

BOOROWA REGIONAL CATCHMENT COMMITTEE
BOOROWA CATCHMENT ACTION
PLAN

Boorowa River and Hovells Creek Catchments



Prepared by:

Robert Langford, Janelle Jenkins, Libby Elliot and David Hilhorst

February 2005



Natural
Heritage
Trust

Funded by the Natural Heritage Trust



CONTENTS

Acknowledgements

1 EXECUTIVE SUMMARY	4
INTRODUCTION	5
1.1 Purpose of the Boorowa Catchment Action Plan	5
1.2 Stakeholders	6
1.3 Linkage to Lachlan Blueprint	7
1.4 Visions	8
2 PLANNING PROCESS	9
2.1 Community Consultation	9
2.2 Data Collection	9
2.3 Cost : Benefit Analyses	9
2.4 Catchment Mapping	10
3 BOOROWA NETWORK OF LANDCARE GROUPS	12
3.1 Landcare History	12
3.2 Achievements	13
4 BOOROWA RIVER CATCHMENT - AN OVERVIEW	16
4.1 Location	16
4.2 History	16
4.3 Community Profile	17
4.4 Climate	18
4.5 Physiography and Drainage	19
4.6 Geology	20
4.7 Soils	21
4.8 Land Capability	24
4.9 Land Use	24

4.10	Native Vegetation	25
4.11	Native Fauna	27
5	BOOROWA CATCHMENT ISSUES	29
5.1	Dryland Salinity	29
5.2	Vegetation & Biodiversity	34
5.3	Soil Management	38
5.4	Water Management	41
6	BOOROWA CATCHMENT ACTION PLAN	42
6.1	Dryland Salinity Action Plan	42
6.1a	Dryland Salinity Best Management Practices	45
6.2	Native Vegetation Management Action Plan	54
6.2a	Vegetation Management Best Management Practices	56
6.3	Soil Management Action Plan	70
6.3a	Soil Management Best Management Practices	72
6.4	Water Management Action Plan	73
6.4a	Water Management Best Management Practices	75
7	REFERENCES	8

Figures

Figure 1	Location of the Boorowa Catchment Action Plan area	6
Figure 2	Context of the Catchment Action Plan in National, State and Regional Policies	7
Figure 3	Location of the Action Plan study area within the Lachlan River Catchment	8
Figure 4	Cost of Land Degradation to the Boorowa Catchment	10
Figure 5	Mean monthly rainfall and temperature for the Boorowa Post Office	18

Figure 6	Long-term rainfall trends Boorowa Township	19
Figure 7	Distribution of soil types in the Boorowa Soil Landscape unit	23
Figure 8	Dryland salinity occurrences in the vicinity of the Boorowa Township	33
Figure 9	Boorowa Weir 2 hydrograph and bar graph of monthly rainfall 1993 – 2002	34
Figure 10	The availability of nutrients for plant growth as pH _(CaCl₂) changes	39
Figure 11	Top soil pH variation in the Catchment	40

Tables

Table 1	Digital data set licensing agreements	11
Table 2	Landcare Group membership in the Catchment Area	12
Table 3	Sites within the Catchment Registered of the National Estate	16
Table 4	Community profile of selected averages in the Boorowa Local Government Area	17
Table 5	Community profile of occupations in the Boorowa Local Government Area	17
Table 6	Value of agricultural commodities produced (VACP)	18
Table 7	Rural Land Capability Classes	24
Table 8	Land cover in the Boorowa Catchment Area	25
Table 9	Vegetation communities in the Boorowa Shire	26
Table 10	Threatened fauna in the Catchment Area	27
Table 11	Threatened fauna in the Catchment Area	27
Table 12	Dryland salinity class categories, criteria and indicator species	32
Table 13	Acidity ranges measured in 1:5 pH (0.01mol CaCl ₂) solution	38
Table 14	Water quality Boorowa River at Prosser’s Crossing 1996-1997	41

Maps

MAP 1	Boorowa River Catchment – Roads and Rivers	92
-------	--	----

MAP 2	Boorowa River Catchment – Geology	93
MAP 3	Boorowa River Catchment – Soil Landscapes	94
MAP 4	Boorowa River Catchment – Grazing and Cropping Country	95
MAP 5	Boorowa River Catchment – High Recharge Country	96
MAP 6	Boorowa River Catchment – Native Vegetation	97
MAP 7	Boorowa River Catchment – Salinity Affected Areas	98
MAP 8	Boorowa River Catchment – Soil and Gully Erosion	99
MAP 9	Boorowa River Catchment – On-ground Works	100

FACT SHEETS

DRYLAND SALINITY

What are the signs of dryland salinity.....	47
How to manage saline discharge sites.....	48
How to manage saline recharge sites.....	49
Pasture management.....	50
Salt tolerant species for the Boorowa area.....	51
Salt Tolerant Pasture Mix.....	52
Further salinity reading.....	53

VEGETATION & BIODIVERSITY

Revegetation establishment.....	57
Vegetation establishment techniques – Tubestock.....	58
Vegetation establishment techniques – Direct Seeding.....	59

Recommended species for understorey revegetation.....	61
Native seed collection.....	66
Native plant propagation.....	67
Grazing management in native vegetation.....	68
Revegetation areas affected by dieback.....	69

WATER MANAGEMENT

Repairing gully erosion.....	77
Suitable species for revegetating gullies.....	78
Important things to know about repairing gullies.....	81

REFERENCES83
-------------------------	-----

APPENDICES

Appendix 1 Technical Contacts	88
Appendix 2 Noxious Weeds	90

MAPS92
-------------------	--------------

Executive Summary

The Boorowa Regional Catchment Committee (BRCC) provides a forum for Landcare groups, state and local governments, and community organisations to work together to address natural resource issues in the Boorowa area. In 1992, funding from the National Landcare Program allowed work to begin on a salinity catchment plan. Ten years later the plan has been extended to include other related land and water degradation issues affecting the catchment. As current chairman of the BRCC, I am now pleased to present this plan.

The plan will assist all land managers with an interest in natural resource management to identify, quantify and prioritise the issues in this part of the Lachlan catchment. It will also provide a sound basis to justify and plan future investment in specific on-ground actions. While we recognise that work needs to continue to refine our data and to collect additional information, we are proud to lay the foundations.

This plan is the result of many hours of data collection, surveys, community consultation and research. Through their hard work, persistence and initiative, the community have made a significant contribution to the future sustainability of this catchment.

This catchment plan is the product of a cooperative effort from all partners. It demonstrates the commitment of those living and working in the Boorowa area to identify and address the most pressing natural resource issues. We thank our funding partners, the Commonwealth Government's Natural Heritage Trust, and the New South Wales Government.

We look forward to continuing our work with them in the Boorowa area catchment

Chairman
BRCC

1. INTRODUCTION

The Boorowa community has been actively addressing land and water degradation in the district. Since the first Landcare group was formed in 1989. Numerous Landcare programs, as well as both public and privately funded on-ground works have been successfully implemented throughout the region. Since 1992, over \$5 million of government contributions and over \$10 million in community contributions has funded this investment.

A salinity management plan for the area around the Boorowa Township was originally developed in 1992, which resulted in the implementation of several major salinity management projects. Preliminary work on a Catchment Action Plan to address other land and water degradation issues began in 1996. Information compiled since then has been used to support community applications for funding various projects.

The area covered by the Boorowa Catchment Action Plan has been defined to include the area within Boorowa River sub-catchment and Hovells Creek sub-catchment (Figure 1) of the Lachlan River Catchment.

The Lachlan Catchment Management Board (LCMB) recently released a Catchment Plan, titled the “Integrated Catchment Management Plan for the Lachlan Catchment 2002”, also known as the “Lachlan Catchment Blueprint.” The Lachlan Catchment Management Board was appointed under the *Catchment Management Act 1989* and the *Catchment Management Regulation 1999*.

The Blueprint commenced on the date of gazettal (February, 2003) by the Minister for Land and Water Conservation, for a term of 10 years. The Lachlan Catchment Management Board has provided an advisory document for co-ordinated and co-operative action that will assist the Lachlan community. The Management Targets and Management Actions developed for the Blueprint have been incorporated, where applicable, into this Boorowa Catchment Action Plan.

The new Catchment Management Authority (CMA) was established in May 2004, by the NSW Minister for Infrastructure and Planning and Minister for Natural Resources, to replace the existing LCMB. The Authority is designed to be a locally driven statutory authority with an accountable board responsible for making decisions about natural resources management issues, and coordinate activities throughout the Catchment.

1.1 Purpose of the Boorowa Catchment Action Plan

The Boorowa Catchment Action Plan arises from concerns of landholders and the general community about the increased land and water degradation problems in the area. This community-initiated Plan has been prepared to ensure that natural resources within the Catchment are managed in an ecologically sustainable manner. The plan has been developed, in part, by NHT funding for a Catchment Planning Officer.

The aims of the Catchment Action Plan are:

- Education, awareness and a support mechanism for funding applications
- Provide the community with current information on natural resources within the Catchment

- Identify priority issues for the Catchment
- Develop regional strategies and action for land managers
- Provide land managers with a set of best management practice guidelines
- Identify options for sharing the costs of implementing the plan
- Allow sustainable management of the catchment to be achieved by partnership of individuals, community groups and all spheres of government



Figure 1 Location of the Boorowa Catchment Action Plan area

The Catchment Plan will be a living document that responds to changing perceptions, needs and priorities, and it will provide directions for achieving a better future both for this generation and the generations to come. The Plan shall remain dynamic and open to a five yearly review.

1.2 Stakeholders

As part of the Catchment planning process, as many stakeholders as possible have been consulted. Stakeholders are people and organisations that have an interest in, are affected by, or are involved in an issue. They may have different ideas about the values of resources requiring protection, and how to address various issues. Stakeholders in the Catchment include: Land owners; Landcare groups; Community members and interest groups; Educational institutions and Research bodies such as schools and universities; Local, State/Territory, Commonwealth Government departments and agencies; Industry representatives; Environmental groups;

Inter-governmental bodies, such as the Murray-Darling Basin Commission; and Coordination groups, such as the Catchment Management Authority.

This Plan is a community-owned document that fits under the broader scale of Lachlan Catchment Blueprint, and state and federal policies relating to natural resource and environmental management (Figure 2). Governments have demonstrated their commitment through natural resource management programs in partnership with local communities. Emphasis has been placed on community action, on-ground works and developing practical solutions at a local level. While governments have provided national and regional frameworks, a large responsibility rests with communities to implement these policies.

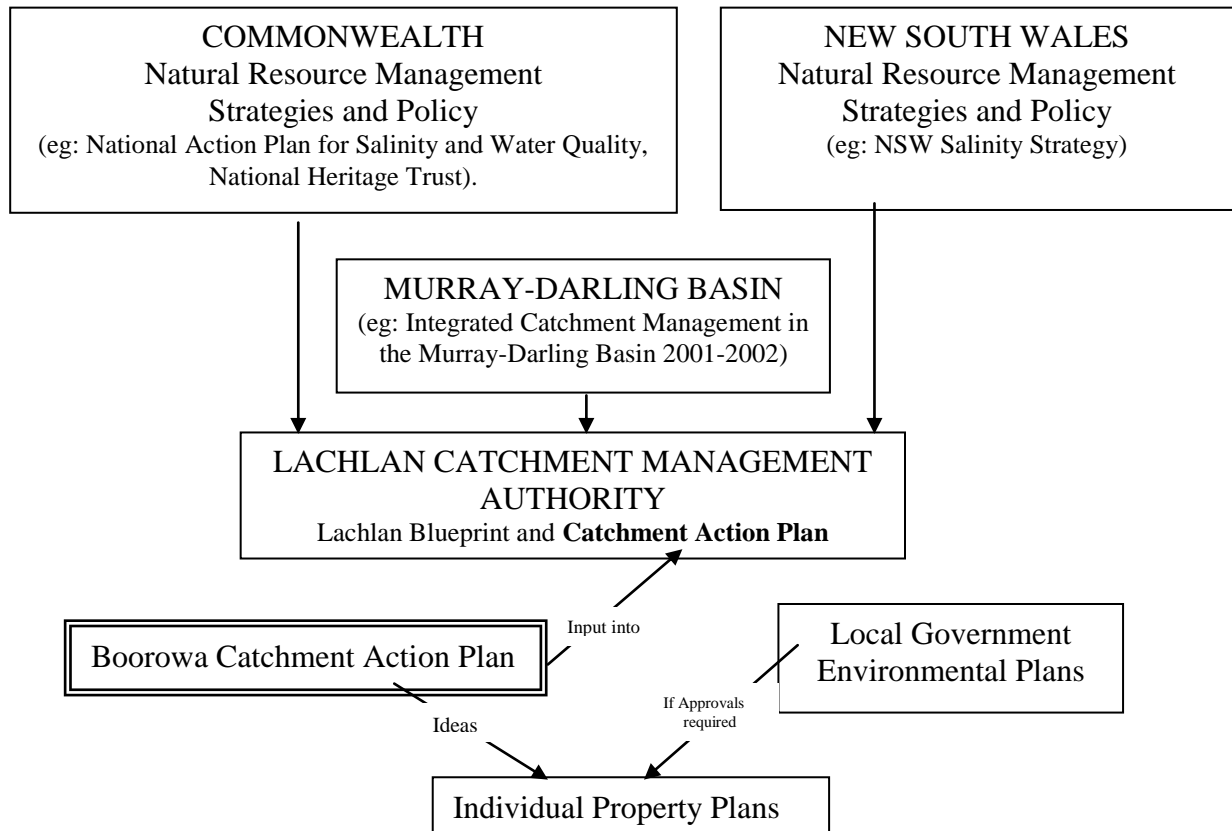


Figure 2 Context of the Boorowa Catchment Action Plan in National, State and Regional Policy and planning

1.3 Linkage to Lachlan Blueprint

The boundaries of the area covered by this Action Plan have been defined to comply with the sub-region boundaries adopted by the Lachlan Catchment Management Authority (Figure 3). The region in which The Boorowa Catchment is located is called the Lachlan Slopes. Many of the Management Actions advised in the Blueprint for this sub-region, such as re-vegetation and salinity abatement, soil health improvement and riparian protection have already been undertaken in the Catchment.

This plan has been developed to: Act as a tool to coordinate further on-ground activities; Assist in developing and implement strategies; Establish measurable targets; and to identify and encourage the use of best management practises in accordance with guidelines set out in LCMA Blueprint. Particular care has been taken in sections 6, to align targeted Management Actions, set out in the Lachlan Blueprint, with actions identified by the Stakeholders in the

Boorowa Catchment. In so doing, a quick reference list of LCMA actions, addressed by proposed works, has been created. This will be a valuable tool for Stakeholders applying for funds allocated to specific issues by the LCMA and other funding bodies, who will utilise the standards set in the Catchment Blueprint.

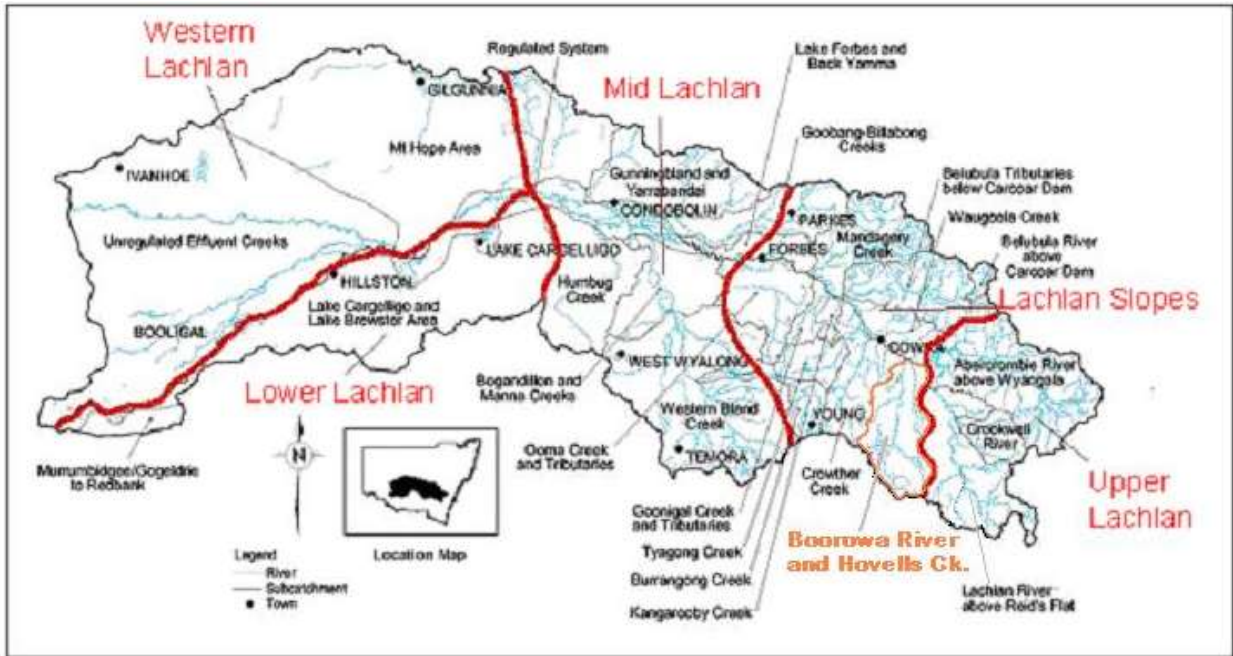


Figure 3 Sub-region boundaries adopted by the Lachlan Catchment Management Board (modified from DLWC, 1999)

1.4 CATCHMENT VISION

“A community actively maintaining a sustainable and productive Catchment.”

2. PLANNING PROCESS

Work on a coordinated Catchment Action Plan began in 1992. A comprehensive Geographical Information System (GIS) mapping system was compiled for planning activities. Natural resources information of the Catchment, e.g. geology, soils, vegetation, biodiversity and land degradation has been entered into the GIS.

Public meetings have also been conducted over the years to identify the natural resource management issues of concern to the community. A series of best management practices and action plans have been compiled for each specific management issues.

2.1 Community Consultation

Community consultation is an on-going process, and has been conducted through a variety of forums including -

- Landcare meetings;
- Property and catchment planning workshops;
- Meetings with groups, government agencies and various catchment committees;
- Landcare newsletters and newspaper columns;
- Field days and farm visits;
- School education days;
- Liaison with Shire Councils.

2.2 Data Collection

Data has been provided from various government agencies, university and research groups, private consultants, and the local community. Data has also been compiled from mapping of existing on-ground works, soil and water analyses, field surveys, and mapping activities that have been conducted by the community over the last 10 years.

The Boorowa region has recently been the focus of numerous investigations, including studies on groundwater and salinity, native vegetation, biodiversity, social history, and soil and grazing studies. This information has been incorporated into the Plan.

Another important source of information are the Catchment Plans that have recently been compiled for areas surrounding the Catchment: Binalong area - Brown, 1997; Cowra area – Sly, 1998; Upper Lachlan area – Sticpewich, 2000; and the Yass area – Cosgrove and White, 2002;

2.3 Cost : Benefit Analysis

To address the need to target specific issues, the BRCC recently funded a cost:benefit economic analysis to examine the financial implications of actions and/or inaction associated with various forms of land degradation in the Catchment. Ivey ATP and Wilson Land Management Services undertook this analysis of the nature and cost of salinity, vegetation decline, soil acidity, soil erosion and soil sodicity. The study included a previous economic analysis of dryland salinity management in the Catchment conducted by Hill (1996), as well as the downstream impacts of salinity.

The non-market value of existing biodiversity in the Catchment, i.e. for greenhouse balance, water quality etc, has not been analysed. Figure 4 depicts the estimated annual costs of land

degradation in the Catchment in 2000, and projected estimate of annual costs in 2050 based on no plan or actions.

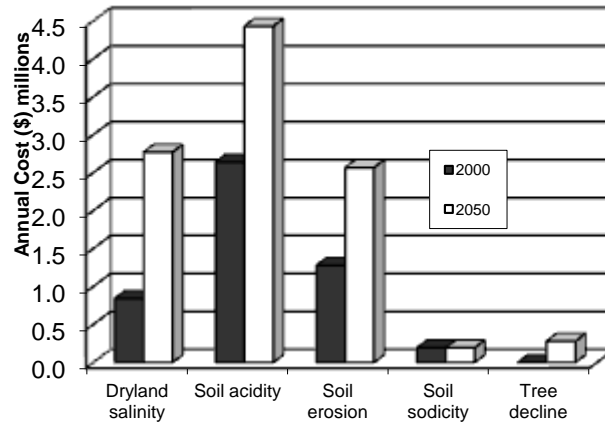


Figure 4 Cost of land degradation to the Boorowa Catchment (Ivey ATP and Wilson Land Management Services, 2000)

The benefit cost ratio for soil degradation indicates that prevention is far more cost effective than remediation. Hence, measures should be taken to ensure that areas currently experiencing only minor to moderate soil erosion are not allowed to deteriorate any further. The results of this analysis indicate that there are considerable benefits associated with lime application to prevent further soil acidification on acid soil types.

While benefits may be gained from lime and gypsum application in sodic cropping soils, in most areas, the effects of subsoil sodicity should be overcome as much as possible by management practises. This may include maintaining high levels of soil organic matter and minimising tillage operations that may expose sodic subsoils (Ivey ATP and Wilson Land Management Services, 2000).

2.4 Catchment Mapping

The catchment-wide Geographical Information System (GIS) has been developed as a basic information resource, and the decision support system for future planning. Maps were produced using ArcView[®] 3.3 GIS computer software. Many of the spatial layers of information have been purchased from government departments and have associated licensing agreements,

(Table 1). These agreements generally preclude the release of data to third parties.

DATASET	CUSTODIAN	CONDITIONS	LICENCE AGREEMENT
Soil Erosion	DIPNR	Standard Condition	DIPNR Licence Agreement
Gully/Streambank Erosion	DIPNR	Standard Condition	DIPNR Licence Agreement
Land Capability	DIPNR	Standard Condition	DIPNR Licence Agreement
Soil Landscapes	DIPNR	Standard Condition	DIPNR Licence Agreement
Known Saline Sites (c2002)	DIPNR	Standard Condition	DIPNR Licence Agreement
Riparian Condition	DIPNR	Standard Condition	DIPNR Licence Agreement
Remnant Vegetation	NSW NPWS	Public data	NA
Geology	NSW Geol. Survey	Standard Condition	NSW Geological Survey Agreement
Cadastre & topographic data	LPI	Standard Condition	LPI Licence Agreement
Water Bore data	DIPNR	Standard Condition	DIPNR Licence Agreement
Satellite Imagery	SPOT Imaging	Special Condition	SPOT Licence Agreement

Table 1 Digital data set licensing agreements

Data includes complete coverage of the Catchment area by recent SPOT5 (18 November 2002), Landsat satellite data (1997, 1998), and base topographic and cadastre (land parcel) data. Metadata (information about digital data) for the GIS data sets has been compiled. The digital SPOT5 data is available to Landcare members, to aid farm and sub-catchment planning.

Further information regarding data availability can be gained by calling (02) 6385 1018.

The maps produced for this report are based on a variety of data sources at various scales. Sub-catchment information varies from 1:25 000 (1cm = 250 m) up to 1:250 000 (1 cm = 2.5 km) scale, depending on the scale and nature of the existing data and planning constraints. Property Management Planning generally requires scales of 1: 10 000 (1cm = 100 m) or larger.

3 BOOROWA NETWORK OF LANDCARE GROUPS

3.1 Landcare History

The first Landcare group in the area (Boorowa Community) was set up in 1989 to coordinate community environmental education and on-ground activities in the catchment. The first direct seeding trial in the area was established in 1990. In 1992, the Landcare Group was successful in gaining NSW Salt Action funds to employ a Project Officer who mapped salinity on 109 Landcare properties. Four sub-catchments surrounding the Boorowa Township were identified as the worst affected by dryland salinity, and a salinity management plan was developed (Powell, 1992).

During the 1990s several other Landcare groups formed within the Catchment. These included the Rye Park, Breakfast Creek, Frogmore Limestone / Kangiara Taylor's Flat and Hovells Creek Landcare groups. This Landcare network now covers over 75% of the Catchment area, and includes about 270 members (Table 2). The Catchment has one of the highest coverage of Landcare number within a Catchment in NSW.

Landcare Group	Membership No.
Boorowa Community	86
Breakfast Creek	28
Frogmore	26
Limestone / Kangiara	53
Rye Park	40
Taylor's Flat	26
Hovells Creek	13
Total	272

Table 2 Landcare Group membership in the Catchment Area

In 1993, the first Landcare Coordinator was employed to implement Stage I of a series of on-ground works programs directed at salinity affected areas in the Catchment. The programs included pH correction, and the establishment of high water use perennial pastures on recharge areas, upslope of identified saline discharge sites. Trees and salt tolerant grasses were also used to reclaim discharge sites (Hayman, 1996). Since the initial Stage I projects, several major salinity programs, and numerous other programs have been successfully implemented throughout the Catchment.

Boorowa Regional Catchment Committee

The Boorowa Regional Catchment Committee (BRCC) was established in 1995 to coordinate Landcare activities in the Boorowa area (Clark, 1995). The Committees provide support and direction to the Landcare Groups across the Boorowa Catchment area. This Action Plan has been produced under direction of the Committee to act as a tool for planning future on-ground works.

3.2 Achievements

On ground activities in the catchment that have been funded through Landcare have included:

- sowing of salt tolerant trees and pastures on discharge areas to reclaim salt affected areas
- establishment of perennial vegetation on recharge areas to control rising water tables and salinity
- re-establishment of native vegetation to provide habitat and enhance biodiversity
- fencing off remnant vegetation to allow natural regeneration and control grazing
- fencing off and rehabilitating riparian corridors to improve water quality in our rivers and creeks and to control bank erosion
- fencing off eroded areas and gullies and rehabilitating with native vegetation to control soil loss
- pH correction of pastures using lime to maintain productive soils

List of some Major Projects .

2002/03

Boorowa River Catchment Implementation Officer
Boorowa River Catchment Planning Officer

2001/02

Saltshaker 2
Boorowa River Catchment Implementation Officer
Frogmore Salinity Reduction and Biodiversity Project
Implementation of the Boorowa River Salinity Catchment Plan - Stage V

2000/01

Saltshaker 1
Boorowa River Catchment Implementation Officer
Extension of the Boorowa River Salinity Catchment Plan - Stage 2
Frogmore Salinity Reduction and Biodiversity Project
Implementation of the Boorowa River Salinity Catchment Plan - Stage IV
Stabilizing & Revegetation of Upper Callaba Creek
Boorowa Remnant Vegetation Project
Integrated Revegetation to Control Salinity & Erosion
Upper Lachlan Tributary Salinity - Stage 3
Implementation of the Boorowa River Salinity Catchment Plan - Stage V

1999/00

Implementation of Boorowa River Salinity Catchment Plan - Stage III
Extension of the Boorowa River Salinity Catchment Plan - Stage 2
Groundwater Discharge, Creek and Gully Erosion Control Program
Further Bed Control Structures and Log Revetments in Graham Creek
Implementation of the Boorowa River Salinity Catchment Plan - Stage IV
Aerial Photography for Farm & Catchment Planning
Boorowa Remnant Vegetation Project
Boorowa Community River Restoration and Revegetation Plan.
Boorowa Riverwalk
Upper Boorowa River Restoration and Revegetation Plan - Year 4
Integrated Revegetation to Control Salinity & Erosion

Upper Lachlan Tributary Salinity - Stage 3
Boorowa River Catchment Regional Facilitator
Frogmore Community Landcare Dryland Salinity Recovery Project
Implementation of the Boorowa River Salinity Catchment Plan - Stage V

1998/99

Implementation of Boorowa River Salinity Catchment Plan - Stage III
Extension of the Boorowa River Salinity Catchment Plan
Extension of the Boorowa River Salinity Catchment Plan - Stage 2
Groundwater Discharge, Creek and Gully Erosion Control Program
Graham Creek Land Degradation Amelioration Project
Soils GIS for Salinity Management in the Boorowa Region
Willow Survey of Boorowa River and Pudman Creek
Superb Parrot Revegetation & Education Project - SW Slopes, NSW
Implementation of the Boorowa River Salinity Catchment Plan - Stage IV
Boorowa Remnant Vegetation Project
Integrated Revegetation to Control Salinity & Erosion
Upper Lachlan Tributary Salinity - Stage 3
Boorowa River Catchment Regional Facilitator
Breakfast Creek Remedial Action Against Increasing Salinity and Rising Water Table
Upper Lachlan Tributary Salinity Control
Frogmore Community Landcare Dryland Salinity Recovery Project
Graham Creek Remnant Vegetation Fencing Project
Cost of Land Degradation in the Boorowa River Catchment and Downstream
Farm Forestry Demonstration Site for the Boorowa Region.
Soil pH mapping Boorowa Catchment
Boorowa River Catchment Dryland Salinity Hazard

1997/98

Implementation of Boorowa River Salinity Catchment Plan - Stage III
Extension of the Boorowa River Salinity Catchment Plan
Groundwater Discharge, Creek and Gully Erosion Control Program
Frogmore Salinity Reduction and Biodiversity Project
Graham Creek Land Degradation Amelioration Project
Farm Plan Mapping and Salinity Monitoring and Planning Project
Boorowa River Catchment Regional Facilitator
Breakfast Creek Remedial Action Against Increasing Salinity and Rising Water Table
Upper Lachlan Tributary Salinity Control
Frogmore Community Landcare Dryland Salinity Recovery Project
Graham Creek Remnant Vegetation Fencing Project

1996/97

Implementation of Boorowa River Salinity Catchment Plan - Stage II
Extension of the Boorowa River Salinity Catchment Plan
Farm plan mapping and salinity monitoring and planning project
Boorowa River Catchment Regional Facilitator
Breakfast Creek Remedial Action Against Increasing Salinity and Rising Water Tables
Upper Lachlan Tributary Salinity Control
Frogmore Community Landcare Dryland Salinity Recovery Project
Graham Creek Remnant Vegetation Fencing Project

1995/96

Implementation of Boorowa River Salinity Catchment Plan - Stage I
Implementation of Boorowa River Salinity Catchment Plan - Stage II

1994/95

Implementation of Boorowa River Salinity Catchment Plan - Stage I
Implementation of Boorowa River Salinity Catchment Plan - Stage II
“Allendale” Salinity Management Demonstration Site

1993/94

Implementation of Boorowa River Salinity Catchment Plan - Stage I

1992/93

Boorowa District Salinity Mapping

1991/92

Groundwater Level Monitoring
Farm Planning Workshops

