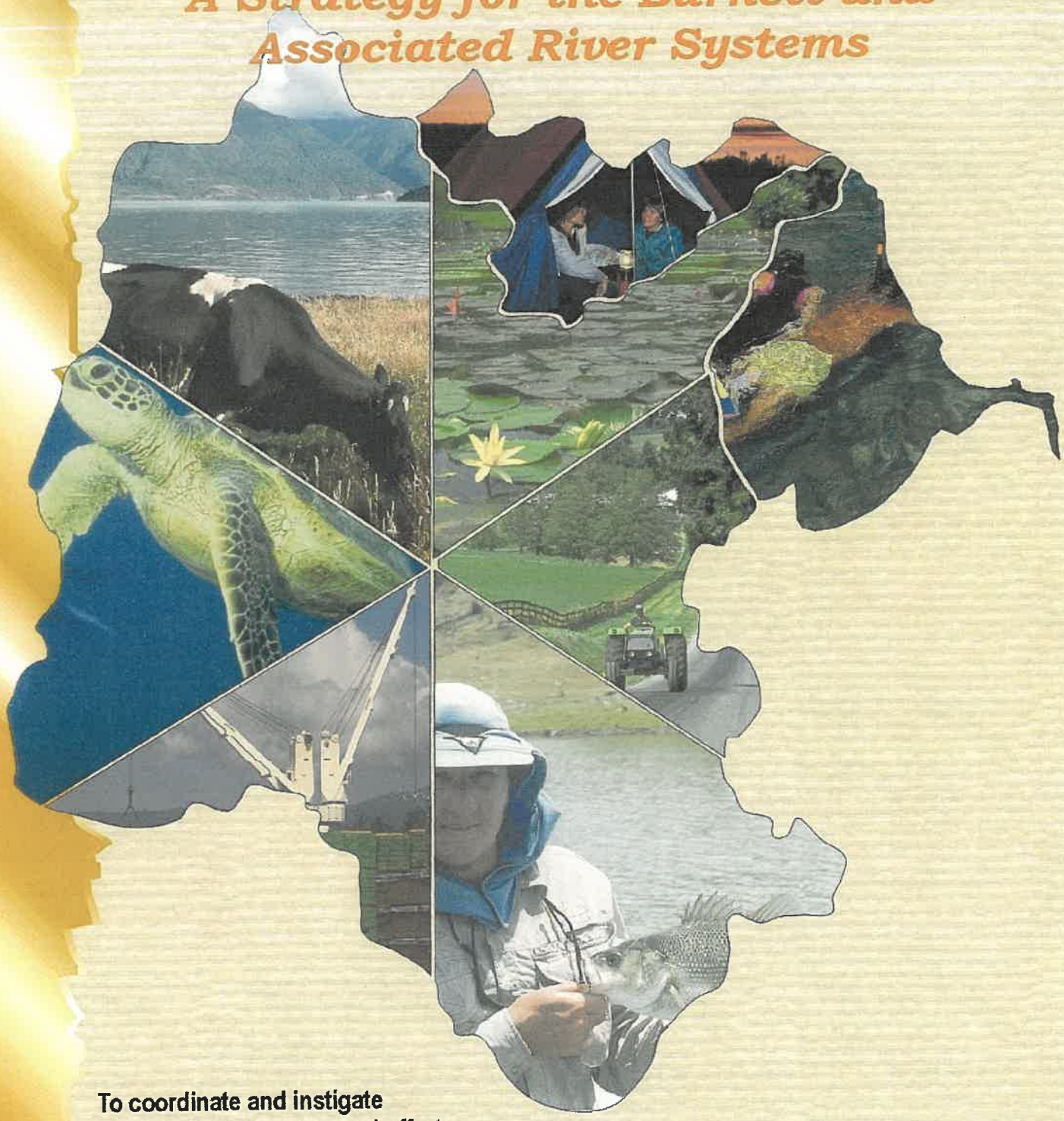
The Burnett Catchment Strategy

A Strategy for the Burnett and Associated River Systems



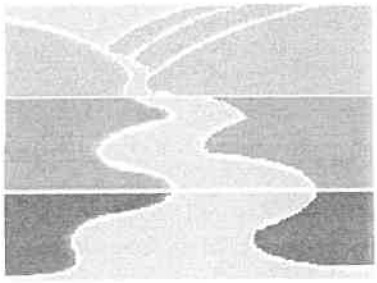
To coordinate and instigate community awareness and effort to maintain ecologically and economically sustainable river systems in the Burnett - a coordinated approach to the management of land, water, vegetation and biodiversity.

CATCHMENT MANAGEMENT LANDCARE QLD

Sept 2000

The Burnett Catchment Strategy

Burnett Catchment Care Association INC



Integrated Catchment Management
for the Burnett

Members of the B.C.C.A. would like to acknowledge the contribution made to this document by the

Environmental Protection Authority
Department of Natural Resources
Department of Primary Industries
Industry and Special Interest Groups
Local Government Associations
Natural Heritage Trust
Widebay 2020

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Executive Summary

The process to develop this strategy began in 1995 and demonstrates the vision and the commitment of the community for the sustainable use of the catchments natural resources. It has involved a collaborative partnership between the Burnett Catchment Care Association (BCCA) and other interests including State and Local governments, industry, community, specialised and business groups, and individual landholders within the Burnett Catchment.

In providing a long-term framework to guide present and future generations in undertaking natural resource management, the Strategy recognises that the most successful plans are those which are embraced and implemented by the catchment community as a whole. This includes landholders, Landcare and catchment groups, rural industries, environmental groups, Indigenous Australians and the Commonwealth, State and Local Governments.

Our goal is *To coordinate and instigate community awareness and effort to maintain and improve an ecologically and economically sustainable Burnett Catchment River Basin.* The BCCA is, therefore, challenged and committed to the complexities of this region for the future benefit of all who live and work in our catchment. The *Burnett Catchment Overview* in Section 3 of the Strategy shows evidence of the great diversity of the catchment. While the landforms, geology and soil types of the Burnett are very diverse and give rise to a variety of industries, the natural resources so vital to the development of successful production, are directly affected by the way they are used and managed. In the same way, the water quality of our rivers and streams are a reflection of the way we manage the land.

The Strategy prioritises required actions within the nine key issues for community concern which relate to natural resource management and catchment management planning. These include: Communication; Education and Awareness; Research; Land Use and Management; Biodiversity Management and Enhancement; Riparian Zone Management; Water Access, Quantity and Environmental Flows; Water Quality; and Pest Management. The incorporation of these themes and associated goals, within the Strategy makes it a useful tool for guiding the decision making and activities of landholders (urban and rural), industry groups and government – in other words, all the 'users' of our natural resources.

The *Proposed Strategies* in Section 4 of the document, while listing and prioritising the relevant actions, focus on desired outcomes for each theme. This, together with the methodology associated with each theme, provides a positive guide and direction for carrying out onground implementation measures.

The release of this document is testament to the enduring commitment of all participants to maintain a voluntary cooperative climate to manage our natural resources. This pathway will not be easy; however, by taking responsibility for the impacts of human settlement, we will understand and create a focus and a vehicle for sustainable natural resource management for our catchment.

Jan Darlington

Chairman - BCCA **September 2000**

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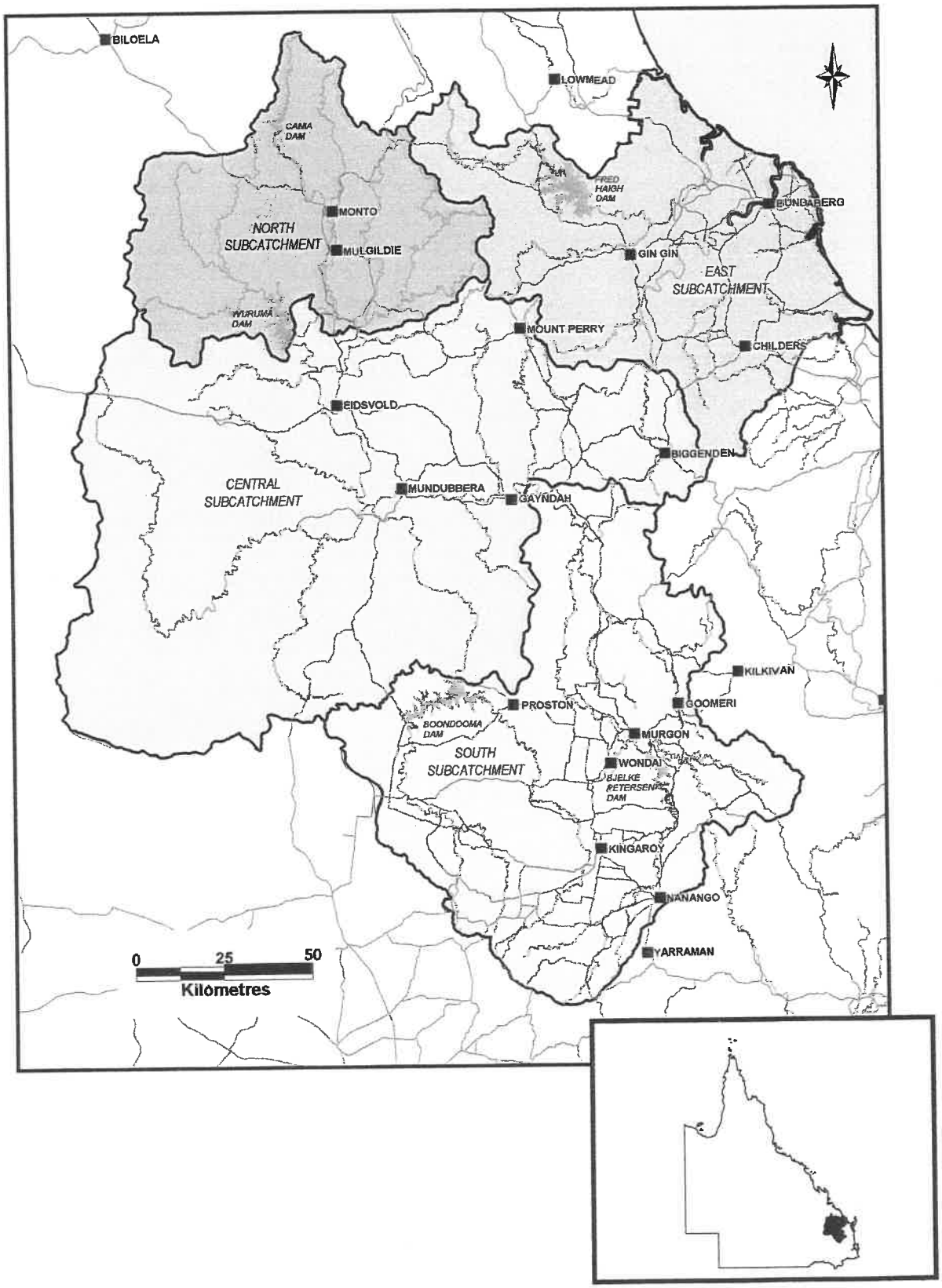

Burnett Catchment Care association Inc To coordinate and instigate community awareness and effort to maintain an ecologically and economically sustainable Burnett and associated river system.

1.0 INTRODUCTION

1.1 WHAT IS INTEGRATED CATCHMENT MANAGEMENT

1.1.1 Queensland Context

Integrated Catchment Management (ICM) is a philosophy that encourages a coordinated approach to the management of natural resources in Queensland. Its overall purpose is to integrate the management of land, water and related biological resources in order to achieve their sustainable and balanced use.

ICM involves the voluntary actions of stakeholders including government, rural landholders, industry, fisheries and urban dwellers that incorporate the goals of achieving and maintaining a healthy catchment for future generations.

The implementation of ICM in Queensland is being guided by the *State Integrated Catchment Management Policy*.

The Burnett Catchment Strategy:

- provides a framework for fostering cooperation and coordination between the many landholders and other resource users, community groups and government agencies;
- is dependent on landholders, the community and government having a coordinated catchment-wide approach for addressing issues affecting them;
- encourages all people who use or manage land and water resources to use practices which maintain, restore or improve the quality and productivity of those resources;
- recognises that there will be many situations where existing groups and organisations can address important environmental problems.

1.1.2 Burnett Catchment Context

1.1.2.1 Formation of the Burnett Catchment Care Association

The Burnett Catchment Care Association (BCCA) was initiated in 1994 when a number of concerned citizens formed an Interim Steering Committee to facilitate the formation of a catchment care group. This steering committee was aware of the need to address natural resource management issues on a catchment approach instead of a Shire or locality basis.

By October 1995 this interim steering committee had become the Burnett Catchment Care Association.

1.1.2.2 Structure and Membership of the Burnett Catchment Association

To facilitate community involvement and input, the BCCA adopted a management structure of an umbrella management group referred to as the BCCA Committee and four sub-catchment groups. Sub-catchment groups comprising of interested community members were established in the northern, southern, central and eastern sectors of the catchment.

Each of the sub-catchment groups are responsible for communicating with the wider community, seek member representation from the local area, identify catchment and local issues, and develop project action plans and funding applications. The sub catchment groups are not separate incorporated bodies from the parent body BCCA to manage projects.

Each of the sub-catchment groups has four elected members, which contribute to the BCCA Committee. The BCCA Committee also includes four State agency representatives one from each of the Departments of Natural Resources, Primary Industries, Environmental Protection Agency and Communication, Information, Local Government and Planning. An outline of structure and a listing of BCCA membership are presented in Appendix A.

1.1.2.3 Role of the Committee

The BCCA's primary objective is to involve all stakeholders in the development of a Catchment Management Strategy which considers economic, social, environmental and cultural issues in the sustainable use and management of the catchment's natural resources. *Catchment* includes the Burnett River and the associated river systems. Figure 1 illustrates the location of the Burnett Catchment. Since its formation, the BCCA has forged strong linkages with the fourteen (14) Local Authorities contained within the catchment as well as peak industry bodies and community groups such as Landcare, regional planing and economic development groups and environmental groups. These linkages have allowed for a significant stakeholder involvement and contribution to the development of the Burnett Catchment Strategy. The process used to develop the Catchment Strategy is outlined in Section 2.0.

2.0 METHODOLOGY

2.1. DEVELOPMENT OF THE STRATEGY

One of the major tasks of the Interim Steering Committee was to decide on how the Burnett Catchment should be split up, given its vast geographical distance, so that catchment management issues could be addressed not only at a subregional level, but also through a 'whole of catchment' perspective. Discussion and debate led to the formation of four subcatchment groups: North; East; Central and South. The basis for boundary consideration was principally geographical (landform, soils, vegetation); however, land use practices were also more consistent within those subregions.

A Burnett Catchment Technical Advisory Group was formed in 1997 to assist in boundary identification and in advising the group on technical issues relating to the catchment. The Technical Advisory Group disbanded after about a year as their relevance as a 'technical group' was not then required; rather, a network of key people to assist where necessary formed the basis for future advice when required.

The BCCA's role was, and continues to be, a vehicle for public involvement on natural resource issues within each subcatchment, as well as catchment wide. Issues would be passed up to the Burnett Catchment Care Association for their advice and action, and information was relayed back to the subcatchments. The intention of each subcatchment was to meet normally monthly, and to seek as much representation as necessary from community, industry, landcare and individual landowners to address and participate in resource management.

One of the initial tasks of the subcatchments was to hold workshops in various locations in 1997 around the Burnett to ascertain what issues were of concern in the Burnett. Findings from those sessions are contained in Appendix B. The subsequent follow up of those issues into a catchment overview and the foundations of the Catchment Strategy did not occur till late 1998 due to many factors.

The framework for the Draft Burnett Catchment Strategy and subsequent identification of themes was developed through various means. Initially, a strategic planning workshop was undertaken in July 1997 to look at a draft business plan and a draft outline of the Catchment Strategy. A very early draft was circulated for comment, mainly focusing on the vision and goals of the group.

Greater emphasis on the development of the strategy, particularly the catchment overview or environmental audit, began in 1998. A literature review of existing strategies in both Queensland and nationally, created a draft framework on which to focus. Subsequent working group sessions identified the most suitable framework to use including the development of themes and strategies. A Regional Strategy Development Guide was also made available in 1999 to assist in framework content. The recent completion of a catchment overview or environmental audit to identify issues at subcatchment level, was also used at regular working group sessions to identify key issues and what strategies or actions were needed to address the identified problems.

2.2. RELATIONSHIP TO OTHER STRATEGIES

The development of the Burnett Catchment Strategy, key issues and proposed outcomes has taken into consideration existing planning studies or other strategies which are already in place within the catchment. The Catchment Strategy lies between several layers of planning documents from property level at the lower end of the spectrum, where Land and Water Management Plans, for example, have been developed for individual properties, to the higher spectrum, such as Regional Growth Management Plans (Wide Bay 2020).

The integration, coordination, and use of existing strategies, planning documents and studies, will enable the Catchment Strategy associated with regional planning to achieve the best outcome for the catchment as a whole. (Table 1) The strategy working group was comprised of community members who were able to ensure key issues could be addressed at the local level, as well as government representatives from DPI, EPA, DNR and DCILGPS who were, and are, involved in other regional planning developments.

Catchment strategies are not statutory planning tools. This strategy, like other catchment strategies, encompasses the views of the community at large, how and what they perceive as a catchment approach in achieving sustainable catchment management.

Implementation of this non-statutory document will focus on:

- encouraging local authorities to adopt the ICM philosophy practice in their planning schemes under the *Integrated Planning Act*
- the adoption of prioritised strategy actions in their annual operations plans, by district agencies of government or industry
- involving relevant industry groups, wider community and landholders in identifying high priority issues within the catchment and at a local level and targeting those issues into onground works.

Table 1 Links between other strategies, planning and resource studies and the Burnett Strategy

National Level	• National Water Quality Management Strategy • Managing Natural Resources in Rural Australia for a Sustainable Future - A Discussion Paper (AFFA 1999) • Environmental Indicators for National State of the Environment Reporting – Series (CRC Soil and Land Management 1999)
State Level	**Regulatory Planning** • *Integrated Planning Act* • *Water Resources Act* • *Lands Act* • *Nature Conservation Act 1992* • *Cultural Record (Landscapes Queensland and Queensland Estate) Act 1987* • *Queensland Heritage Act* • *Vegetation Management Act* • *Native Title Act* • *Rural Lands Protection Act*

	Growth Management and Economic Development **NRM and biodiversity Conservation Planning** • *Queensland's Weeds and Pest Animal Strategy* DRAFT (DNR 1999) • *The Conservation Status of Queensland's Bioregional Ecosystems* (Sattler and Williams 1999) • *State of the Environment Queensland* (EPA 1999) **Resource Condition** • *Testing the Waters – A Report on the Quality of Queensland's Waters* (EPA/DNR 1999)
Regional Level	**Regulatory Planning** • Central Queensland Coastal Management Plan **Growth Management and Economic Development** • Wide Bay 2020 Regional Growth Management Framework • DRAFT Burnett Inland Economic Development Organisation Strategy **NRM and Biodiversity Conservation Planning** • Burnett/Mary Regional Strategy • Resource Allocation • SEQ Regional Forestry Agreement • DNR Regional Infrastructure Development Studies of Proposed Dams • Burnett Tree Clearing Guidelines (Leasehold)
Catchment Level	**Regulatory Planning** • Local Government Planning Schemes **Growth Management and Economic Development** **NRM and Biodiversity Conservation Planning** • WAMP Reports: *Burnett Basin Condition & Trend Report* (DNR 2000) *Burnett Basin WAMP: Current Environmental Conditions and Impacts of Existing Water Resource Development* Vol I & II (TAP 2000) *Burnett Basin WAMP: Proposed Environmental Flow Performance Measures* & App (S Brizga & Assoc, 2000) *Burnett Basin WAMP: Indigenous Cultural Report* (DNR 2000) *Burnett Basin WAMP: Social Assessment Report* (Draft) (DNR 2000) *Burnett Basin WAMP: Economic Situation Report* (Draft) (DNR 2000) *Burnett Basin WAMP: Existing Entitlement Case Assumptions & Data for the Burnett/Kolan River System* (Draft) (DNR 2000)

	• *Burnett River Catchment Overview Study* (Sinclair, Knight, Merz 1999) • *Overview of the Burnett River Catchment Flora and Fauna* (WBM Oceanics 1999) • *Assessment of the Ecological Condition of the Burnett River using Macroinvertebrates as Bioindicators* (DNR 1999) • *State of the Rivers: Burnett and Major Rivers* (DNR 1999) • Pest Management Plans for all 14 Councils (in progress) • Recovery Plans for Endangered Species including *Alectryn ramiflorus; Carretta caretta* • Platypus Population Monitoring Programs – Baselines Investigation (Gunninah Environmental Consultants 1997) • *Freshwater Turtle Populations in the Area to be Flooded by the Walla Weir* Baseline Study (EPA 1997) • *A Riverine Fisheries Resource Assessment of the Burnett River Catchment in the Wide Bay Burnett Region of Queensland* (DPI/DNR 1999) • *An Estuarine Fisheries Resource Assessment of the Burnett River Catchment in the Wide Bay Burnett Region of Queensland* (DPI/DNR 1999) • *Preliminary Surveys for Nesting Sites of Freshwater Turtles in the Walla Weir* (Tucker 1999) • *Aquatic Macroinvertebrate Monitoring and Assessment Program for Walla* Weir (EPA 1999) • Walla Weir Baseline Study (DNR 1997) • Lungfish and General Fisheries Surveys in the Burnett River (DPI 1997) • Walla Weir Irrigation Project Burnett River Platypus Population Monitoring Program (DPI 1997) • Walla Weir Vegetation Survey (EPA 1997) • *Aquatic Flora of the Burnett River* in Relation to Walla Weir Post Construction Phase (DNR 1998) • *Study of the Aquatic and Semi-Aquatic Flora of the Burnett River in relation to the Walla Weir* (DNR 1998) • Various Land Resource Use Studies and Soil studies (DNR) **Resource allocation** • DNR Regional Infrastructure Development Studies of proposed dams • Burnett WAMP – to be completed • Burnett Tree Clearing Guidelines (Leasehold)
Property Level	**NRM and Biodiversity Conservation Planning** ▪ Land and Water Management Plans (as required)

Future adoption of studies currently being undertaken

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3.0 BURNETT CATCHMENT OVERVIEW

3.1 INTRODUCTION

The Burnett River Catchment starts in the Bunya Mountains south west of Kingaroy and runs some 400 kilometres to discharge into the sea at Burnett Heads. The Burnett River, together with the associated systems of the Elliott, Gregory and Kolan Rivers, covers a land area of 33, 150 square kilometres. The Catchment includes 15 Local Governments including the Shires of Monto, Perry, Eidsvold, Mundubbera, Gayndah, Biggenden, Wondai, Murgon, Cherbourg, Kingaroy, Nanango, Kilkivan, Kolan, Isis, Burnett and the City of Bundaberg. Bundaberg is the major city in the catchment with other towns being Kingaroy, Nanango, Kumbia, Wondai, Murgon, Cherbourg, Proston, Goomeri, Gayndah, Biggenden, Mundubbera, Eidsvold, Monto, Mount Perry, Gin Gin, Childers and Bargara. The Catchment has a rich diversity of natural resources. This chapter presents an overview of the occurrence and status of these resources, how they are currently being utilised and what needs to be done in the future for their sustainable use. It also presents an overview of some of the human influences that have impacted on the use and management of the catchment's resources.

3.2 NATURAL RESOURCES

3.2.1 Soils

The Burnett Catchment consists of a complex variety of landforms, geology and soil types. The soils of the entire catchment have been investigated and land resource assessment projects have been undertaken. While the majority of these land resource assessments have been undertaken at a land systems scale, in a number of areas of the catchment more detailed soils information is available for certain areas of the catchment, generally along the major rivers. An overview of available land resource/soils information for the Burnett Catchment is presented in Table 2.

Table 2 Existing Land Resource Information for the Burnett Catchment

Geology	Land Systems Surveys	Soils Surveys
1:250 000 scale – whole of catchment 1:100 000 scale	• Land Resources of the South Burnett region (Vandersee and Kent, 1983) • Land Resources of the Burnett Region Qld Part 3 North Burnett (Donnollan and Searle, 1999) • Land Resources of the Central Burnett Region (Kent – in preparation) • Understanding and managing soils in the Inland Burnett District. Resource Information. (G.K Smith and D.J. Kent) Scale 1:500 000	• Soils and irrigation potential of the Ceratodus area, Eidsvold (Kent, Sorby, Reid 1989) • Soils of the Central Burnett area Qld (De Mooy, et al. 1977) • Auburn River Irrigation Suitability Study (Wilson and Sorby (1991) • Soils of the Riparian Lands of the Burnett River between Mundubbera and Gayndah, Queensland : Suitability for Irrigated Agriculture (Tucker and Sorby, 1996) • Land Units of the Creek Alluvium and South Eastern area of the Three Moon Creek catchment (Donnollan and Searle, undated) • Soils and Irrigated Land suitability of the Bundaberg Area, South East Qld (Donnollan, Wilson, Zund and Irvine, 1998)

Geology	Land Systems Surveys	Soils Surveys
1:250 000 scale – whole of catchment 1:100 000 scale		• Soils and agricultural suitability of the Childers ara Queensland (Wilson, 1997) • Soils of the Barker-Barambah Ck irrigation feasibility study, Byee area (Reid, 1979) • Soils and irrigated land suitability of the Bundaberg area, Southeast Queensland, 1998 • Agricultural land resource assessment of Coalstoun Lakes, Queensland (McCarrol and Brough, 2000) • Land attributes and agricultural suitability of the Burnett River Riparian Lands, Gayndah-Perry River area (McCarrol and Brough, 2000) • Soils and agricultural suitability of the South Burnett agricultural lands, Queensland (Sorby and Reid, in preparation)

These survey reports contain detailed information on the attributes and limitations of the soils for the sustainable production of a range of crops. Much of this information is held on the Department of Natural Resources' Geographic Information System (GIS) at Bundaberg. The DNR is currently developing a 'user-friendly' Web Site to provide for an enhanced community access to this land resource information. Land capability maps have been developed for a number of areas using the following four-class system:

Class A	Land that is suitable for cropping with negligible to moderate limitations
Class B	Land that is marginal for cropping due to severe limitations
Class C	Land that is suitable for pasture improvement
Class D	Land that is unsuitable for agricultural development due to extreme limitations ie very steep slopes, rock outcrops, poor drainage

Surveys are currently being undertaken in the Kolan/MiriamVale Shires and the riparian lands of the Burnett River at Eidsvold to further our knowledge of the catchment's land resources. While further detailed work needs to be undertaken, information of a broad scale nature is available for much of the catchment.

Source: DNR Database (Bundaberg)

Survey reports also indicate that the catchment's lands are subject to, or have already experienced, significant forms of land degradation. The forms of degradation listed include:

- Development on acid sulfate soils in the low-lying areas of the Coastal Burnett has resulted in acid leaching into streams. Some 6,500 ha of land has affected by acid sulfate soils or potential acid sulfate soils.
- Increasing acidification of soils, many of which are inherently acidic and are engaged in monoculture production and high fertiliser use ie the Coastal Burnett sugar lands and the South Burnett red soils.
- Declining nutrient levels of soils under a continuous cropping regime and grazing.

- Salinity outbreaks and surrounding waterlogging, particularly where highly permeable soils on plateaus or slopes intersect with less permeable soils on the lower slopes. Some 3,550 ha in the Coastal Burnett and 4,500 ha in the Inland Burnett are estimated to be currently affected by salinity.
- Increasing levels of sheet, gully erosion in the grazing lands, particularly those that have texture contrast soils and have poor ground cover either from over grazing, over clearing or seasonal impacts. While soil erosion is a natural occurring phenomenon the influence of human practices has accelerated it.
- Sheet rill and gully erosion of all cultivation lands that have a land slope of greater than 1%. Department of Natural Resources assessments estimate that 258,000 ha of the catchment's cultivated land require soil conservation measures. While some 186,000 ha (72%) of these lands have been treated with structural measures large areas of these lands still remain unprotected. The standard of maintenance of soil conservation works on the protected lands is also an area of concern.
- Small areas of landslip along the eastern edges of the Booie Range, Binjour Plateau, Mulgildie Plateau and Dawes Range near Kalpowar.

Over the last decade there has been a significant increase in the general awareness of the Catchment's soil resources and the degradation they are susceptible to. Programs such as the DPI's PMP/FutureProfit initiative and industry sponsored initiatives such as the QDO's Smartsmove have increased producer's knowledge of the limitations of their soils and the need to adopt more sustainable management techniques. There has also been a significant change in attitude by agencies and authorities involved in land planning activities. Many of them are now incorporating soils information into their planning and decision-making processes for future development opportunities and proposals.

While this progress is encouraging there are still many areas in the catchment where unacceptable degradation of the soils is occurring. In some streams the high levels of turbidity may indicate poor land management practices. There is a need for increased landholders' awareness and increased adoption of sustainable management practices if these lands are to maintain or improve production for future generations.

Desired Outcomes:

- Landholders in the catchment continue to adopt sustainable management practices to halt further degradation of the catchment's soils.
- The continued delivery of a soil conservation planing and implementation service to assist landholders to protect the national resources.
- Government agencies and local governments providing support and undertaking joint projects with landholders and the community to address land management issues.
- Continued monitoring and updating of data on progress of degradation of the Catchment's soils.
- Development of appropriate indicators to monitor the condition and trend of the Catchment's soil resources.
- Increased community awareness and knowledge of the Catchment's soils
- Increased community support for the adoption of improved land management practices in the catchment.
- Greater understanding of technical and scientific information relating to improved land management techniques.

- Appropriate recognition of soils and landscape factors when formulating and assessing development proposals.
- Identification and protection of Good Quality Agricultural Lands (GQAL) from inappropriate use or development.

3.2.2 Water

Within the Burnett Catchment there is a heavy reliance on surface and groundwater resources to sustain town water supplies, stock and domestic supplies, irrigated agriculture, aquaculture and industrial use.

Surface Water Supplies

The surface water resources of the Burnett Catchment have been the subjects of numerous studies and investigations. The most recent of these studies is the Burnett River Catchment Study, which resulted from recommendations of the Water infrastructure Task Force. This study is evaluating a number of options for the provision of additional surface water storages in the catchment.

An integral component of this study was the completion of an overview report, which documented the current state of development and utilisation of available resources, as well as a prediction of future needs of water users. This report titled – Burnett River Catchment Study - Catchment Overview was published in June 1998. Selected data from this report will be presented in this section.

A total of 7 dams and 26 weirs have been constructed throughout the catchment area. Details on these existing storages are provided in Table 3.

Table 3 Specifications of Existing Storages – Burnett Catchment

Stream	Storage	Storage Capacity at FSL (ML)	Nominal Allocation ML/Yr
North Burnett			
Three Moon Creek	Cania Dam	89,000	15,314
Monal Creek	Mungungo Weir	166	
Three Moon Creek	Youlambie Weir	143	
Three Moon Creek	Monto Weir	27	
Three Moon Creek	Bazley Weir	75	
Three Moon Creek	Avis Weir	275	
Three Moon Creek	Mulgildie Weir	333	
Central Burnett			
Nogo River	Wuruma Dam	165,000	9,450
Burnett River	John Goleby Weir	1,700	1,560
Burnett River	Jones Weir	3,720	5,985
Burnett River	Claude Wharton Weir	12,600	11,970
Boyne			
Boyne River	Boondooma Dam	212,000	42,783
Stuart River	Gordonbrook Dam	2,960	1,100

Stuart River	Proston Weir	123	430
Upper Barambah			
Barker Creek	Nanango Weir	15	
Barker Creek	Bjelke-Petersen Dam	125,000	32,439
Barker Creek	Joe Sipple Weir	732	
Barker Creek	Silverleaf Weir	621	
Barker Creek	Murgon Weir	500	
Lower Burnett			
Burnett River	Walla Weir	29,600	
Burnett River	Ben Anderson Barrage	22,300	
Burnett River	Bingera Weir	4,800	
Kolan River	Fred Haigh Dam	584,000	198,354
Kolan River	Bucca Weir	9,800	
Kolan River	Kolan Barrage	3,950	
TOTAL		**1,269,440**	**319,385**

Source: DNR Bundaberg

The total storage capacity of dams and weirs within the study area is 1,269,440 ML with a nominal supply of 319,385 ML/year.

Drought conditions over much of the catchment for the last decade has resulted in long periods of reduced supply to water users in most schemes. This has placed greater pressures on the catchment's surface water resources.

A review of regulated water use in the catchment indicates that the Bundaberg Irrigation Area accounts for some 75% of all surface water allocations and has accounted for approximately 70% of surface water use for the 1986/1997 period.

DNR records also indicate that water allocations are approaching full utilisation when water is available during dry conditions and that irrigation water use was increasing at 25,000 ML/year. Future pricing structures may impact on this.

Urban use of surface water allocation is currently at or beyond the limits of allocation. Current nominal allocation is 10,690 ML/year with use in 1996/97 being 10,280 ML. Given the need for a high reliability of supply for urban users, the current lack of availability of additional supplies to meet increasing demand from population growth in the coastal areas of the catchment is of major concern. Data on urban use indicates that consumption was increasing at approximately 900 ML/year – if supplies were available. This demand will further increase if the projected population increases for the coastal part of the catchment are achieved.

There has been intense lobbying from industry groups and local governments for the construction of additional infrastructure to improve the reliability of supplies to agriculture and to meet the increasing demands from both urban and agriculture. In response to this lobbying and in accordance with the provisions of the Coalition of Australian Governments (COAG) agreement, the Qld Government is currently undertaking two key studies in the catchment. These are:

- The Burnett Catchment's Water Allocation and Management Plan (WAMP) that will establish the principles for environmental flows of the catchment, an improved specification of existing licences and allow for transferable water allocations.

- The Burnett River Catchment Study that will investigate and identify options for the provision of additional water infrastructure in the catchment that comply with the planned development limit set by government in the WAMP. This will include investigations into existing schemes that have never been developed.

Both of these studies, which are scheduled for completion in 2000, will have a major influence on the future management of the catchment's surface water resources.

Irrespective of the outcomes of the Burnett Catchment WAMP and the Burnett River Catchment Study there is a need for greater community awareness of the limited availability and high value of the catchment's surface water resources. There is also a priority need for the catchment's water resources to be used more efficiently – both by rural and urban water users and recognise the potential for water reuse. A further need is recognition by all sectors of the community of the need for environmental flows to sustain the health of the catchment's streams and associated ecosystems.

The DNR have recently commenced a partnership program with key industry bodies to research and promote 'best water use efficiency' practices. The Rural Water Use Efficiency Program is a State-wide initiative and operates within the sugar, horticultural, cotton/grain and dairy/pasture industries to assist irrigators across the Burnett Catchment.

Groundwater Supplies

Groundwater supplies have played a major role in the agricultural development of the Burnett Catchment. Groundwater availability allowed for the establishment of the grazing industry in the catchment in the late 1800s and introduction of irrigation to the sugar industry in the early 1900s. Since that time groundwater supplies have contributed significantly to the catchment's productivity.

There are three major sources of groundwater supplies in the catchment:

- Bundaberg Area – the Elliott Formation and Fairymead beds;
- Mulgildie and Mundubbera – consolidated sediments; and
- Alluvial deposits adjacent to major streams.

A summary of estimated sustainable yields from these sources of groundwater is presented in Table 4.

Table 4 Burnett Catchment Groundwater Supplies

Area/Aquifer	Estimated Yield (ML/year)	Allocation (ML/year)
North Burnett		
Three Moon Creek	15,100	13,805
Splinter Creek	2,400	
Monal Creek	1,100	
Cattle Creek	N/A	Nil
Central Burnett		
Burnett River	14,100	

Upper Barambah		
Barker Creek	6,200	
Barambah Creek	2,000	
Lower Barambah		
Boonara/Nangur Creek	8,000	
Lower Burnett		
Elliott/Fairymead Formations	56,100	76,909
TOTALS	**105,000**	**90,714**

Source: DNR Bundaberg

Note: A number of areas/aquifers listed above are not Declared Groundwater Areas and hence no allocations have been determined.

Of the 90,714 ML annual allocation shown in Table 3, 78,613 ML is allocated for irrigated agriculture and 12,101 ML is allocated for urban/light industrial use. Data in Table 4 indicates that the lower Burnett groundwater area, with an estimated annual yield of 56,100 ML and an allocation of 76,909 ML, is significantly over allocated. Indeed significant seawater intrusion into the aquifer has occurred along the coastal interface from Moore Park to Elliott Heads. This intrusion has had a major impact on water quality in near coastal areas and extraction rates from the aquifer. To address this situation, extraction has been restricted by reducing the annual announced allocations for irrigation and town water supply bores.

The lack of available water supplies has restricted the expansion of urban development in the Burnett Shire. A number of development proposals have either been put on hold or refused due to a lack of either groundwater or surface water allocation.

The Three Moon Creek system in the North Burnett is recharged from Cania Dam. From 1992 to 1998 this system has performed adequately north of the town of Monto with water users receiving their full allocation. South of Monto recharge has been variable.

A number of unregulated aquifers in the catchment are suffering from over extractions. The Splinter and Monal Creeks, areas outside of the Declared Bundaberg groundwater area, Kumbia, Kingaroy, Nanango, Blackbutt and Ban Ban Springs localities have all experienced falling aquifer levels and reduced bore yields over the last decade. The security of assured domestic water supplies for the townships of Blackbutt, Nanango and Kumbia is a major concern for Nanango and Kingaroy Shire Councils.

An additional concern is the increasing evidence of nutrient and wastewater contamination of the shallow groundwater aquifers of the Coastal Burnett. If this trend continues the use of these supplies may have to be restricted to stock and garden use only. There are already instances in the catchment where this action has occurred.

Desired Outcomes (Surface and Ground Water)

- There is a priority need to better manage catchment groundwater and surface water resources.
- Encourage more research into, development and implementation of, effluent reuse opportunities including rural and urban water use efficiency.
- Understanding that infrastructure has a role to play in improving regulation of water use and reliability of supply. Both of these factors can help prevent the degradation of the resources.

- The impact of the interaction between cyclical seasonal influences and extractions needs to be recognised.

3.2.3 Vegetation

Vegetation may be seen to fall within the categories of *natural* and *introduced*. Introduced vegetation includes agricultural crops, tree crops (timber plantations and orchards) and grasses and is referred to in Section 3.4 of the Strategy.

Natural vegetation, located within the Burnett on both government and private lands, is an important physical and cultural resource. In the Burnett, Eucalypt open forest and woodland dominates the vegetation and includes species typical of both tropical and sub-humid areas. The distribution of vegetation on the coastal lowlands of the catchment is dominated by eucalypt open forest and wallum communities incorporating melaleuca wetlands and heath. The vegetation of the coastal lowlands has a marked tropical component, while the western vegetation communities reflect the hot dry climate of these sections of the catchment. Land clearing for sugar cane production has occurred in the eastern areas.

Elevated areas and areas of volcanic soils receiving higher annual rainfall, around Kalpower and Yarraman, support notophyll and microphyll rainforest types usually dominated by hoop pine or bunya pine *(Araucaria* spp.). Much of these areas have been cleared for hoop pine plantations. In the Kingaroy area, most of these forests were cleared for intensive agriculture.

The western section of the catchment is within the southern brigalow biogeographic region, and in this area, extensive eucalypt open forests and woodlands are interspersed with small to large patches of brigalow *(Acacia harpophylla)* open forest and associated softwood communities (dry rainforest). The patches of semi-evergreen vine thicket (dry rainforest) are a feature of this part of the catchment and contain a number of specialised flora and fauna species. Extensive clearing, however, has taken place within this area for agricultural purposes. Vine thicket and brigalow areas have particularly been targeted in view of the high quality of the soils.

Native vegetation on river flats was also targeted for early development for agriculture and horticulture. As a consequence, little remnant vegetation remains on these flats.

In general the link between clearing and loss of biodiversity is clear; in addition, clearing of deep-rooted vegetation has been linked to the development of dryland salinity in other States while in many parts of Queensland, the clearance of native vegetation for pasture production has not significantly increased deep drainage due to predominantly summer rainfall and heavy clay soils. Within the Burnett, however, salinity is occurring in lower discharge areas below areas with high infiltration capacity and which have been cleared of vegetation. These areas are usually small and occur throughout the catchment to varying degrees depending on the hydrology.

Desired Outcomes

- the maintenance of a coverage of at least 30% of natural vegetation within the Southern Brigalow and South East Queensland bioregions which address conservation and production sustainability
- good land management practices which maintain appropriate levels of vegetation for the prevention of land degradation and biodiversity loss
- in grassy woodland areas, aim to limit the extent of intensive land use to a maximum of 30% of the property

3.2.4 Biodiversity

Conserving our biodiversity is extremely important, not only in terms of its intrinsic values but because many of our economic activities are based on healthy and functioning natural systems. Any use of natural resources must be sustainable and the conservation and management of biodiversity is essential for the maintenance of natural systems.

Biodiversity refers to the variety of all life forms including the different plants, animals and micro-organisms, their genes and the ecosystems of which they form a part. In terms of management, it is useful to consider biodiversity issues at three separate levels of scale or organization, viz: at a *landscape* or regional ecosystem level; at the *community/habitat* level; and at the *species/subspecies* level. A decline in biodiversity values at each of these three levels has been observed in the Burnett Catchment, particularly where agricultural production has necessitated some level of native habitat loss or modification. Remnant vegetation, and the native wildlife it supports, is under continuous threat of development from a wide variety of competing land uses and ongoing remnant management and restoration/rehabilitation is needed to avert further loss or decline in biodiversity values.

At the *landscape level* the Burnett Catchment spans two of Queensland's thirteen bioregions, Southeast Queensland and the Brigalow Belt. Representation of ten of a possible twelve land zones are included, clearly illustrating the catchment's diversity at the landscape scale. One hundred and forty-five distinct regional ecosystems have been identified and mapped at 1:100,000 scale (Sattler and Williams 1999), Table 5. This represents about half the total ecosystem diversity found in these two bioregions.

Table 5 Burnett Catchment Regional Ecosystems and their Conservation Status

Conservation Status	Brigalow Belt	SE Queensland	Total Catchment
Endangered	6(27)*	8(10	14(37)
Of concern	10(39)	29(32)	39(71)
No concern at present	36(97)	56(100)	92(197)
Combined	52(163)	93(142)	145(305)

* bracketed figures are totals for the entire bioregion/s

The conservation status of regional ecosystems is based on an assessment of their original extent, current clearing rate, condition and level of reservation. Clearing rate criteria have been applied as follows:

Conservation Status	Clearing Rate
(a) No concern at present	Clearing rates below 70%
(b) Of concern	Cleared 70-90% of original (<30% retained but >10%)
(c) Endangered	Cleared more than 90% of original (<10% retained)

(Reference: Sattler & Williams eds 1999)

Biodiversity at the Species/Subspecies Level

A comprehensive list of *Endangered* and *Of Concern* regional ecosystems in the catchment is presented in Appendix C. The number of *Endangered* and *Of Concern* regional ecosystems in the catchment is a reflection of the level of landscape and vegetation modification that has historically occurred.

The maintenance of healthy ecosystems is dependent on the maintenance of plant and animal associations or *communities and their habitats*. Conserving communities or habitats which are intrinsically rare or which exhibit high levels of species richness/endemism is an efficient and effective strategy for maintaining biodiversity across the catchment. At the same time is important to consider fully the range of communities present and to give special consideration to those which provide important functional ecological roles in the landscape, eg ecotonal communities, buffer zones, habitat corridors, etc. Spatial considerations such as patch size, shape and level of connectedness/fragmentation are important considerations in planning for functional habitat conservation.

A systematic determination of key animal/plant communities and their habitats in the Burnett Catchment is yet to be completed but certain elements are obvious on the basis of the above general criteria –

- rainforest and other closed forest communities (high species diversity/endemism)
- coastal and montane heathlands (high species diversity/endemism)
- riparian, aquatic, estuarine and intertidal communities (important functions)
- ecosystems associated with restricted geology/soil types, eg serpentine, limestone (rarity/often high endemism)
- communities at or near their limits of geographic distribution/biogeographic islands, eg Kroombit Tops, Mt Walsh (high endemism/scientific value)

Biodiversity at the *species* level can be considered in terms of overall species numbers (richness) and distribution (species density patterns, 'hot spots' of rarity or endemism, etc). Our understanding of species level biodiversity patterns in the Burnett should be viewed as uneven, at best, at the present time. At the 'higher' end of the evolutionary scale (viz vertebrate animals and vascular plants) our knowledge of species ecology is reasonable. We know roughly where species live, what their habitat requirements might be, what threats may exist and whether they are protected in the current reserve system, etc. At the 'lower' end of the evolutionary scale (viz invertebrates, non-vascular plants, microbes, etc), however, our knowledge base tapers dramatically. Unfortunately, it is at this lower end that much of the species diversity is concentrated. To exaggerate the problem, many of the 'lower end' species also play key roles in maintaining the health and productivity of our ecosystems.

Despite these problems, it remains essential to monitor the conservation status of individual species considered at risk. To this end, schedules have been produced to recognise the rare and threatened species in the State. Appendix D contains a subset of this list for species known to be present in the Burnett Catchment.

This information provides a basis for the community to focus its efforts on maintaining and restoring catchment biodiversity at the *landscape, community* and individual *species* level. While further work needs to be undertaken, the available information indicates the following major biodiversity issues in the catchment –

- inadequate conservation protection of the range of regional ecosystems, important habitats and their component species
- progressive loss or decline in the condition of remnant bushland due to a variety of threatening processes
- decline in the status of particular species affected by habitat loss or fragmentation and/or a decline in habitat condition

In the last decade there has been substantial change in the way the Burnett Catchment community views biodiversity issues. The need to integrate biodiversity conservation with

other forms of sustainable natural resource management is better understood and accepted and there are definite signs that the community is prepared to take on the challenges in partnership with government support. Programs such as QPWS, *Community Nature Conservation* initiative and Greening Australia's *Bushcare Support* have facilitated greater awareness and an increased level of financial support for delivering 'on ground' biodiversity outcomes. This latter program comes under the umbrella of the Federal Government's *Bushcare* program and is financed through the *Natural Heritage Trust Fund.*

Desired Outcomes:

- Better and more complete information and increased community awareness of the Catchment's biodiversity values and its management requirements
- Better integration of a dedicated 'reserve' and 'off-reserve' approach to achieving an integration of biodiversity conservation with other forms of ecologically sustainable natural resource management
- Government agencies and local governments providing support and undertaking joint projects with landholders and the community to address biodiversity conservation issues.
- Development of a more strategic approach to the identification, mapping and targeting of management works aimed at the maintenance and/or restoration of biodiversity values at the ecosystem, habitat and species level.

3.2.5 Riparian Condition, Aquatic Vegetation and Habitat

The state of health of a catchment's riparian zone is often a good indicator of the surface water quality of a catchment. Anecdotal evidence suggests that agricultural practices and urban settlement have had a significant impact on the catchment's surface water quality. The nutrients being discharged into the catchment's streams contribute to the increased frequency of blue green algal blooms occurring in streams and storages. The riparian zone is one of nature's filters for removal of nutrients, silt and other pollutants.

A number of studies have been completed or are currently underway into the condition of the riparian zone of the Burnett River and its major tributaries. Published studies include:

- *Effects of Dams and Weirs on Freshwater Turtles: Jones Weir, Mundubbera* Dr Tony Tucker
- *State of the Rivers Report: Burnett River and Major Tributaries* DNR (1999)
- *A Riverine Fisheries Resource Assessment of the Burnett River Catchment in the Wide Bay – Burnett Region* - M J Heidenreich, C J Lupton, DPI/DNR (1999)
- *Burnett Basin WAMP Current Environmental Conditions and Impacts of Existing Water Resource Development* (Vol II(b)), Department of Natural Resources (2000)

These studies have indicated that some 48% of the stream length surveyed was in either good or very good condition, 28% was in moderate condition and that significant disturbance has occurred to 24% of the riparian reaches of streams surveyed in the catchment. This disturbance was caused by grazing pressures (86% of survey sites) followed by road influences (48% of sites) and bridge/culvert construction (40% of sites). Heidenreich and Lupton reported that one or more major disturbances to riparian vegetation of the 46 sites observed in their survey. Disturbances included clearing of riparian vegetation and damage to river banks and vegetation by grazing animals. (Burnett State of River Report, 1999)

The State of the Rivers survey found that some 85% of the catchment's stream lengths have stable to very stable banks and some 15% are moderately stable to very unstable. Although the overall ratings of bank stability were good, the survey also showed that a mean 50% of the

lower banks and a mean 19% of the upper banks were devoid of stabilising vegetation. Livestock grazing (62% of sites), clearing of vegetation (33% of sites) and runoff water (44% of sites) were identified as the major contributors to the instability of the catchment's river banks. (Burnett State of River Report, 1999)

The survey also found that 57% of stream lengths surveyed in the catchment had stable stream beds, 19% had moderately stable beds and 24% had unstable beds. Stream bank erosion was identified as the major factor affecting streambed stability. This factor was recorded along 33% of the catchment's stream length. (Burnett State of River Report, 1999)

Riparian vegetation ratings of streams consider the width of existing riparian vegetation and the proportion of native vegetation species in this zone. The survey found that 47% of the catchment's stream lengths had poor or very poor riparian vegetation condition, 17% had moderate condition and 36% of riparian vegetation was in good or very good condition. Exotic plant species were recorded at 82% of sites (Burnett State of River Report, 1999). (The *State of the Rivers* Report, as a source of information, was only a snapshot of the river, taken during the Winter/dry season. As such, the assessment of aquatic vegetation may have been different if the survey had been conducted during warmer wet months.)

Channel habitat types in the Burnett catchment's streams have been found to be very low. Some 88% of stream lengths had low to very low channel diversity, 9% had moderate diversity while only 3% of stream lengths had high channel diversity. Habitat types surveyed included waterfalls, cascades, riffles, runs, pools and backwater. (Burnett State of River Report, 1999)

The catchment's streams support little aquatic vegetation. Some 75% of stream lengths had very poor aquatic vegetation and only 1% was rated as good. There were no stream lengths where the aquatic vegetation was rated as very good. It appears that poor aquatic vegetation may be a natural feature of the catchment with the ephemeral streams in the western part of the catchment containing even lower populations. High stream turbidity that may be influenced by seasonal conditions was reported at 20% of sites surveyed (Burnett State of River Report, 1999). (As indicated above the *State of the Rivers Report* was limited in its scope.)

Aquatic habitat in the catchment's streams also rates poorly with 86% of stream lengths either being assessed as very poor, poor or of moderate condition. The health of aquatic habit has a major impact on the diversity and survival of aquatic life such as macro-invertebrates and micro-invertebrates. Heidenreich and Lupton also outlined that the tidal flushing effect of the estuarine section of the Burnett River has been severely impacted by the construction of the tidal barrage. They state that the tidal prism of the lower Burnett River (Department of Harbours and Marine – 1985) has been effectively reduced by 40% and this has had a major impact on the estuarine riparian zone. Major engineering works at the mouth of the Burnett River have also impacted on the health of estuarine fish habitats and compromised the productivity of those habitats.

While the limitations of the *State of the Rivers* Report have been referred to, the recently released WAMP Report stated that the overall current condition of aquatic vegetation throughout the western reaches of the study area was naturally poor since the streams there are ephemeral. In impoundments, however, where water level fluctuations may affect the survival of submerged plants, aquatic vegetation condition was modified in a very major way from natural. Generally, most of the other reaches experienced moderate or minor modification with only one reach (on Gin Gin Creek) being in a natural or near natural state

(*Burnett Basin WAMP Current Environmental Conditions and Impacts of Existing Water Resource Development* (Volume II(a)) (2000).

These studies indicate that while the health of a number of riparian zone indicators have deteriorated for a number of streams of the catchment, the catchment is not past the point of no return. Proactive action by landholders, government agencies and the community to adopt better riparian zone management practices are necessary to return these degraded areas to a healthy state. Measures such as management of continuous grazing of the riparian zone, control of exotic plant species and prevention of clearing of riparian vegetation are integral to sustainable riparian zone management.

Desired Outcomes:

- Greater appreciation by the community of the value of water and water quality for the socio-economic stability of the nation.
- Greater appreciation of the value of the riparian zone for biodiversity conservation and as a wildlife corridor.
- Partnership approaches to enhance community involvement and understanding of future water management planning including environmental flows.
- Better water use efficiency consistent with maintaining healthy ecosystems.
- Better understanding that poor aquatic vegetation is a natural feature in the catchment.
- Whole community participation including landholders, government and non-government agencies in riparian zone management.
- Landholders and riparian landowners adopt good riparian management practices.
- Community groups and other agencies undertaking monitoring of ecosystems health.
- Involvement and support of government and non-government agencies.
- Research into blue green algae – including the benefit/efficiency of riparian zones as filters.
- Ongoing research and development into wastewater management and reuse.
- Operators of instream water infrastructure such as a private licence holder or SunWater (ex Department of Natural Resources) assure protection to aquatic vegetation is part of their operations.

3.2.6 Land Use and Land Management

The Catchment supports a wide variety of land uses including:

- agriculture
- industrial
- urban settlement (including commercial)
- forestry
- water storages
- recreation, and
- extractive industry

Data on the land use of the Catchment is presented in Australian Bureau of Statistics bulletins.

Agriculture is the principal land use of the Catchment with the most important industries being beef and dairy cattle, sugar cane, field crops, horticultural crops and intensive livestock. Some 2,877,243 ha or 74% of the total Catchment area is involved in actual agriculture Within the agriculture sector the predominant land use is grazing which accounts for over 80% of the Catchment area.

A high proportion of agricultural production is dependent on irrigation water. The areas of land irrigated for the major agricultural industries in the Catchment are:

Horticultural Crops (Coastal/ North Burnett)	7,200 ha
Citrus Crops (Cental Burnett)	2,000 ha
Sugar Cane	49,200 ha
Grapes (Central/South Burnett)	193 ha
Dairying (Central/South/North Burnett)	4,302 ha
Cotton/Field Crops (South Burnett)	8,629ha
Total Area	71,524 ha

Sources: ABS 1996/97

The Catchment also supports extensive areas of dry land crop production. The principal crops grown are peanuts, sorghum (grain), sorghum (forage), soybeans, wheat, barley, maize and beans.

Changing market forces for agricultural products as well as population demographics in the coastal part of the Catchment are facilitating a number of land use and land management changes in the Catchment. These include:

- Increasing competition between the sugar and horticulture industries for good quality agricultural land in the Coastal Burnett part of the Catchment;
- Increasing competition between the agricultural and urban/industrial sectors for land to accommodate a predicted population expansion in the Coastal Burnett part of the Catchment;
- Diversification from low value field crops to high value/alternate crops;
- An expansion of the citrus industry in the Central Burnett part of the Catchment;
- An expansion of the tree crop industry in the Coastal Burnett part of the Catchment;
- An expansion of agro forestry plantings across the Catchment (including paulownia);
- Implementation of new technologies to achieve vertical expansion of agricultural industries production ie irrigation efficiency and improved agronomic practices.
- Development of aquaculture enterprises

Desired Outcomes:

To facilitate the efficient transitions in land use/land management changes the following strategic needs have been identified:

- The production of a resource inventory of land suitability and land condition within the Catchment to assist with enterprise decision making and local government planning decisions.
- The identification of critical resource degradation areas, particularly those where significant unsustainable land management practices are being utilised.
- The provision of local input into State, Regional and Local planning instruments as well as industry codes of practice.
- The promotion of sustainable land use and land management practices to the Catchment's land users.
- The provision of accessible and user friendly resource information to all Catchment stakeholders to facilitate more informed land use/land management decisions.
- The development of policy to support the above strategies.

- The protection of good quality agricultural land from degradation and urban encroachment

3.2.7 Pest Management

Plant and animal pest management is a significant land management issue in the Catchment. Plant pests reduce the productive capacity of the land because they compete for nutrients and water that would normally be used by the crop or pasture production and can be toxic to humans and livestock. They also have the capacity to significantly change the biodiversity of an ecosystem by suppressing the growth of a particular species until it disappears. It is acknowledged that some weeds are invasive and aggressive are not necessary due to mismanagement.

The spread or invasion of plant pests may be caused by a number of factors including commercial sales by nurseries, over clearing, over grazing, use of contaminated seed and/or machinery, poor agronomic practices/control of weeds in the fallow or spread by livestock, contaminated vehicles or floodwaters. In many cases a lack of community knowledge fails to detect a weed in its initial stages of infestation.

There are a number of declared weeds in the Catchment, which are of major concern to land managers. These include Giant Rats Tail (mainly confined to the coastal part of the Catchment), mother of millions, fireweed, parthenium, rubber vine, annual ragweed and groundsel. Several other non-declared invasive weeds include creeping lantana, lantana camara blue heliotrope, cats claw, madeira vine hymenachne and para grass.

The major pest animals of concern in the Catchment are rabbits, cane toad, foxes, feral cats, feral pigs and wild dogs. These animals must not be introduced into or kept in the Catchment and must be eradicated (controlled in the case of wild dogs). Local Authorities and producers in cooperation with the Department of Natural Resources land protection officers undertake regular chemical control actions against these pests.

Pest management is an issue of major concern to the catchment's Local Authorities and industry bodies. The Land Protection Bill 1999 will, when enacted, put the onus on Local Government committees to prepare pest management plans and to ensure that local action is taken. State Government Agencies responsible for land management now have a coordinated policy for action. While Local Governments are actively developing pest management plans to achieve a coordinated approach by landholders and government to the control of these plant and animal pests, there is still much work to be done. Further action needs to be taken on the following issues:

- Researching the ecology and cost effective treatment methods of creeping lantana.
- Coordinated action on the containment and, hopefully, eradication of Giant Rats Tail Grass from the Catchment.
- Containment action on the spread of parthenium weed in the Catchment. This includes the provision of effective machinery/vehicle wash down facilities.
- Eradication of rubber vine from the Catchment's watercourses
- Action to control the spread of cats claw in the Catchment's watercourses and riparian zones.
- Monitoring the potential spread of recently introduced plant species and/or related genus, such as bamboos, paulownia, Madeira vine and leucaena.

Desired Outcomes:

- That coordinated landholder, Local Authority and State Government action is continued for the control or eradication of priority plant and animal pests in the Catchment.
- That Local Authority pest management plans are implemented.
- That Government agencies responsible for the management of State lands implement effective onground programs for the control of plant and animal pests on these lands.
- Continued research/investigation into potential pests to prevent future outbreaks.
- That Federal Government continues funding programs and opportunities for further research and control programs.
- Greater awareness of aquatic flora and fauna pests, eg Telopea, Carp and Cabomba.

3.2.8 Cultural Issues

Indigenous Culture

Prior to European settlement there was a strong indigenous presence in the Catchment. While violence, disease and the forced displacement of indigenous peoples from their traditional lands have had a significant impact on the indigenous population, the indigenous people have still maintained strong ties to the land and sites of cultural significance.

There are many indigenous groups associated with the Burnett area. They include: the Cherbourg Community and the Gooreng Gooreng; Gurang; Kabi Kabi; Taribelang Bunda; Wakka Wakka; Wakka Wakka Eidsvold (and Descendants); Wakka Wakka Jinda and the Wuli Wuli Clans. This list is not exhaustive and has been identified from the Water Allocation and Management Plan working group study only.

The visible evidence of past indigenous habitation of the Catchment are rock carvings, burial sites, stone arrangements, shell middens, canoe and shield trees, bora rings and evidence of occupation in rock shelters. The Ban Ban springs at Ban Ban is considered to be a site of significant cultural heritage to the indigenous peoples.

The protection and management of indigenous cultural heritage items in Queensland is regulated by the *Cultural Records Act 1987* (Landscape Queensland and Queensland Estate). This Act makes it mandatory for any interested party to secure a permit that authorises actions covered by the Act. The Act also:

- Provides protection for classes of places covered by the Act.
- Outlines that all cultural items as defined by the act are the property of the Crown.
- Outlines that the tenure of the land is irrelevant in considering questions of ownership and protection of indigenous heritage.

While the environmental Protection Agency (EPA) is the lead agency for implementing the Act, Indigenous groups in the Catchment continue to identify and register sites of significance through their traditional avenues. The EPA is continually listing this information on a register, as it becomes available.

Major development proposals and studies such as the Calamvale to Tarong powerline, the Burnett River Catchment Study, the South East Queensland Comprehensive Regional Assessment (as part of the RFA) and mining proposals are furthering our knowledge of indigenous sites of cultural significance through detailed assessments as part of the development proposal.

There is still a degree of community apathy and a lack of knowledge on the significance of indigenous culture in the Catchment. A community awareness and education program is needed to address this issue.

Desired Outcomes:

- Greater community awareness of the culture of indigenous residents in the catchment.
- Ongoing protection and management of recognised indigenous culture heritage sites.

European and Other Cultures

Benjamin (1995) in her publication of the Burnett Catchment outlines that the first European exploration of the Catchment was undertaken by Henry Stuart-Russell, William Orton and Jemmy (their aboriginal helper) in November 1842. They explored the Boyne and Stuart Rivers and later established Burrandown Station.

In 1843, Henry Stuart-Russell, Sydenham Stuart, William Orton, William Glover, Henry Denis and Jemmy explored the Boyne River to its junction with the Burnett River and then continued for a further 110 km downstream. These expeditions led to the settlement of Nanango and Baramba Stations and Boonara and Ban Ban pastoral holdings.

In 1846, surveyor J C Burnett followed the Burnett River down to its mouth. In 1847, settlement of the Bundaberg district began with the establishment of Tirroan Station, Kolan Station, Barolin Plains and Bingera Station.

In 1848, Thomas Archer, Jacky Small and Daniel Bunce explored the area from Mt Perry to Eidsvold and established Coonambula and Mundubbera Stations. In July 1848, Henry Trevethan selected a run on the Nogo River called Rawbelle. In March 1849, Hugh Mackay established the Dalganga run which included the Splinter and Three Moon Creeks.

The majority of these pastoral stations grazed sheep until the late 1870s when beef cattle became more profitable. In the 1880s and 1890s, land resumptions of the large pastoral properties led to their subdivision and closer rural settlement. This facilitated the dairy industry being introduced to the Catchment in the 1880s and the citrus, horticulture and peanut industries being established in the early 1990s.

The first plantings of sugar cane at Bundaberg were recorded in 1866 and by 1882 the Millaquin Refinery had been established. In the early days of the sugar industry plantation owners began kidnapping Pacific Island and Indigenous people and using them as slave labour to overcome a labour shortage in the area. Fortunately this practice was stopped and labourers imported from the Pacific Islands, Sri Lanka and China became indentured employees. By the early 1900s the larger sugar plantations were subdivided into smaller farms and the use of indentured labour ceased.

Gold was discovered in the Catchment at Cania in March 1870. The Cania and Krombit goldfield was officially proclaimed in 1871 and high grade copper and gold deposits were mined at Mt Perry between 1873 and 1913.

The expansion of intensive agriculture in the Catchment also facilitated a degree of cultural diversity. A number of German families settled in the South Burnett while a large number of Italian families settled in the Coastal Burnett. The strong family influences of these nationalities are still evident today where large aggregations of land are operated as a family

enterprise. Many of the farming techniques used by these families were traditional methods that were introduced from their original homelands.

The pioneering spirit of many of the original families in the Catchment together with their resilience to withstand the forces of adverse seasons and market fluctuations has made them fiercely independent. While there are some landholders opposed to the need for change of land management practices. However, there are farming families that have accrued knowledge and understanding of resource management from many generations and will continue to contribute to better management and adoption of alternative landuse management practices. This is a challenge the Burnett Catchment Care Association must face in the implementation of its Catchment strategy.

Desired Outcomes:

- Greater community awareness of the culture of non-indigenous residents within the Burnett Catchment.
- Greater incorporation of community knowledge in resource management issues.

3.3 CLIMATE

The climatic factors of temperature, rainfall and evaporation are those that have the greatest impact on the use and management of the Catchment's resources. Details on the Catchment's climate data have been sourced from the Australian RAINMAN Analysis, Clewett et al, Department of Primary Industries (1995).

The climate of the Catchment is described as subtropical with long hot summers and mild winters on the coast to cold winters in the inland. The mean maximum and minimum monthly temperatures for major centres in the Catchment are shown in Table 5.

Table 5 Mean maximum and minimum monthly temperatures for the centres of Bundaberg, Monto, Gayndah and Kingaroy.

Mean maximum temperatures °C	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Bundaberg	30.1	29.9	29.1	27.5	24.7	22.4	21.8	23.2	25.2	26.9	28.3	29.6
Monto	31.9	31.2	29.9	27.6	24.1	21.0	20.6	22.6	26.0	28.9	30.8	32.0
Gayndah	32.4	31.9	30.8	28.6	25.2	22.4	21.8	23.5	26.5	29.2	31.1	32.4
Kingaroy	29.5	28.5	27.6	25.2	21.6	18.8	18.3	19.9	23.2	25.9	28.1	29.5
Mean minimum temperatures °C												
Bundaberg	21.6	21.5	20.4	18.0	14.9	12.0	10.5	11.5	14.0	17.0	19.3	20.8
Monto												
Gayndah	20.4	20.2	18.6	15.1	11.3	8.0	6.4	7.6	10.6	14.6	17.5	19.5
Kingaroy	17.6	17.4	15.7	12.3	8.6	5.4	3.8	4.9	7.9	11.7	14.6	16.7

Source: Australian RAINMAN Analysis (1995)

These temperature variations may have a significant effect on crop and pasture production. Heat wave conditions in December, January, February and March can rapidly desiccate crops grown under natural rainfall or raise irrigation demand to critical levels. Alternatively cold frosty conditions in the inland parts of the Catchment can suppress crop and pasture growth during the months of June to August

The majority (>60%) of the Catchment's rainfall occurs in the summer season of December to March. This rainfall mostly occurs as a result of thunderstorms and occasional monsoon troughs or tropical cyclones. Rainfall during the cooler winter months is associated with periodic north west influences, upper level troughs and interactions between southern fronts and tropical air masses (DNR 1988a).

Annual average rainfall in the Catchment ranges from 1,128 mm at Bundaberg to 706 mm at Mundubbera. Data in Table 6 shows the mean rainfall for a number of centres across the Catchment.

Table 6 Rainfall Data for the Catchment

Month	Bundaberg Post Office	Biggenden Post Office	Monto Post Office	Eidsvold Post Office	Mundubbera Post Office	Kingaroy Post Office	Gayndah Post Office
Jan	199	137	112	107	105	115	117
Feb	172	120	110	110	92	96	108
Mar	140	98	76	80	65	80	76
Apr	84	52	45	43	43	48	39
May	71	48	41	43	38	40	41
Jun	64	45	42	43	35	43	40
July	52	42	34	36	36	41	39
Aug	34	29	23	29	25	29	29
Sept	36	35	24	34	31	37	36
Oct	62	64	51	59	62	65	64
Nov	84	80	73	68	71	78	77
Dec	128	123	95	95	100	110	107
Total (mm)	1,128	874	728	737	706	781	774
Maximum (mm)	2,362	1,578	1,415	1,848	1,228	1,430	1,470
Minimum (mm)	340	336	178	271	299	339	339
Period of records (Yrs)	84	95	84	104	82	88	123

This data shows that the greater majority of the catchment receives less than 800 mm of rainfall per year. It also demonstrates the summer dominance of the rainfall and the great variability between maximum and minimum annual rainfall ie Bundaberg 2,362 to 340 mm and Monto 1,415 to 178 mm. This indicates that the Catchment suffers from frequent droughts. Data in Table 7 presents a summary of the occurrence of drought across the Catchment.

Table 7 Summary of Drought Occurrence at Bundaberg, Gayndah, Monto and Kingaroy

Centre	Total Number of Droughts
Bundaberg	24 droughts in 113 years
Gayndah	20 droughts in 124 years
Monto	16 droughts in 87 years
Kingaroy	18 droughts in 89 years

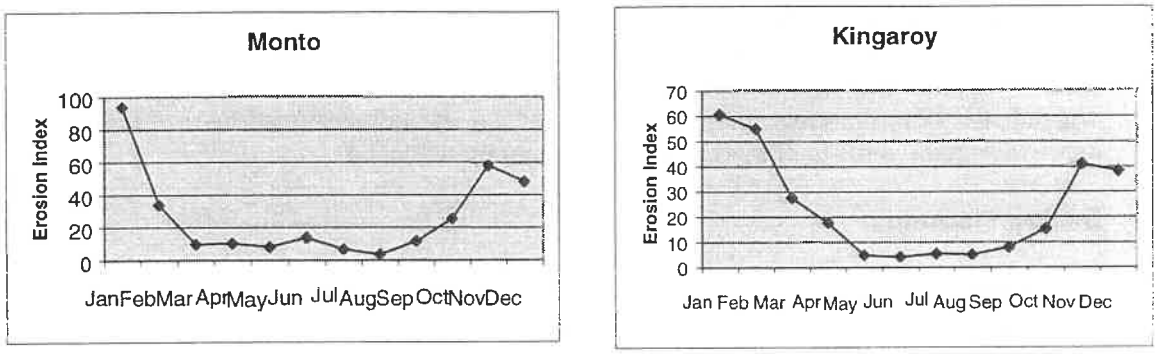
Source: Benjamin (1995)

A major drought (dry period of 12 months or more) occurs in parts of the Catchment on average about every 5 years and an extended drought (dry period of 24 months or more) occurs about every 10-12 years.

Another important issue about rainfall in the Catchment is the intensity at which it falls. As already stated much of the summer rainfall occurs as a result of thunderstorm, monsoonal or cyclonic activity. A number of the Bureau of Meteorology weather recording stations record rainfall intensity. Data presented in Figures 2 show that the intensity of summer rainfall is

extremely high. Many of these summer storms have rainfall rates which are greater than the soils infiltration rates and hence storm runoff and soil erosion occurs.

Figure 2 Seasonal Distribution of Erosion Index (EI) for Monto and Kingaroy



The data in Figures 2 highlight the need for the use of land management techniques that maximise water infiltration into the soil and minimise storm runoff over the summer months. Techniques such as contour banks, contour cultivation and retention of soil cover through crop stubbles or pasture growth greatly assist water infiltration.

Evaporation is another climatic factor that has a significant impact on agricultural production in the Catchment. There are four pan evaporation stations located in the Catchment, at Bundaberg, Gayndah, Monto and Kingaroy. Data on the mean evaporation rates from these stations is presented in Table 8.

Table 8 Mean Monthly Pan Evaporation Rates

Month	Mean Evaporation (mm)			
	Bundaberg	Gayndah	Monto	Kingaroy
Jan	209	222	207	197
Feb	178	193	169	157
Mar	165	179	173	148
Apr	135	149	131	112
May	97	114	89	81
Jun	82	97	78	61
July	88	101	83	67
Aug	115	133	120	91
Sept	144	175	169	127
Oct	188	199	196	169
Nov	203	215	232	189
Dec	219	243	219	202
Mean Annual Evaporation	1,823	2,020	1,866	1,601
Period of Records (Yrs)	32	23	5	31

Source: Bureau of Meteorology

The data in Table 8 indicates the variability in the annual evaporation rate between Monto (1,866 mm) in the north Burnett, Gayndah (2,020 mm) in the central Burnett and Kingaroy

(1,601 mm) in the south Burnett. The central and north Burnett areas (inland) also have higher evaporation rates than the coastal Burnett (1,823 mm). The data also indicates that peak monthly rates of evaporation occur between November and February – the period when the Catchment receives the majority of its rainfall. If rainfall hasn't occurred this is often the period of peak demand for irrigation water supplies.

The variability and unpredictability of the Catchment's climate can have a major impact on agricultural production as well as the sustainable use of the Catchment's resources. Research by a number of agencies is increasing our understanding of how we can better manage our lands to reduce the risk of adverse consequences from climatic variability. While this research needs to continue there is also a need for the information flow to landholders to improve so their skills in climate management can be enhanced.

Desired Outcomes:

- Continued research to achieve a better understanding of climatic factors and climate predictability.
- Better climate information dissemination to and skilling of landholders to become better managers of the use of this information.

3.4 SOCIO ECONOMIC

3.4.1 Primary Production Systems

The factors of climate, market value and land resources have had a major influence on the primary production systems in the Burnett Catchment.

The lower rainfall, cooler winter and higher summer temperatures experienced by the inland parts of the catchment determines the pattern of agriculture. Traditionally on the more fertile soils of the north and central Burnett region extensive grain crops such as grain sorghum, wheat and soybeans are commonly grown. This part of the catchment also supports a dairy industry, competitive until now with milk supplies being processed within the region, but soon to face deregulation and a suite of socio-economic factors that are expected to accompany this change. The rich alluvial flats adjacent to major streams are currently popular for the production of either lucerne hay or forage for dairy farm production.

The red soil plateau areas of the north and central Burnett and the red soils of the south Burnett are commonly used for peanut, maize, soybeans and navy bean production. The south Burnett is commonly known as the peanut and navy bean capital of Australia.

The recent alluvial and granite soils between Gayndah and Mundubbera have been the focus of an expanding tree and vine crop industry in the central Burnett, with citrus, mangoes and grape production continuing to expand.

The catchment supports a significant extensive grazing industry with some 602,000 meat cattle being depastured in 1996/97. The inland Burnett cattle grazing enterprises are predominantly based on rangeland grazing of native pastures. In recent years producers have introduced legume species such as *leucaena* and *wynn casia* to boost protein levels of dry matter production. Grazing enterprises on the coast are usually smaller in size and rely more on improved pastures for their production.

Cropping patterns in the coastal part of the catchment are more intensive than those of the inland. The area has traditionally grown large areas of sugar cane with some 46,700 ha of cane cut for harvest in 1996/97. The last decade has also seen a major shift in agriculture

towards more diversified production systems. Intensive horticultural crop production systems involving tomatoes, zucchinis, capsicums and melons are common. Extensive areas of tree crops such as citrus, lychees, mangos, avocados, and macadamias have also been established.

The proximity of the catchment to the major grain growing belts of the Darling Downs and the Central Highlands has seen a significant intensive livestock industry involving intensive piggeries and cattle feedlots established in the Catchment. The Catchment supported 156,000 pigs and 632,000 cattle in 1996/97.

The current and future trends for rural industries in the catchment are very much subject to the vagaries of international market forces and the influence government (both State and Federal) policies. A review of industry trends over the period 1987 to 1997 has seen the following shifts in agricultural production in the Catchment:

- A contraction in the areas of grain, navy beans, soybeans and peanuts grown (N.B: some of this may be due to seasonal influences);
- An expansion in the area planted to sugar cane (although this may change in response to the current low market price for this commodity brought about by increased international competition);
- An expansion in the area planted to tree crops – particularly citrus, mangoes and macadamia nuts; and expansion and a greater diversity of intensive horticultural crops (ie tomatoes, capsicum, melons and zucchinis). grown in the coastal part of the Catchment. The rate of such expansion, limited to a degree by the uncertainty of reliable water supplies.
- An expansion in the number of cattle and pigs produced in the Catchment.
- Introduction of new crops and crop species.
- Expansion of aquaculture industries.

While future industry trends will continue to reflect market influences and the availability of resources, it is clear that the primary production sector will continue to play a major part in the Catchment's economy and social structure.

Details of major crops and livestock industries in the Catchment are shown in Appendix D.

Desired Outcomes:

- Recognition that these systems rely on natural resource use and hence the economic future of the Catchment depends on the sustainable use of these resources.

3.4.2 Population and Settlement Patterns

The Department of Communication Information Local Government Planning and Sport (DCILGP&SS) have undertaken a number of studies into population projections and potential settlement patterns for the catchment. Data on these demographics is presented in the following reports and publications:

- Department of Local Government and Planning Report – Recent Populations and Housing Trends in Queensland (1997)
- Wide Bay 2020 Project – People and Settlement Technical Paper (April 1997)
- Department of Communication, Information, Local Government and Planning – Population Projections for Queensland (1998 edition).

These population and settlement pattern studies indicate that there will be significant implications for the Burnett Catchment. Data on the historic population distribution and settlement patterns are presented in Table 9.

Table 9 Burnett Catchment by Shire Populations

Shire	1986	1991	1996
North Burnett			
Monto	3,269	3,138	2,921
Eidsvold	1,240	1,052	965
Perry	332	386	371
Central Burnett			
Mundubbera	2,347	2,337	2,436
Gayndah	2,932	2,928	2,872
Biggenden	1,603	1,643	1,637
South Burnett			
Wondai	3,940	4,059	4,106
Kingaroy	10,212	10,863	11,442
Nanango	5,536	7,052	8,076
Murgon	4,728	4,663	4,627
Cherbourg			
Lower Burnett			
Bundaberg City	37,994	41,790	43,538
Burnett	12,608	15,619	20,964
Kolan	2,699	3,098	4,347
Isis	4,065	4,730	5,799
	93,505	**103,358**	**114,101**

Source: DCILG&P Report – Recent Population and Housing Trends in Queensland (1997)

Data in Table 9 shows that the total population of the Catchment increased by 20,596 in the period from 1986 to 1996. This represents an overall increase of 2,290 or 2.2%/year. However the data also indicates the while 17,282 or 84% of this population growth occurred in the Coastal Burnett and 3,835 or 18.5% of the growth occurred in the south Burnett parts of the Catchment, the North and Central Burnett sections of the Catchment experienced a 521 or 2.5% reduction in population. This data shows that the catchment is experiencing shifts in population that will have major economic, social and natural resource impacts.

The pattern of settlement in the catchment is relatively concentrated in and around three major centres; namely Bundaberg, Kingaroy and Nanango. (Note that Bundaberg includes Burnett Shire).

Future population projections for the Catchment are presented in Table 10.

Table 10 Population Projections 1996 to 2016

Shire	Current Population (1996)	Estimated Population
North Burnett		
Monto	2,920	2,190
Eidsvold	970	700
Perry	370	360
Central Burnett		
Mundubbera	2,430	2,710
Gayndah	2,870	2,650
Biggenden	1,640	1,470
South Burnett		
Wondai	4,110	4,110
Kingaroy	11,440	12,320
Nanango	8,090	10,040
Murgon	4,630	4,320
Cherbourg		
Lower Burnett		
Bundaberg City	43,560	51,070
Burnett	20,950	35,060
Kolan	4,340	8,240
Isis	5,800	8,380
	114,120	**143,620**

Source: DCILG&P – Planning Information and Forecasting Unit (medium Series Information) 1998 Edition.

Data in Table 10 indicates that significant population increases are projected for the South Burnett (2,250) and Coastal Burnett (28,100) while the Central Burnett and the North Burnett's populations are projected to further decrease by 110 and 1,010 respectively. These projections again suggest that further concentrations of population will occur in the Bundaberg, Kingaroy and Nanango centres.

The implications of these population projections are likely to be very significant and include:

- Increased demand and competition for scarce land and water resources to meet urban needs in the Bundaberg City/Kolan and Burnett Shire areas.
- Increased pressures for the safe treatment and disposal of effluent and household wastes from these expanding urban areas.
- Increased demand for land and competition for water resources in the South Burnett – particularly Kingaroy and Nanango Shires.
- Increased economic and social pressures on the Central and North Burnett parts of the Catchment to maintain basic community infrastructure and services.
- Increased demand for more efficient utilisation of land and water resources.

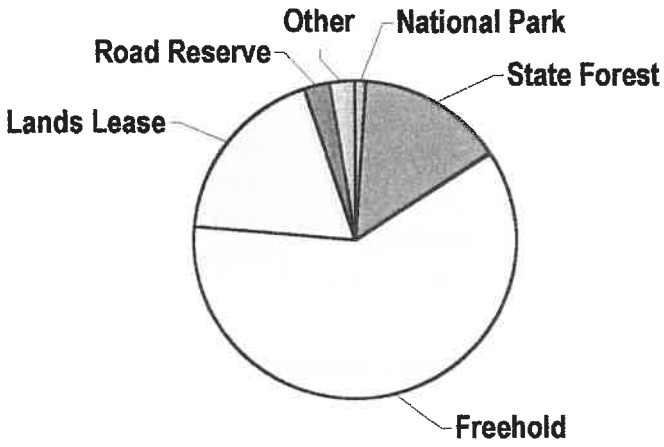
Desired Outcomes:

- That appropriate agencies and Local Governments coordinate their efforts to develop an integrated approach for the most efficient and effective allocation of natural resources to accommodate projected population growth in the Catchment.
- That strategies are developed to ensure that a reduction in community infrastructures and services do not contribute to a population decline and loss of community capacity within the Catchment.
- Investigation of alternative industries/infrastructure to reinvigorate declining rural communities.

3.4.3 Land Tenure

Land in the Catchment is held under the following tenure categories in approximate proportions as shown below:

Land Tenure in the Burnett



Department of Natural Resources records indicate that the majority of the catchment is privately owned as freehold tenure (60%).

National Parks (1.2% of the catchment area, or 45,133 ha) are concentrated mainly along the coast of the Burnett Catchment while State Forests are not. To improve this imbalance the State Government is in the process of reallocating selected State Forests; the largest National Park is at Burrum Coast National Park combining Woodgate and Kinkuna (wallum heath and open forest); others include Mt Walsh (rugged eucalypt and vine forest), Cania Gorge (sandstone country/rainforest), Coalstoun Lakes (crater lakes/remnant softwood scrub) and Auburn River (open forest/bottle tree scrub). Goodnight Scrub (hoop pine scrub), Kroombit Tops (elevated sandstone plateau/lush rainforest) and Bunya Mountains (Bunya Pine rainforest/open eucalypt) are partly National Park and partly State Forest.

State Forests currently occupy 18.1% of the Burnett Catchment and some of the largest State Forests occur at Allies Creek and Coominglah. A list of State Forests is shown at Appendix E together with a locality map (Appendix F).
Unallocated State Lands including reserve lands occupy some 92,946 ha while road reserves cover 100,449 ha of the catchment.

Since European settlement, and until the existence of Native Title rights was established in the 1992, technically all land in Australia was presumed to be owned by the State. While governments promoted a policy which facilitated the alienation of land to private individuals and corporate entities, the alienated land was held under a range of tenures which provided for various rights to those who held the land.

Freehold title is considered to confer the highest level of rights to the landholders. In granting freehold title the State is considered to have relinquished all proprietorial ownership of the land and must rely on its sovereign powers to make laws and regulations in order to control land use or land management activities. The pending *Vegetation Management Act* is one case in point where the State has decided to exercise its powers in respect to the management of freehold lands.

Leasehold tenure allows the State to have a degree of control as to how the land is used or managed. These controls are in the form of terms and conditions pertaining to the right of occupancy. Failure to comply with these terms and conditions may result in the lease being forfeited.

Ownership by the State allows land to be put to uses that can be strategically valuable to the entire community rather than just to an individual or a particular interest sector. All leasehold land and unallocated State Lands are strategically managed under the Government Land Management System policies and guidelines by the Department of Natural Resources on behalf of the Crown.

State Forests and Reserve Lands, like National Parks, are land tenures where the State has full control as to how the land is used and managed. While State Forests (multiple use) and Timber Reserves are primarily managed for timber production, private individuals are often granted grazing rights to these lands through Stock Grazing Permits (*Forestry Act*) or Leases under the *Land Act.* The Department of Natural Resources is responsible for the management of State Forests in the catchment, while plantation areas within these Forests are managed by the Department of Primary Industries (Forestry). Codes of Practice are being developed for the management of State Forests to protect their environmental and conservation values.

The recently announced Regional Forest Agreement (RFA) for South East Qld has identified a number of areas in the catchment's Native State Forests that are of high conservation value. Logging ceased on 1 January 2000. While the future tenure of nominated areas is still to be determined their management will remain within the Department of Natural Resources. The South East Qld RFA also provides for the establishment of hardwood plantations and the phasing out of logging from all Native State Forests over the next 25 years. This will have a significant impact on how these tenures are managed in the future.

National Parks in the catchment are managed by the Queensland Parks and Wildlife Service of the Environmental Protection Agency.

While roads remain the property of the State their custodial management is split between the Department of Main Roads (for designated highways), Local Authorities (for shire roads) and DNR responsible for roads dedicated but not constructed. The management of vegetation, public utility access, grazing and livestock access is vested with these authorities. Within the Burnett Catchment there is a need for an enhanced community awareness of the value of roads for wildlife corridors and biodiversity maintenance. There is also a need for better management of roadside vegetation by the relevant authorities.

Since the initial settlement of the catchment until the 1950s governments have pressed a policy of closer settlement. This resulted in extensive subdivision of the land and the creation of properties that were subsequently to small for the landholders to make an adequate living. The soldier settlement schemes of post World War I were an excellent demonstration of this flawed Government policy.

As economic pressures increased the owners of these small properties either sold out to their neighbours and allowed a natural build up of property size to occur or worked their land harder in an effort to make ends meet. There is a common perception that many of the land degradation issues faced by land management today are a legacy of the pressures imposed by the closer settlement patterns of yesteryear.

In some cases Government intervention has encouraged the build up of property size. The Dairy Reconstruction Scheme of the 1960s is one example where dairy farmers were provided with low interest loans to purchase neighbouring non viable farms to improve the viability of their own enterprise. This scheme allowed non viable farmers to leave the industry with some assets and dignity. Deregulation and associated compensation packages currently being developed will predicably trigger a similar restructuring of the industry.

There are still significant areas of the catchment where property sizes are marginal for an acceptable standard of living in today's economic climate. If normal market forces don't create a further rationalisation and build up of property sizes, then restructuring incentives intervention may be necessary in some areas.

In 1992 a decision of the High Court (known as the *Mabo Case*) significantly changed the legal understanding of land title in Australia by recognising the prior ownership of and by Australia's indigenous people. The Court's decision found that native title exists in accordance with the laws and customs of indigenous people where they have maintained their connection with the land and native title has not been extinguished by some action of the Crown.

As a result of the High Court's decision the Commonwealth Government introduced the *Native Title Act 1995* to address the implications of the Mabo decision. Each State and Territory also passed complimentary legislation to validate past dealings in land that may have been invalid or discriminatory against the indigenous peoples.

The *Native Title (Queensland) Act 1993* provided for the validation of land dealings for the period 31 October 1975 to 1 January 1994. From 1 January 1994 all land dealings in Queensland must comply with the Commonwealth's Native Title Act 1993 in that potential and existing native title holders must be accorded the same procedural rights as any other title holders. To validate past land dealings and to provide guidance to future dealings, the *Native Title (Queensland) Act 1993* specifies where native title may still exist and where it has been extinguished. The Act considers that native title may still exist in:

- Unallocated State Lands
- Reserves and others not used for their dedicated purposes
- Aboriginal and Torres Strait Islander community land, and
- Nature conservation reserves
- State Forests

Native Title was considered to have been extinguished on privately held freehold lands and some privately held leasehold lands such as pastoral leases and agriculture leases. However, the High Court judgement in the *Wik Case* that was handed down on 23 December 1996 ruled that Queensland pastoral leases did not necessarily extinguish native title and that native title

rights survive to the extent that they are not inconsistent with the rights granted to pastoralists under their leases. While the Wik decision provided a basis for negotiation between native title claimants and pastoralists in respect to coexistence, it does not allow for native title-holders to impede the operation of pastoral leases.
The Gurang Land Council is the Native Title Representative Body for the Central Queensland Region. The Council that is based in Bundaberg is responsible for servicing indigenous land interests for the major part of the catchment. The Goolburri Land Council that is based in Toowoomba covers indigenous land interests for the southern part of the catchment and includes the Shires of Nanango, Kingaroy, Wondai and Murgon.

Indigenous groups in the catchment view land rights as crucial to their future and as an imperative to providing necessary links with their cultural heritage.

A number of native title claims have been lodged for State lands in the catchment. The determination of these claims may recognise the existence of native title over significant parcels of land.

Desired Outcomes:

- That decisions relating to the allocation and use of State lands consider issues of ecologically sustainable development and the maintenance of biodiversity as well as the economic and social needs of the community.
- Better management of rural residential subdivisions to reduce their impact on the natural resources and viability of enterprises (eg pest management, pollution of groundwater)
- That the rights and interests of potential native title claimants be recognised and considered by decision makers before any land dealings proceed on land where native title or cultural heritage values may still exist.
- Ongoing monitoring of the impacts of the RFA on the catchment's local communities.
- Development and introduction of practical and fair rural property restructuring systems.
- Implementation of appropriate Vegetation Management protocols and associated community support mechanisms.

3.4.4 Impacts of Industry on Natural Resources and Catchment Economy

Data in Appendix D shows that the cropping industries contributed $309.94 million and the livestock domestic industries contributed $106.25 million to the Catchment's economy in 1996/97 (source ABS). The figure for the Catchment's total gross domestic production for 1996/97 was unavailable at time of printing.

The major contributors to the cropping production are the sugar industry, the fruit and vegetable industry and the field crops/grain crops industry. Each of these industries has had a significant and different impact on the use and management of the natural resources of the catchment.

As outlined in Section 3.2.6 on Cultural Issues the sugar industry was established in the Bundaberg District in 1866. The expansion of the industry since then has seen and continues to have significant impacts on the District's natural resources. These include:

- Almost the complete clearing of the Woongarra Scrub and its associated biodiversity. Only 20 ha out of a total estimated area of 4000 ha remain;

- Significant impacts on the Bundaberg groundwater systems to the extent that groundwater supplies have had to be augmented by surface water supplies to prevent further saltwater intrusion of the aquifers;
- Significant soil erosion of the steep red soils in the Childers District to the extent that in 1975 a land substitution scheme was introduced to remove lands of greater than 8% landslope from cane production and provide replacement lands on flatter slopes;
- The drainage of extensive wetlands/swamps in the Moore Park, Fairydale, Tantitha areas and the resultant release of acid leachate from acid sulfate soils. Some 6,500 ha of land is considerer to be affected by acid or potential acid sulfate soils;
- The expansion of cane assignments onto the more marginal soils that are susceptible to land degradation effects such as salinity.

While these impacts are a historical fact it must be noted that the Sugar Industry has made substantial advances in the adoption of sustainable land management practices over the last decade. The adoption of green cane trash blanketing and reduced tillage practices has significantly reduced soil erosion from the catchment's canelands. Over 65% of the canelands are protected by these practices.

Significant advances are also being achieved by the Sugar Industry in the area of irrigation efficiency and water use efficiency. The replacement of flood irrigation and water winches with drip irrigation and water monitoring technology is resulting in crop production benefits and water savings. There are still considerable opportunities for further technology development and landholder adoption of this technology.

The horticultural industry is a relative newcomer to the catchment and hence it has had limited impacts on the state of the catchment's natural resources. Much of the production has been as a rotational crop in conjunction with sugar cane. The advent of the horticultural industry to the catchment has seen the introduction of new technology to agriculture in general. Technology such as drip irrigation, water monitoring/scheduling, fertigation, plastic mulching, crop rotation, Integrated Pest Management and improved pesticide/herbicide regimes have all resulted from the horticulture industry. However areas of concern in regard to the horticulture industry include the structural degradation of soils, the safe disposal of discarded plastic mulch and the leaching of excess pesticides/herbicides/fertilisers into the catchments surface and groundwater water systems. There is an indication that the horticultural industry needs to encourage improved management practices in these areas.

The impacts of the field crops/grain crops industry on the catchment's natural resources are not as severe as the intensive cropping industries. However loss of soil through water and wind erosion, nutrient decline and deterioration of soil structure are still all evident on these lands. These are also occurrences of salinity where over clearing of the upper parts of the catchment for cultivation lands has resulted in rising groundwater tables on the lower lands. While landholders have implemented land protection measures such as contour banks, waterways and retention of crop residues to reduce the impacts of soil erosion there are still large areas of cultivation land in the catchment requiring protection.

The major contributors to the Catchment's livestock production are dairy cattle, beef cattle and intensive livestock industries such as pigs and cattle feedlots. The intensive livestock industries as well as dairies can have a significant impact on water quality. Uncontrolled discharge of effluent from these operations has the potential to pollute surface and groundwater supplies. There are stringent conditions imposed by State and Local Government on the control of runoff waters and disposal of effluents from these operations.

The grazing industry has also had an impact on the Catchment's natural resources. Land management practices such as overgrazing of pastures, overclearing of timber and the

introduction of improved pastures have resulted in increased land degradation and changes to the natural botanical biodiversity. In some cases pest species such as Giant Rats Tail grass and Parthenium have been introduced through pasture seed or fodder supplies. The grazing industry has also contributed to the decline of the stability of riparian vegetation along the Catchment's streams. As outlined in Section 3.2.3.1 continuous grazing pressures applied to some of the Catchment's riparian zones has resulted in a deterioration of this vegetation. Research results from trials at Narayen Field Station and Bundaberg also indicate that significant impacts on water quality can result from erosion of grazing lands. Increased turbidity and nutrients are outcomes of this erosion (personal comm. – Mark Sallaway).

The impacts of secondary industry and tourism on the catchment's natural resources are very site specific.

While a number of mining operations including sand and gravel extractions are undertaken across the catchment the environmental impacts of each of these is managed by an environmental management plan.

Desired Outcomes

- Government and Industry support in the soil conservation area is imperative to facilitate uptake of soil conservation measures by landholders.

3.4.5 Future Planning

A range of planning initiatives are currently being undertaken or are in place in the Burnett Catchment. These include:

- Local Authority Planning Schemes for each of the Shires.
- Wide Bay 2020 Regional Growth Management Framework for the coastal part of the catchment.
- Burnett Inland Economic Development Organisation strategy for revitalising the North, Central and South Burnett parts o the catchment (in preparation).
- Burnett River Catchment Study – an investigation into potential water infrastructure development in the catchment.
- Burnett Water Allocation and Management Plan (WAMP) – a planning study for the allocation and management of the catchment's surface water resources.
- Wide Bay Coastal Management Plan.
- Burnett/Mary Regional NRM Strategy.
- The Regional Forest Agreement for South East Qld will have significant impact on the timber industries and reallocation of lands between State Forests and National Parks.
- The *Vegetation Management Act* will impact on future development related to tree clearing.

Desired Outcomes:

- The Burnett Catchment Care Association through its catchment strategy seeks to facilitate a coordinated and partnership approach to the implementation of the priority resource allocation and management actions that have been identified in these planning initiatives.
- Participation of the community (and the BCCA) in the IDAS (Integrated Development Assessment System) process, eg submissions on developments during the public notification stage, submission on draft planning schemes, etc.
- Fostering a partnership approach between all interested and affected parties for future continuous planning.
- Coordination and consistency between the various planning schemes that guide the Catchment's development.

4.0 PROPOSED STRATEGIES

4.0.1 METHODOLOGY FOR PRIORITISING STRATEGY ACTIONS

From the initial strategic planning workshops held in July 1999, information provided from the Technical Advisory Group and the completion of the catchment overview has lead to the development of nine sub strategies. The following sub strategy themes are;

1. Communication
2. Education and Awareness
3. Research
4. Land Use and Management
5. Biodiversity Enhancement and Management
6. Riparian Zone Management
7. Water Access, Quantity & Environmental Flows
8. Water Quality
9. Pest Management

For each of the sub strategies; goal/s, strategic actions, priorities and responsibilities have been identified.

The BCCA working Committee was able to determine the level of priority for each of the strategy actions by qualitatively assessing the importance of each proposed action to an integrated approach to catchment management and the achievement of long-term results. The extensive community consultation period enabled the working committee to discuss issues and priorities with all stakeholders and to reach their conclusions based on a perceived importance to catchment management planning for the future.

At the conclusion of this process a large number of actions received a 'high priority' or 'ongoing priority'.

The large number of strategy actions that received a high priority was a result of community and stakeholders identifying the need for an integrated approach towards implementation of the catchment strategy. This integrated approach reflects that most of the actions require long-term financial commitment to provide opportunity for action planning and implementation. They therefore received a status of 'high priority' to enable planning for onground actions and funding identification as soon as possible. As different sources of funding opportunities and programs become available this will favour community and stakeholders to address a wide range of the high priority actions.

The strategy actions receiving the status of 'ongoing priority' was a result of community and stakeholders identifying the need for continuous works and commitment of funds and resources for implementation of strategy actions. This is to ensure long term monitoring and evaluation, maintenance and completion of projects occurring within the Catchment.

'Low priority' actions are those considered to be the type of actions which are able to be built in to catchment management planning as normal procedures such as monitoring and evaluation.

4.1 COMMUNICATION

4.1.1 Overview of the issue

Overview:

- To develop open and effective communication networks across the Burnett Catchment
- To improve the sharing of information and resources on natural resource management

Barriers:

- Information overload
- Misleading information as there are limited opportunities to discuss new information through extension
- Gaps in the current communication network between community and researchers, as information is highly technical and capable of being misinterpreted
- Distance is a geographical barrier
- General apathy and the perception that added costs will be involved in changed land and water management practices

Opportunities:

- To enhance the coordination of information and networks through the implementation of a communication plan
- Potential use of new technology to increase the efficiency of communication networks
- To improve the profile of the BCCA and an awareness and commitment to integrated catchment management in the Burnett Catchment
- To fill knowledge gaps identified in BCCA Issues Database
- Show positive aspects of improved practices and management of our natural resources
- Promote a shared community ownership and responsibility for natural resource management in the Catchment

4.1.2 Goal

- Develop and implement a communication plan for the Burnett Catchment

4.1.3 Outcomes

- Reduction in the duplication of information and resources
- Coordinated approach to the sharing of information and the most effective use of human resources
- To improve communication networks between community, government agencies, local authorities and industry groups

- Overall integration of all forms of communication technology
- Improved communication and education on catchment issues will lead to sustainable resource management in the Burnett Catchment as attitudes and values change with the adoption of sustainable practices

4.1.4 Strategies

Goal	Strategy Actions	Priority	Responsibility	Contributor
Develop and Implement a communication plan for the Burnett Catchment	**Research**	-		
	• Identify the difficulties associated with maintaining communication linkages	Low	DNR	BCCA
	• Identify gaps in communication linkages and activities between Landcare and catchment management	Ongoing	BCCA	DNR
	• Continue to update communication issues and information on the BCCA Issues Database	Ongoing	BCCA	DNR,DPI, EPA
	• Develop a communication plan for the Burnett Catchment to ensure the coordination and management of information and resources.	High	BCCA	DNR, EPA,DPI, Local Govt, Industry groups
	Extension and Communication			
	• Encourage the adoption of appropriate communication activities and tools identified in the communication plan to share information, resources and research findings	High	BCCA	BCCA
	• Increase the BCCA's capabilities, confidence and competence in engaging communities while communicating the principles and practices of natural resources processes relevant to the local area	Ongoing	DNR	DPI, EPA, BCCA
	• Increase the profile of the BCCA to wider community through the use of local and regional media, access to educational department and research institutes, forums, field days, and relevant promotional materials such as newsletters	Ongoing	BCCA	DNR, DPI, EPA
	• Encourage the use of new technologies to improve communication networks such as Internet services, e-mail, fax, and teleconferences.	Ongoing	BCCA	LCMC, DNR
	• Encourage ongoing community participation and ownership of the Strategy and encourage the community to be involved in the development of action plans, implementation of the strategies, development of project proposals and projects, etc.	High	BCCA	Landcare, Industry groups DNR, DPI,EPA

	• Promote community groups to be involved in the process of LCMC throughout QLD and encourage the involvement and interaction of the wider stakeholders.	High	BCCA	Landcare, DNR, LCMC
	• Develop I.T information suitable for students (6-17 years)	Low	BCCA	Edu & Res Inst.
	• Promote opportunities to link the BCCA website through Widebay 2020 website and to other websites including: *Queensland Landcare and Catchment Management; Environment Australia; DNR Resource Net; Australian Greenhouse Office; Streamline, Infoscan, etc*	Medium	BCCA	DNR, DPI, EPA,
	• Encourage the use of Future Profit style group training to enhance knowledge and commitment to property based natural resource management.	Medium	DNR/DPI/EPA	Industry groups, BCCA, Landcare
	Planning and Implementation • Plan and implement a communication plan for the Burnett Catchment to - identify the use of promotional resources such as brochures and posters - to develop an integrated approach with other programs and projects in the Catchment (Waterwatch, Waterwise, Water Safety, Riparian Restoration, Rivercare, Bushcare, Landcare) - improve the overall media coverage of the Burnett (regional approach) - encourage Sub-catchments or sub committees of BCCA to develop promotional material at local level - seek local sponsorship opportunities to engage in the promotion of natural resource management	High	BCCA	DNR, DPI, EPA, Edu & Res Inst
	• Encourage the use of appropriate communication tools and methods for community to access the information they need and at an appropriate level for various target audiences.	Ongoing	BCCA	DNR, EPA, DPI
	• Develop and implement mechanisms so that valuable information is not lost due to staff changes	Ongoing	DNR, DPI, EPA	BCCA DNR, DPI, EPA
	• Develop and implement mechanisms to reduce information collation and coordination problems caused by jurisdictional boundaries	Ongoing	BCCA	DNR,
	• Resource BCCA to undertake actions identified in the sub strategies.	High	Federal & State Govt	
			BCCA	DNR, DPI, EPA

	Monitoring and Reporting • To review and revise those communication tools and activities to suit the key partners and audiences within landcare and catchment management • Report on the improved methods and adoption of the communication plan • Report on the use of effective information and extension in the Burnett Catchment	Ongoing High High	BCCA BCCA	Industry groups, Landcare, DNR DNR, DPI, EPA

4.2 EDUCATION AND AWARENESS

4.2.1 Overview of the issue

Overview:

- To create greater awareness and knowledge of natural resource management in the Burnett Catchment, ie an awareness of the heavy costs imposed on our natural resources as a result of inappropriate land and water management
- Greater appreciation and ownership of the management of natural resources for long term sustainability
- To enable the Burnett Catchment community to plan for and maintain a healthy and economically viable catchment

Barriers:

- Lack of understanding and research regarding the barriers that reduce the adoption of improved practices, changes in attitudes, values, motivations.
- Limited resources and extension services to provide education, training and awareness to a diverse and widespread community
- Overabundance of information can lead to misinterpretation and overwhelm community members
- Economic realities may give rise to extended delays in the adoption of improved management practices

Opportunities:

- The widespread use of natural resource education and awareness programs within community groups, schools, youth groups, TAFE colleges , universities and other educational institutions, etc
- Increase in adoption of best management practices in urban and rural communities
- To raise the profile of the BCCA, giving it the status of a peak body with the ability to assist community in the identification of issues, development of catchment management plans and ongoing remedial activity
- Ready accessibility by the community to information relevant to their requirements
- To capitalise on the thirst for information, educational material and a desire to learn

4.2.2 Goal

- To enhance the community's knowledge, understanding of, and involvement in sound natural resource management.

4.2.3 Outcomes

- A BCCA coordinated approach to the dissemination of relevant information and resources to the community
- A positive community response to new or improved educational material and programs

Burnett Catchment Care Association Inc To coordinate and instigate community awareness and effort to maintain an ecologically and economically sustainable Burnett and associated river systems

- Greater understanding of the need for the adoption of improved land management practices

4.2.4 Strategies

Goal	Strategy Actions	Priority	Responsibility	Contributor
To enhance the community's knowledge, understanding of, and involvement in sound natural resource management.	**Research**			
	• Encourage ongoing research and the development of case studies to trial and demonstrate the impact and success of new educational material	Ongoing	BCCA	DPI, DNR, EPA, Edu & Res Inst
	• Encourage ongoing research and development of resource inventories and databases to help assist groups in obtaining the information they require	Ongoing	BCCA	DNR
	• Identification and documentation of gaps in research and knowledge as they arise in the course of the development of catchment management plans	High	DNR	DPI, EPA, Industry Groups
	Extension and Communication			
	• Development of educational programs amongst the community to deliver effective training and information which target local needs	High	DNR, DPI, EPA	BCCA, Local Govt. Ind
	• Develop appropriate strategies which target Australian youth as they will become *tomorrow's natural resource managers.*	High	BCCA	Groups, Local Govt.
	• Stage greater awareness activities and programs throughout the catchment in a systematic way to give come continuance to educational and resource material as a fundamental part of community activities	Ongoing	BCCA	DNR, DPI, EPA
	• Ensure that the educational and resource material promoted to groups is relevant and useful	Ongoing High	DNR,DPI,EPA	Landcare
	• Establish a pattern of forums, field days and information sessions across the catchment to enable the sharing of information among groups, agencies, industry, research institutes, etc.		BCCA, Landcare	DNR, DPI, EPA, Industry groups
	Planning and Implementation	Ongoing		
	• Link into existing educational programs and projects being undertaken by community groups and promoted through local activities	High	BCCA, Landcare	Edu & Res Inst
	• Encourage the reduction of institutional and financial barriers to providing		DNR, DPI, EPA	BCCA, Edu &

	information access with a priority on community access to Geographical Information Systems	High		Res Inst
	• Plan education and awareness programs and activities such as field days, forums, and information sessions to assist in the implementation of the Burnett Catchment strategies	Ongoing	DNR, EPA, DPI	BCCA, Local Govt.
	• Implement ongoing educational programs in the Burnett Catchment, such as the expansion of a *Waterwatch* project across the entire Burnett Catchment	Ongoing	BCCA	Landcare, Greening Australia
	• Implement further training courses and adult learning programs to provide information on natural resource management to the wider community	Ongoing	DPI, DNR, EPA	DNR BCCA
	• Encourage and plan for the inclusion of new and existing information and resources to be included in the curriculum for schools and tertiary institutions	High	DNR, Edu & Res Inst	Landcare BCCA
	• Further development of natural resource management modules in Future Profit courses	High	DNR, DPI, EPA	BCCA, Industry group
	• Resource BCCA to undertake actions identified in the sub-strategies	Ongoing	Federal & State Govt	DNR
	Monitoring and Reporting			
	• Monitor regularly, the use and suitability of resource information and educational material on behalf of the community	Ongoing	BCCA	Landcare, Industry group
	• Review regularly, any contributions of resources and information available for increasing community knowledge and understanding of land management	Medium	BCCA, DNR,	DPI, EPA
	• Develop case studies of community groups that have capitalised on new information and/or training programs; such case studies to be used as a reference and for benchmarking reviews on future programs	High	DNR, DPI, EPA	BCCA, Landcare
	• Publicise information on completed projects with a related summary to encourage the development of future projects and to gauge any operational improvements that may be deemed necessary		BCCA, Landcare, G.A	DNR, DPI, EPA, Local Govt, Edu & Res Inst

4.3 RESEARCH

4.3.1 Overview of the issue

Overview:

- Greater awareness and understanding of the impacts of natural resource management
- Identify catchment changes, as a result of improved options for decision making and adoption of new management practices
- Maintain a database of catchment information to be used as a education and resource tool for the wider community
- Investigate specific natural resource issues within the catchment
- Investigate socio-economic implications of NRM to land owners and the community
- Investigate impacts of changed flow regimes on biodiversity, fish species and spawning

Barriers:

- Limited funding opportunities for research projects
- Limited community access to research information and findings
- Technical and research information gaps in the catchment
- Failure to recognise the socio-economic implications of Government driven NRM agendas (eg RFA, Water Reform, Vegetation Management

Opportunities:

- Community groups to lobby industry, state and federal government to fund research of catchment issues
- To improve resource information to the community
- Community to link with research institutes to share information and undertake appropriate research projects
- Community and landholders to modify decision making and land management practices as a result of research findings
- Development of total Catchment community approach to NRM

4.3.2 Goal

- To undertake research to identify methods to improve natural resource management practices within the catchment

4.3.3 Outcomes

- Further research undertaken to address priority resource management issues
- Coordination and integration of research activities in the catchment
- Research directed to practical and sustainable outcomes based on a full understanding of the environmental, social and economic implications of natural resource management

4.3.4 Strategies

Goal	Strategy Actions	Priority	Responsibility	Contributor
To undertake research to identify methods to improve natural resource management practices within the catchment	**Research**	-		
	• To continue the development of comprehensive accessible relational and spatial databases for resource information	Ongoing	BCCA, DNR	DPI, EPA, Edu & Res Inst
	• To identify and investigate the gaps and hotspots of resource information within the Burnett Catchment	High	BCCA	
	• Investigate the socio-economic implications of NRM initiatives specific to the Burnett (whole of the Government responsibility)	High	DPI, DNR, EPA	DNR, EPA
	• To collate current information and research of other River Systems identified in the Catchment area.	High	DNR, DPI, EPA	BCCA Edu & Res Inst, BCCA, Landcare
	Extension and Communication			
	• To maintain a pro-active approach with all tiers of government and institutions that are producing local, regional or state plans	Ongoing	DNR, DPI,EPA	BCCA
	• Recognise the professional fields, organisations, committees, and personnel within the catchment that can provide information and resources for research.	Ongoing	BCCA	DNR,DPI,EPA, Industry group
	• Lobby industry, Local Govt, State and Federal Government for funding opportunities to continue ongoing research in the Burnett Catchment	Ongoing	BCCA	Landcare, Industry group
	• Encourage research partnership approaches between agencies and community, to increase the sharing of information and research outcomes.	Ongoing	DNR,DPI, EPA	Edu & Res Inst, BCCA
	• Encourage community to participate in the review of research and resource information reports, studies, strategies etc.	Ongoing	BCCA, Landcare	DNR, DPI, EPA
	• Encourage researchers to disseminate information to the community, through field days, workshops, environmental forums, etc	High	BCCA	Industry groups, Landcare
	• Encourage implementation of the communication plan, to ensure research findings and information is accessible to the community, targets the appropriate audience and ensure information is not mis- interpreted	High	BCCA	DNR, DPI, EPA, Industry groups

	Planning and Implementation • Encourage stakeholder groups to be involved in the planning and implementation of research projects. • Coordinate the development of research projects to ensure they address high priority issues for the catchment and the findings are of relevance to the wider community • Resource the BCCA to undertake actions identified in the sub-strategies **Monitoring and Reporting** • Report to catchment stakeholders on any change or significant developments as a result of research projects • Monitor the adoption of new research findings and technology within the community • Report to the catchment stakeholders any change as a result of developing and implementing codes of practice • Monitor the socio-economic responses to environmental and natural resource management changes in the Catchment	High High High High Ongoing High High	DNR, DPI, EPA BCCA DNR, DPI, EPA Federal & State Govt. DNR,DPI, EPA DNR, DPI, EPA Industry Groups, DNR, DPI, EPA DNR, DPI, EPA	BCCA, Landcare, BCCA, Landcare, Industry groups DNR Industry groups, BCCA, G.A, Landcare Local Govt BCCA BCCA, Local Govt, Edu & Res Inst

4.4 LANDUSE AND MANAGEMENT

4.4.1 Overview of Issue

Overview:

- To assess the extent of probable land degradation in the Catchment
- Identification and implementation of appropriate vision for sustainable land use
- Increase education and awareness of appropriate landuse and sustainable practices to the wider community
- To improve community appreciation and awareness of cultural and landscape values

Barriers:

- Attitude change over long period of time, reluctance to adopt new/improved practices
- Lack of perceived benefits and incentives accepted by community
- Large costs associated with adopting new practices and no mechanism for consumers to share these costs
- Inadequate resources, technical advice and assistance in demonstrating new practices, individual support to assist in adoption of new practices
- Decline of productivity due to wide Socio-economic impacts on the rural sector
- Individual's perceptions of broader Catchment situation clouded by narrow focus of personal experiences
- Fragmentation of input and activity due to lack of a coordinated response at local, sub Catchment and Catchment levels

Opportunities:

- To provide assistance to landholders by providing information, support and assistance to industry groups.
- Pressure industry groups to undertake new programs and incentives to help landholders and farming groups
- New extension and education material to improve awareness
- Landholders undertake improved practices with support and assistance from Local Govt, Govt agencies and community
- Community economy builds as farming businesses undertake long term sustainable methods of farming
- Landholders (and community) combine to address NRM issues in a coordinated and collaborative way

4.4.2 Goals

- Increase community participation in integrated management of the land, water and vegetation resources in the Catchment
- Promote greater collaboration between research, development and extension activities to achieve a more integrated delivery of information to Catchment groups and Landholders

- Encourage the use of adult learning techniques in skilling land users for the planning and implementation of best management practices across the Catchment

4.4.3 Outcomes

- Increase in community's awareness and knowledge of the Catchment landscape, soils and vegetation.
- Increase in communities adoption of improved land management farming practices
- Greater understanding technical, scientific, and generally for the community to undertake new incentives to improve land management
- Government agencies and Local Govt to provide support and undertake joint incentives with community to address land management issues
- A coordinated and collaborative approach to NRM in the Catchment

4.4.4. Strategy

Goal	Strategy Action	Priority	Responsibility	Contributors
Increase community participation in integrated management of the land, water and vegetation resources in the Catchment	**Research** ▪ Identify the priority issues for landuse management within the Catchment ▪ Encourage ongoing research of developing new landuse technologies/processes and improving land management practices to be adopted by landholders in the Catchment ▪ Continual research to achieve a better understanding of climatic factors and climate predicability **Extension and Communication** ▪ Organise and facilitate meetings with Landcare groups, farmer groups, community and stakeholders to develop plans to implement onground measures that address the identified priorities of land management ▪ Organise community awareness programs and activities such as field days, demonstration sites, trial sites, farm walks, and media releases, etc	High Ongoing Ongoing High High	BCCA, Landcare DNR, DPI, EPA Industry groups DPI, DNR, EPA BCCA, Landcare, G.A BCCA, Landcare, G.A	DNR,DPI,EPA BCCA, Landcare. BCCA, Edu & Res Inst Industry groups Industry groups,

	▪ Encourage improved methods of climate information dissemination to and skilling of landholders to become better managers of the use of this information	Ongoing	BCCA, Edu & Res Inst	DPI, DNR, Epa, Industry groups, Local Govt.
	Planning and Implementation ▪ Formation of a Steering committee to seek funding, plan, implement an integrated program for managing landscapes, soils and vegetation	High	BCCA, DNR, DPI, EPA	Industry group, Local Govt, Landcare, G.A
	▪ Encourage community and landholders to collaboratively undertake on-ground improvements such as erosion control in areas identified by State of Rivers survey, Riparian restoration, water recycling, runoff minimisation, conservation cropping, pest control, fencing of riparian areas, cropping along contours, encouraging buffer strips to trap sediments and nutrient run-off, etc	High	BCCA, Landcare	Industry groups
	▪ Encourage sustainable management of estuarine, coastal fringes and land resources.	High	EPA, DPI, DNR	Industry groups, BCCA
	▪ Target assistance and support from DNR, DPI and EPA to ensure technical support, extension and planning occurs for the implementation of identified priority actions of local work plans and are built into their Annual Operational Plans	High	BCCA, Landcare	DNR, DPI, EPA
	▪ Seek assistance and technical support from DNR, DPI and EPA to organise the delivery of field days, information sessions, shed workshops/meetings, environmental forums etc on soil, water, vegetation management, day to day management for sustainable use, and linkages between resource attributes and limitations	High	BCCA, Landcare	Industry Groups
	▪ Encourage adoption of practices consistent with completed Land Use Studies (DNR) ▪ Resource the BCCA to undertake actions identified in the sub-strategies	Ongoing High	DPI, DNR Federal & State Govt	Edu & Res Inst DNR

	Monitoring and Reporting ▪ Establish a system to enable monitoring and reporting of progress and implementation of on-ground works throughout the Catchment. ▪ Continue to monitor and update the data on progress of degradation of the Catchment's soils ▪ Review the diversity of adoption of improved practices throughout entire Catchment and assess the areas of major change to small/no change. ▪ Establish a process to identify the needs of community adopting changes in those areas that have not reported any change ▪ Monitor the community's ongoing capacity to maintain appropriate land management practices in a changing economic environment	Ongoing Ongoing Ongoing Low Ongoing	BCCA DNR, DNR, DPI,EPA BCCA, Landcare DNR, DPI, EPA	DNR, DPI, EPA BCCA BCCA Industry groups DNR BCCA, Industry groups
Promote greater collaboration between research, development and extension activities to achieve a more integrated delivery of information to Catchment groups and Landholders	**Research** ▪ Identify gaps in technical knowledge, or service delivery that are constraining the implementation of 'on-ground' works. ▪ Encourage ongoing research into balancing conservation and production **Extension and Communication** ▪ Encourage key agencies and other stakeholders to facilitate and exchange the information on research findings, objectives of future plans which support the implementation of on-ground works to address the priority issues for Landuse management ▪ Develop a communication plan to actively promote the content, accessibility and benefits of the BCCA Resource Inventory in objective resource management decision making ▪ Continue the promotion and development of Future Profit style training modules that address land management issues in the Catchment	High Ongoing High High Ongoing	DNR DPI, DNR, EPA, Edu & Res Inst BCCA, Landcare BCCA DPI, DNR	BCCA, Landcare BCCA Industry groups, Local Govt. DNR, DPI, EPA BCCA

	Planning and Implementation			
	▪ Encourage and assist in the identification of 'case study' properties that demonstrate key principles of 'best management' practices	Ongoing	BCCA	DNR, DPI, EPA,
	▪ Encourage community and stakeholders to have input intoIPA planning schemes and the development of industry codes of practice	High	BCCA, Local Govt.	Landcare Landcare
	▪ Encourage protection of cultural heritage (European and Indigenous cultures) through IPA planning schemes	High	BCCA, Local Govt,	Industry groups
	▪ Encourage implementation of actions which have had research that has already been completed	Ongoing	DNR, DPI, EPA	BCCA, Landcare
	▪ Encourage adoption and use of land resource information including DNR Land Resource Information and WB2020	Ongoing	BCCA	DNR, DPI, EPA, Widebay 2020
	▪ Promote community involvement in the development of extension activities that deliver information on improved practices for landuse management through field days, environmental forums, information sessions and static displays, workshops, etc	High	BCCA	
	▪ Develop action plans at sub-catchment levels to address the identified gaps of technical knowledge and service delivery to landholders	High	BCCA	Industry groups
	▪ Deliver the key components of the communication plan	High	BCCA	DNR, DPI, EPA
	Monitoring and Reporting			
	▪ Report on the delivery of technical information and research data, through integrated development and extension activities to the wider community	Ongoing	DNR, DPI, EPA	BCCA
	▪ Review communities response to communication and extension programs, field days, and environmental forums, etc to use in the development of future communication and extension programs or activities	Ongoing	BCCA, Landcare	Industry groups
	▪ Monitor the usage of the BCCA Resource Inventory by the community, and modify the communication plan as required	Ongoing	BCCA	DNR, DPI, EPA

Encourage the use of adult learning techniques in skilling land users for the planning and implementation of best management practices across the Catchment	**Research** • Investigate and identify appropriate adult learning mechanisms that will effectively deliver desired understanding and activity in the Catchment	High	DPI	DNR, EPA, BCCA
	Extension and Communication ▪ To identify the content and availability of existing adult education programs in the Burnett Catchment	Low	BCCA	DPI
	▪ Identify gaps in the provision of adult education programs and develop a plan of action to address these gaps	Low	BCCA, DPI	DNR, Industry groups
	Planning and Implementation ▪ Seek technical and funding support for the delivery of training activities that address the gaps identified or new research finding or technologies	Medium	BCCA DNR Edu & Res Inst	Landcare Industry groups
	▪ Encourage the funding and delivery of adult training activities, such as Future Profit, to address high priority issues such as livestock grazing pressures, irrigation water use efficiency, property management planning for the land's capability, land degradation issues, and efficient vegetation management	High	DNR,DPI, EPA Edu & Res Inst	Industry groups, BCCA
	Monitoring and Reporting ▪ Monitor the performance of extension, education and skilling activities and modify if/when required	Ongoing	DNR, DPI, EPA	BCCA

4.5 BIODIVERSITY MANAGEMENT AND ENHANCEMENT

4.5.1 Overview of Issue

Overview:

- Loss and degradation of biodiversity values at the landscape, ecosystem, community and species/subspecies level
- decline in ecosystem/community/population resilience

Barriers:

- continued development pressures leading to threatening processes
- complexity of natural systems and incomplete information
- lack of community awareness/ownership of issues

Opportunities:

- improved quality and availability of relevant information
- increased community awareness
- incentive programs and participation in biodiversity management
- improved legislation, government policy and planning schemes to protect biodiversity values
- further consolidation of the dedicated reserve system
- Maintenance and beneficial exploration of genetic diversity that is inherent in the natural system

4.5.2 Goal

- Implement an effective and efficient program of Biodiversity Management in the Catchment

4.5.3 Objectives

- Raise the level of awareness/ownership of biodiversity conservation issues in the Catchment by all sectors of the community (government, private industry and the general public)
- To encourage the implementation of improved environmental standards/codes of practice through legislative, policy, planning and operational initiatives which incorporate the protection of biodiversity values

4.5.4 Outcomes

- Maintenance and enhancement of biodiversity values and benefits through increased community understanding and commitment and improved government legislation, policy and planning.
- Adoption of operational frameworks/standards/codes of practice to protect and manage biodiversity values
- Community, Government and Non Government agencies working in partnership, such as joint projects, sharing of information and resources

4.5.5 Strategy

Goal	Actions	Priority	Responsibility	Contributors
Implement an effective and efficient program of Biodiversity Management in the Catchment	**Research** • Develop a metadata base of information relevant to biodiversity management within the catchment with the objective of improving public access to relevant information using technologies such as GIS and the internet	High	EPA, DNR, DPI	Edu & Res Inst
	• Encourage and support research programs, which target gaps in the existing information/ knowledge base within the Burnett Catchment - Investigations of the adequacy of the existing reserve system to protect biodiversity values at the ecosystem, community and species/subspecies level - studies to develop efficient and effective remnant vegetation management/ habitat restoration techniques - studies associated with the recovery of threatened species of flora and fauna - Studies of 'keynote' special interest flora and fauna and poorly known taxonomic groups, eg habits of fruit bats, species with commercial value (medicines, bushfoods, timber or fibre production, etc.)	High	BCCA	EPA, DNR, Local Govt, Edu & Res Inst Landcare, G.A/
	• Establish a database for capture of the Catchment's natural gene base attributes for use and development of future generations.	High	EPA	Edu & Res Inst, G.A, DNR, BCCA
	Extension and Communication • Promote further awareness of the dedicated protected area reserve system in the Bioregions of Southeast Queensland and Brigalow Belt South, in	Medium	EPA, G. A	DNR, DPI, Local Govt,

	accordance with established CAR principles (comprehensive, adequate and representative reserves)			Edu & Res Inst
	• Promote initiatives targeting community participation in conservation of biodiversity on privately managed land (on all other lands)	High	BCCA	EPA, Local Govt
	• Organise, encourage and facilitate community participation in environmental forums, workshops and field days to demonstrate and increase awareness of the importance of and need to retain biodiversity alongside sustainable production systems	High	BCCA	Landcare, Industry groups
	• Encourage and facilitate landholder participation in various forms of natural resource management plans at the property level e.g. property management plans (Future Profits), land and water management plans (LWMP), vegetation management plans (VMP)	High	EPA, DNR, DPI	BCCA, Landcare, Industry groups
	• Support for landholder participation in various forms of voluntary conservation agreements such as *Land for Wildlife*, Nature Refuges and/or Local Govt. Voluntary Conservation Agreements', International/ Federal/ State/Local Government initiatives.	Ongoing	EPA BCCA,	Landcare Local Govt,
	• Encourage community participation in strategic projects funded under relevant programs of the *Natural Heritage Trust* e.g. Bushcare, Wetlands, Endangered Species	High	BCCA, DNR,	Greening Aust, Landcare, DPI, EPA, DNR
	• Encourage participation in community-based wildlife survey programs such as *Natureserach*	Ongoing	EPA	BCCA, Local Govt, G.A, Landcare
	• Encourage agencies responsible for enhancement of natural resource management and biodiversity conservation on dedicated single purpose and multiple-use reserves in the catchment viz. National Parks, State Forests, Council Reserves, Roads and Stock Routes, etc	Ongoing	Reserve Managers (EPA, DNR, Local Govt, Trustees etc.)	

Burnett Catchment Care Association Inc To coordinate and instigate community awareness and effort to maintain an ecologically and economically sustainable Burnett and associated river systems

	Planning and Implementation			
	• Seek funding support for community 'on ground' actions and funding incentives for landholders seeking to protect strategic remnant bushland (riparian and non-riparian) and critical habitats in the catchment	High	BCCA, Landcare	DNR, EPA Local Govt.
	• Incorporate protection of biodiversity values within and across individual Shires in the catchment through IPA planning schemes	High	Local Govt	DCILGP, EPA, DNR, BCCA
	• Recognition of developed Codes of Practices for ecologically sustainable natural resource management and protection of biodiversity	Ongoing	Major Land Use Industry Groups	BCCA EPA, DNR,
	• Provide assistance to landholders and community in the application of Codes of Practice	Ongoing	EPA, Local Govt	DNR, BCCA, Edu & Res Inst
	• Resource BCCA to undertake actions identified in the sub strategies.	High	Federal & State Govt.	DNR
	Monitoring and Reporting			
	• Develop a 'State of the Environment' report in conjunction with industry and local government for monitoring future environmental change	Ongoing	BCCA, EPA	DNR, Local Govt, Edu & Res Inst
	• Development of appropriate indicators to monitor the condition and trend of the Catchment's regional ecosystems and biodiversity	Ongoing	EPA	Local Govt, BCCA, Landcare
	• Survey landholder attitudes affecting the implementation of best management practice for ecologically sustainable production and biodiversity conservation	Ongoing	BCCA	DNR, DPI, EPA
	• Survey landholders to look at information gaps/requirements, technical issues, extension support and the provision of incentives, and barriers or impediments to implementation	Ongoing	BCCA	DNR, DPI, EPA

4.6 RIPARIAN ZONE MANAGEMENT

4.6.1 Overview of Issue

Overview:

- Non sustainable landuse practices and land management within riparian zones leading to an overall decline in Catchment health.

Barriers:

- Reluctance to change management practices
- Lack of community awareness and understanding of the importance of riparian ecosystems for the entire catchment
- Government regulations
- Economic barriers for riparian landholders to change riparian zone management practices

Opportunities:

- Programs and incentives to increase community awareness and maintenance of riparian zones of good and moderate condition as identified in reports and studies such as: *State of the Rivers: Burnett River and Major Tributaries; State of the Environment Queensland 1999; Riverlandscapes; A Rehabilitation Manual for Australian Streams; Fisheries Resource Assessments of the Estuarine and Riverine Reaches of the Burnett River in the Wide Bay-Burnet Region of Queensland;* etc

4.6.2 Goal

- To improve riparian zone management and consequently enhance the condition of existing riparian zones and associated Catchment health

4.6.3 Outcomes

- Whole community awareness and ownership of riparian zone management issues
- Adoption of good riparian management practices
- Community groups and other agencies undertaking monitoring of the health of the Burnett Catchment
- Continuing support by government and non-government agencies for riparian zone management
- Riparian landholders participating in joint riparian zone management initiatives

4.6.4 Strategy

Goal	Strategy Actions	Priority	Responsibility	Contributors
To improve Riparian Zone Management and consequently enhance the condition of existing riparian zones	**Research**			
	• Determine (list and map) priority locations requiring protection as outlined in the State of Rivers Report, Fisheries Resource Assessment, Catchment Overview, BCCA Issues Management Database and community knowledge	High	BCCA ,	EPA, DPI, DNR
	• Encourage and support agencies, research institutions and universities to research key riparian sites in the Burnett Catchment as part of ongoing studies of 'good and bad' ecological systems	Ongoing	BCCA, Industry groups	Landcare
	• Encourage and lobby agencies and other stakeholders to continue research into riparian management processes and funding opportunities	Ongoing	BCCA, Industry groups	Landcare, G.A
	Extension and Communication			
	• Develop action plans in conjunction with Local Government, State and non-Government Agencies for riparian landowners to address critical areas of concern and riparian areas of good/excellent ecological significance requiring protection which have been identified.	Ongoing	BCCA,	Industry groups
	• Undertake community participatory activities to demonstrate and increase awareness of the importance of and need to maintain riparian areas	High	BCCA, DNR	Landcare, Industry Groups
	• Develop and implement relevant Riparian Zone Management guidelines	High	EPA	DNR, BCCA
	• Develop an inventory of good management practice adopted by land users, identify case studies and actively promote throughout the sub-catchments and Landcare groups	Ongoing	EPA, DNR	Industry groups, Local Govt., BCCA
	Planning and Implementation		BCCA,	
	• Facilitate on-ground actions of the high priority riparian areas as identified in reports, such as the State of Rivers Report - maintenance of good riparian areas - maintenance and recognition of very good riparian areas		BCCA, EPA	DNR

	- maintenance and rehabilitation of moderate riparian areas • Seek funding opportunities and corporate sponsorship through industrial groups, Local Govt. and other sources for funding Riparian land users management plans and programs • To Lobby industry and other stakeholders to ensure commitment to riparian zone management where it has been identified in the 'Guidelines' Riparian Zone Management **Monitoring and Reporting** • Encourage sub-committees to monitor and report on: - on-ground activities and projects - ecological changes of moderate to good riparian zones • To participate in the review of reports ie. State of Rivers review survey in 5 years • Assess data and information collected by community programs and activities, such as the South Burnett Waterwatch Program. Use this information for assessing ecosystem changes and future planning. • Undertake a survey of riparian landowners' needs in the adoption of improved management practices • Access a monitoring tool kit to provide community groups and individual riparian landowner guidance to-monitor sites throughout the catchment. • Document practices used by landholders and riparian land owners for maintaining areas for the long term sustainability • Report on the long term environmental benefits versus economic costs for community		BCCA – Sub-catchments Landcare, Local Govt. BCCA, Landcare BCCA, DNR BCCA BCCA BCCA, EPA EPA, DNR, DPI BCCA DNR, EPA	Industry groups Industry Groups, Local Govt, EPA, DNR, DPI Industry groups DNR, EPA DNR, EPA, DPI, Industry groups, Edu & Res Inst DNR, Landcare Edu & Res Inst, Local Govt Edu & Res Inst Local Govt, Edu & Res Inst

4.7 WATER ACCESS, QUANTITY AND ENVIRONMENTAL FLOWS

4.7.1 Overview of Issue

Overview:

- To ensure maintenance of current and future water supplies within the Burnett and associated rivers
- Recognition and appreciation from community that the water supply of the Burnett and associated rivers is a finite and valuable resource
- Need to understand infrastructure and future developments are an integral part of managing our water resources in the Catchment
- Recognition of importance of water resource to non-extractive industries – commercial and recreational fishing, and tourism
- Recognition of importance of water resource to survival of in-stream natural resources for example fish and aquatic plants

Barriers:

- Lack of community awareness and acceptance of the Government Water Reform Agenda
- Legislative changes and implications arising from the Water Reform Agenda
- Divergence of opinion on the necessary planning and regulation to sustain use while allowing for environmental flows
- Lack of community awareness of need to maintain seasonal flows for migratory fish species

Opportunities

- New incentives from industry and government to encourage long term water use efficiency.
- Greater understanding of water access/availability/sustainability through the WAMP
- Ability to sell or transfer water entitlements under the new Water Act

4.7.2 Goal

- **Access to assured supplies of water for the Burnett Catchment within the capabilities of the system and maintenance of environmental values.**

4.7.3 Outcomes

- Better water use efficiency consistent with maintaining healthy ecosystems
- Greater appreciation of the value of assured supplies of water
- Partnership approaches to enhance community involvement and understanding of future water infrastructure and management planning
- Introduction of water reuse strategy
- Effective fishways on all in-stream barriers, and seasonal flows that mimic requirements for fish migrations

Burnett Catchment Care Association Inc To coordinate and instigate community awareness and effort to maintain an ecologically and economically sustainable Burnett and associated river systems

4.7.4 Strategy

Goal	Strategy Action	Priority	Responsibility	Contributors
Access to assured supplies of water for the Burnett Catchment within the capabilities of the system and maintenance of environmental values.	**Research**			
	▪ Encourage onground research of groundwater supplies throughout the Catchment	High	DNR	BCCA
	▪ Research and monitor the impact of current landuse and management practices on the limited ground water resources of the catchment	High	DNR	Industry groups, Edu & Res Inst, BCCA
	▪ Research the development of better water use efficiency techniques and distribution systems	High	DNR, Industry groups	BCCA, Edu & Res Inst
	▪ Research options for Wastewater reuse and the impacts on the land	High	DNR	BCCA, Local Govt.
	▪ Research the needs and management of migratory fish species	High	DPI, Industry Groups	BCCA
	Extension and Communication	High	DNR	BCCA, Industry groups
	▪ Develop and implement a mechanism for community awareness and ongoing involvement in the Burnett Catchment Water Allocation Management Plan.	Ongoing	BCCA, Edu & Res Inst	
	▪ Encourage schools, universities, TAFE and community groups to continue adopting water efficiency awareness programs such as *Waterwise* ie Yarraman & Bundaberg *Waterwise* Gardens	Ongoing	BCCA, Industry groups	Landcare
	▪ Lobby industry groups and Govt to help provide incentives and funding for landholders to adopt best/improved management practices which enhance water use efficiency	Ongoing	BCCA	DNR, DPI, EPA, Local Govt
	▪ Develop a catchment awareness and communication plan to promote water efficiency and healthy river systems using existing education tools and programs.	Ongoing	DNR	BCCA
	▪ Encourage communication and awareness of long term water needs to meet within			

	sustainable capacity	Ongoing	DNR	BCCA, Industry groups
	▪ Encourage a greater appreciation of the need to maintain environmental flows as part of river health	Ongoing	DPI, Industry	BCCA, Local Govt
	▪ Encourage a deeper appreciation of need to maintain healthy populations of aquatic vertebrates and invertebrates			
	Planning and Implementation			
	▪ Ensure community input into the development of ROP's and ROL's for the Burnett WAMP	High	DNR	BCCA
	▪ Encourage and adopt best management practices for efficient water use by Local government, industry and landholders	High	BCCA, Local Govt	DNR Local Govt
	▪ Encourage further development and assistance with on farm water management in terms of Land and Water Management Plans, property planning, new technologies and practices such as encouraging the adoption of alternative cropping and irrigation procedures	Ongoing	DNR, DPI, EPA	Industry groups
	▪ Encourage the adoption of improved technologies for better water use efficiency	High	DNR	BCCA
	▪ Encourage partnership approach between community and Govt agencies to develop and implement infrastructure proposals and plans	High	BCCA	DNR
	▪ Encourage the community to access information from the BCCA Resource Inventory, Resource information on the Burnett via the Web, and Wide Bay 2020 web to enhance existing knowledge and gain further access to other databases, research, case studies, programs, etc	Ongoing	BCCA	DNR, Widebay 2020
	▪ Encourage urban residents to adopt other water efficiency measures such as installing rainwater tanks and water wise garden systems	High	DNR BCCA, Local Govt	Landcare
	▪ Pressure DNR Regional Infrastructure Development to investigate, assess and plan to maintain and enhance riparian systems above water storage impediments, and to similarly address downstream impacts of water storages.	High	BCCA	Industry groups
	▪ Resource BCCA to undertake actions identified in the sub strategies.	High	Federal & State Govt	DNR
	Monitoring and Reporting			
	▪ Undertake action to be part of the consultation phase for the WAMP			

	▪ Community to report on the use and benefits of accessing information from the BCCA Resource Inventory. Resource information on the Burnett via the web, and Widebay 2020 website	High Low	BCCA BCCA, Industry group	Landcare Landcare
	▪ Encourage the review of current environmental reports, surveys, monitoring programs, ecosystem health assessments, and issues from the BCCA Issues Management Database to compare the catchment improvements to enhancing sustainable ecosystems	Ongoing	BCCA	Landcare, Industry groups
	▪ Community involvement in reviewing results of environmental auditing on the yields of impoundment	Ongoing	DNR, Local Govt	BCCA

4.8 WATER QUALITY

4.8.1 Overview of Issue

Overview:

- The need to maintain a supply of good quality water for current and future use
- Supplying good quality water is influenced by the total development pressure (population growth, infrastructure), landuse and natural factors (such as dissolved salts) within the Catchment
- To understand the issue of both water quality in streams, dams, large impoundments and farm dams, and then the quality of water at the point of use by consumers (urban/domestic use)
- Management of groundwater systems to prevent salt intrusions and contamination

Barriers:

- Financing new technology and improved landuse practices to ensure good quality water
- Cost of treatment facilities for Local Govt to recycle water for long term benefits of improving the quality of recycled water
- Reluctance of people to change the practices and a lack of awareness about the cause of water quality problems eg. Industrial chemicals (PCB's, etc), excess nutrient runoff, organic wastes

Opportunities:

- Community participate in water quality awareness programs such as *Waterwatch, Waterwise*
- Lobby industry group and Local Govt for support and funding opportunities to continue monitoring programs and ongoing research of water quality management
- Increase adoption of good landuse practices such as riparian retention, offstream watering points, managed grass strips and buffers for trapping sediments and nutrients, cropping along contours, minimum tillage cropping practices, etc

4.8.2 Goal

- Accept the importance of improved management plans and landuse practices to deliver quality water of accepted industry and health standards

4.8.3 Outcomes

- Community has a greater appreciation and knowledge of the value of good quality water and its real cost
- The level of water use does not exceed existing capacity and degrade water quality or future planning opportunities
- Community to accept necessary procedures, planning, regulations and costs involved in supplying of good quality, safe water

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4.8.4 Strategy

Goal	Strategy Actions	Priority	Responsibility	Contributor
Accept the importance of improved management plans and landuse practices to deliver quality water of accepted industry and health standards.	**Research**			
	• Document effective and efficient management practices of urban, industrial and rural land to enhance good quality water in the Burnett Catchment	High	DNR	Local Govt, Industry groups
	• Determine future water storage requirements for Local Government	High	DNR, Local Govt	
	• Encourage ongoing research and development of strategies for managing water sources in the Burnett Catchment that are already stressed through uncontrolled demands of water	High	BCCA	DNR, Local Govt
	• Continue ongoing research and investigation of major sources (point ordispersed) of pollution that causes/affect water quality	High	DNR	BCCA
	• Research into the solutions and best method of managing water quality in the Burnett Catchment	High	DNR, Industry groups	BCCA, Local Govt.
	• Encourage consistent data collection of water quality monitoring within all sectors and agencies, Local Govt. State Govt agencies, industry, community groups and programs	Ongoing	DNR	DNR
	• Encourage ongoing research into the impacts of landuse on river systems and water quality	High	BCCA, Local Govt	Edu & Res Inst
	Extension and Communication			
	• Encourage greater community participation in existing water quality monitoring and awareness programs and undertake incentives such as Waterwatch, *Waterwise*, *Coast Care*, *Rivercare,* etc	Ongoing	BCCA, Landcare	Landcare, Industry groups
	• Promote and adopt best management and improved land management practices for all land and water uses through environmental forums, field days, catchment tours, etc	High	BCCA,	EPA, BCCA
	• Communicate the findings of research into major sources of pollution and	Ongoing	DNR	Landcare BCCA,

	investigate solutions to reduce or eliminate the problem	High	BCCA, Local Govt	Local Govt, Industry groups
	• Encourage community to be involved in rehabilitation and management of degraded areas in the Catchment and undertake programs to target causes of degraded water quality	Ongoing	DNR, EPA	
	• Ensure research findings of landuse implication on water systems/ water quality are fed back to industry and government for future planning and management including environmental flows, salinity and siltation implications on water quality			
	Planning and Implementation	High	DNR	Local Govt.
	• Analyse the consistency of data collected and existing data patterns/records to enhance planning and management of supplying good quality water.	High	DNR, EPA	Local Govt, BCCA
	• Promote monitoring of water quality to establish ANZECC water quality standards are being met and maintained	Ongoing	BCCA	DNR, EPA
	• Prioritise key locations within the Catchment for future water monitoring, analysing existing data, river health and ecosystems reviews/surveys such as State of Rivers Report, Burnett Macroinvertebrates Report, etc	Ongoing	BCCA	Local Govt, Industry groups
	• Seek funding and corporate sponsorship for funding monitoring programs and to develop incentive programs to address riparian zone management	Ongoing	BCCA	DNR
	• Lobby industry and other stakeholders to ensure commitment to the provision of good quality water, plans and management in the Burnett Catchment	High	BCCA	DNR, Local Govt
	• Encourage riparian landholders to maintain appropriate landuse systems such as riparian buffer zones, develop off stream water points, limit overgrazing of stream banks, development of appropriate contour banking, soil conservation practices, reduce run-off, safe fertiliser and chemical application, etc	High	BCCA,Landcare	Edu & Res Inst
	• Encourage the promotion and participation of field days, catchment and farm tours, trial sites etc to address community awareness and understanding of water quality	High	DNR	BCCA
	• Ensure the findings from groundwater research is incorporated in future management plans to ensure long term use and supply of good quality water	High	DNR, DPI	Industry
	• Ensure WAMP actions are carried out to ensure the return of good quality water to the Catchment river systems	High	Federal & State	DNR

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	• Ensure effective fishways are installed on all in stream-barriers. • Resource BCCA to undertake actions identified in the sub strategies. **Monitoring and Reporting** • Monitor the community uptake of programs and incentives for understanding the development of community awareness and appreciation of ecosystem health • Assess the capability/capacity of community monitoring programs, equipment, database etc to understand the integrity of the data collected • Participate in the review of reports and databases ie State of Rivers Report, Burnett Macroinvertebrate studies etc in order to be able to make recommendations for future actions • Review existing and current data sources and data bases to analise water quality patterns and instigate further research projects, planning and monitoring of water quality • Review the monitoring and documentation of environmental change from the monitoring data collected (before and after) and assess the implications and long term outlook for water quality management in the Burnett Catchment • Ensure Local Govt does provide regular updates on water quality issues, future management plans and developments	Ongoing Low Ongoing Low Ongoing Ongoing	Govt BCCA DNR, EPA, Local Govt BCCA BCCA, DNR DNR, EPA BCCA, DNR	DNR,EPA Industry groups Landcare Local Govt Local Govt, Industry groups, Edu & Res Inst

4.9 PEST MANAGEMENT

4.9.1 Overview of Issues

Overview

- To identify the existing and potential weeds and feral animals within the Catchment
- Control and management of these pests within the Catchment

Barriers

- Limited funding available for weed and feral animal control programs
- High cost in financing implementation and elimination programs
- Unregulated importation of produce and supplementary feed from infested areas.
- Lack awareness and knowledge of potential risks and impacts of some of the serious pests

Opportunities

- Link in, and provide advice to existing Local Government Pest Management Plans
- Seek new/alternative-funding programs which target feral animals and weed control

4.9.2 Goal

- To implement pest management plans to minimise impact on the Catchment

4.9.3 Outcomes

- Increase in community awareness and adoption of weed and pest control programs
- Minimise noxious weeds and feral animal spreading throughout catchment

4.9.4 Strategy

Goal	Strategy Actions	Priority	Responsibility	Contributors
To implement pest management plans to minimise impact on the Catchment	**Research** • Undertake research into the human health risk associated with weeds • Undertake research into the audit and mapping of feral animals within the catchment and their associated impacts	High High	Edu & Res Inst DNR, EPA	DNR, EPA, DPI BCCA

	• Undertake research into the consequences of new plants becoming potential environmental weeds for the Catchment such as paulownia, *hymenachne*, honey locust, etc	High	DNR AQIS	Edu & Res Inst, Local Govt
	• Assist in the research of potential uses of weeds such as alternative sources of medicine, fodder, and oils.	Low	Edu & Res Inst	DNR
	• Develop a pest impact assessment of economic and environmental cost to the environment and catchment	High	DNR	Local Govt
	• Target ongoing research into biological control of declared and environmental weeds	High	Edu & Res Inst	DNR
	• Updated, monitored and evaluated Pest Management Plans , past their three year program	Ongoing	Local GOvt	DNR
	• Research cost effective measures and practices of pest management, to be adopted by landholders and the wider community	Ongoing	DNR, Local Govt, Industry Groups	BCCA, Landcare
	Extension and Communication			
	• Encourage groups and community to undertake the role of communicating to school children the importance of pest management	Medium	Edu & Res Inst	BCCA, Landcare
	• Develop a communication plan to deliver information about new research, strategies, polices which can be delivered at a local level.	Medium	BCCA	DNR,DPI, EPA
	• Encourage the appropriate control of weeds and feral animals particularly in relation to existing strategies or policies, pest management plans, and pest fact information	Ongoing	DNR, Edu & Res Inst	Local Govt Industry groups
	• Communicate and demonstrate to community the impact of weeds and pests on farm productivity, land management, risk to human health, etc	Ongoing	DNR, Edu & Res Inst	BCCA, Local Govt
	• Support for Land Protection Officers, Local Government Weed and Land Management Officers and other Extension Officers within the Catchment to continue ongoing awareness programs for Landholders and Industry Field officers (Telstra, Ergon Energy field officers), such as information sessions and field days to demonstrate identification systems, eradication methods, strategic approaches for pest control	Ongoing	BCCA	Landcare, Industry Groups
	• Promote awareness and understanding of weeds and plant identification to reduce the sale of noxious weeds from commercial	Ongoing	DNR	BCCA, Landcare

	nursery's, markets, etc			
	• Promote community participation in State Awareness Programs such as Weedbuster Week, Environmental Day, etc	Ongoing	BCCA	Landcare,
	• Communicate public quarantine laws and restrictions to help reduce risk or pests spreading, ie ticks, fruit fly, aphids	Ongoing	DNR, DPI,EPA	Local Govt
	• Encourage groups and community (urban and rural) to undertake and participate in workshops, field days, demonstration sites to increase awareness of pest management practices, policies, applications, control measures, etc	Ongoing	BCCA	Landcare, Industry groups
	• Lobby Local Govt, industry, Federal and State Govt Agencies, and Non Govt agencies to develop incentives for farmer groups and Local Govt to undertake joint projects to tackle large areas of weed infestation or feral animal control	Ongoing	BCCA, Landcare	Industry groups
	• Develop an education tool kit for community and schools to be used for identifying weeds, control methods, health risks, and general awareness	High	Edu & Res Inst, DNR	BCCA, Landcare
	Planning and Implementation			
	• Support funding opportunities through corporate sponsorship, industry groups, Local Govt, State programs and other sources of funding for ongoing commitment to the implementation of pest management plans, and the monitoring and evaluation at the end of each three year period	Ongoing	BCCA	Landcare, Industry, Local Govt
	• Support funding opportunities to offer incentives for landholders and local government, etc	Ongoing	BCCA	Landcare, Industry
	• Lobby industry, Local Govt and Govt Agencies to use technical advice and services provided through research stations, universities, CSIRO to provide information and advice for groups undertaking pest management programs or trials	High	BCCA, Landcare	Groups
	• Promote commitment to implementing pest management plans as identified in Local Govt Plans, State/Regional pest management plans	Ongoing	BCCA, DNR, DPI	Industry groups, Local Govt
	• Seek sponsorship and commitment from agencies, local government and community to continue to advance the mapping and development of databases to help address the gaps in current information and maps	Medium	BCCA	Landcare
		High	DNR, DPI	

	• Develop alternative method through licences or permits to regulate or monitor the movement and transportation of machinery, fodder and livestock from infested areas to clean areas		AQIS	Edu & Res Inst,Local Govt,
	• Access information on international and national pest management programs and strategies ie importation of grain into the country. Research the potential pests entering Australia that may have impact on the Burnett Catchment and its agricultural production systems	High	Educ & Res Inst	Industry groups DPI
	• Form links with industry and Local Govt to help support planning opportunities to address new pests entering catchment or monitoring of existing noxious weeds, such as Parthenium, Giants Rats Tail Grass, etc	High	BCCA	Industry groups,
	• Resource BCCA to undertake actions identified in the sub strategies.	High	Federal & State Govt	Landcare DNR
	Monitoring and Reporting			
	• Subcommittees to monitor and report on progress and adoption of incentive programs by landholders	Medium	BCCA	Industry groups
	• Regularly assess data and information collected by community on pests spreading throughout the catchment. Use this information and data collected to help rectify management plans, strategies and help develop future plans	Ongoing	DNR, DPI	Edu & Res Inst, Local Govt
	• Report on long term environmental benefits versus economic cost for community undertaking pest management	Medium	DNR, DPI	Edu & Res Inst
	• Document and monitor cost effective practices and programs used by landholders	Ongoing	DPI, DNR	BCCA
	• Monitor and evaluate the pest management plans and strategies to ensure ongoing assessment and strategies are in place for declared pests	Ongoing	DNR, DPI	Local Govt, BCCA, Industry Groups

5.0 IMPLEMENTATION OF THE BURNETT CATCHMENT STRATEGY

5.1 IMPLEMENTATION OF THE CATCHMENT STRATEGY

The Burnett Catchment strategy has been designed to target high priority issues and to encourage an integrated approach to manage natural resources. There is a community expectation that the Strategy will target action through partnership approaches and funding opportunities to lead to long term management of the Catchment's Natural Resources (BCCA Goal) in an economically and environmentally sustainable manner for future generations.

5.1.1 Draft Release

The Burnett Catchment Strategy was developed over four years, involving a wide variety of stakeholders and community. BCCA have used the sub-catchment groups to encourage participation in identifying issues, the development and consultation process.

The draft Catchment Strategy was released and distributed to all key stakeholders and community members for public comment. The BCCA Strategy Working Committee had reviewed all comments and made the necessary changes to the Strategy.

The draft Catchment Strategy was endorsed by the BCCA Committee meeting of 17th of April 2000 and released to key stakeholders. Each stakeholder, groups or sectors were posted copies of the draft strategy to review and endorse.

5.1.2 Endorsement of the Strategy

The Burnett Catchment Strategy has been formally acknowledged and endorsed by XX number of key stakeholders. Refer to Appendix E. Stakeholders will continue their commitment and support to the Strategy through the participation and provision of resources ie providing technical advice and support, materials and funding opportunities, and undertake partnership approaches.

The draft strategy together with letters of support from stakeholders was forwarded to the LCMC strategy working committee for review and recommendations to be given to the LCMC.
Full endorsement of the Catchment Strategy was given by the LCMC at the meeting of XX 2000.

5.1.3 Development of Action Plans

During the development of the Burnett Catchment Strategy the BCCA have undertaken several natural resource projects and educational programs. This approach has been successful as it has created credibility and encouraged future and ongoing opportunities to implement the Burnett Catchment Strategy. Action plans shall be developed as necessary to seek funding to undertake activities. The action plans and projects will be developed in partnership with Landcare Groups, key stakeholders and 'communities of concern' where appropriate.

Many of the strategy actions have either been or are currently being implemented through projects funded by the Natural Heritage Trust or other research grants. The existing or past projects addressing the main strategy actions are shown in Appendix H.

5.1.4 Performance Indicators

Performance indicators are intended to be used collectively to determine whether or not a particular desired outcome of a project is being achieved. The performance indicators help evaluate long-term projects and outcomes, generated from those projects, that are difficult to measure and evaluate.

The BCCA will use performance indicators in action plan development to help focus and rationalise monitoring programmes that draw attention to the critical issues identified, and lead to the achievement of the long term desired strategy outcomes. The performance indicators developed under each of the project action plans will have significant input into the review period of the Strategy, as the overall achievement of strategy outcomes and effectiveness of the Strategies objectives will be reviewed every five years.

5.1.5 Development of Project Proposals

The BCCA has been currently involved with five NHT projects. These projects have been for onground works, research, planning, education and awareness, monitoring and evaluation. The project proposals have been designed to obtain funding for the implementation of the action plans.

Continual development of new project proposals will consist of;

- Forming partnerships and linkages with other stakeholders and community such as Local Govt, Industry, Industry groups, Research and Education Institutes, Community groups, State Agencies, Landholders etc.
- Identify support and assistance from stakeholders and community, such as in-kind support, labour, monetary, hire of equipment etc
- Identify sources of funding, at a Local, State, or Federal level
- Determine linkages and networks with other strategies, programs, action plans
- Use of new information, research, technologies

5.1.6 Access to Government Support

The Department of Natural Resources, Department of Primary Industries, Environmental Protection Authority and Communication, Information, Local Government and Planning has worked in partnership with the BCCA to develop the Catchment Strategy. These agencies have provided support and will continue to do so through the provision of resources to implement the Strategy and participate within the relevant subcommittees to coordinate and monitor the development of action plans.

5.2 BCCA ROLE IN PROJECT DEVELOPMENT, MONITORING AND REPORTING

The BCCA will establish a portfolio approach whereby 2-3 members of the BCCA Committee or the Sub-catchment groups will be responsible for monitoring and reporting on the implementation of each of the nine sub-headings outlined in Section 4.0. The sub-strategy groups will seek funding opportunities, plan the development of new projects, and seek partnership with stakeholders to develop action plans for catchment projects. These groups will provide annual reports on achievements to the BCCA Committee.

As well as monitoring the implementation of the strategy, the BCCA will conduct an annual overview monitoring to identify new and emerging issues that may impact on the strategy. This annual monitoring will also update current progress with the strategy and flag areas that are falling behind. A report will be presented at the BCCA at its Annual General Meeting.

The BCCA sub catchment groups will be involved in local forums and catchment tours to encourage community and ICM members to reflect on the outcomes achieved at a sub catchment level.

The BCCA will undertake a Catchment forum every 12 months to involve the wider community and stakeholders to report on the success and outcomes achieved from the implementation of the strategy action plans.

Other activities that the BCCA will undertake will include the development of a mayor forum, summary report of projects achieved, catchment newsletter to report on the arising issues and project achievements.

5.3 EVALUATION AND REVIEW

The Catchment Strategy is designed as a living plan that can be modified to meet changing circumstances in the catchment. During the BCCA's annual overview monitoring, the achievement of strategy milestones and outcomes will be reviewed and evaluated.

Should this review identify that new or unforseen issues are having a significant impact on the adoption of the Strategy then remedial changes will be necessary. The BCCA Committee will be responsible for any "fine tuning" of the Strategy and Action Plans.

It is also envisaged that the Strategy will undergo a major review and evaluation at least every five (5) years. Input and feedback from stakeholders will be an integral part of this review.

This five year review will consider the achievement of overall Strategy outcomes as well as the effectiveness of the Strategy's vision objectives desired outcomes and action plans. The results of this review will be utilised to revise the Strategy for the next five year timeframe.

APPENDIX A

Burnett Catchment Care Association Members for 1999 / 2000

Chairperson: Jan Darlington

Vice Chair: Bob Downes

Secretary: Selwyn Lutz

Treasurer: Tom Bancroft

North Sub-Catchment

Geoff Knight	Grazier
George Main	Grazier, Monto Timber Workers
Paul Francis	Local Government, Landcare
Jan Darlington	Qld Dairy Organisation
	Landcare/ Catchment Management
	Regional Strategy Group

South Sub-Catchment

Bob Downes	Grazier, Agforce
Jim Barton	Local Government
Stuart James	Conservationist
Bob Somerset	Grazier, Agforce

East Sub-Catchment

Selwyn Lutz	Local Government, Canegrowers
Janet Tallon	Local Government, Conservationist
Brian Flanders	Farmer
Barrie McLellan	Canegrowers

Central Sub-Catchment

Ian Carruthers	Horticulture
John Vicary	Grazier
Stephen Marshall	Horticulture
Tom Bancroft	Local Government, Grazier

Members within each of the sub-catchment groups of the BCCA represent other stakeholder groups.

Departmental Representatives

Department of Primary Industries
Allan Stephens

Department of Natural Resources
Jim Mobbs

EPA & QPWS
Awaiting confirmation, previous member Peter Tierney

DCILGPS (Widebay 2020)
Bernard Cleary & Mark Saunders

Burnett Catchment Stakeholders List

Landcare groups
Farmers
Graziers
Local Government
Conservationists
Extractive Industries
Tourism group
Urban
Catchment resident
Schools/education
Research Institutes
Aquaculture
Irrigation groups
Cotton
Intensive animal production
Industry groups
Forestry
Transport
Tarong Coal
Tarong Energy
Fruit and Vegetable
Qld Diary Organisation
Agforce
Canegrowers
Wine and Olive Growers,
Fisheries
Peanut Company of Aust
Bean Growers Australia
Timber
Greening Australia
Burnett Inland Economic
Development Group
Widebay 2020
Department of Natural
Resources
Department of Primary
Industries
Environmental Protection
Agency
Department of Main Roads
Q-Rail
Queensland Parks and
Wildlife

APPENDIX B

Issues broadly identified in 1995 by each of the Sub catchment groups of the BCCA

CENTRAL SUBCATCHMENT

1. **Communication**
   - Community cooperation, coordination, responsibility

2. **Education/Awareness**
   - Community awareness of ICM program (publicity)
   - Creating awareness of resources/needs (schools and general community)
   - Greater awareness of local area values (national parks, flora, fauna)
   - Education > water conservation/water use
   - Local expertise

3. **Resource Information/Research**
   - Research priority: water and its usage
   - Identifying research priorities
   - Identifying current information in the catchment
   - Modelling, database, simulation of management and different variables
   - Getting facts/research into environmental impacts of storages
   - Resource base lines: indicators for future comparison

4. **Landcare and Management**
   - Local irrigation management
   - Better management in/of released water
   - Erosion
   - Soil conservation
   - Balance between environment and progress

5. **Biodiversity Management and Enhancement**
   - Tree clearing guidelines
   - Fauna
   - Death of gum trees along river and in the rest of the catchment
   - Appropriate clearing practices
   - Revegetation
   - Fish movement(mullet)/fish ladder (5 or 8)

6. **Riparian Zone Management**
   - Protection of riverine vegetation (overgrazing, weeds)

7. **Water Access, Quantity and Environmental Flows**
   - Maintenance of river flow for biodiversity
   - Encouraging water use efficiency
   - reasonable cost of water
   - % annual flow held in storage (what is acceptable)
   - Plan for water availability
   - Plan water storages
   - Plan for coordination of water infrastructure with environmental stability
   - Plan to avoid time delay before action (weirs and dams)

8. **Water Quality**
   - Turbidity of water in Gayndah Weir
   - Siltation
   - Bore water quality
   - Salinity, nutrient, pollution levels in water
   - Water monitoring (soil, chemicals, salt, nutrients, heavy metals)

- Mining effects

9. **Pest Management**
   - Parthenium, rubber vine
   - Feral animals

EAST SUBCATCHMENT

1. **Communication**
   - ICM coordination of research
   - Communication amongst all stakeholders

2. **Education/Awareness**
   - River inspections and knowledge

3. **Resource Information/Research**
   - Flora
   - Progress resource auditing
   - Fauna and habitat
   - Tourism value assessment
   - Re-use/Disposal of sewage effluent
   - Waste management: urban/industry/rural
   - Industry pressure on catchment
   - Compatibility of all resource uses
   - Population pressure on catchment
   - Urban pressure on sensitive environmental area

4. **Landcare and Management**
   - Identify nutrient sources (agricultural/urban/pastoral)
   - Salinity
   - Water runoff
   - Tailwater management

5. **Biodiversity Management and Enhancement**
   - River flow to maintain biodiversity and fisheries
   - Excessive clearing of native vegetation
   - Mangrove loss
   - Fish movement between salt and fresh water (5 or 8)
   - Tilapia, Carp and other noxious fish species (5 or 8)

6. **Riparian Zone Management**
   - Riparian zone management

7. **Water Access, Quantity and Environmental Flows**
   - WAMP process
   - Water needs, demands and conflicts
   - Identify future water needs
   - Tailwater management

8. **Water Quality**
   - Salinity
   - Urban and agricultural storm water management (drain traps)
   - Runoff
   - Siltation

9. **Pest Management**
   - Pest plants and animals
   - Management of feral pigs

NORTH SUBCATCHMENT

1. **Communication**
   - Community and State Water Projects
   - Determine the will of the majority (community)

2. **Education/Awareness**
   - How to tackle weeds
   - How to use water to best advantage
   - Lack of education
   - At the headworks – what is done in the north affects others further down the catchment

3. **Resource Information/Research**
   - Need facts not anecdotes (3 Moon Upper Reaches)
   - Effect of mining on the river (Burnett Headwaters)

4. **Landcare and Management**
   - Erosion prone due to drought (Monal Creek)
   - Feedlots potential for nutrient runoff (Monal Creek)
   - Drought issues (Nogo – NW)
   - Properties rarely change hands (Burnett Headwaters)
   - Need for responsible guardians (Burnett Headwaters)
   - Economic hardship of families during droughts and beef slumps (Burnett Headwater)
   - Land degradation on poorer soil (Three Moon)
   - Salinity in soils and water (Three Moon)
   - Pest weeds on grazing land (3 Moon – Upper Reaches)
   - Regrowth in stock watering areas a problem (3 Moon – Upper Reaches)
   - Viability of families and neighbouring properties (Langley Flats)
   - Fix up what has been wrecked – look after what we have (Langley Flats)

5. **Biodiversity Management and Enhancement**
   - Platypus (Burnett Headwater)

6. **Riparian Zone Management**

7. **Water Access, Quantity and Environmental Flows**
   - Fair distribution of water allocation (Monal Creek)
   - More water storage needed (Monal Creek)
   - Bore holes by creek nearly dried out (Nogo Headwaters)
   - Springs drying up at top of creek (Nogo Headwaters)
   - In 2-3 years will be unable to draw water from the Burnett River (Burnett Headwater)
   - Abuse of underground water (Three Moon)
   - Conflict in use of dam water (between those who want to stock fish and those who want to draw water from the dam) (3 Moon Upper Reaches)
   - Money spent looking for water with no results (3 Moon Upper Reaches)
   - Drought or irrigation (3 Moon Upper Reaches)
   - Inequitable distribution of water allocation (3 Moon Upper Reaches)
   - Lack of management of available water (Langley Flats)
   - Full consultative process needed (Langley Flats)
   - Inequitable distribution of underground water (Langley Flats)
   - Water shortage not beyond repair – fix when rains (Langley Flats)
   - Overall subcatchment need for more water storages

8. **Water Quality**
   - Salinity in water (Nogo Headwaters)
   - Need sand to filter water –v- good cement sand (Nogo Headwaters)
   - Very muddy, smelly – 3 Moon and Splinter (Burnett Headwaters)

- Salinity in water (Three Moon)

9. **Pest Management**
   - Cats Claw in Creek and Creeping and Bush Lantana in catchment (Monal Creek)
   - Rabbits in creek bank could cause erosion (Monal Creek)
   - Parthenium coming in in grain from central highlands (Monal Creek)
   - Noogoora Burr and Thornapple (Nogo Headwaters)
   - Creeping Lantana (Burnett Headwaters)
   - Need cost-effective way to eradicate Creeping Lantana (Burnett Headwaters)
   - African Box Thorn, Cats Claw, Hartsy Vine, Rubber Vine, Green Cestrum (Three Moon)
   - Creeping Lantana and Bush Lantana in water course (3 Moon)
   - Rubber Vine, Mother of Millions, Noogoora Burr – small infestations (3 Moon)
   - Weeds the major problem. Include Blue Verbena, Primulea (toxic to cattle), Chinese Elm in Creek, Parthenium controlled in dry but has potential as problem – will travel downstream (Langley Flats)

SOUTH SUBCATCHMENT

1. **Communication**
   - No sense of ownership
   - Peoples' expectations

2. **Education/Awareness**
   - Improve extension services
   - Fundings
   - More Landcare groups
   - Lack of understanding of climate – its limitations
   - Incentives to do the right thing
   - Tax incentives to keep us with agricultural technology
   - Natural farming systems (organic farming)
   - Quality of life

3. **Resource Information/Research**
   - Planning for changes in population
   - Recycling
   - Inventory of existing information
   - Need for information

4. **Landcare and Management**
   - Natural farming systems (organic farming)
   - Understanding and using land according to its capacity
   - Planning for drought
   - Soil erosion
   - Land degradation
   - Soil, land, water and air pollution
   - Salinity
   - Seepage
   - Livestock pressure
   - Bank Balance
   - Erosion (halt and repair) – result of wind and water

5. **Biodiversity Management and Enhancement**
   - Wetlands
   - Recreation/aesthetics
   - Sand and gravel removal
   - Mining and quarrying
   - Effects of water harvesting
   - Planning for urban and industrial land use
   - Heritage issues involved in planning

- Achieving a balance between nature and man's activities
- Natural wildlife habitats
- Biodiversity issues
- Vegetation quantity and quality
- Management for translocation of fauna and flora
- Effects of water quality on ecosystem
- Trees -v- powerlines – leading to erosion
- Workable fish ladders
- Fish management
- Lack of fish habitat
- Fishways
- Fisheries management – fish stocking
- Wivenhoe pipeline – fish introduction – competition with natives

6. **Riparian Zone Management**
   - Riparian rights

7. **Water Access, Quantity and Environmental Flows**
   - Bore monitoring
   - Better water use efficiency
   - Stormwater management
   - Environmental flows
   - Determine sustainable optimal water impoundments
   - Competing water users
   - Planning coordination (for resources)
   - Reliable urban water supplies
   - Water costing
   - Water storage (small/local)
   - Impoundments and their preservation

8. **Water Quality**
   - Groundwater quality and leakage
   - Groundwater management
   - Nutrient enrichment
   - Waste and hazardous waste disposed of in waterways
   - Pollution
   - Reliable water quality
   - Water weeds
   - Salinity, chemicals, urban & rural effluent, silt, fertiliser
   - Legislation

9. **Pest Management**
   - Water and vegetation weeds
   - Condamine couch

APPENDIX C

Endangered and Of Concern Regional ecosystems in Burnett Catchment

Summary of conservation status*	Brigalow Belt Section	SE Qld Section	Total Catchment
Endangered	6 (27)†	8 (10)	14
Of concern	10 (39)	29 (32)	39
No concern at present	36 (97)	56 (100)	92
TOTAL	**52 (163)**	**93 (142)**	**145**

* conservation status is based on Sattler & Williams (1999) which considers a broad range of indicators such as original extent, level of clearing, special ecological values and threatening processes. Regional ecosystems status may vary when applied to the *Vegetation Management Act 1999.*

† bracketed figures are totals for the bioregion viz. Brigalow Belt and Southeast Queensland respectively

Endangered regional ecosystems	
11.3.1 ¶	Brigalow *Acacia harpophylla* and/or belah *Casuarina cristata* on alluvial plains; provinces; 3, 5, 7, 11, 14, 15, 29, 31, 34, 36
11.4.3	Brigalow *Acacia harpophylla* and/or belah *Casuarina cristata* shrubby open forest on Cainozoic clay plains; provinces 26, 27, 28, 29, 30, 32, 33, 34
11.9.5	Brigalow *Acacia harpophylla* and/or belah *Casuarina cristata* open forest on Cainozoic fine grained sedimentary rocks; provinces 15, 18, 25, 26, 27, 28, 31
11.9.10	Brigalow *Acacia harpophylla*, poplar box *Eucalyptus populnea* open forest on Cainozoic fine grained sedimentary rocks; provinces 15, 18, 20, 22, 25, 26, 28
11.11.14	Brigalow *Acacia harpophylla* open forest on deformed and metamorphosed sediments and interbedded volcanics; provinces 14, 17, 18
11.12.21	Brigalow *Acacia harpophylla* open forest on igneous rocks; provinces 21, 22
12.2.2	Mixed microphyll/notophyll rainforest on beach ridges; provinces 4, 8, 9, 10
12.3.10	Poplar box *Eucalyptus populnea* woodland on alluvial plains and associated lower slopes; provinces 5, 6, 10
12.5.2	Forest red gum *Eucalyptus tereticornis* and/or pink bloodwood *Corymbia intermedia* on remnant Tertiary surfaces, usually near coast; provinces 4, 7, 8, 10
12.5.11	Turpentine *Syncarpia glomulifera* open forest on complex of remnant Tertiary surfaces and Tertiary sedimentary rocks; province 8
12.8.22	Softwood scrub (semi–evergreen vine thicket) with *Brachychiton australe* on Cainozoic igneous rocks; northern half of bioregion; provinces 5, 10
12.8.23	Brigalow *Acacia harpophylla* open forest on Cainozoic igneous rocks; province 5
12.9/10.8	Silver–leaved ironbark *Eucalyptus melanophloia* woodland on sedimentary rocks; provinces 2, 7, 10
12.12.26	Brigalow *Acacia harpophylla* open forest on Mesozoic to Proterozoic igneous rocks; province 5

Regional ecosystems of concern	
11.3.2	Poplar box Eucalyptus populnea woodland on alluvial plains; provinces 3, 4, 5, 6, 7, 8, 11, 16, 17, 20, 22, 25, 27, 31, 35, 36
11.3.4	Forest red gum Eucalyptus tereticornis and/or river red gum Eucalyptus camaldulensis tall woodland on alluvial plains; provinces 1, 2, 3, 4, 5, 6, 7, 11, 14, 16, 17, 18, 22, 24, 25, 26, 27
11.3.27	Swamps. Freshwater wetlands; provinces 1, 7, 8, 11, 14, 20, 31, 35, 36
11.5.15	Semi-evergreen vine thicket on Cainozoic sand plains/remnant surfaces; provinces 11, 18, 27
11.8.3	Semi-evergreen vine thicket on Cainozoic igneous rocks; provinces 6, 9, 10, 12, 22, 23, 24, 25, 26, 31
11.9.2	Silver–leaved ironbark Eucalyptus melanophloia open woodland on Cainozoic fine grained sedimentary rocks; provinces 18, 25, 27, 29
11.9.4	Semi-evergreen vine thicket on Cainozoic fine grained sedimentary rocks; provinces 18, 25, 26, 27, 31
11.9.7	Poplar box Eucalyptus populnea, false sandalwood Eremophila mitchellii shrubby woodland on Cainozoic fine grained sedimentary rocks; provinces 15, 20, 26, 27, 31, 32
11.9.9	Narrowleaved ironbark Eucalyptus crebra woodland on Cainozoic fine grained sedimentary rocks; provinces 13, 15, 18, 20, 31
11.12.17	Poplar box Eucalyptus populnea woodland on igneous rocks; provinces 21, 22
12.1.1	Swamp oak on estuarine muds; provinces 4, 8, 9, 10
12.3.1	Gallery rainforest (notophyll rainforest) on alluvial plains; provinces 1, 2, 3, 4, 7, 8, 10
12.3.3	Forest red gum Eucalyptus tereticornis woodland to open forest on alluvial plains; provinces 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
12.3.5	Paperbark tea-tree Melaleuca quinquenervia tall open forest on alluvial plains; provinces 4, 8, 9, 10
12.3.6	Paperbark tea-tree Melaleuca quinquenervia woodland on alluvial plains; provinces 4, 8, 9, 10
12.3.8	Freshwater swamps with Cyperus spp., Schoenoplectus spp. and Eleocharis spp.; provinces 2, 5, 6, 7, 10
12.5.6	Queensland grey ironbark Eucalyptus siderophloia, grey gum (E. propinqua, E. longirostrata) ± blackbutt E. pilularis tall open forest on remnant Tertiary surfaces; provinces 4, 6
12.8.13	Araucaria microphyll rainforest on Cainozoic igneous rocks; provinces 1, 6, 8, 10

Regional ecosystems of concern (cont.)

12.8.15	Poa labillardieri grassland on Cainozoic igneous rocks; provinces 1, 6
12.8.17	Narrow–leaved ironbark Eucalyptus crebra, silver-leaved ironbark Eucalyptus melanophloia ± Eucalyptus spp. grassy woodland on Cainozoic igneous rocks, esp. basalt ; provinces 1, 2, 5, 6, 1012.8.21 Semi–evergreen vine thicket with Brachychiton rupestris on Cainozoic igneous rocks; southern half of bioregion; provinces 2, 6
12.8.24	Spotted gum Corymbia citriodora open forest on Cainozoic igneous rocks; province 2
12.9/10.1	Tall mixed open forest on sedimentary rocks; provinces 4, 9
12.9/10.3	Gum topped box Eucalyptus moluccana on sedimentary rocks; provinces, 6, 8
12.9/10.7	Narrow–leaved ironbark Eucalyptus crebra woodland on sedimentary rocks; provinces 2, 6, 8
12.9/10.10	Prickly leaved tea tree Melaleuca nodosa low forest or thicket on Cainozoic to Proterozoic sediments; provinces 4, 8 (small distributions may be present)
12.11.7	Narrow–leaved ironbark Eucalyptus crebra woodland on Mesozoic to Proterozoic sediments and interbedded volcanics; provinces 3, 7, 10
12.11.8	Silver–leaved ironbark Eucalyptus melanophloia woodland on metamorphics ± interbedded volcanics; provinces 3, 6, 7, 10
12.11.11	Araucarian microphyll rainforest on metamorphics ± interbedded volcanics; southern half of bioregion; provinces 3, 6, 7
12.11.13	Semi–evergreen vine thicket on metamorphics ± interbedded volcanics; northern half of bioregion; province 7
12.11.16	Mixed tall open forest with Gympie messmate Eucalyptus cloeziana on metamorphics ± interbedded volcanics; provinces 7, 8
12.12.7	Narrow–leaved ironbark Eucalyptus crebra on Mesozoic to Proterozoic igneous rocks; provinces 5, 6, 7, 10
12.12.8	Silver–leaved ironbark Eucalyptus melanophloia on Mesozoic to Proterozoic igneous rocks; provinces 5, 6, 7, 10
12.12.10	Montane shrubland on Mesozoic to Proterozoic igneous rocks; provinces 5, 10
12.12.12	Forest red gum Eucalyptus tereticornis, narrow–leaved ironbark E. crebra or E. siderophloia, Lophostemon suaveolens open forest on granite; provinces 3, 6, 7, 10
12.12.17	Semi–evergreen vine thicket on Mesozoic to Proterozoic igneous rocks; south of bioregion; province 5
12.12.18	Semi–evergreen vine thicket on Mesozoic to Proterozoic igneous rocks; north of bioregion; provinces 5, 10
12.12.19	Vegetation complex of rocky headlands, predominantly but not exclusively Mesozoic to Proterozoic igneous rocks; provinces 4, 8, 9, 10
12.12.24	Rusty gum Angophora leiocarpa, narrow-leaved ironbark Eucalyptus crebra on Mesozoic to Proterozoic igneous rocks; provinces 5, 6, 10
12.12.28	Gum-topped box Eucalyptus moluccana on Mesozoic to Proterozoic igneous rocks; provinces 5, 6, 7, 10

¶ Regional Ecosystem Codes: first number indicates the bioregion (brigalow belt = 11, southeast Qld = 12); second number indicates the land zone; third number is a unique identifier for each regional ecosystem within a bioregion/land zone.

NB: The conservation status in this table is determined on remaining extent, condition and extent of original distribution, and threatening processes as determined in *The Conservation Status of Queensland's Bioregional Ecosystems* (Sattler and Williams ed, 1999). This status may differ in relation to the status of regional ecosystems as set out in the *Vegetation Management Act* (1999).

APPENDIX D

Details of Major Cropping and Livestock Industries – Burnett Catchment (period 1987 to 1997)

INDUSTRY	1986/87	1990/91	1996/97
Grain Sorghum (ha)	21,651	12,893	14,875
Maize (ha)	10,034	8,462	11,248
Navy Beans (ha)	5,859	2,607	0
Soy Beans (ha)	7,766	8,555	3,483
Wheat (ha)	11,238	19,518	11,543
Cotton (ha)	194	445	40
Peanuts (ha)	24,307	12,371	14,706
Sugar Cane (cut for crushing ha)	16,765	16,699	46.697
Tomatoes (ha)	130	228	742
Zucchini (ha)	29	78	596
Capsicum, chillies, peppers (ha)	14	30	303
Melons (ha)	181	213	794
Oranges (trees)	117,384	134,434	156,319
Mangoes (trees)	9,726	29,605	100 120
Macadamias (trees six years and over)	0	300	91,958
Grapes (ha)	104	150	No return
Dairy Cattle (No.)	28,414	24,711	29,628
Beef Cattle (No.)	524,530	530,011	602,413
Pigs (No.)	129,726	139,063	155,910
Gross Value Crop Production	110.377 M	123.744 M	309.939 M
Gross Value Livestock Disposal	86.315 M	111.959 M	106.248 M
Gross Vale of Ag Production	211.127 M	255.035 M	449.308 M

Source: Australian Bureau of Statistics. (QRSIS database maintained by the GSO)

APPENDIX E

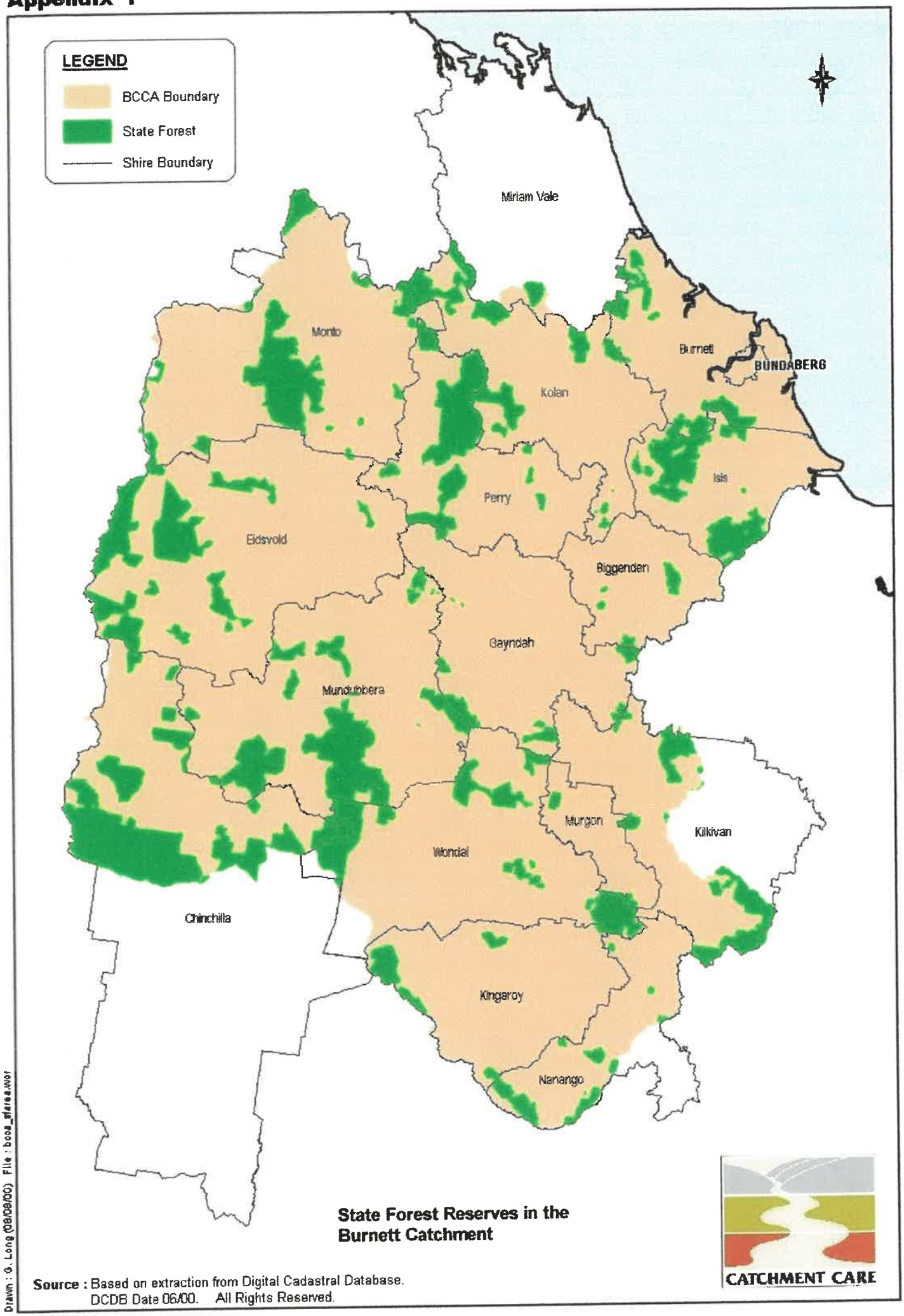
State Forest Reserves in the Burnett Catchment

RESERVE NUMBER	PLAN	RESERVE NAME	AREA (ha)
SF 12	FTY 1580		13380
SF 28	FTY 1711	COOMINGLAH	41461
SF 40	FTY 884		19276
SF 42	FTY 1497		5802
SF 43	FTY 1717		4301
SF 44	FTY 892		3125
SF 47	FTY 1480		13449
SF 48	FTY 872		1583
SF 49	FTY 1194		1046
SF 54	FTY 1683		32367
SF 57	FTY 1288		11161
SF 64	FTY 1828	CAMBOON	888
SF 67	FTY 1173		8796
SF 69	FTY 1305		785
SF 70	FTY 490		11124
SF 74	FTY 460		1861
SF 92	FTY 518		1879
SF 93	FTY 572		1323
SF 94	FTY 1594		9662
SF 95	FTY 751		1011
SF 95	FTY 1191		1779
SF 96	FTY 573		5144
SF 97	FTY 867		872
SF 117 *	FTY 88	ARCHOOKOORA	458
SF 118	FTY 1342	TARONG	1510
SF 121	FTY 1365		7
SF 127	FTY 1135	DANGORE	1909
SF 130	FTY 660		719
SF 132	FTY 1348	ALLIES CREEK	66496
SF 135	FTY 668		465
SF 138 *	FTY 1389		332
SF 146	FTY 673		2847
SF 151 *	FTY 824		6509
SF 169 *	FTY 1702	GOOD NIGHT SCRUB	785
SF 172	FTY 743		1637
SF 179	FTY 1406		1
SF 193	FTY 1407		43
SF 197	FTY 823	DIAMONDY	8808
SF 210	FTY 702		2672
SF 214	FTY 1456		231
SF 215	FTY 713		779
SF 215	FTY 717		2574
SF 219	FTY 1311		1571
SF 220	FTY 998	PILE GULLY	9069
SF 226	FTY 656		3339
SF 227	FTY 1244		21512

RESERVE NUMBER	PLAN	RESERVE NAME	AREA (ha)
SF 228	FTY 654		17650
SF 230	FTY 719		1879
SF 231	FTY 995		5400
SF 234	FTY 926		232
SF 249	FTY 1693		5853
SF 253	FTY 747		40
SF 254	FTY 1533		1177
SF 255	FTY 1025		4308
SF 259	FTY 1508		1969
SF 268	FTY 1353		1097
SF 269	FTY 377		4415
SF 287	FTY 1540	WOOWOONGA	6929
SF 289 *	FTY 1640	YARRAMAN	3359
SF 295	FTY 1251		1466
SF 298 *	FTY 1230		5039
SF 302	FTY 1349		61722
SF 309	FTY 1703		1032
SF 316	FTY 1328	KROOMBIT TOPS	6343
SF 355 *	FTY 1408	CINNABAR	141
SF 370	FTY 486		842
SF 376	FTY 1788		1
SF 381	FTY 954		7386
SF 391	FTY 1007		13715
SF 406	FTY 1622		3482
SF 416	FTY 734		57
SF 417	FTY 735		58
SF 465	FTY 669		16
SF 506	FTY 958		1275
SF 510	FTY 1416		24
SF 521	FTY 1650		84
SF 535	FTY 1760		423
SF 536	FTY 1409		278
SF 546	FTY 1315		727
SF 554	FTY 1463		227
SF 612 *	FTY 1410		954
SF 618 *	FTY 1626	EAST NANANGO	308
SF 632	FTY 625		184
SF 639 *	FTY 902	WRATTENS	8323
SF 645	FTY 1439		2433
SF 648	FTY 515		36
SF 673 *	FTY 1603		3513
SF 695 *	FTY 1570		8150
SF 721	FTY 1004	BOOIE	239
SF 723	FTY 1394		419
SF 832	FTY 1631	CORDALBA	26399
SF 840 *	FTY 1633		18242
SF 869	FTY 1690		242
SF 898	FTY 1707		8208

RESERVE NUMBER	PLAN	RESERVE NAME	AREA (ha)
SF 986	FTY 1720	YABBA	34
SF1068	FTY 1285		1077
SF1072	FTY 1564		343
SF1294	FTY 1705		30560
SF1344	FTY 1534		2986
TR 26	FTY 250		54
TR 157	FTY 1077		937
TR 296	FTY 1438		743
TR 580	FTY 1444		157
TR 581	FTY 1445		366
		TOTAL HECTARES	599898

- Denotes State Forests within the Burnett containing Plantations



State Forest Reserves in the Burnett Catchment

Source : Based on extraction from Digital Cadastral Database. DCDB Date 06/00.

Drawn : G. Long (08/08/00) File : bcca_state.wor

APPENDIX G

Letters of Support and Endorsement have been sought from the following organizations –

Government Agencies	Department of Natural Resources Department of Primary Industries Environmental Protection Agency Department of Main Roads Q-Rail Widebay 2020 Queensland Parks and Wildlife Services
Local Government	Burnett Catchment City and Shire Councils
Community Groups	Landcare, Greening Australia, Burnett Inland Economic Development Organisation
Industry Groups	Agforce, Canegrowers, Tarong Coal, Tarong Energy, Fruit and Vegetable Growers, Wine and Olive Growers, Fisheries,, and Peanut Company of Australia
Industry	Timber, Queensland Dairyfarmers Organisation

Letters of Support have been received from: (copies attached)

Kingaroy Shire Council
Bundaberg Fruit and Vegetable Growers
Department of Primary Industries (Rural Service Coordinator (South East)
Environmental Protection Agency (Regional Service Director, Central Region)

APPENDIX H

Appendix List of previous, existing and potential projects that are/have occurred in the Burnett Catchment

Research

NHT 972401	Integrated Land Management Central & North Burnett	North Burnett Landcare Group	The project is undertaking research into the biology and ecology of creeping Lantana with replication of experiments over a large geographical area : Monto-Brisbane. Unique and interesting results have been obtained at different sites. This information would not have been obtained had the project restricted experimental work to the main research station. Collaboration/partnership with DNR, DPI, DOE, Alan Fletcher Research Station, Landcare groups, Shire Councils and landholders has resulted in the project achieving more than was originally envisaged. There have been advantages for the management by having the ecologist employed by DNR. The group does not have to worry about the administration involved with employing staff with the ecologist having better access to support from government departments.
NHT 972433	Kolan-Miriam Vale Resource Assessment	Department of Natural Resources	Radiometrics and derivatives from a Digital Elevation Model (DEM) have been valuable tools in undertaking a land resource survey of 651,600 ha of the Kolan and Miriam Vale Shires. This project now nearing completion will provide user friendly land resource information to improve planning and resource management in these shires.
ACIAR Project 9446	Measurement and Production of Agrochemicals movement in tropical sugar production	Department of Natural Resources	Measurement and Production of Agrochemicals movement in tropical sugar production
Internal	Surface Water network operations	Department of Natural Resources	Area studied includes Burnett, Baffle and Mary systems to Sunshine Coast
Internal	Groundwater Network Operations	Department of Natural Resources	Groundwater Network Operations in Burnett, Baffle and Mary systems
Internal/external	Water quality network operations	Department of Natural Resources	Burnett, Baffle and Mary systems
internal	Sediment Transport River Regimes Stability Analysis	Department of Natural Resources	Burnett, Baffle and Mary Systems
internal	Bio-assessment of River Health	Department of Natural Resources	Burnett, Baffle and Mary Systems
internal	Land Resources of the Central Burnett	Department of Natural Resources	Central Burnett – completed (Wilson and Kent)

internal	South Burnett Ag Lands	Department of Natural Resources	Kingaroy (Wilson, Sorby)
internal	Acid sulfate soils, Bundaberg	Department of Natural Resources	Bundaberg ((Donnollan, Ahern)
Internal	Enhance model development	Department of Natural Resources	Bundaberg (Searle et al)

Lands Use and Management

NHT 972469	Maintaining Viability at Sustainable Stocking Rates	Department of Primary Industries	The project is aimed at the grazing industry of the coastal southern speargrass region. Its objectives are to firstly, develop a process that producers can use to return the natural resource base (soils and pastures) to, and/or maintain it at, an acceptable and sustainable standard while the grazing enterprise remains financially viable. Secondly, the project will demonstrate the results of the process in a commercially relevant situation. A combined team of land owners, researcher and extension personnel manage the project.
962491	Landcare and Catchment Coordination for South East Queensland	Department of Natural Resources	Staff in Kingaroy (South Burnett, Lower Mary) and Ipswich supporting and assisting landcare and catchment groups
992476	Implementing NRM Strategies for South East Queensland	Department of Natural Resources	Community enthusiasm to be involved in natural resource management is being harnessed and supported. In these first six weeks of the project considerable effort has gone into assisting those applying for Natural Heritage Trust projects to develop high quality projects that implement the priority actions outlined in regional and catchment strategies. Three workshops were held, 32 face-to-face visits, and 41 phone conferences were held with applicants to assist in the development and planning of projects. In addition 19 visit have been made to continuing NHT project proponents to optimise project implementation, ensuring projects are achieving stated objectives and that any obstacles proponents may be encountering are addressed. Positive feedback was received from groups that the face-to-face visits were beneficial. Visits gave an opportunity to talk through any difficulties they have encountered and develop solutions and improved ways to carry out their group's objectives. This was done in the context of a strategic approach to natural resource management in their catchment and region. Other activities included coordination of development of promotional material on a regional basis, to get economy of scale from this collaborative, regional approach. Participants in the project has trialed

			placing significant emphasis on development of high quality projects and ensuring the best outcome from continuing projects as the priority action for supporting community based natural resource management activities at this time of the year. This approach has been a very successful way of developing rapport with these groups and transferring the learnings from one group to others.
NHT 962491	Developing Catchment Management Strategies	Department of Natural Resources	Assist the Burnett Catchment Group in developing catchment strategies and action plans
NHT 992477	On-ground implementation of the Burnett Catchment Strategic Plan	Burnett Catchment Care Association	The project aims to employ a project officer to facilitate community involvement in the implementation of the Catchment Strategy. Due to the two-year timeframe of the project, priority will be given to implementing the recommended actions of the Land Use and Management theme of the Strategy.
NHT 982401	PMP - Inland Burnett Resource Management through FutureProfit	Department of Primary Industries	
NHT 992480	Delivering Quality Property Management Planning Services for SEQ	Department of Primary Industries	
NHT 982403	School Salinity for Decade of Landcare	Isis Landcare group	Tree planting as part of the Decade of Landcare on strategic locations where salinity may have been at threat.
NHT 982405	Developing a Regional Strategy for Burnett/Cooloola Region	Department of Natural Resources	The Burnett Mary Regional Strategy is the future of natural resource management and biodiversity conservation within the region. The strategy will shape the direction of natural resource and biodiversity actions. Developed by community industry and government groups and bodies the strategy provides the framework for future government and possible other funding bodies to allocate funds for natural resource management and biodiversity conservation.
NHT 982413	Natural Resource Information on Burnett River Riparian Lands	Department of Natural Resources	The project aims to provide land resource information on lands 5 km adjacent to the Burnett River and major tributaries in order to support catchment management planning, strategic planning and property planning for the sustainable use and management of lands. The outcomes of the project will help address a range of issues dealing with development pressures and competition for the limited resources. All information will be available to community groups, landholders, industry, Government and all land managers in an affordable, easy to use format.
NHT 992410	Looking to the Soil to Rehabilitate Degraded Pastures in the Central Burnett	Central Burnett Landcare Group	This project will address widespread symptoms of pasture degradation occurring across a range of soil types which are resulting in the reduced capture of rainfall into the soil, increase run-off and soil and nutrient loss and reduced productivity. These symptoms include erosion, surface sealing, scalded areas, low levels of cover and poor pasture species composition. Objectives : 1. To contribute to long term sustainability by arresting the degradation of much of our grazing land and reduce soil loss and sediment build up in the Burnett River catchment. 2. To promote sustainable grazing practices and monitoring techniques which arrest declines in the health of grazing land before it is past repair. Short Term 3. To trial rehabilitation of 80 ha (200 acres i.e. 20 acres x 10 sites) of degraded grazing land over 10 representative trial sites which address a range of soils.

NHT 982439	Burnett River Revegetation Project	Gayndah Landcare Group	Revegetation of a 400 metre section of the Burnett River adjacent to the Gayndah Township

Biodiversity Management and Enhancement

NHT 992440	Coalstoun Lakes Parks and Recreation Reserve	Biggenden Shire Council	The remnant area is unique, as the bottle tree are an endangered species. When completed the area will provide valuable benefit for education and ecotourism purposes. All participants currently in the project are obtaining an understanding of the importance of regenerating the remnant area.
NHT 992441	Sustainable Management of Isis Red Soils	Isis Landcare Group	The project will be used to encourage landholders to revegetate abandoned ex-canelands through the establishment of representative sites on a range of soil types and long term degraded areas which will not regenerate without landholder intervention. The representative sites will include two farm forestry and one native vegetation areas.
NHT 992433	Kingaroy Shire Remnant Vegetation Management Strategy and onground Community Conservation Action	Kingaroy Shire Council	The project will develop and implement a strategic plan for the management and conservation of native vegetation in the Kingaroy Shire including onground restoration works at a number of selected sites. The strategy will be promoted to other shires in the region as a model on appropriate management and conservation of native vegetation.
NHT 992435	Re-establishment of local Woongarra Scrub Vegetation on the Hummock near Bundaberg	Bundaberg and District Landcare Group	Prior to European settlement, the Woongarra Scrub in Bundaberg City and Burnett Shire covered approximately 4000 ha. Today the Scrub consists of about 20 ha of degraded and fragmented remnants. This present project is addressing the urgent need to re-establish an area of Woongarra Scrub on a site where it can be permanently maintained and protected by Burnett Shire Council. The project will continue to raise community awareness about the ecological and economic value of Woongarra Scrub and native vegetation in general.
NHT 972468	Native Vegetation Propagation Project – Woongarra and Isis Scrub species	Bundaberg and District Landcare Group	Identifying, collecting and propagating seeds from Woongarra and Isis scrub and planting in strategic areas.
NHT 992449	Wide Bay - Burnett Land for Wildlife Project	Hervey Bay City Council	The Land for Wildlife program is recognised nationally as an effective means of encouraging and assisting landholders to protect and manage wildlife habitat on private land. Land for Wildlife has been successfully established in southeast Queensland as a Local Government initiative and the current project aims to extend the reach of this program to the Wide Bay-Burnett Community.

Proposed for October 2000 – New Projects

NHT 2002412	Advancing On Ground Nature Conservation in the SEQ Bioregion (North)	Greening Australia	To protect, restore and encourage appropriate management of high priority native vegetation communities in the Baffle, Burnett, Kolan, Elliot, Gregory and Isis Catchments with the focus being on the protection and expansion of regional ecosystems, flora and fauna habitat and vegetation corridors identified as "endangered" and "of concern". A substantial percentage of the targeted vegetation and communities occur on private freehold land. This project will provide incentives (ie. Trees, fencing, water points) through a voluntary management agreement, to assist and encourage landholders in strategic on ground nature conservation. The catchments incorporate 7 endangered and 30 of concern ecosytems. The northern section of the bioregion has 31 endangered, 68 vulnerable and 131 rare flora species, 13 endangered, 33 vulnerable and 47 rare fauna species. These areas will form the basis for the provision of incentives through this project. This project is a modification of 99290 which was approved in 99/00. Which has been expanded to enable the delivery of anticipated needs. The initial project did not proceed due to insufficient funding approval.
NHT 2002413	The Yarraman and Cooyar Creeks Restoration Project	Rosalie North Landcare Group Inc.	The Upper Yarraman and Cooyar Creeks Restoration Project will be a devolved grant project with the objective of assisting between 50 and 100 landholders in the Yarraman Creek and Cooyar Creek catchments to carry out onground works identified in the pending Management Plan being developed. Both of these creeks are important tributaries to the Brisbane River, so works aimed at improving the riparian zone vegetation, creek bank stabilization and necessary environmental weed control along the creeks will have an overall beneficial effect on improving the water quality of the Upper Brisbane River, and thus the water supply for downstream areas including the city of Brisbane.
NHT 2002443	Future Profit - South East Region	Department of Primary Industries - QLD	The aim of the project is to introduce landholders and their families to strategic planning, and the range of issues that underpin successful property management into the future. This will assist landholders implement changes in management practices, improve their preparedness for change and to encourage their participation in life long learning. The project will employ experienced facilitators, who will develop and deliver client driven workshops (300 new people to FutureProfit). Additionally, they will facilitate landholders in on-going group activities, aiming to encourage them to move along the "Dependence-Interdependence" continuum, to more advanced adult learning and community development activities. These on going groups will be involved in activities such as sub-catchment planning, ongoing discussion/management, regional Nature conservation, group purchasing and group employment. Activities will be underpinned by 4 key criteria. These are: whole systems, strategic planning, adult learning and farm/family scale. This program links closely with many partners including DNR/DEH/DSD/Landcare and other community groups, and private providers. The program is continually evaluated for continuous improvement, to measure impact and indicate vale for investors.
NHT 2002477	Small's Creek Restoration Project	Small's Creek Landcare Group	To improve the riparian ecosystem of Nogo River and Small's Creek. To restore the riparian vegetation to a natural state to increase the biodiversity values and habitats. To encourage landholders and community participation in managing riparian areas through adopting improved stock and weed management practices. To improve the physical stability of the riverbank sites along the Nogo River and Small's Creek. Enhance catchment management and encourage community involvement in Rivercare Programs.

Riparian Zone and Aquatic Vegetation Management

NHT 992478	Black Gully Habitat Revegetation Project	Kolan Shire Landcare Group	To revegetate Black Gully, link with existing ecosystems of Forest Red Gum (Eucalyptus tereticornis). To enhance existing wetlands area. To involve the community in flora and fauna protection and preservation.
NHT 982415	Restoration of Native Riparian Vegetation in the Upper Burnett	North Subcatchment of the Burnett Catchment Care Association	A thorough summary of the different methods of riparian restoration will be completed for distribution. We envisage the results which will have been undertaken over 3 years will be useful to government agencies, landholders and community groups. The results will include best treatment rates and reasons for natural regrowth and difficulties which occurred.

Water Quality

NHT 2002437	South Burnett Waterwatch Program	Burnett Catchment Care Association	Assist local groups (Landcare, Local Govt, Schools, Industries and Landholders) to develop an understanding on the water quality issues in the South Sub Catchment of the Burnett River. Coordinate the monitoring of water quality through the sub catchment, and managing, analysing and interpreting that data through the national database. Sharing and participating in water quality issues and workshops for industry, schools, local councils and the public. The program aims to ultimately raise the sustainability of our community in the South Burnett by improving water quality and practices relating to water quality through informed action from the community.

ABBREVIATIONS

ABS	: Australian Bureau Statistics
ANZECC	: Australian & New Zealand Environmental & Conservation Council
AQIS	: Australian Quarantine Inspection Service
AWWA	: Australian Waste Water Association
BCCA	: Burnett Catchment Care Association
BIEDO	: Burnett Inland Economic Development Organisation
BMP	: Best Management Practice
CAR	: Comprehensive, Adequate & Representative
CIS	: Client Information Service
CQU	: Central Queensland University
CSIRO	: Commonwealth Scientific Industry Research Organisation
DNR	: Department of Natural Resources
DPI	: Department of Primary Industries
DEH	: Department of Environment and Heritage
DCILGPS	: Department of Communication Information Local Government Planning & Sport
DPIE	: Department of Primary Industries and Energy
DFYCC	: Department of Families Youth and Community Care (Qld)
EIA/EIS	: Environmental Impact Assessment / Statement
EPA	: Environmental Protection Authority
ESD	: Ecologically Sustainable Development
GA	: Greening Australia
GIS	: Geographic Information System
IAS	: Impact Assessment Study
ICM	: Integrated Catchment Management
IDAS	: Integrated Development Assessment System
IPA	: Integrated Planning Act
LCMC	: Landcare and Catchment Management Council
LGA's	: Local Government Areas
LWMP	: Land and Water Management Plans
NLWA	: National Land and Water Audit
NRM	: Natural Resource Management
PMP	: Property Management Planning
QFF	: Queensland Farmers' Federation
QDO	: Queensland Dairy Farmers' Organisation
QGGA	: Queensland Grain Growers Association
QFVGA	: Queensland Fruit and Vegetable Growers Association
QPWS	: Queensland Parks and Wildlife Service
RAP	: Regional Assessment Panel
RFA	: Regional Forestry Agreement
RSG	: Regional Strategy Group
RID	: Regional Infrastructure Development
SAP	: State Assessment Panel
SF	: State Forests
SOE	: State of Environment Report
TAFE	: Technical and Further Education
UQ	: University of Queensland
VMP	: Vegetation Management Plans
WAMP	: Water Allocation Management Plan

GLOSSARY

Aquaculture: The commercial growing of marine or freshwater animals and plants in water.

Arable land: Land that is, or has the potential to be, cultivated for crop production.

Areas of high nature conservation value: as defined in the *Vegetation Management Act*, 1999.

Arid Zone: Often arbitrarily defined as those areas receiving annual rainfall of less than 250mm in the south and 30mm in the north.

Benchmark: A point of reference against which change may be measured.

Best management practice: A concept conditional on management objectives, that is practices, which can subsequently be assessed in terms of how efficiently, and equitably they achieve the objectives. Best management practice relates to activities by managers at the property, regional, catchment, State, Territory and national levels.

Biodiversity (or Biological diversity): The variety of all life forms: the different plants, animals and micro-organisms, the genes they contain and the ecosystems they form. The term is often considered at three levels: genetic diversity, species diversity and ecosystem diversity.

Biodiversity (or Biological diversity): Means the variability among living organisms from all sources, including terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, and includes –

(a) diversity within species and between species; and
(b) diversity of ecosystems. (*Vegetation Management Act*, 1999)

Biological community: Any assemblage of populations of living organisms in a prescribed area or habitat.

Biological control: Controlling a pest by the use of its natural enemies.

Bioregion (or biogeographical region): An extensive region distinguished from adjacent regions by its broad physical and biological characteristics; generally, a system of related, interconnected ecosystems.

Biota: All the organisms at a particular locality.

Broadacre farms: Commercial farms producing relatively low-value crops, such as wool, sheep meat, beef and cereals, on large areas.

Carry*ing Capacity*: The maximum population of a given organism that a particular environment can sustain. It implies a continuing yield without environmental damage.

Catchment: A region or drainage basin which collects all the rainwater that falls on it, apart from that removed by evaporation, directing it into a river, stream or watercourse.

Clearing: Removing vegetation, particularly trees and shrubs, from a landscape, often with the intention of replacing it with plants regarded to be more directly useful to humans.

Climate variability: The natural year-to-year and season-to-season variation of the climatic system.

Code of Practice: Sets of guidelines adopted by management agencies and industry organizations concerned with minimising the impact of primary industry operations on the environment (eg soil erosion) and on worker safety.

Compaction: The reduction in bulk volume of sediments and soils owing to the increased weight of overlying materials or the impact on the surface layers such as by machinery and livestock.

Conservation: The protection, maintenance, management, sustainable use, restoration and enhancement of the natural environment.

Conservation farming (or conservation tillage): Farming systems designed to reduce run-off so that water storage in the soil is maximised and soil erosion is reduced.

Contour banks: small banks cut into the soil, aligned close to the contour of the land and which convey water across the slope to a waterway or drain designed to resist erosion.

Degradation: A loss of capacity to provide for desired uses and values, either now or in the future. Severe degradation is that which would be considered to cause irreversible damage to the productive capacity of natural resources or significant costs to rehabilitate or restore productive values. Land degradation includes soil erosion, removal of top soil, soil fertility and structure decline, soil contamination including acidification, soil salinity, mass movement and destruction caused by animal and plant pests.

Development: The definition will be consistent with that being proposed under the Local Government development and planning legislation.

Development approval: An authorisation to carry out development under the applicable legislation.

Discharge: The volume of water that flows through a cross section of a stream.

Dryland Salinity: Soil salinity levels high enough to affect plant growth. It occurs as a result of natural soil forming processes or, in disturbed landscapes, through clearing or other activities that interfere with water and salinity balance and lead to shallow watertables. It is a hydrological response to the replacement of deep-rooted, perennial native vegetation with shallow rooted annuals, which use less water. As a consequence more rainfall enters the groundwater, causing watertables to rise. Where these rise to within 1-2m of the soil surface, salinisation occurs as a result of evapotranspiration and direct evaporation. Dryland salinity can result in both stream and soil salinity.

Ecologically Sustainable Development (ESD): Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

Ecologically sustainable use: The use of a species or ecosystem within the capacity of the species, ecosystem and bioregion for renewal or regeneration.

Ecological Sustainability: The capacity of ecosystems to maintain their essential processes and functions and to retain their biological diversity without impoverishment.

Ecotone: A zone where two ecosystems overlap, and which supports species from both ecosystems as well as species found only in this zone.

Eco-tourism: Nature based tourism that involves education and interpretation of the natural environment and is managed for ecologically sustainability. The natural environment includes cultural components, and ecological sustainability involves an appropriate return to the local community and long term conservation of the resource.

Effluent: A discharge or emission of liquid or gas or other waste product.

Endangered regional ecosystem: means a regional ecosystem that is prescribed (according to the *Vegetation Management Act*, 1999) under a regulation and has either –

(a) less than 10% of its pre-clearing extent remaining; or
(b) 10% to 30% of its pre-clearing extent remaining and the remnant vegetation remaining is less than 10 000 ha.

Environmental indicator: Physical, chemical, biological or socio-economic measures that can be used to assess natural resources and environmental quality.

Equitable: Fair, impartial and just. In relation to resources and of sharing the costs associated with using them.

Exotic species: an animal or plant that has been introduced into a region

Fauna: The entire animal life of a region

Fisheries resources: All stocks of fish in QLD including all or any of the varieties of marine or freshwater fishes and crustacean and marine animals (excluding crocodiles or fish protected under the Nature Conservation Act); and the immediate habitat upon which fish depend.

Flood plain: All areas of land, both urban and rural, subject to inundation from a watercourse during a flood event and likely to cause significant property or natural resource damage and/or be the subject of competing claims for the use of water.

Flora: The entire plant life of a region

Forest products: All forms of vegetable growth and material of vegetable origin whether living or dead and whether standing or fallen, and in relation to State Forests includes honey, native animal life and shelter, fossil remains, Aboriginal remains and artefacts, relics, water resources and quarry materials.

Forest resources: Forest products, landforms and landscape features, land and tourism or recreational opportunities within State Forest; and forest products and quarry material on all Crown lands.

Geographical information systems: A package of computer programs specifically designed to deal with data that are spatially related; a set of tools for collecting, storing, retrieving, manipulating, analysing and displaying mapped data from the real world.

Grey water: Wastewater useable for a limited range of purposes, such as playing field irrigation or industrial cooling.

Heritage: Those places, objects and indigenous languages that have aesthetic, historic, scientific or social significance or other special value for future generations as well as for the community today.

Indigenous species (or native species): Species that are native (i.e. occur naturally in) a region.

Integrated Catchment Management (ICM): A community-based approach to the management of natural resources focusing on the development of strategies to achieve the integrated management of land, water, forest, fishery and related biological resources within a river catchment.

Landcare: A community-based approach to the management of natural resources involving local people taking local action in their local area. Landcare encourages community interest and action through the formation of Landcare groups to access local problems, determine priorities and undertake action.

Land resources: All tenures of land and its soils, pastures and native vegetation including trees.

Minimum Tillage: A system of crop growing which uses the fewest possible tillage operations to prepare seedbed. Minimum tillage encourages the maintenance of soil structure and soil organic matter.

Natural resource users and holders: Holders and users of land, water, forest and fishery resources, including landholders, owners, occupiers, including all members of the public that use or hold rights to the possession of natural resources for industry, trade or other purpose. Holders include statutory, means land resources, water resources, forest resources and fishery resources.

Burnett Catchment Care association Inc To coordinate and instigate community awareness and effort to maintain an ecologically and economically sustainable Burnett and associated river system.

Of concern regional ecosystem: means a regional ecosystem that is prescribed under a regulation and has either (*Vegetation Management Act*, 1989) and has either –
(a) 10% to 30% of its pre-clearing extent remaining; or
(b) more than 30% of its pre-clearing extent remaining and remnant vegetation remaining is less than 10 000 ha

Rare ecosystem: Defined as having an original extent of less than 1000 ha, or patch sizes generally less than 100 ha which in total occur only over a limited extent across the bioregion, or the total range of the regional ecosystem is generally less than 10000 ha. (Sattler & Williams, ed, 1999)

Remnant native vegetation: The term which is used for those small patches of native plant communities that still remain in the landscape. The patches can be of any size or shape. The term does not refer to native trees scattered in paddocks and urban parks or the introduced trees on timber plantations.

River Improvement Trust: A body corporate established under the River Improvement Trust Act, to undertake and maintain river improvement works, and to control financial arrangements necessary to discharge these functions.

River Regulation: Flow modification of water in a river system. This may involve the creation of dams and weirs and diversions, and the control of flow to and from such storages.

Rural Industry: Comprises agriculture, forestry and fishing. The 'term' agriculture is used to include the breeding, keeping or cultivation of all kinds of animal or vegetable life except forest trees and marine life. 'Forestry' includes afforestation, harvesting and gathering of forest products. 'Fishing' includes the catching, gathering, breeding and cultivation of marine life from ocean, coastal and inland waters.

Salinisation: The accumulation of salts at the soil surface or in the main root zone, due usually to capillary rise of saline moisture from a shallow watertable. Soluble salt levels in the soil increase to the point where plant growth is affected.

Semi arid zone: Lands where rainfall is so low and unreliable that crops cannot be grown with any reliability.

Species: A group of plants, animals and micro-organisms that have a high degree of similarity and generally can interbreed only among themselves to produce fertile offspring, so that they maintain their 'separateness' from other such groups.

State Forests: Lands set apart and declared by the Governor in Council as State Forest for the permanent remnant reservation and management of such areas for the purpose of sustainable use of forest resources. For the purposes of this paper they include land set apart as Timber Reserves.

State Planning Policies: Used to guide local governments in the preparation of their planning schemes and in carrying out their planning functions. Policies are intended to be referred to in matters related to planning, land use and development.

Sustainability indicators: Quantitative attributes of rural industry production systems and the environment needed to estimate current status and trends in sustainability.

Sustainable use: The use of natural resources in accordance with ESD principles, and in particular the principle that decision making processes should effectively integrate both long and short term economic, environmental, social and equity considerations.

Water resources: Surface water in watercourses, lakes, springs, dams or weirs upstream of the tidal limit, groundwater and quarry materials within watercourses and includes waters outside a watercourse where so determined in an approved NRM plan.

Woody weed: Shrubby plants (both native and exotic) that have increased in numbers and become a problem, particularly for pastoralists in parts of the arid and semi arid zones.

Zero Tillage: A production system in which there is no tillage at all. Zero tillage systems minimise soil disturbance to maintain as much crop residue cover as possible to conserve soil moisture and prevent erosion. Lon-term zero tillage also increases soil organic matter and improves soil quality and fertility. Zero or no-tillage systems are totally reliant on chemicals, such as herbicides, and are usually used instead of tillage to control weeds.

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AUSTRALIA

Natural Heritage Trust

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