weeds. Other projects (e.g. Wongi Waterholes) have included the identification of protection measures for wetlands and water bodies identified as having Traditional Owner values (e.g. around Cherbourg and Barambah, Mary Valley and Sandy Straits).

Urban stormwater is a high interest topic for local governments in the region with the Burnett East local government cluster Stormwater Smart project forming a template for use by the four clusters of local governments in the region. Local governments in the region are demonstrating an increasing interest in NRM matters and this is supported by the dedication of resources to NRM in the councils (refer to Box 14). Initiatives include:

- increase in the number of local government staff who have ‘high capacity’ for NRM.
- move to a ‘cluster’ system to ensure greater equity, based on natural clusters of local government.
- each cluster has a natural resource management staff member.
- a representative from local government in each area – Burnett East, Burnett Inland and Mary – sits on the Board.

**Box 14**  
**Leading the way in partnership agreements with local government**

BMRG is working with local government to implement their regional NRM plan and in turn deliver outcomes for the Reef Plan. The regional body has negotiated agreements with the four clusters of local governments in their area – Burnett East, Burnett Inland North, Burnett Inland South and Mary. As well as offering devolved grants and incentives for on-ground projects, BMRG are co-funding four positions – one to support each local government cluster – to strengthen the partnerships with local government in their area. Each NRM Officer has a specific sub-regional focus. NRM reference panels have been established under the cluster partnerships to provide strategic direction and guidance to the NRM Officers and BMRG on priorities for investments.

Initiatives that are specifically focused on water quality with local governments include assisting their development of urban stormwater management plans and potential future funding of remediation works. The ‘Stormwater Smart’ program with approximately \$100,000 in funds is being rolled out in Burnett East cluster to develop a template with best practice guidelines for whole of shire stormwater management plans. The next step will be to seek a link with State Government subsidy funding for local governments from 2008 onwards of a minimum 25 percent towards implementing stormwater remediation works. In the Mary cluster, the ‘Mary-wise urban stormwater’ program is at the concept stage. If approved for on-ground action, it will identify hot spots within the Mary cluster local governments for remediation works to improve water quality.



**Table 6 Progress at a glance in Burnett Mary**

<b>Going well</b>	<p>Partnership arrangements with local government clusters in region are well established.</p> <p>Promoting incentives schemes relating to sustainable land management practices and property level planning with industry partners.</p> <p>Communicating the outcomes and findings of pilot projects relating to management of wetlands through a range of media.</p> <p>Analysis of existing information, predictive systems modelling, farming systems analysis relating to nutrient management zones. Zones used to target activities through devolved grants and incentive programs.</p> <p>Community water quality monitoring is well established in multiple locations.</p>
<b>Underway</b>	<p>Protocol with regional Traditional Owners has been established for engagement and representation in BMRG structures. On-going engagement and communication over projects is underway.</p> <p>A prospectus of priority research and development needs is being developed. BMRG participating with SEQ Catchments on the regional science coordination forum which has been addressing the need for coordination in research and development and monitoring for NRM.</p> <p>WQIP for Baffle/Burnett catchments has commenced and will establish environmental values and water quality targets.</p> <p>Modelling of sediment and nutrient loads and development of scenarios has been undertaken for the Burnett and Mary catchments and coastal catchments.</p> <p>Participation in the CCI Program Leaders workshops to facilitate exchange of information and experience between catchments with WQIP projects has occurred.</p> <p>Partnering with catchment groups and Mary River Catchment Coordinating Committee is occurring to ensure coordinated planning and investment in on-ground actions.</p> <p>Waterways, riparian areas and wetlands in good condition have been identified in collaboration with State agencies across most catchments in the region. Rehabilitation for wetlands and riparian areas is a high priority for investment.</p>
<b>Challenging</b>	<p>Linking preferential access to funding with planned approaches e.g. property level plans.</p> <p>Programs to establish conservation agreements and covenants for vegetation, riparian areas and wetlands yet to fully commence.</p> <p>Establishing philanthropic investment into natural resource management activities remains a challenge.</p> <p>WQIP process has not yet commenced for Mary/Burrum catchments (co-funded position to commence in July 2006).</p> <p>No hot spots for pesticides have yet been identified.</p> <p>Identifying potential areas within high-risk areas of the Reef catchment where protection of vegetation might be secured under a regulatory framework is not occurring.</p>

## 4.0 Cross-regional activities

There are four major state-wide and cross-regional projects that are having an impact on Reef Plan outcomes<sup>3</sup>: the Reef Extension Initiative; the Sustainable Coastal Agricultural Systems project; the short-term modelling project; and coordinated water quality monitoring program.

### 4.1 The Reef Extension initiative

FNQ NRM and BDT are involved in this DPI&F lead project, which seeks measurable increases in the voluntary uptake of sustainable land management and best management practices that improve the quality of water entering the Reef. It has involved establishing a team of five extension specialists, while also working in collaboration with the FNQ NRM and BDT NRM groups, agricultural industry bodies, farmers and graziers. The extension services are focused on high-risk reef catchments and on changing those practices that can have detrimental impacts on water quality, in particular targeting sediment, nutrient and chemical contributions from grazing cattle, horticulture and broad acre cropping.

An initial year's funding for this activity was provided under the 2004–5 state-wide allocation approved by Ministers. A total of \$1 million over 2005–6 and 2006–7 was sought and approved from the Trust and NAP strategic reserves, which would bring the total investment in this project to \$1.5 million over three years.

### 4.2 Sustainable coastal agricultural systems project

MWNRM is leading this project which also involves FNQ NRM, BDT, FBA and BMRG (refer to Box 15). The project aims to facilitate the adoption of sustainable coastal cropping and grazing management systems to enable a significant contribution to the delivery of regional and Reef water quality protection outcomes. This will be achieved by building on the stakeholder framework and goodwill developed by the NAP AgSIP Implementation of Sustainable Coastal Agricultural Systems in the Reef region.

The project outcomes include:

- increased level of input into understanding, ownership, acceptance and adoption of regional NRM plans, monitoring frameworks and targets by agricultural industries.
- enhanced joint planning and implementation processes to integrate industry needs with the different regional planning, monitoring and reporting frameworks.

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<sup>3</sup> A fifth – the Reef Water Quality Partnership – approved and commenced by government following this evaluation is not referred to in detail in this section.

### Box 15 Sustainable Coastal Agricultural Systems Project (SCAS)

This cross regional program facilitates the uptake of sustainable agricultural practices and provides industry with the capacity to deliver priority NRM outcomes in the coastal regions adjoining the Reef.



SCAS provides extension services, information and technical support to facilitate on-farm adoption of sustainable agricultural practices and protection of natural assets, provides targeted capacity building, research and development, and improved multi-organisational networking and coordination. It specifically addresses the central barriers to the uptake of sustainable on farm practices in various sectors including grazing, horticulture, native forest management and cane.

A key finding of the program is that practices that are profitable, compatible with existing practices, are not too complex, can be easily tested by farmers, and whose results can be readily observed are more likely to achieve rapid adoption rates. It has been found that farmers' participation in learning and training activities is positively correlated with changing agricultural practices that improve, or are expected to improve, long-term profitability and viability.

- improved agricultural industries' capacity to engage in the regional target setting processes and participate in delivery of on-ground actions to help meet these targets.
- improved capacity of grazing, cane and horticultural sectors to communicate with each other and with regional bodies and government at a landscape / catchment level in order to achieve more positive NRM outcomes.
- supported agricultural industry leadership in improving the water quality and biodiversity relevance of existing codes of practice and assist in implementation.
- integrated the best elements from existing approaches (e.g. BMPs, codes of practice) and development of tools and mechanisms that assist producers to implement management systems that achieve the best environmental and economic outcomes.
- increased rates of adoption of sustainable land-use practices.
- coordinated industry and regional NRM monitoring and reporting processes.
- delivered technical assistance where needed to enhance implementation, monitoring and reporting processes.

#### 4.3 Short-term modelling project

Sediment and nutrient loads delivered to the Reef lagoon have been modelled using SedNet/ANNEX for the five NRM regions. Sediment modelling was performed by teams from state agencies located in each of the regions. These teams provided their SedNet model results to a CSIRO nutrient modelling team who subsequently computed nutrient loads using ANNEX. An important part of the project was the effort given to communication to regional NRM boards of the strengths and weaknesses of models, as well as the development of model scenarios, which represent management actions defined in NRM plans.

The project provides important information for the setting of water quality targets in Reef catchments. The NRM boards have the latest information available on modelled outputs, which they can combine with other information (e.g. local and regional water quality information) to set targets. However, it is imperative that this is done with stakeholders in their regions. Some key components of targets are:

- ownership and partnership – everyone (e.g. landholders, governments, regional bodies, industries, etc) needs to agree on the target setting process.
- delivery – everyone needs to deliver their part (e.g. this may be a partnership or it may be achieved through coordinated, but individual deliveries).
- review of targets – this is essential, particularly as new information becomes available and review must occur in a timely manner. The review helps to improve the accuracy of the model, manage expectations and prioritise future actions.

Progress towards target setting and barriers that constrain implementation activities to reach those targets need to be regularly discussed and addressed.<sup>4</sup>

#### **4.4 Coordinated water quality monitoring program (IFA08)**

FNQ NRM is leading the IFA08 project *Integrated Great Barrier Reef Catchments Water Quality Monitoring Program* on behalf of the six regional bodies of the Reef. The objective of the project is to deliver a single integrated and standardised water quality monitoring framework for Reef catchments including data collection, analysis, storage, access, interpretation (modelling and assessment), communication and reporting. The project has developed a monitoring and information framework for the Reef and scoped the actions required to deliver the framework across government and the regional bodies. The project has contributed to the refinement of expectations in relation to setting water quality targets in line with available science and an understanding of catchment processes in each region. To deliver improved coordination of water quality target-setting, monitoring and reporting the IFA08 project has brokered the establishment of the Reef Water Quality Partnership. The Reef Partnership<sup>5</sup> will be established in 2006 across the Australian and Queensland Governments and the regional NRM bodies of the Reef. The Reef Partnership will facilitate an integrated approach across land management, water quality and Reef health by agreeing coordinated strategies to deliver the priority activities identified through the IFA08 project.

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<sup>4</sup> This finding is consistent with the agreed Module 19, *A guideline to target setting*.

<sup>5</sup> The Reef Partnership has since been established following completion of this evaluation.

## 5.0 Big initiatives

The regional bodies have a sole or shared primary responsibility for 10 Reef Plan actions and a secondary responsibility for 23 actions. Detailed information on their achievements is available in Appendixes 3 and 4 and a summary is provided in Table 7. While each regional body is undertaking a range of activities that will result in improved water quality outcomes for the Reef, there are several 'Big initiatives' that are common across the five regions. These initiatives include:

- preparation and implementation of water quality improvement plans.
- a range of self-management approaches and incentive packages.
- comprehensive education and extension services.
- emphasis on research and development in several regions.
- development of partnership approaches.
- region-wide monitoring of water quality and other natural resources.
- focus on wetland and riparian areas.

In this section, the key features of each big initiative are described, regional variations highlighted and the significance and effectiveness discussed.

### 5.1 Water quality improvement plans (WQIPs)






Action D4 of the Reef Plan focuses on the preparation and implementation of WQIPs. Through Australian Government funding under the CCI program, preparation of WQIPs and supporting projects are underway in four of the five regions. Aligned activities (e.g. local water quality plans) are also occurring under RIS funding. Regional variations exist regarding the stage and status of WQIPs between regional bodies and for different catchments within the regions.

In FNQ NRM, the Douglas Shire WQIP is near completion and funding is focused on implementing actions under the plan. This project has provided useful lessons for WQIP processes in other regions, including the importance of engaging the local community and relevant stakeholders throughout the plan's development. The structure and framework for the Tully WQIP has been established on the basis of a significant partnership with the local authority, a research provider and key industry and other stakeholder groups. Key activities include BMP assessment, monitoring of land use at sub-catchment scale, and water quality modelling.

**Table 7 Level of alignment of regional body funded activities with Reef Plan strategies and actions**

RP	FNQ	BDT	MW	FBA	BM
A4	High alignment	High alignment	High alignment	High alignment	High alignment
A5	Low alignment	Moderate alignment	Moderate alignment	Moderate alignment	Moderate alignment
B1	High alignment	High alignment	High alignment	High alignment	High alignment
B2	High alignment	High alignment	High alignment	High alignment	High alignment
B3	High alignment	High alignment	High alignment	High alignment	High alignment
B4	High alignment	High alignment	High alignment	High alignment	High alignment
B5	High alignment	Moderate alignment	High alignment	High alignment	Moderate alignment
C1	High alignment	High alignment	High alignment	High alignment	High alignment
C5	Low alignment	Low alignment	Low alignment	High alignment	Low alignment
C6	High alignment	Low alignment	Moderate alignment	High alignment	Low alignment
C8	Low alignment	Low alignment	Low alignment	Moderate alignment	Low alignment
C9	Low alignment	Low alignment	Low alignment	Low alignment	Low alignment
D4	High alignment	High alignment	High alignment	High alignment	High alignment
D8	Moderate alignment	Moderate alignment	High alignment	High alignment	High alignment
D1	Regional body has sole or shared primary responsibility	Low alignment	Low alignment	Low alignment	Low alignment
E1	Low alignment	Low alignment	Low alignment	Low alignment	Low alignment
E2	Low alignment	Low alignment	Low alignment	Low alignment	Low alignment
F3	High alignment	Moderate alignment	Moderate alignment	Moderate alignment	High alignment
F4	High alignment	High alignment	High alignment	High alignment	High alignment
F8	High alignment	High alignment	High alignment	High alignment	High alignment
G1	High alignment	Moderate alignment	High alignment	High alignment	High alignment
G2	High alignment	High alignment	High alignment	Moderate alignment	High alignment
G3	High alignment	High alignment	High alignment	High alignment	High alignment
G4	High alignment	High alignment	High alignment	High alignment	High alignment
G7	Moderate alignment	Low alignment	Low alignment	Low alignment	High alignment
H1	High alignment	High alignment	High alignment	High alignment	High alignment
H2	Low alignment	Low alignment	Low alignment	Low alignment	Low alignment
H3	Moderate alignment	Moderate alignment	High alignment	High alignment	High alignment
H4	High alignment	High alignment	High alignment	High alignment	High alignment
H5	Moderate alignment	High alignment	High alignment	High alignment	High alignment
I3	High alignment	High alignment	High alignment	High alignment	High alignment
I5	Moderate alignment	Moderate alignment	High alignment	Moderate alignment	High alignment
I6	High alignment	High alignment	High alignment	High alignment	High alignment
I8	Low alignment	Low alignment	Low alignment	Moderate alignment	Low alignment

Key:

-  High alignment with Reef Plan
-  Moderate alignment with Reef Plan
-  Low alignment with Reef Plan
-  Regional body has sole or shared primary responsibility
-  Regional body has supporting responsibility

Where: RP Reef Plan; FNQ Far North Queensland; BDT Burdekin Dry Tropics; MW Mackay Whitsunday; FBA Fitzroy Basin Association; and BM Burnett Mary

BDT has developed a conceptual framework for the preparation of a WQIP, based on an understanding of the major policy drivers, inputs, processes and outputs. A WQIP for the Townsville area was recently contracted with Creek to Coral program partners.

In MWNRM, the WQIP is in its initial stages of development and the expectation is that it will establish environmental values and water quality objectives, as well as environmental flow objectives for waterways outside of the NRW water resource planning which is occurring in the Whitsunday catchments. Additionally, the WQIP process will provide direction on how to coordinate resource condition monitoring. Due for completion by November 2007, the WQIP will focus on the whole region rather than high priority catchments. Core concerns for water quality in the region are dissolved nutrients and contaminants. A WQIP project manager and WQIP research assistant have been recently employed by MWNRM and their work plan and terms of reference have been completed. A communication strategy has also been completed. MWNRM is looking to secure additional resources to ensure implementation of the early stages of the WQIP.

In FBA, the regional NRM plan is considered by the regional body to be the equivalent of a WQIP. Local WQIPs are progressing and will be incorporated into other planning processes in future. Under RIS funding, a range of water quality improvement projects is being undertaken.

In Burnett Mary region, a WQIP officer has been appointed for the Burnett/Baffle catchments and a WQIP has commenced. Through a previous project, the environmental values and water quality objectives have been set for the Mary/Burrum catchments. The WQIP project for this area has not yet commenced.

It is evident that in several regions, the WQIPs represent a significant step in understanding and determining water quality objectives and targets. In many cases, there are high expectations regarding the level of information and direction that the WQIP processes will deliver for the Reef regions.

## **5.2 Self-management approaches**

The delivery of the Reef Plan is dependent on 'significant uptake of best management practices in high-risk catchments' (State of Queensland and Commonwealth of Australia 2003:12). The Reef Plan's Strategy A ('Self management approaches') identifies six actions. The regional bodies have a responsibility for implementing two actions (A4 and A5). However, the regional bodies are funding initiatives or are providing advice and support in all six actions.

All regions are promoting the adoption of best management practices as a key initiative and use a diversity of approaches. These approaches are seen by the regional bodies as being cost effective methods of delivery, for while land managers may receive advice and some financial assistance to implement improved practices, they are also required to contribute to the initiatives, either financially or in kind (refer to section 5.4). Therefore, investment in this area is multiplied through the contributions of landholders. The focus of these approaches is to achieve more sustainable land management, particularly through

**“Targets for uptake of best management practices are being used as a surrogate for end of system water quality targets!”**

efforts to reduce soil and nutrient loss from cropped and grazed lands. The use of a range of best management practices in all their various forms is viewed by the regional bodies as a surrogate for end of system water quality load based targets.

In the agricultural sector there is a range of programs that have been developed in conjunction with industry e.g. Cotton BMP, COMPASS (Combining Profitability and Sustainability in Sugar), and EMS (Environmental Management Systems). In several of the regions, cane is the prime crop and a range of improved production systems have been developed and are being applied (e.g. green cane harvesting, crop rotation, fertilizer management (application rates), minimum tillage, controlled traffic systems, and stubble retention).

Grazing practices are spatially extensive in the five regions and a key focus is to reduce grazing pressure by retaining and enhancing ground cover (e.g. assessing pasture condition, pasture and stock monitoring and management). For example, BMPs specific to BDT for grazing lands are being developed and focus on riparian and wetland management. However, their scope is currently limited to several trial properties and hence their effectiveness is difficult to assess. In FBA, the focus in several funded programs is to minimise the impact of episodic events, such as cyclones and high rainfall, by ensuring adequate ground cover, appropriate timing of cropping activities and stock management. In this region efforts are directed at reducing hill slope erosion, undertaking pasture monitoring, managing woodland thickening and seasonal variability, and introducing weed control, fencing and off-stream watering points (refer to section 3.4). Early results indicate up to a 40 percent reduction in soil loss in this region through retention of ground cover. The GLM program is widely implemented with beef producers throughout the regions. For example, in BMRG, a small pilot project has seen high adoption rates and positive responses from landholders.

“We have moved from managing cows to managing land cover!”

Implementation of practices that enhance productivity and sustainability usually involve consultation with regional body staff, development of a farm plan or property management plan, implementation of improved practices, monitoring and review of these activities and subsequent modification based on the accumulated evidence. Such adaptive practices, which may incorporate action-learning strategies, are a core focus of all the regional bodies.

### **5.3 Education and extension**

The regions' stakeholders have a range of perceptions, attitudes and values which underpin their actions and land use activities, as well as their assessment of risks and opportunities. Hence, environmental education and extension are key components of almost all programs funded by the regional bodies to deliver improved information, technologies, capacity and skills and ultimately to improve water quality outcomes for the reef. These programs are based, where possible, on integrating a range of knowledge systems, including the best available science, local knowledge and Traditional Owner knowledge.

The successful implementation of improved land management practices (refer to section 5.2) at the property and landscape scale depends on land managers understanding the key elements of the systems they are managing and the impacts of their land use activities on these systems, both at a micro- and macro-scale.

Hence, education and awareness raising are key activities undertaken in all five regions. Comprehensive extension programs have been developed to facilitate the uptake of improved land management practices. These initiatives are particularly important due to the high variability and sometimes low profitability of farm businesses. In many situations, extension activities are based on one-on-one discussions with landholders or groups of landholders and this is seen as possibly the only way to break down barriers and raise awareness of the benefits of changed land use practices in raising productivity and enhancing sustainability. All regional bodies have adopted a voluntary approach allowing their stakeholders to focus on the activities and management strategies that they feel will suit their circumstances.

Many of the implementation methods are similar throughout the regions and include workshops focused on specific issues, development of educational packages and information (e.g. brochures and booklets, and resource materials for schools), media campaigns, web sites, holding forums and having a presence at local shows, field days, and demonstration sites. Involvement in water quality monitoring projects in all regions has also played a significant role in educating the volunteers. In addition, the regions have developed a range of education and extension mechanisms to suit their particular needs. For example, FBA's primary mechanism is through the identification of priority neighbourhood catchments, where land managers volunteer to become part of a neighbourhood catchment and then receive technical advice; support and training (refer to section 3.4). Efforts to date have focused on Healthy Waterways advertising, salinity and acid sulfate issues, involvement of Traditional Owners in the transfer of traditional knowledge and general capacity building and action learning through community based monitoring programs.

FNQ has produced a range of education packages and information for raising community awareness regarding links between catchment management and water quality entering the reef. These include regular articles in FNQ NRM's newsletter, the local newspaper and media releases. An environmental education program has also been developed aimed at introducing natural resource management issues to school children (refer section 3.1).

MWNRM's Healthy Waterways Month is a recent and very good example of a comprehensive awareness raising strategy that is focused on water (refer to section 3.3). The regional body and associated catchment management organisations hosted an extensive range of free events and activities to enable the community to join in and learn about water issues in a holistic way focussing on source to sea linkages, as well as specific issues in each local area. The Creek to Coral Program in BDT focuses education in urban areas and is important for building capacity. Education services are also directed to industry, local government (storm water activities), schools, young people, and the wider community.

The regional bodies have shown a strong commitment to education and extension activities and see this as one of their primary and most important tasks. They also emphasised the need for long term commitment and enhanced and secure funding to deliver on-going outcomes which will have positive impacts on water quality within their regions.

#### 5.4 Incentives for water quality outcomes

All regional bodies are active in promoting the adoption of existing incentives schemes that have the potential to encourage landholders to implement sustainable management practices and property level planning (Reef Plan's Action C1). There is unanimous agreement among the regional bodies that economic incentives are a cost effective mechanism for achieving improved natural resource management outcomes. The focus of the regional bodies is on achieving a high level of voluntary uptake of best management practices by land managers, particularly those engaged in grazing, cane production and other cropping activities, rather than promoting more regulatory approaches such as covenants on riparian vegetation and wetlands. This voluntary approach is aligned with Reef Plan's Action C6.

The use of incentives that are promoting best practice can have dual benefits in enhancing production outcomes, as well as improving water quality by minimising sediment and nutrient input into waterways. An additional benefit reported by the regional bodies is that the success stories are being spread throughout their catchments encouraging other land holders to implement the best practice strategies, without necessarily requiring access to incentives funds to undertake the works. Hence, initial seed funding through incentives is seen as an important mechanism to promote the wider uptake of best management practices.

**“The multiplier effect has come into play in the Fitzroy!”**

While the extension activities of the regional bodies are primarily focusing on volunteer participants, the incentive funding is directed to land managers who are undertaking works within priority areas and where changed land management practices will result in improved natural resource management outcomes, particularly in relation to water quality issues. The incentives are directed at changing practices as well as protecting regional assets and include financial assistance as well as mapping resources, on-farm expert advice and workshop activities. In all regions the incentive schemes require co-contributions from the landholders and thus the incentive funding usually provides only a proportion of the total cost of any project. Landholders are expected to contribute to the funded projects, either in money or labour. This arrangement is in recognition of the private benefit gained by landholder participation over and above the public benefit that is delivered.

Existing incentives have encouraged the adjustment of stocking rates to reflect carrying capacity, provided riparian fencing and off-stream watering points and increased water efficiency (e.g. irrigation supply). For example, in MWNRM both capital grants (for stormwater and fish ways activities) and staged grants (for grazing, cane and native vegetation activities) are available. Funding is directed to volunteers who wish to become involved in property management planning. While land managers may receive funding from 10 to 40 percent of the project cost, land managers in priority areas will usually receive 40 percent of the costs involved. In this way the incentive funds are used both to encourage broad implementation of best management practices and also to focus activity on priority areas through the scaled devolution of funds. Although the incentive grants are in their initial stages in MWNRM, there were 200 applications by June 2006, with a good response from cane and grazing land managers (refer to section 3.3).

FNQ NRM has devolved grants for sustainable agriculture aimed at improved land management that affects water quality including: minimum tillage, cultivation

technology and riparian repair initiatives; the placement, rate and timing of fertiliser use; and a trial of incentives to improve water quality in Douglas Shire.

In FBA, the priority neighbourhood catchments are the focus of the on-ground works and incentives schemes, particularly in relation to conserving remnant riparian vegetation, rehabilitating wetlands, enhancing riparian connectivity, preventing the outbreak of new weeds, addressing salinity, improving cropping practices and improving water use efficiency. Similarly the BMRG devolved grants and incentives are targeted to areas which have been identified as hotspots (e.g. nutrient sensitive areas).

“Research should move beyond the Reef to include all the Reef catchments!”

Incentive programs are seen by the regional bodies as a key to increased uptake of improved management practices and are widely and creatively used throughout the regions. While benefits are becoming evident in terms of increased productivity, monitoring and evaluation of the impacts of changed practices are needed to better understand the links to improved water quality outcomes.

### **5.5 Research and development (with a focus on water quality)**

Research and information sharing (Reef Plan’s Strategy F) is identified as crucial to achieving improved water quality outcomes and the regional bodies have primary responsibility for three of the nine actions under this strategy (Actions F3, F4 and F8). However, they are involved in several additional Reef Plan actions, for which they have not been identified as having a responsibility. For example, they provide technical information from research and monitoring on water quality to landholders, industry peak bodies and the public (Action F1); they provide similar information to assist in the preparation of property management plans (F2); and some regions (e.g. MWNRM) have been collating information to assist in understanding fertiliser sales by catchment (F6).

Much research in the regions is undertaken cooperatively with a range of research institutions, universities and industry bodies. These focus on assessing land condition using photo standards, identifying lands for rehabilitation, understanding physical processes related to soil and nutrient movement, identifying sources of sediment input into waterways, mapping salinity risk areas, understanding the role of fertilisers and pesticides, mapping vegetation (e.g. wetlands) and prioritising wetlands and waterways. For example in FBA, cooperative research initiatives include salinity risk mapping (CSIRO, NRW and CRC Landscape Environments and Mineral Exploration), water quality modelling (NRW, CSIRO and Water CRC), biodiversity (CQU, SCU and EPA) and understanding impediments to the uptake of best management practices and incentives.

Research and development efforts vary significantly across the five regions. In BDT, research and resource condition assessment play a major role in guiding planning and on-ground works and there are several cooperative research projects which are well funded. For example, research into dryland salinity is examining water table depth, water quality, landscape salt storages, landscape water balance to improve assessments of salinity hazard and information to assess the options available for reducing salinity hazard in cleared and irrigated areas. Research is also identifying ground cover targets at the neighbourhood catchment scale, setting water quality targets and assessing biodiversity condition. A significant proportion of each asset

package identified in BDT's RIS is directed to research (e.g. surface water – 32 percent; ground water – 84 percent; biodiversity – 26 percent; coast and marine – 24 percent; and land, soil and agriculture – 25 percent). Several research initiatives have also been undertaken in the Priority Action Planning projects (e.g. salinity water quality management and community engagement).

A similar focus on research in support of management activities is evident in FNQ NRM. Examples include research into land management activities such as the isolation of nitrogen-fixing bacteria in sugar cane to reduce fertiliser use and therefore, water quality outcomes, as well as investigations into methods of measuring adoption rates and application of best practice within the region.

In the Fitzroy Basin there are initial projects that are trying to better understand the links between agricultural production and salinity. There are soil conservation research projects. Acid sulfate soils have been mapped and this provides crucial information for determining conditions to be attached to relevant development applications. Decision support tools have been developed and applied in the region to assist in development of priorities that underpin Central Queensland's Strategy for Sustainability and to assist decision making in relation to stocking rates, crop needs and potential yields (e.g. Rainman, Feedman and Howwet). However, there is limited understanding in the region of ground water flow systems and the effects of land use change on soil types and areas to be affected by salinity due to changed land uses.

In BM, the regional body is participating in a CIRM project to identify the research and development needs and priorities of the Reef catchments and they are working with state agencies and industry partners to identify additional opportunities. There is also a sharing of resources to undertake research. Cooperative partnerships with AIMS and DPI&F are working to identify point and diffuse sources of sediments, nutrients and other water quality problems (e.g. salinity and pesticides). In addition a prospectus of priority research and development needs is being developed.

MWNRM's NRM plan emphasises the importance of identifying research priorities, in particular related to water re-use, water quality standards, ecosystem models and vegetation management. It is expected that research and development priorities will be identified and coordinated through the WQIP process.

All regions viewed research as an important activity to underpin their extension activities and on-ground works. However, the regional bodies perceived that there were inequities in the distribution of research funds across the five regions. This may relate to differences in funding sources, with FBA, BDT and BMRG being NAP funded regions. There was a perception in some regions that funding should be applied to address particular issues rather than on the basis of whether the regional body was a NAP funded region.

Research gaps identified in all regions included the need for improved understanding of the cost effectiveness of remediation strategies for land degraded by erosion and improved information on pasture condition at the property scale as these were limiting the regional bodies' ability to provide effective extension activities.

## 5.6 Partnerships

The Reef Plan (Strategy G: Partnerships) recognises the regional bodies as one of its most critical partners and identifies them as having joint responsibility for five of the seven listed actions. However, they are also involved in the remaining two actions relating to building partnerships with industry (Action G5) and working with local government (Action G6). All regional bodies emphasise the need to create strong and enduring partnerships. These currently include:

- *Universities* (e.g. James Cook, Central Queensland, and The University of Queensland) and *research institutions* (e.g. CSIRO, AIMS and ACTFR) to develop best practice models and guidelines and water quality modelling tools. For example in BDT, links have developed with several research institutions (e.g. CSIRO, RIRDC, SRDC, Tropical Savannas CRC, Land and Water Australia, Meat and Livestock Australia); a short term water quality modelling project is near completion; CSIRO and EWater are undertaking research related to SedNet modelling. A small amount of research and development is occurring in MW, including the development of modelling tools as part of the WQIP and research that will underpin the BMPs. Contracts have been signed in relation to the development of the WQIP (James Cook University, Central Queensland University, DPI&F and NRW), as well as a MOU with EPA. In the Tully catchment, FNQ NRM is partnering with CSIRO Sustainable Ecosystems, as well as Cardwell Shire Council, AgForce, Growcom and the Traditional Owners to deliver the Tully WQIP.
- *Industry* (e.g. sugar cane, meat and livestock, fruit and vegetable growers, grazing, irrigators, prawn farmers, cotton etc) to develop best practice models and guidelines in all regions.
- *State and commonwealth government agencies* (e.g. NRW, DPI&F, EPA, DEH, GBRMPA and AFFA).
- *Local governments*  
Local governments are key partners in the delivery of improved water quality outcomes. However, involvement and participation varies across the regions. Linkages are in their initial stages of development in BDT with two positions having recently been established to provide liaison with local government. The focus is on community capacity building, developing planning and development assessment tools (e.g. stormwater code) and sharing information through the local government network. FBA has been assisting in the development of strategic pest management plans and the incorporation of natural resource management issues into planning schemes, policies and development assessment. BMRG is increasing its links with local government through the development of a 'cluster approach' whereby regional body staff are responsible for liaising with four clusters of local governments. In addition three local governments are represented on the regional NRM board (e.g. Burnett East, Burnett Inland and Mary).
- *Traditional Owners*  
Traditional Owners are recognised by all regional bodies as playing an essential role. In FNQ NRM an Aboriginal and Natural Resource Management Plan has been developed and frameworks for on-going involvement have been established and will be further refined. A cultural mapping project is underway. In BDT a Traditional Owner Management Group has been established and funding is being provided to identify sites of cultural significance and to understand the uses and

“Partnerships with local government have been neglected in our past, but will figure highly in our future!”

values attached to water resources. A Caring for Country Plan has been developed which facilitates the involvement of Traditional Owners in decision-making in relation to cultural heritage and natural resource issues. MWNRM has established a Traditional Owner reference group; appointed an Aboriginal land management facilitator; and several sectors' projects are focused on recording Traditional Owner knowledge. In FBA several initiatives are funded to enhance Traditional Owner involvement and the identification of values and building capacity. BMRG has developed a protocol with Traditional Owners for engagement and representation in BMRG structures; ongoing engagement and communication is underway; and a high level of importance is placed on ensuring indigenous community participation in all levels of management and planning for country.

“The Traditional Owners of the Wet Tropics are on board and now we are supporting each group to start planning for their traditional country!”

- *River Improvement Trusts (RITs)*

RITs have been established in FNQ NRM, BDT and MWNRM. There are no RITs in FBA or BMRG. In FNQ, the main focus is the rehabilitation of riparian zones in partnership with the North Queensland River Trust Strategy. In MWNRM, links have been established with the RITs through the Healthy Waterways task force, although this is not a high priority for the region. While RITs are in place in BDT's Burdekin Haughton and significant works have been undertaken in these areas to reduce the effects of flooding, there is no significant investment being directed to the RITs and this is not a significant approach in this region.

In response to Reef Plan's Action G1, all regions have developed aspirational and short-term resource condition and management action targets (RCTs are interim in a number of regions). However, alignment in relation to the development of water quality environmental values and objectives varies. In FNQ NRM, Douglas Shire has established environmental values and water quality objectives and CCI funding is being used to develop these for the Tully catchment. In BDT and MWNRM, while the water quality environmental values and objectives have not been identified, the CCI and cross regional activities will identify these in the near future and will focus on priority catchments. In BDT, the focus will be on five priority catchments (i.e. those adjacent to the reef). Other catchments within the BDT are not funded through the CCI and will not be undertaking this task. The Reef Water Quality Partnership may be a vehicle to obtain further funding to allow this to occur.

### **5.7 Region-wide monitoring of water quality**

All regions have implemented water quality monitoring projects, which aim to determine how sediment and nutrient transport and delivery varies between different parts of their catchments. The data are helping to better understand trends in sediment delivery over time, to validate modelling (e.g. SedNet) and benchmark information for input into WQIPs. This is a significant funding initiative across all five regions. As well as the water quality monitoring, all regions are involved in monitoring a range of other resources (e.g. pasture condition).

“Significant effort has been made towards coordinating water quality monitoring in the region, though all involved have more work to do on this!”

Regional bodies have responsibility under the Reef Plan's Strategy I (Monitoring and Evaluation) for four actions. Action I5 addresses the need for a coordinated water quality monitoring program in high risk catchments and Action I6 requires community and industry based water quality information collection programs (e.g. Waterwatch).

Action I8 requires the incorporation of monitoring and implementation of local WQIPs and environmental flow objectives into other planning processes. Action I3, for which regional bodies are identified as having a supporting responsibility, concerns the incorporation of Reef Plan goals into the State and Commonwealth Government's evaluation processes. This action is believed to be the responsibility of the relevant government agencies and is not viewed by the regional bodies as one of their responsibilities. As a result, no action has been undertaken.

The key initiatives in the regions include:

- In FNQ NRM, several monitoring programs are funded although the prioritisation of 'high risk' catchments is partly implemented.
- In BDT, water quality monitoring is event based and is collaboratively implemented by several agencies utilising community volunteers (refer to BDT Summary regional profile). Sampling is conducted over 25 waterways by approximately 25 volunteers. Current results show variation in sediment concentrations between catchments, ranging from high concentrations in the Bower and upper Burdekin sub-catchments, to low concentrations in the Cape-Campaspe sub-catchment. ACTFR, in collaboration with CSIRO, AIMS and GBRMPA, is expected to coordinate the preparation of the benchmarking reports that will provide input into the development of a WQIP. Coordination of monitoring effort, particularly at the property scale is at the planning stage and needs continuing financial support. The design of an integrated water quality monitoring program is not currently funded under the RIS. Current efforts focus on validating existing water quality monitoring, prioritising sub-catchments and establishing baselines and variability. Other monitoring activities include Creekwatch, Seagrasswatch, ReefCheck, and Coastcare projects which are undertaken in cooperation with scientific research institutions and local councils.
- In MWNRM, the Healthy Waterways Integrated Monitoring Program is working to link all existing and future water quality monitoring programs in the region and thus provide a central system for storage and analysis of data (refer to MWNRM Summary regional profile). The program is not formally named a Waterwatch program, although similar activities are undertaken. The program relies on a network of about 50 volunteers who collect both ambient and event monitoring samples. The WQIP, when developed will provide further direction on how to coordinate the monitoring efforts.
- In FBA, a water quality monitoring plan was released in March 2006, with 25 monitoring sites selected from the priority neighbourhood catchments (refer to FBA Summary regional profile). Monitoring will be event based and focus on sediment, salinity and nutrient (nitrogen and phosphorus) parameters. There is a two-fold purpose to the monitoring. First, to provide baseline data and trend information to identify changes brought about by stakeholders' management actions, and second, to engage landholders and raise awareness. Property managers involved in the program are contacted and paid to sample floodwaters. The data are input into a regionally coordinated catchment based monitoring evaluation reporting and review framework. The objective is to use this data to inform and accelerate changes in land use practices. Emphasis is also placed on ground cover monitoring using remote sensing and this is undertaken cooperatively with CSIRO, DPI&F and NRW.
- Community water quality monitoring is occurring in BMRG through the Mary River Catchment Coordinating Committee and a focused program of monitoring in

selected inland areas of the Burnett. Event sampling is also taken following pulse events. There is a proposal to extend the WMP Monitoring Network to five nodes where community water quality monitoring will be undertaken.

- FNQ NRM is also leading the Coordinated Water Quality Monitoring Project (IFA08) (refer to section 4.4), which aims to deliver an integrated and standardised water quality monitoring framework for Reef catchments including data collection, analysis, storage, access, interpretation (modelling and assessment), communication and reporting.

## 5.8 Focus on wetland and riparian management

All regions place a high priority on the identification and improved management of wetlands and riparian areas. The key initiatives in the regions include:

- In FNQ NRM efforts are directed to increasing community awareness of the importance of riparian vegetation and incentives are offered to landholders to protect and rehabilitate wetland and riparian areas as part of the broader sustainable landscapes program (e.g. fencing). Standard protocols for monitoring and reporting on the extent and condition of wetlands are being developed. Assistance is also provided to local government to incorporate mechanisms for the protection of wetland and riparian vegetation in planning and development.
- In BDT the PAP4 project assessed 100 wetland sites throughout the catchment and preliminary projects are now underway as part of the CCI to map and assess the condition of wetlands and riparian areas in order to identify priorities within the catchment. Joint initiatives are developing with Thuringowa City Council to locate wetlands of importance and in Townsville property management plans and incentives (e.g. Land for Wildlife) are in place to better manage wetlands. These collaborations are also contributing to improved input into city planning processes which are recognising the values of wetlands and riparian areas. The EPA is continuing to map wetlands within the region and aquatic weed mapping is also very important. Property planning, on-ground works, education and extension are seen by the regional body as being essential to improve the values of wetland and riparian areas. Action plans are being developed for wetlands, with rehabilitation focussing on enhancing functional connectivity. The Grazing Land Management Program funds riparian fencing in degraded wetland and riparian areas (e.g. east Burdekin and Clark Rivers) and provides incentives to protect, rehabilitate and manage wetlands. The reef extension project (DPI&F, FNQ NRM and BDT) focuses on riparian management and wetlands with several trials and case studies in place within the region. The regional body has also funded wetland exhibits at various functions (e.g. World Wetlands Day) and has an information kiosk located at Reef headquarters.
- Past land practices in MWNRM have resulted in the loss of significant wetlands and thus the remaining wetlands and riparian areas are considered by the regional body to be a very high priority. The key initiatives in which the regional body is involved are:
  - wetlands and riparian areas are part of the regional vegetation initiative of MWNRM under the Sustainable Landscapes Program (SLP), where approximately \$500 000 has been allocated to revegetation and management of riparian and wetland areas (e.g. weed control, fencing, off-stream watering

“We need to protect what’s left and sustain what we can!”

- points) and developing property management plans with landholders who volunteer to become part of the program.
- several priority projects are funded by external providers, including Reef's coastal wetlands protection program (\$8 million) which focuses on the Pioneer River's floodplains (SLP); and Trust funding of the Wetland International Project which is delivering management-based skills to wetland managers and owners of wetlands listed as significant wetlands.
  - seagrass monitoring and mangrove watch initiatives.
  - FBA's neighbourhood catchment approach is focused on: riparian zones in third or higher order streams; wetlands greater than five hectares in size; and wetlands which are classed as 'endangered' or 'of concern'. The aim is the rehabilitate, better manage and enhance the connectivity of wetlands and riparian areas. This is achieved by education and extension efforts which promote property management plans that encourage sustainable production systems, including the fencing of wetlands and stream banks (e.g. Stowe Park project). Biodiversity mapping is being conducted in the region to identify wetlands and riparian areas and to assess their condition. There is initial work being undertaken to conduct baseline monitoring of seagrass (e.g. Currumin Creek estuary and Corroya Bay).
  - In BMRG there are several initiatives underway to better protect freshwater wetlands including:
    - collaboration with Wetland Care Australia and Burnett Shire Council in Splitters Creek (lower Burnett River) to improve the management of riparian vegetation and control weeds in the riparian area and on creek itself through offering a range of devolved incentive grants to landholders. A similar collaboration is occurring at Pasturage Reserve, a remnant wetland attached to Mon Repos, where funding is provided to implement improved grazing management, stormwater drainage, and manage weeds, fire and pest animals.
    - Wongi Waterholes, where a pump is to be installed to remove excess water to ensure the wetlands remain intact following the raising of the dam wall.
    - Ban Ban Springs, where cultural heritage research is being undertaken.
    - planning a manual that will provide information for landholders with wetlands on their properties.

“If we can't do it for the Reef, we can't do it for anything!”

There has been no systematic mapping of inland wetlands in the region, although mapping of riparian vegetation has been undertaken on the Burnett River and the Mary River Catchment Coordinating Committee has been involved in stream reach and rehabilitation planning and riparian mapping of the Mary River. Coastal wetlands are investigated through seagrass monitoring in Hervey Bay and mapping of these areas is being undertaken by EPA.

## 6.0 Big insights

A diversity of approaches exists among the five regions in delivering on the outcomes identified as responsibilities of the regional bodies in the Reef Plan. These differing approaches and emphases have been examined in the previous sections (refer to summary regional profiles and big initiatives) and in Appendixes 3 and 4. This section identifies the 'big insights' that have been drawn from the regional bodies' approaches.

### 6.1 Regional approach works well for water quality

Regional NRM planning offers new opportunities to improve water quality within waterways and within the Reef lagoon. It is not the only answer, but it is an important process for addressing complex, multi-scale problems at a regional level. Water quality issues vary throughout the catchments that impact on the Reef lagoon. Landscapes in the Wet Tropics have small, steep catchments, a wetter climate, more dense vegetative cover and intensive land uses, while those in the Dry Tropics of northern and central Queensland are dominated by large, flat catchments, with extensive grazing lands. Social capacity also varies across the Reef catchments. Hence a regional approach to managing water quality issues is an important platform for delivering on the Reef Plan, as aspirational, resource condition and management action targets can be specific to the threats and pressures within each region and actions can be tailored to the capacity and strengths of the regional communities.

**“The regional approach works well for water quality!”**

The regional approach also allows regional bodies to focus on the roles that they are best at delivering (refer to Table 8). It is important to integrate the key stakeholders and reach agreement concerning their roles and responsibilities for planning and management. Bennett and Moss (2006) identify the typical roles of the various 'partners' usually involved in waterway management and stress the need for stakeholders in particular catchments to form their own partnership and agree on roles and responsibilities that fit within their institutional arrangements.

A regional approach also works well for monitoring and modelling of water quality indicators, which will require different conceptual models due to the varied climate, landscapes and biophysical processes. Thus, the new regional NRM arrangements have the potential to more effectively address the declining trends in several natural resource assets, including water quality, than did previous state-wide and more local approaches. This new regional approach will enhance existing governance and institutional arrangements.

**Table 8 Typical stakeholder roles and responsibilities for managing impacts on Australian waterways**

		Categories for Management				
		Point source mg'ment	Urban stormwater mg'ment	Rural land use & land mg'ment	Flow mg'ment	Riparian and in-stream mg'ment
<b>'Partners' in Waterway Management</b>	State/Territory EPA	✓✓	✓			
	State/Territory NRM agency			✓	✓✓	✓✓
	State/Territory primary indus. agency			✓		✓
	State/Territory planning Agency		✓	✓		✓
	Regional NRM body			✓✓		✓
	Local governments	✓	✓✓			✓
	Rural industry bodies			✓✓		✓

(Source: Bennett and Moss 2006)

**6.2 High levels of enthusiasm and commitment**

Perhaps the biggest insight gained from this review of regional bodies and their activities, has been the high level of commitment and enthusiasm displayed by the participants at the five workshops. This includes both regional body staff, as well as allied industry partners, research organisations, and local government. All the regions now have the majority of their key positions filled by capable and enthusiastic staff, who displayed a strong commitment to NRM planning and implementation for the long term. Building and strengthening this capacity is essential and all regional bodies called for a greater alignment of state agency policies with regional bodies' activities and clearer indications of the long-term direction for regional bodies.

“Regional bodies are here to stay!”

**6.3 Culture and history play a role in priority setting**

The priorities that are identified and funded in each region are highly reflective of the different attitudes and values of the stakeholders, the historical evolution of their regional institutional arrangements and their regional infrastructure and services. Thus, while similar problems may exist in several catchments, the identified regional priorities vary. For example, two of the regions focus heavily on research and development as the key to providing improved knowledge of resource condition and trends (refer to section 5.5). This reflects a strong presence of research institutions and industry structures which have an interest in furthering research, and the ability of regional groups to secure research funding. Other regions with very few research providers in the region or those located in the less popular research areas, i.e. the more southern sections of the reef, struggle to obtain research funding as exemplified by BMRG's reported failure to obtain any research funding through the recent MTSRF processes.

“History and place matter!”

In the regions where research is not a high priority, staff are focused on identifying and implementing strategies to improve productivity and natural resource management outcomes through extension and on-ground works. Their aim, as opposed to the regions which are heavily engaged in research, is to ensure that appropriate actions are happening on the ground now, rather than at some time in the future. These regions also have a high emphasis on adaptive management, utilising the results of their on-ground works to guide future planning and decision-making. For example, BMRG's focus is on developing strong partnerships with local government, industry and the community, providing information, raising awareness and engaging with stakeholders in meaningful activities, such as the comprehensive community water quality monitoring project.

In some regions, groups are focused on building robust institutional arrangements to ensure involvement of key players, multiple agendas are addressed and long-term change is facilitated. An example is the arrangements being put in place to deliver the Tully WQIP in FNQ NRM. Some regions employ staged funding to ensure short and medium term projects by any grant recipient.

These varying emphases may be a reflection of the extent of maturation of NRM processes. Each region has begun the process with a level of knowledge, community awareness and willingness to change, and certain institutional processes and arrangements in place. The differing regional processes and priorities may reflect, in part, the level of evolution of the NRM processes within the regions.

#### **6.4 Differing approaches to self-management at the property level**

Self-management is a key strategy in the Reef Plan and regional bodies are using a diversity of approaches across the regions (refer to section 5.2). For example, FBA relies on the priority neighbourhood catchments approach and the involvement of landholders who volunteer to undertake property planning and on-ground works with other landholders in their sub-catchment. Priority catchment issues are addressed through the prioritising of incentives to those landholders in key areas (e.g. nutrient and sediment hotspots). This approach is seen as a way to build capacity within the region and for land managers to informally spread the 'good news stories'. FBA also rely significantly on voluntary uptake of best management practices.

In FNQ NRM, emphasis is placed on developing BMPs through working with peak industry groups (e.g. grazing, sugar and horticulture) and producing and delivering education and training material in conjunction with local producers.

Similarly, while all regions are promoting 'best practice' approaches, these are not necessarily consistent in their content or application. For example, BDT focuses on the identification of D condition lands and efforts to rehabilitate these, while MWNRM focus their efforts on B and C condition lands, where rehabilitation efforts are considered to be more cost effective.

Greater regional cooperation in the identification of the necessary strategies to monitor the impacts and effectiveness of these practices will reduce duplication and provide more consistent advice to landholders across all regions.

Information on the effectiveness of the 'best practices' that are recommended to achieve measurable improvements in water quality is lacking. While the extension work of the regional bodies is promoting changes in land use practices, more specific data on current practices and how they will contribute to the targets set by regional bodies are needed.

### **6.5 Same tools, different outcomes**

All of the regions employ a similar range of planning and management tools (e.g. BMPs, incentives, and education and extension etc.). While the regions are usually aware of the complex array of planning and management tools that are available for implementation, they are carefully selecting the relevant tools for implementation and are clearly specifying the outcomes that are being sought. Hence the application of one particular tool can produce quite different outcomes depending on where it is implemented. For example, while the Reef Plan identifies Healthy Waterways as a model to enhance community awareness of water quality and the need to protect and rehabilitate wetlands and riparian habitats (Action B4), in FNQ NRM and FBA, the approach is used primarily for the collection of a range of data that are used to improve understanding of water quality and thus contribute to a sound, science-based approach to improved management. In contrast, in MWNRM the program is used primarily as a communication and engagement strategy to enhance community understanding of water quality issues, threats and impacts.

### **6.6 Cooperative approaches, co-funding and institutional capacity building**

The Reef Plan has been instrumental in facilitating regional cooperation and coordination among stakeholders on a number of different levels. There are improved linkages between agencies responsible for marine and fresh water issues and between marine and terrestrial issues e.g. Great Barrier Reef Authority and regional bodies. All levels of government are beginning to engage in cooperative arrangements and these new governance structures provide opportunities for increased integration of natural resource management issues. Of particular importance is the increased input into local government strategic and development assessment processes. This approach is designed to increase the capacity of the partner organisations and enable increased understanding and appreciation of NRM issues and their subsequent incorporation into relevant strategies, policies, actions and works. For example, the regional bodies are beginning to work with local government through the identification of key staff who have primary responsibility to assist in the incorporation of NRM issues into planning schemes, development assessment tools and general community awareness raising programs. There are four co-funded coordinators situated in four local government clusters throughout the BMRG region. Improved horizontal integration is also evident as NRM staff begin to address issues across several local governments within their regions. More holistic and integrated approaches are significant outcomes from the new regional governance arrangements. Coordination with industry has also been crucial in the development of BMPs, codes of practice, and a range of best management practices to improve land use activities and practices that impact on water quality.

Cross-regional coordination among regional bodies is also developing with several activities being co-funded (refer to section 4), and there is more frequent consultation and joint planning (e.g. reporting on initiatives, problems, common issues and how to deal with them etc), as well as forums to discuss specific issues, workshops and general sharing of information. These processes help to minimise duplication of

effort, enable gaps in approaches between regions to be identified and will work towards developing more strategic coordination of effort (e.g. research, data management, extension, monitoring, education and awareness raising) to achieve greater alignment and economies of scale.

This cooperative approach is frequently based on co-funding arrangements and this is an important mechanism for delivery of natural resource and water quality outcomes.

### **6.7 Question of effectiveness**

Questions relating to the overall effectiveness of the efforts that are being employed by the regional bodies are difficult to answer at this stage. The NRM plans in general do not provide extensive scientific support for several of the activities that are being implemented. Whether kilometres of fencing, or riparian planting, or improving the quality of 'D' condition land will result in improved water quality outcomes for the Reef can only be known if monitoring is undertaken and the results are used to adaptively manage resources into the future. However, it is likely that land management systems are the key factors that are affecting Reef water quality (Reef Science Panel 2003; Productivity Commission 2003), particularly pastoral and cropping activities, but also industrial and urban related land uses.

The focus on working with 'the willing' may be effective in the short term, but long term outcomes will be constrained if research, resource condition monitoring, planning and on-ground works are not directed to the identification of priority areas and the implementation of appropriate land management strategies.

The NRM plans stated reliance on an adaptive management framework will be essential to ensuring the long term effectiveness of many of the actions in relation to improved water quality outcomes. Hence there is a strong need for monitoring and evaluation of all activities undertaken within the RIS and for these results to inform future planning and management in an adaptive process. This adaptive framework is essential to better understanding cause and effect relationships within reef catchments.

### **6.8 Regulatory frameworks**

Strategy E of the Reef Plan addresses Regulatory Frameworks and identifies regional NRM bodies (Action E2) as having a responsibility to identify areas where declarations might be made under the Vegetation Management Act 1999 thus securing protection of the vegetation against land degradation. However, none of the regional bodies were involved in this identification process and none saw it as their responsibility. The primary approach use by the regional bodies is based on voluntary, incentive based self-management, rather than regulatory mechanisms.

## 7.0 Challenges, gaps and opportunities

While regional bodies have made significant progress towards delivering on actions that will support the Reef Plan, as identified in the 'big initiatives' and 'big insights', there remain several challenges. These are outlined in this section, along with the key gaps between the current regional body initiatives and the Reef Plan actions and opportunities for the future. This analysis begins with a snapshot of the Reef Plan strategies and the progress that has been made by regional bodies.

The features and focus of regional body efforts, in relation to Reef Plan strategies, can be arranged on a continuum of achievement (Table 9), which ranges from an initial level of achievement representing the first steps taken by regional bodies (e.g. usually preliminary and pilot projects), to a comprehensive level of achievement, which is the most advanced stage of achievement, where a solid foundation exists and there is capability within the regional body to do more under that Reef Plan strategy.

Regional bodies vary in terms of their location on this continuum of initiatives for the Reef Plan. While their starting points differ, they are without exception working hard to 'cover all bases' of the Reef Plan requirements. A steep learning curve is evident in all cases, although the focus of that learning varies. Most are adapting frameworks such as the scientific collaboration or community awareness-raising seen in the Healthy Waterways process of south-east Queensland, or the tools and lessons from Waterwatch.

Some have made good progress on priority-setting and agreement-building for implementation. Most regional bodies though are in the early stages of their planning and implementation and there is much to be done to build awareness and commitment at the on-ground level. Awareness followed by relevant and practical solutions to site-level implementation will be essential.

Most are grappling with the science and information demands of prioritising and implementing initiatives at the finer scale. In the next stage, significant effort is to be directed through WQIPs to obtain that finer scale of planning and engagement for at least one catchment per region. In the absence of a scientific framework for reef condition that is appropriate to inform regional body planning, end-of-catchment best management practice models are the best available approach for directing the efforts of regional bodies.

Many are making good progress on engaging with partners for specific challenges, for example research and development or building collaboration with local governments and Traditional Owners. All see engagement as the vehicle for delivering the level of change required and are directing efforts at capacity building to ensure engagement is possible.

**Table 9 Levels of achievement – the continuum of regional body initiatives**

<b>Reef Plan strategy</b>	<b>Initial achievement*</b>	<b>Comprehensive achievement*</b>
<b>Self-management approaches</b>	<p>Collating of industry practices and NRM; initial scope of 'better practices'</p> <p>Promotion mechanisms targeting selected industries or selected pilot areas; or ad hoc basis with applicants taking the initiative</p>	<p>Targeted research and development to drive 'better practices'</p> <p>Knowledge-based and self-managed continuous improvement at industry level and at property level</p> <p>Monitoring provides feedback on practices at property and regional level</p> <p>Strong adaptive management processes</p>
<b>Education and extension</b>	<p>Working with 'what is known'</p> <p>Limited Traditional Owner input</p> <p>Initial work to engage community in landscape monitoring</p> <p>Challenge of funding and skilling for extension at level required</p>	<p>Comprehensive NRM education process for all</p> <p>Partnership-based education strategy</p> <p>Caring for country and caring for sea country are integral</p> <p>Landscape-wide approach based around high risks and priority areas</p> <p>Involvement in monitoring</p> <p>Extension work is valued, funded and staffed with skilled enthusiasts</p>
<b>Incentives</b>	<p>Selected or willing industries or properties</p> <p>Patchwork basis</p> <p>Property works focus</p> <p>Conditions for funding vary</p> <p>Emphasis on formula basis for funding</p>	<p>Targeted to spatial or high risk activities</p> <p>Links to property and productivity planning</p> <p>Adoption rates monitored by catchment; by industry</p> <p>Conditions for grants include monitoring and demonstration</p>
<b>Research and development</b>	<p>Focus on understanding natural landscapes and processes</p> <p>Inventory of multiple data sets</p> <p>Identifying risks (areas and pressures) and priorities</p> <p>Mostly rural focus</p>	<p>Identifying risks, cause and effect and management intervention points</p> <p>Targeted social, ecological and economic research and development</p> <p>Urban, coastal and rural lands</p> <p>Collaborative and cross-regional arrangements</p>
<b>Regulatory frameworks</b>	<p>Absence of a common framework for sustainable NRM</p> <p>Protection response low</p> <p>Regional body role not regulatory</p>	<p>Agreement amongst NRM participants on a shared approach to protection and rehabilitation</p> <p>Regional body role provides knowledge base and extension work for proactive compliance</p>
<b>Partnerships</b>	<p>Opportunistic partnerships (the willing)</p> <p>Gaps in partnerships</p> <p>Roles unclear or under resourced</p> <p>Local government potential not tapped</p>	<p>Targeted partnerships for stages of NRM work such as TO involvement, planning or education</p> <p>Roles are defined and resource commitments given</p> <p>Integral role of local government in NRM</p>
<b>Targets</b>	Interim targets for:	Hierarchy for targets in place:

<b>Reef Plan strategy</b>	<b>Initial achievement*</b>	<b>Comprehensive achievement*</b>
	resource condition and management actions No overall target framework for Reef condition	Reef resource condition In-stream health and contribution to reef RCT High risk catchments High risk industries/communities
<b>Planning</b>	WQIP mechanism Pilot scale – one catchment per region; ‘willing catchments’ Environmental values and WQ objectives focus Patchy monitoring information Some events-based information Initial partnerships for WQIP emerging	Targeted and sequenced – all catchments across region Learning is transferred between WQIPs Funding to match implementation and extension actions in the WQIPs Targeted monitoring to inform WQIP preparation and implementation Partnership-based (for research and development, planning and implementation)
<b>Monitoring</b>	Building strong interest in monitoring Monitoring strategies based around community networks or individuals’ interest or recruitment Property scale in some instances, working to regional picture Knowledge building about landscape	Monitoring sites based on catchment and site priorities Monitoring standards and staffing match the purpose of information Combining community and partnership monitoring Comprehensive scaling from property level to regional Knowledge building AND community empowerment

(\* where: Initial achievement represents the first steps regional bodies are taking; and Comprehensive achievement is the most advanced stage of achievement, where a solid foundation exists and there is capability within the regional body to do more under that Reef Plan strategy.)

Progressing beyond the current initial stages of water quality improvement in the regions will require a framework of well developed and strongly supported initiatives, some of which are at the scale of state-wide strategy and others which are more related to operational aspects of regional NRM. These key challenges, gaps and opportunities include the following:

### **7.1 Reef lagoon resource condition and drivers for regional NRM**

At the upper end, driving the efforts of regional bodies in relation to implementing Reef Plan objectives, there is a critical need for a science-planning-community framework to be planned for at the Reef lagoon level. This will include close cooperation between the regional bodies and the key research institutions, industry bodies, local governments and key community stakeholders. The current reliance by regions on an ‘end-of-catchment, best practice approach is working at this initial stage. A comprehensive picture of Reef lagoon imperatives in relation to resource condition protection and rehabilitation will need to be translated and transferred to regional bodies for their planning. This gap must be addressed through a process that ensures two-way communication about the needs of in-stream resource condition and Reef resource condition.

In addition, the as high priority catchments in the Reef Plan were not a primary focus of most regional bodies (refer to section 7.7), the Reef lagoon planning frameworks will also need to address this shortfall.

## **7.2 Data capture, acquisition, management and exchange**

The Reef Plan focuses on achieving improved water quality in the Reef and has an outcomes-based focus. Regional bodies are tasked with undertaking a range of actions that will halt water quality decline. For this to happen regional bodies have had to undertake research to better understand the biophysical processes and land use activities that drive water quality change. However, this information is:

- available in a variety of formats (e.g. spatial data sets, modelling information, quantitative data, and expert, local and Traditional Owner knowledge) and is difficult to manipulate.
- relevant at particular scales.
- difficult to adapt to higher and lower levels of planning and management.

Data collection, availability, access and sharing arrangements were cited by all regional bodies as challenging issues. While a range of data is available, there were concerns expressed at the difficulty in accessing relevant data from several agencies and applying it to problem solving at a range of scales, from the property level to the catchment level. Data and information sharing arrangements, particularly between regional bodies and government custodians need clarification and commitment.

Information is needed, and is being collected and monitored, at a number of scales (e.g. property, local catchment, sub-catchment, catchment and regional levels). Adapting this information to the scale at which it will be used and interpreted is challenging. For example, vegetation is currently being mapped across all of the regions, but the scale of capture may make this information difficult to use at the property level. Similarly, best practice advice is leading to changed land use practices at the property level and water quality monitoring projects are being established to monitor water quality indicators at a range of scales from sub-catchment to entire catchment. Whether this monitoring data can be used to inform future extension and best management practices at the property level may be questionable, for information gained at the property level may be difficult to relate to issues of river and reef water quality. Hence, end of catchment targets, when set, are likely to be difficult to measure, let alone meet in the short to medium term, due to the complexities of data collection and multi-scaled information that is based on measuring the impacts of land use change within catchments.

It is important to note, however, that this information which is collected at the property scale may be useful to refine catchment modelling (e.g. SedNet). The challenge for regional bodies is to ensure that data and information are collected and monitored at multiple scales, and that there is effective and efficient coordination and sharing of this data.

The scale of this challenge is another 'gap'. This challenge impacts on all aspects, from monitoring, to research and development, to planning and implementation. The risk is that funds for initiatives are spread across the various actions with the result that monitoring is limited to some areas, knowledge gained about the regional

processes is patchy, incentives are ad hoc, emphasis is on biophysical rather than social and economic frameworks, and achievements are diluted.

During the NRM plan preparation phase there was a significant amount of research, information gathering and data sharing that took place among government agencies, research institutions, industry and the regional bodies. These initial efforts need to be maintained and built upon, and regional priorities identified. All regions cited the need for ongoing resourcing to enable enhanced data collection and sharing arrangements between regions and with stakeholders in each region, and as a means for facilitating adaptive management approaches.

The following are just some examples of the types of information sharing that are currently occurring:

- in FNQ NRM, lessons from the Douglas Shire WQIP are being shared with other regional bodies.
- in BDT, forums have been established to discuss cross-regional projects; information in relation to BMPs are shared with MWNRM; workshops have been conducted to share information in relation to environmental values water quality objectives; and the Creek to Coral network is a further opportunity to share experiences.
- in MWNRM, information has been exchanged with other regions to aid the development of WQIPs and volunteer water quality monitoring programs.
- in FBA, a variety of strategies are identified to raise awareness and exchange information through extension services, education packages, and information sessions. The regional body is also providing satellite imagery free of charge to landholders and this innovative strategy is well supported by the community.
- in BMRG, regular meetings, workshops and a field trip to Douglas Shire have been held in relation to the development of the WQIP.

While regional bodies act as a clearing house for information that is of value to a range of stakeholders, a key challenge is maintaining the capacity to provide this information in an efficient and cost effective manner. The long term role of regional bodies in collecting, managing and disseminating information is invaluable.

In addition, landholders are now starting to access relevant information from which to plan their activities. Information is no longer only in the hands of government, but is being shared with stakeholders, who are beginning to use this information to their own advantage. Enhancing this process of stakeholder empowerment is a key opportunity for delivering improved reef water quality outcomes.

Addressing the data challenge is not just a matter of funding, although funding is a key element. In addition to continued and adequate funding, there is a need for the appropriate sequencing of efforts; and a clear set of agreed priorities (accepting that not all things can be done at one time).

### **7.3 Priorities and target-setting**

The Reef Plan identifies the regional bodies as having responsibility for four of the five actions listed in Strategy H (Priorities and targets). However, a key challenge facing all regions is the critical gaps in the resource condition information base, which has limited their ability to develop meaningful and measurable resource condition and

management action targets for water quality and related issues. This is highlighted by use of surrogate water quality targets in all regions and the high investment in funding programs which will gather relevant data, particularly for the development of WQIPs.

While the surrogate targets do reflect the requirements of the Reef Plan, all regions have in place processes to refine these targets as improved data become available. All regions are using SedNet modelling outputs and other data to identify hotspots (sediment and nutrients) and the processes contributing to these hotspots. Based on this information relevant management actions have been identified in all regions to minimise the input of sediment and nutrient to waterways.

There is currently a range of activities being undertaken to develop water quality targets (Reef Plan Action H1). For example:

- in FNQ NRM, the Douglas Shire WQIP is in its implementation phase and the Tully WQIP is in the establishment phase. These plans incorporate the identification of water quality targets and will identify priority sites for monitoring.
- in BDT, water quality guidelines are in place; a regional dataset is being developed with data input from the water quality monitoring projects; in developing the WQIP, water quality targets will be developed; and draft environmental flows are being established through the Water Resource Plan.
- in MWNRM, the WQIP, which is under development, will identify end of catchment targets and strategies to achieve these; quantitative surrogate water quality targets are to be established in all catchments for sediment and nutrient discharges; management actions to achieve the load targets are to be identified for each sector; benchmark adoption rates are to be identified for each management practice; and uptake of management practices is to be promoted. Water quality guidelines are being developed for cane and grazing lands, bushland catchments and flow impacted and point source impacted waterways.
- in FBA, surrogate water quality targets are in place and will be refined following baseline monitoring and modelling. Monitoring is occurring through the Healthy Waterways program and is undertaken at strategic sites. Catchment targets are being developed based on levels of salinity, nitrogen, phosphorus, sediments and suspended particulate matter. Targets are also being developed and refined for ground cover on different soil types, slopes, average rainfall areas and land uses in the region; and remedial action is undertaken across a spectrum of assets (land, water, biodiversity, coastal and marine).
- in BMRG, while surrogate water quality targets were not set from the 2005 SedNet modelling, the WQIP process is aiming to define targets by September 2006. SedNet modelling has been undertaken in the Burnett and Mary Rivers and this will be the basis for developing water quality targets.

Monitoring and modelling of the management actions that are being implemented in the regions to reduce sediment and nutrient input is a challenge. The regions are at various stages in this process and ongoing effort is required to ensure that the recommended best practices will work to halt the decline in water quality in the reef lagoon. Local water quality monitoring strategies are being developed and implemented across the regions to assist with the identification of effective land use practices within sub-catchments.

In relation to specific actions identified in the Reef Plan, Action H2 requires the incorporation of the water quality targets into the evaluation processes of the Reef Plan. The regional bodies do not view this as one of their responsibilities, but rather a responsibility of the Reef Secretariat through its reporting processes. However, regional NRM bodies have taken responsibility for running processes to identify and set a range of targets which is a significant achievement in itself.

Action H3 requires the identification of waterways, riparian areas and wetlands that are in good condition and should be preserved. Vegetation mapping (including that of wetlands and riparian areas) is near completion in all regions. This will provide the basis for the identification of waterways, riparian areas and wetlands that are in good condition and will also inform the prioritising on-ground works. The WQIP processes that are underway in all regions will also be used to identify waterways in good condition. The current activities include the following:

- in FNQ NRM, this is addressed through the devolved grants program e.g. incentives for landholders to protect riparian areas and through the WQIP processes for Douglas Shire and Tully catchment.
- in BDT, conservation priorities are currently being assessed and on-ground works and financial incentives are in place to conserve significant waterways, riparian and wetland areas.
- in MWNRM, all remaining wetlands are considered a conservation priority and education and on-ground works are directed to these areas.
- in FBA, conservation efforts are focused not only on areas in good condition, but also those that play a role in enhancing connectivity, in improving water quality and those that are in need of rehabilitation due to their poor condition.
- in BMRG, in-stream values of waterways are being identified.

Action H4 requires the identification of sub-catchment hotspots responsible for delivering sediment, nutrient and pesticides to the Reef. The current activities include the following:

- in FNQ NRM, hotspots have been identified for Douglas Shire and this work is being extended to the Tully River catchment.
- in BDT, high risk catchments have been identified (bank and gully erosion, and sediment and nutrient input) and on-ground works are targeted to these areas; the contribution of pesticides and contaminants from agriculture is being assessed; sediment and erosion on agricultural lands has been identified (e.g. hill slope erosion); contaminants in drinking water have been assessed; and SedNet modelling is helping to identify areas of streambank and gully erosion.
- in MW, water quality monitoring programs are to be established in high risk sub-catchments and this will assist in the identification of hot spots.
- in FBA, hotspots are being identified, but the focus is on priority neighbourhood catchments.
- in BMRG, processes to identify hotspots are underway e.g. hotspots for sediment and nutrient input are being identified by examining the impact of various land uses; and additional support is to be given to the identification and development of mitigation initiatives and community monitoring of hotspots.

Action H5 requires that wetland and riparian rehabilitation be a high priority in high risk Reef catchment areas. While the regional NRM bodies are not listed in the Reef

Plan as having a responsibility for this action, many activities are funded in all regions to improve wetland and riparian areas. For example:

- in FNQ NRM, some funding is directed to this as part of the Douglas Shire and Tully WQIPs.
- in BDT, several on-ground works are funded to rehabilitate wetlands and riparian areas. There are programs to raise community awareness and PMPs and BMPs are targeted to these areas in the agriculture sector. Work is being undertaken with the Department of Environment and Heritage (DEH) to develop decision support tools to help prioritise wetlands for rehabilitation. Priority is given to D condition lands (identified through remote sensing), which are seen as hotspots. The current aim is to rehabilitate 75% of wetlands and riparian areas to A condition by 2020. This is a high priority in the region.
- in MWNRM, all catchments in the region (except the Gregory River) are high priority and there is a focus on wetland and riparian rehabilitation in all priority catchments. The focus is on prioritising and rehabilitating “of concern” wetlands wherever they occur.
- in FBA, the focus is on protecting and rehabilitating regionally significant and state significant wetlands.
- in BMRG, the Burnett River is a high risk Reef catchment and wetland and riparian rehabilitation are high priorities. This is also addressed in the freshwater biodiversity and water resource programs

A further challenge for the regions relates to the form in which targets are written. There is considerable variation in the specificity of the targets that are set in relation to a wide range of water quality related practices. Some are general in nature and others more quantitative. For example, FBA’s management action targets are frequently written in terms of spatial coverage (e.g. retain a minimum of 30% cover on 95% of all land in the region within 15 years). FBA also has targets relating to measuring percentage increases in uptake (e.g. 20% increase in the number of landholders grazing sustainably by 2009). MWNRM identifies more general targets (e.g. farmers use industry agreed set of management practices that reduce soil and nutrient loss and land degradation). These varying approaches are in part a reflection of the information base and the lack of clear understanding of cause and effect relationships, particularly between land use practices and their impacts on water quality. It will be particularly challenging for the regions to develop more transparent RCTs and MATs. Integrated research and cross-regional coordination of activities will be critical in the refining of many existing targets and surrogate targets.

#### **7.4 WQIPs**

These planning initiatives under the CCI have gained considerable standing in regional body programming. They provide the opportunity for identifying issues, setting environmental values and water quality objectives, and defining priority actions to address risks. They will be tailored to individual circumstances in regions. The fundamental issue for WQIP work is their pilot nature (aerial extent, learning process, availability of monitoring results, maturity of partnerships etc.). While they represent a prime vehicle for region bodies to bring together a number of Reef Plan strategies and actions, their effectiveness will be reduced unless funding for implementation of current WQIPs and adequate resources to complete WQIPs’ coverage across all Reef catchments is ensured.

### **7.5 Going beyond the 'pilot project' and 'working with the willing'**

Many regional initiatives can be described as pilot initiatives. They have been based on a set of 'interims' including interim targets, interim best practices, interim priorities set from an interim assessment of key risks and values and so on. It will be critical to ensure the right leverage is applied to shift regional bodies' work on Reef Plan strategies in the next era, beyond the pilot project phase.

The pilot project phase is also characterised by processes of working mostly with the early adopters and 'the willing', and regional bodies acknowledge that this has been a workable and effective strategy in the initial stages of implementation of their NRM plans, enabling rapid progress.

However, future monitoring of the spatial distribution of the uptake of BMPs is necessary to ensure that identified hot spots for a range of factors (e.g. erosion, sediment and nutrient input) that are contributing to poor water quality in the Reef lagoon are being addressed. This information is essential to developing more strategic approaches to the implementation of management actions and may require more adaptive institutional structures as well as innovative approaches to involve the resistant and 'unwilling'. Thus in the second phase of implementation there is a need to target incentives and on-ground works to priority areas and to maximise the input of existing program participants. This will take a different set of resources and processes to go beyond this 'low hanging fruit' stage and achieve whole of landscape change.

Steps to ensure this leverage are contained within the Reef Plan strategies and range across monitoring to implementation. The critical component will be regional body capacity to deliver initiatives at the finer scale needed for real change. However, such leverage is a key outcome sought by the regions.

Some indicators of ways in which regional bodies are increasing their impact through aligning with other organisations and their initiatives might be:

- at the property level, the ratio of in-kind contributions to dollars funded.
- the ratio for industry contributions.
- the ratio for other organisations such as local governments and NRM funding for example for NRM resource officers dedicated to local governments in the region.

Local governments' capacity to support NRM public policy has to gain greater recognition and matching capacity. Local governments have a remarkable array of responsibilities for water quality going beyond point source wastewater and urban stormwater management, into pest management (groundcover related), devolved licenses and statutory planning. They have enforcement capabilities that complement the work of regional bodies and their active involvement can lend considerable leverage to regional work. Adequate regional frameworks are needed for their effective engagement (e.g. regional planning frameworks or 'clusters' of councils at a sub-regional scale).

### **7.6 Economic incentives**

Economic incentives (refer to section 5.4) are an important mechanism for delivering improved water quality outcomes in all regions. These incentive-based tools require co-contributions from stakeholders, either financial or in-kind. This approach,

however, is vulnerable, particularly to the vagaries of major climatic events such as cyclones, floods and droughts. For example, destructive cyclones may significantly affect a regional body's ability to encourage the uptake of BMPs and hence, to promote the 'multiplier effect' within their region. Landholders who are subject to these episodic events are likely to have limited funds available, perhaps over extended time periods, to devote to new and innovative approaches.

The importance of extraneous factors, which have a significant influence on the delivery of regional body actions and even the uptake of incentives packages, indicate the need for more flexible delivery of these programs. This may require the application of changed criteria for the application of incentives programs, such as the relaxation of the need for stakeholder contributions.

At this point, regional bodies are focused on linking NRM to productivity, and work on other incentive mechanisms or other outcomes from incentives is not so evident. Actions under this strategy aimed at economic incentives for greater commitment to conservation outcomes such as wetlands and riparian management at the property level are not evident.

Also not widely evident are efforts by regional bodies to seek philanthropic investment as a source of finance for the protection and rehabilitation of important wetlands, riparian and other remnant vegetation that has a direct relationship with water quality improvements in the high-risk reef catchments (Reef Plan's Action C9).

FNQ NRM is the only region that has some philanthropic investment. For example, Stanwell Corporation contributes funds through the schools program in the region. A bush heritage program is also in operation in this region. Activities in other regions are more limited, although BDT is investigating the possibility of corporate members of the board, encouraging landholders to target innovative funding schemes to implement beneficial works (e.g. Rolex and Myer etc), and corporate sponsorship (e.g. Comalco). Initiatives at this level in relation to economic incentives (including philanthropic investment) may require greater policy support and market-based strategies.

Also not widely evident is the requirement under Strategy C of Reef Plan (Economic incentives), Action 5 for regional NRM bodies to investigate the potential of planning systems to be linked to preferential access to government financial support programs, funding from regional NRM bodies and the like. This is not currently a priority of any of the regional bodies and is not a funded activity. They are all in the initial stages of developing property management plans with landholders and have not taken the next step in linking these to preferential access to funding.

Similarly for Strategy C (Economic incentives), Action 6, which identifies regional NRM bodies as having a responsibility to implement programs to establish conservation agreements and covenants to ensure protection and management of a range of resources (e.g. riparian vegetation and wetlands) that produce water quality outcomes for the Reef. Uptake of this initiative is limited to the following:

In BDT, this is not a priority, although a recent BDT forum (2006) has examined different incentive mechanisms and the results of this investigation will guide the board in its future investment.

In MWNRM, there are no programs that support covenants, although support is provided for more voluntary schemes such as Land for Wildlife and voluntary conservation agreements (of which there is a high uptake).

FBA has funded initiatives to help establish nature conservation covenants that are expected to improve water quality outcomes. Covenants are promoted by providing a higher level of funding or incentives to landholders who agree to movement beyond voluntary conservation agreements to more formal regulatory approaches.

Strategy C (Economic incentives), Action 8 identifies regional NRM bodies as having a responsibility to implement a pilot action program that targets the conservation of wetland, riparian and other remnant vegetation that has a direct relationship with water quality improvements in high-risk Reef catchments. This is currently not a priority in the regions and has an overall low alignment with the Reef Plan. However, FBA has a pilot project underway and will monitor the success of this project.

### **7.7 High risk catchments and spatial prioritisation of works**

The Reef Plan's geographic emphasis on high-risk catchments is not evident in the regional NRM plans and investment strategies at this stage. The regional bodies view almost all of their catchments as high risk and hence in compliance with the spirit and intent of the Reef Plan.

Regional bodies indicated that in general their strategies focused on 'working with the willing'. Anecdotal evidence seemed to indicate that this was a mechanism for expanding awareness to other landholders (i.e. those not directly involved in property management planning and incentive funding) who may then voluntarily implement improved practices. As a long-term strategy this may be effective. However, in the short term, financial incentives and on-ground works that are not targeted to priority areas may not deliver the water quality outcomes identified in the Reef Plan.

The spatial prioritisation of on-ground actions and the related allocation of financial incentives is a major challenge for regional bodies. Similarly, a key challenge in the review of the Reef Plan will be the clarification of the high-risk catchments and the justification for the areas selected. Opportunities exist for this to be achieved in collaboration with regional bodies and it is expected that the developing WQIPs will begin to address priority areas and that improved modelling will enhance confidence in the areas identified as priorities.

### **7.8 Sharing the knowledge and lessons learnt**

Education and extension will become more critical as the results of the collaborative research projects and monitoring and evaluation projects (e.g. water quality and land uses) become available and are incorporated into adaptive management frameworks to improve natural resource management outcomes. Regional bodies are enthusiastic about engagement in education and extension, but expressed concern at the state agencies' 'retreat from extension'.

The expertise and experience of staff in several state agencies is an important resource and while some of these staff have moved to the regional bodies, the concern was expressed that the knowledge and skills of this ageing workforce may be lost.

**"We are filling the gap created by the government's retreat from extension!"**

Consideration needs to be given to improved workforce planning to ensure the effective transfer of knowledge thus enabling the maintenance of a high level of expertise in the delivery of education and extension efforts. Staff turnover within regional bodies is another concern, particularly the loss of experienced staff. Thus strategies to build the capacity and expertise of regional body staff who are engaged in extension work are crucial to the success of several on-ground programs.

In addition, cross-regional work may not be a panacea for all regional concerns. However, there are some projects in research and best management practices which are best conducted as cross-regional exercises where regions are willing and able. Cross-regional collaboration is already occurring for WQIPs and this includes BMPs for specific industries. The focus of cross-regional collaboration would also benefit initiatives such as market-based mechanisms as well as monitoring frameworks.

Information and an aware community are the basis of change. Regional bodies are acting as regional information centres in most instances. They are able to collate essential information and to package it to address regional or individual needs. This role is powerful. This role combined with well developed and well marketed research and development strategies, ensures regional bodies gain capacity, particularly to act as 'myth-busters' (e.g. 'there's no real sediment problem from cane'), to refine targets and set future directions and to test solutions for their effectiveness.

## **7.9 Framework for NRM**

Local governments and their related planning and development assessment processes are seen by the regional bodies as an important vehicle to deliver improved NRM outcomes. Progress has been significant in terms of improved pest management strategies, managing acid sulfate soils, stormwater and infrastructure management, but there is a need to move beyond this and to develop local government capacity to integrate NRM issues into strategic planning processes and planning instruments that can deliver more sustainable outcomes. In this context, a number of projects are now underway (refer to section 7 Big insights) and ongoing cooperation and coordination of these activities will be crucial.

An additional challenge for participants – industry, community and governments – is to develop a common and agreed framework for sustainable NRM and a range of tools within which the regional bodies can deliver improved self-management approaches incorporating best management practices. For example, if this were possible, future state-level policies relating to NRM (e.g. wetlands, waterways, and biodiversity) would provide the statutory framework in which to develop improved codes as well as the identification of 'valuable features' and 'desired environmental outcomes' in local government planning schemes.

There are also opportunities to promote a greater range of mechanisms including market-based mechanisms that have not been actively pursued by regions at this point.

Environmental flows and the continued threat of further impoundments impacting on water quality (though their sediment capture role) is acknowledged by the regional bodies. There is a greater need for integrated NRM planning to ensure resource use is assured within a framework of ecological objectives for in-stream and marine environments. The issue of climate change makes this need more critical.

### **7.10 Traditional Owners and Indigenous land use agreements (ILUAs)**

Traditional Owner engagement is in its initial stages in all regions; although some regions are demonstrating strong Traditional Owner direction-setting around 'caring for country' programs (refer to section 6 Big initiatives). For example, FNQ NRM, BDT, MWNRM and BMRG have established management committees or reference groups with representatives from key Traditional Owner groups and protocols to facilitate engagement. FBA work with the Fitzroy Basin Elders, a group of Traditional Owners and historically associated Indigenous leaders from the region.

While there are many obstacles that may impede progress in Traditional Owner engagement at the regional level, regional bodies have recognised that caring for country and managing culture are integral to achieving NRM outcomes. They are issues that cannot be dealt with separately or in isolation. Caring for culture is about caring for country and support for such programs will provide improved NRM outcomes. Hence it is important to develop structures and mechanisms to record Traditional Owner knowledge and to incorporate this into NRM plans and programs.

Reef Plan identifies regional bodies as having a responsibility for the development of ILUAs (Strategy D: Planning for Natural Resource Management and Land Use, Action 11). There was a unanimous response from the regional bodies that this was not seen as a priority relevant to their region. In some cases, it was not seen to be their responsibility, as regional bodies have no legislative basis on which to negotiate such an agreement. Hence the involvement of the regional bodies in this process was not clear.

Despite the lack of progress towards developing ILUAs, all regions are involved in a comprehensive range of actions and funded projects to identify Traditional Owner values and interests, implement on-ground works, build capacity and raise awareness.

Conscious and effective engagement of Traditional Owners relies on several considerations, which have relevance to regional bodies:

- relationship building at community level and emergence of self-managed Traditional Owner structures enabling engagement.
- respect for Traditional Owner knowledge systems and culture and support for an interface with non-indigenous NRM frameworks.
- multi-agency collaboration around NRM as a primary vehicle for indigenous aspirations to be identified and met.
- time and patience and a community commitment to the economic and cultural well-being of Traditional Owners.

While progress towards effectively engaging Traditional Owners varied across the regions, significant progress has been made towards these goals since the beginning of the regional NRM planning process. In some cases, regional bodies have delivered outcomes that agency staff have been unable to deliver in their various NRM-related planning activities.

### **7.11 Integration of a wide range of knowledge frameworks**

Related to the challenge of data acquisition and sharing (refer to section 7.2) is the allied issue of ensuring all key stakeholders are appropriately integrated into the decision making processes in each region. There needs to be strong input from scientists into the planning processes in all regions. This is necessary to ensure that there is detailed understanding of water quality issues in relation to threats, causes, impacts and effective solutions. It is also important to ensure that future research which is undertaken in the regions is related to the priorities of the regional bodies and their activities in achieving the water quality outcomes of the Reef Plan. It is difficult to assess whether current research activities are directly contributing to these outcomes.

Scientific activity is variable across the regions, with FNQ NRM and BDT engaged in extensive research activities and other regions indicating a lesser ability to attract sufficient research funding. As indicated in section 5.5 this may be related to the higher research funding that is provided to NAP regions. Further, while many Reef projects are funded, these tend to concentrate on the northern section of the Reef and do not, for example, extend south to the Burnett. It is thus crucial that research funding be directed to areas and issues of priority. More collaborative research activity throughout the regions will also facilitate the development of water quality targets in each region.

However, in addition to science-based knowledge there needs to be appropriate mechanisms for Traditional Owners, individual landholders, industry and local governments to input their considerable knowledge into the planning process. Opportunities exist at several levels to facilitate partnerships with a wide range of stakeholders. In addition there needs to be recognition of the need for improved decision making which is based on relevant criteria such as:

- convergence which encourages a diversity of views and opinions.
- systems thinking which means dealing with fuzzy boundaries and developing appropriate temporal and spatial scales.
- synthesis of knowledge which is based on trans-disciplinary approaches.
- ‘what if’ scenarios which encourage thinking forward and laterally about issues.

It is within this framework that decision support tools may play a role in enhancing NRM decision-making. Such processes have been implemented in FBA’s initial NRM planning process and priority target setting processes.

### **7.12 Operational level**

At the more operational level, the key drivers to progress regional body initiatives from an initial level of achievement to a more comprehensive achievement can be summarised as:

- ongoing refinement of priorities to deliver a landscape-wide approach to water quality improvement based around high risks and priority areas.
- continued development and improvement, through research and development and partnerships, of the framework (and substance) of BMPs for different regions and different capacity levels.
- continued refinement of the incentives programs and effective monitoring of ‘adoption rates’ in relation to desired changes.

- appropriate resourcing to deal with existing shortfalls in monitoring and predicted shortfalls in extension staffing.
- more comprehensive research and development and regional body uptake of social and economic as well as ecological aspects of NRM.
- incorporation of urban and coastal priorities with the predominantly rural agenda of NRM.

### **7.13 Uncertain futures**

There is a degree of uncertainty that is evident in the regions about their long term future, funding sources and staffing needs. It should be acknowledged that regional body staff have complex tasks to undertake, requiring transdisciplinary skills, a sound scientific knowledge, the ability to translate this information to workable on-ground actions, and to communicate and facilitate engagement with stakeholders. Their work is demanding and the regions have attracted a core staff, who are committed to improving NRM outcomes. A critical challenge for the regions is to build the capacity of their staff, to ensure appropriate training and adequate resources to minimise burnout and loss of staff.

Inequitable funding was cited by the regional bodies as a contributing factor in relation to the extent of their future uncertainty. There were perceived inequities between the NAP and Trust funded regions, with the belief that major opportunities to deliver on the Reef Plan were not eventuating due to under-funding in some regions. A key opportunity for future funding is to ensure that it is geared more to outcomes rather than the funding sources available from the Commonwealth Government.

## 8.0 Reporting arrangements

At the state and Commonwealth level, managing the reporting from all agencies and bodies involved in Reef Plan implementation has been a critical need. The same challenge exists where regional bodies with specific responsibilities under Reef Plan are endeavouring to report progress.

This evaluation exercise, with its development of a framework of strategies and its review of regional bodies' actions under their RIS and NRM plans, provides initial insights for comprehensive reporting. The exercise produced a wealth of insights into the types of actions and the funding dedicated to these. The main task from here is the need to systematise reporting to meet a number of criteria. These criteria would include:

- simplicity of reporting frameworks.
- qualitative and quantitative data.
- ease of input and transfer.
- meaningful collation of data.

ViSTA is the regional body reporting framework which is currently under development. At this stage, one useful reporting mechanism would be the use of a 'tagging' facility for those regional body projects directly or indirectly supporting Reef Plan for incorporation into Reef Plan reporting at state level. The activities included in Appendix 3 'Evaluation of regional NRM plans and RISs against Reef Plan actions' have been discussed with the regional bodies for this purpose and should form the basis of the reporting to State and Australian Government agencies. This initially simple form of tagging for reporting against Reef Plan strategies and actions could be built upon over time, for example to enable reporting on progress over time in terms of funding or to group the funding and activities under specific actions for all regional bodies in the Reef catchment.

In the evaluation exercise, regional bodies gave their full support to the integration of reporting requirements for Reef Plan into their routine progress reporting. They supported the tagging facility as a first step.

As ViSTA is under development and awaiting release of reporting formats, the detailed mechanisms for tagging would need to be negotiated with the ViSTA technicians.

## 9.0 Recommendations and conclusions

Our review of the five NRM regional plans in Queensland Reef catchments has revealed a diversity of approaches to improving water quality, with some regions more advanced than others. The sharing of information and knowledge among regions is already happening, and represents an important step to overcoming some of the limitations of the NRM plans. Where information is lacking cooperative research partnerships between the regional bodies, government agencies, research institutions, universities and other stakeholders will be a key initiative. Collaborative partnerships are being built between the research community and regional bodies. However, a more integrated planning framework is needed if significant threats and pressures are to be addressed and target setting and priority setting refined. Spatial priority setting is paramount as a mechanism to guide NRM investment. This needs an understanding of the source areas of threats, the level of risk attached to the threat, its possible cumulative effects, cost of mitigation and likely effectiveness. A clear understanding of these linkages and issues will help to guide strategic investment.

Future efforts will need to move beyond the pilot project to more substantial and on-going funded initiatives. However, this report has identified an impressive range and level of activity that is being funded and that the regional bodies are, in the main, covering their wide spectrum of their responsibilities as identified in the Reef Plan and in many instances are achieving well beyond their stated responsibilities.

In order to continue progress, we recommend relevant parties undertake the following:

- continue collaborative approaches between government, rural industries, research organisations and regional bodies to progress building the understanding Reef lagoon resource condition targets.
- continue to refine priorities to deliver a landscape-wide approach to water quality improvement based around high risks and priority areas.
- provide adequate support and funding for data provision, interpretation and management and agree on sequencing and priorities of tasks relating to data;
- provide appropriate resourcing to deal with existing shortfalls in monitoring and predicted shortfalls in extension staffing.
- provide adequate support for implementation of WQIPs currently being developed and for further development and implementation of plans for remaining waterways within the Reef catchment.
- continue to develop, through research and development and partnerships, the framework of BMPs and property level plans for different regions and different capacity levels.
- with regional bodies and industry groups, monitor the spatial distribution of the uptake of BMPs to ensure that identified hot spots that are contributing to poor water quality in the Reef lagoon are being actively addressed.
- in collaboration with lessons from other jurisdictions, continue to develop strategies to improve engagement of those landholders and resource managers not actively involved in the early phases of regional body activities.

- continue to refine incentives programs and effective monitoring of 'adoption rates' in relation to desired changes.
- retain the flexible approach by regional bodies to incentive programs to reduce the impact of extraneous factors on the uptake of programs.
- evaluate level of alignment of regional body initiatives against other programs e.g. wetlands program.
- incorporate urban and coastal priorities with the predominantly rural agenda of NRM.
- facilitate transfer of knowledge and experience regarding strategies for engaging with Traditional Owners amongst regional bodies and between regional bodies and government agencies.
- continue to support regional bodies to integrate information from a wide range of knowledge frameworks.
- continue to work with local governments to ensure capacity to integrate NRM issues into strategic plans and other planning and development assessment instruments.

This first era of initiatives to improve Reef water quality through regional body efforts has delivered the vital foundation work to meet the challenges. Regional bodies have demonstrated their status as core contributors to the success of Reef Plan.

The size of the Reef Plan challenge however is considerable and regional bodies have a good deal to do to advance beyond this foundation work, to adapt, consolidate, address gaps and target efforts to the risks and resources available.

Demonstration of change in resource condition, regionally and at whole of Reef scale, may take decades. Having adequate time to implement is a core challenge, together with ensuring the appropriate direction-setting structures for whole of Reef action and for regional delivery.

## 10.0 References

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