Report

End of Program Evaluation on Catchment Demonstration Initiative (CDI)

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Department of Agriculture and Food

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Abbreviations

Abbreviation	Description
ACC	Avon Catchment Council
AOCLP	Area of consistently low productivity
BBG	Blackwood Basin Group
CDI	Catchment Demonstration Initiative
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFWA	Department of Agriculture and Food WA
DEC	Department of Environment and Conservation
DEM	Digital Elevation Modelling
DOW	Department of Water
FBG	Fitzgerald Biosphere Group
FCP	Focus Catchment planning
Fitzgerald	Fitzgerald River Catchment Demonstration
Gillingarra	Gillingarra-West Koojan Catchment Demonstration
GRDC	Grains Research and Development Corporation
KLCDC	Katanning Land Conservation District Committee
LGA	Local Government Authority
M&E	Monitoring and Evaluation
mbgl	metres below ground level (refers to watertable)
NACC	Northern Agricultural Catchment Council
NRM	Natural Resource Management
QFR	Quarterly Financial Reporting
RAP	Regional Assessment Panel
RCA	Rapid Catchment Appraisal
RIRDC	Rural Industries Research and Development Corporation
SCRIPT	South Coast Regional Initiative Team (now South Coast NRM)
SGSL	Sustainable Grazing on Saline Lands
SIF	Salinity Investment Framework
SNRMO	State Natural Resource Management (NRM) Office
SWCC	South West Catchments Council
TAP	Technical Assessment Pane
UCCG	Upper Coblinine Catchment Group
Upper Coblinine	Upper Coblinine Catchment Demonstration
Wallatin Creek	Wallatin-O'Brien Catchment Demonstration

Executive Summary

In 2003 the Western Australia Department of Agriculture and Food commenced the development of a Catchment Demonstration Initiative (CDI) Project as a contribution to the National Action Plan for Salinity and Water Quality (NAPSWQ). Joint Commonwealth and State funding saw the allocation of $6 million towards a project aimed at demonstrating viable salinity management systems in the agricultural area of Western Australia. The CDI sought to deliver its outcomes in partnership with NRM Regions by co-investment in targeted, large-scaled, catchment-based demonstrations of integrated salinity management practices.

Submissions were invited from interested groups to provide proposals containing:

1. plans to manage salinity (recover, contain and adapt) capable of being implemented at a catchment scale;
2. identification of important and local assets (land, water and biodiversity) in process of being recovered, contained or adapted;
3. economically viable salinity management options that are available for wider adoption;
4. evaluated innovative practices;
5. monitoring and evaluation systems that could be used to report each of the projects longer term outcomes;
6. strategies for real costs of salinity management systems to be established and communicated;
7. demonstration of the groups capacity and commitment to complete the work started by the Initiative;
8. strategies to deliver demonstrations available for others to visit and learn from; and
9. identification of packages and products that can be applied elsewhere.

Following an assessment process at the local, state/Commonwealth level against pre-determined criteria, four catchment groups were successful in their applications to the Department of Agriculture and Food, having been assessed as technically and economically sound. They were thought to have the ability to deliver 'realistic examples of the management of land, water, infrastructure and flora and fauna to contain, reduce or make productive use of salt-affected land'. The four CDI projects were:

1. Gillingarra-West Koojan ('Gillingarra') Catchment Demonstration;
2. Wallatin-O'Brien ('Wallatin Creek') Catchment Demonstration;
3. Upper Coblinine ('Upper Coblinine') Catchment Demonstration; and
4. Fitzgerald River ('Fitzgerald') Catchment Demonstration.

The first CDI project commenced in January 2005 with the signing of an agreement for the Fitzgerald River Catchment Demonstration Initiative. The other three projects followed soon after. Completion of all four CDIs occurred in December 2009.

End of Program Review

URS Australia Pty Limited was contracted by the Department of Agriculture and Food to undertake an end of program review of the Catchments Demonstration Initiative. Specifically the review sought to:

1. Review the Catchment Demonstration Initiative (CDI), aims, objectives and catchment selection process;
2. Evaluate the four approved Implementation Plans in terms their ability to meet requirements of the CDI, State/Commonwealth Programs (National Action Plan for Salinity and Water Quality) and those of Regional NRM Groups;

3. Evaluate the Implementation Plans and changes made during the program, in terms of their ability to deliver the program outcomes and also meet both local needs;
4. Compile materials from the projects that compare the original and completed plans and outputs (intent, works). Review the actual and/or forecast resource condition change (impact of the works) and basis (methodology). Use other available tools, expertise or knowledge to determine effectiveness of CDI works (if material is incomplete) and major learnings from the demonstrations.
5. Review the concept and application of Catchment Demonstrations, their value and recommend options for future use. Consider their use in terms of adoption, resource condition change, and capacity, knowledge and community benefit;
6. Consider their effectiveness in terms of engaging farmers in the catchment, their capacity, wider dissemination and uptake of results in the region, changes to the catchments resource condition and improvement in the knowledge base for salinity management (technical, social, economic).

This report details the outcomes of the end of program review.

Methodology

The methodology followed for this evaluation was informed by the requirements set out in the scope of works provided by the Department of Agriculture and Food. It included six primary tasks:

1. Review of appropriateness of the CDI (Task 1)
2. Review and evaluate Implementation Plans (Tasks 2 and 3)
3. Review concept and application of catchment demonstrations (Task 4)
4. Assess capacity to develop similar programs (Task 5)
5. Review opportunities to continue/ restart program (Task 6)

Consultation Process

The URS team was provided with a large number of people who have been involved in various ways in the CDI Program. This included (current and past) Program Coordinators/Managers, Catchment Group Managers, consultants appointed to work with the four catchment groups, members of CDI Steering Management Committees, Technical Advisory Groups, land-holders and others with an interest in the program.

Findings and Recommendations

Findings have been presented in the report against four key questions:

1. How well have the projects acted as demonstrations?
2. What is the need for catchment scale planning?
3. What are the challenges for communities?
4. How do we manage the legacy?

The use of projects as demonstrations

As well as achieving ‘accelerated adoption’ within the catchment, the CDI was about influencing behavioural change at up to regional scale. The use of the projects as demonstrations varied considerably, but the overall impression is there has been less value gained through extension than could have occurred.

As well as demonstrating works on the ground, there was an opportunity to demonstrate community processes, collective decision-making, responsible investment of public funds and shared learning. While this occurred well in two projects, it was much less satisfactory in the other two projects. The former would have provided good demonstrations; the latter two would not have been suitable for that purpose.

The need for Catchment scale planning?

The *Salinity Action Plan* guiding the development of the CDI envisaged a role for intervention at catchment scale in agricultural areas. Agricultural (as opposed to recovery) catchment planning and action can now be critiqued after the experiences of Rapid Catchment Appraisal, Focus Catchment planning, and now the CDI. Clearly there is a role for catchment planning and action when one landholder's management of water affects others. It is becoming clear that in the case of groundwater management, this is not often the case. Thus an important argument for operating at biophysical catchment scale has been challenged.

Collective planning, action and learning are successful approaches to developing knowledge and practice change, as shown by the experiences of farmer grower groups and programs such as Sustainable Grazing on Saline Lands (SGSL). However, these groups are not normally defined by or confined to biophysical catchment boundaries, and instead link through community processes and industry interests. Although the CDI operated within catchment boundaries, the projects could have operated within other types of groups.

Catchment planning and action requires good baseline data, sound technologies and access to good technical skills and knowledge. In three of the CDI projects, perennial pastures provide economic and environmental benefits. In the fourth, the project looked for technologies with these characteristics. Across the drier land agricultural areas, profitable technologies to address rising saline groundwater do not exist. Planning for implementation without suitable technologies has little value. Similarly, without adequate baseline information, planning occurs in an environment of uncertainty with no ability to link planned actions to expected outcomes. Finally, the difficulty in accessing good technical skills was an on-going problem in all projects, although over time, the matters were resolved to a degree. Expecting landholders within a group to invest their own time and money in technologies with uncertain outcomes and in the absence of sound technical support is unrealistic.

The lack of private sector commercially-based support for investments in NRM activities is a barrier to landholders accessing the required skills and knowledge to implement required practices with confidence. The dearth of private sector activity in areas such as surface water management, saline pastures establishment and perennial pastures establishment contrasts with the abundant availability of commercial services in crop and annual pastures agronomy.

The review notes the difficulty in establishing a fixed four year plan in a dynamic agricultural environment. The consequence in the CDI was the need for numerous variations requiring approval, compromises in implementation, and some evident stress for Project Officers, local committees and State management. An approach that is better aligned to the challenges facing agricultural businesses is required.

The theory of how public funds should be invested to achieve public outcomes is well understood. However, in implementation, inevitable compromises will be made. Attempting to stick to a purist model of cost sharing is not likely to work. Most practitioners in this area recognise that to achieve a

public good outcome will require differing cost share arrangements according to case-by-case circumstance.

An advantage offered by intensive intervention through the CDI projects is that the locations and activities can be subjects for investigations by other parties. This occurred in the two locations, with the involvement of CSIRO and UWA research scientists. This value-adding of the original investment needs to be encouraged and then recognised in any assessment of the overall value of such a Program.

The CDI projects were, in part, about accelerated adoption achieving practice change at landscape scale. This occurred in three of the four catchments, owing to the existence of feasible technologies (principally perennial pastures). They were not about 'fixing salinity'; although the impression gained from some people involved is that they now believe the job is done. This view does not account for the need for farming systems to adapt continually to new challenges and opportunities as they emerge.

The challenge for communities

The review has found that good social processes and community capacity is critically important as a foundation for effective catchment-scale action. The importance of good governance, involving clear responsibilities and accountabilities in achieving smooth operations and good decision-making was evident. Where governance was contested, and responsibilities unclear, problems emerged which lessened the effectiveness of the project. Related to this is the importance of good relationships and trust between people, both within the catchment groups, and between groups and other parties.

In each case, the Project Officers played a vital role in facilitating group processes, acting as an intermediary between Government and landholders, in helping interpreting plans to action on the ground, and in data capture and storage. This contribution needs to be emphasised and recognised. Several people interviewed stated that the projects would not have been completed with the drive from their Project Officers.

The CDI projects were challenging for the 'host' communities in a number of ways. Over a reasonably short period of time (three to four years), groups of 15 to 20 landholders were required to invest significant public and private dollars in new technologies. In planning the CDI, the challenges of 'time and dollar scarcity' may not have been fully appreciated by Government decision-makers. Although all catchment groups were able to complete their projects, for which they deserve praise, perhaps too many compromises were made in how the funds were invested. Further, there is an impression that the groups are ready now for a rest from this period of relatively hectic and at time stressful activity. .

Committing to the CDI project required 'catchment thinking' and the application of 'catchment knowledge'. For some landholders this was difficult, and seemingly unnecessary, with their main focus being what works were being applied to their farm, and not how these contribute to catchment-wide outcomes. The manner in which some of the Implementation planning occurred reinforced this approach, with individual landholders' desired works captured in isolation, prior to aggregation upwards into a 'catchment plan'. This is not unexpected, and highlights the importance of having technologies that can make both private and public contributions wherever they are applied.

The 'gap' between the concept of the CDI as planned and executed at State Government level, and the challenges facing landholders in putting the concept into practice in the face of seasonal and commodity price difficulties may not have been fully appreciated at the start of the program. Thus

while Government can plan and operate in one 'space' (e.g. $6 million, four projects, four groups, five years), landholders have to plan and operate in another 'space' (changing prices, frost 'wipe-outs', droughts, changing interest rates). The two spaces may not be aligned, yet it is not easy for each party to flex to the others needs.

Managing the legacy

The CDI has been a significant public investment and will leave a legacy of lasting land use change in the four catchments. However, it is unclear how this legacy will be maintained and its value maximised.

Based on discussions with participants in all CDI projects, it is apparent that the groups intend to 'take a break' after the intense activity in implementing the on-ground activities. While this time will be used by some to reflect on the project activities, there was little evidence that participants have considered what priorities/ plans/ strategies will be pursued in their catchments into the future. Government should maintain a watching brief on these catchment groups and be prepared to facilitate and support future NRM activities.

All projects have compiled good baseline data on biophysical state and the works installed. Tracking trends through time is essential and the means to monitor (e.g. piezometers, photo-standards etc) are mostly in place. However in all projects it is unclear what systems and resources have been committed to ensure that on-going monitoring and analysis is undertaken.

The works done in the four catchments have generated a range of new knowledge, both scientific and experiential. This knowledge needs to be properly captured. The Wallatin Creek group have prepared a number of Fact Sheets documenting the outcomes from their individual projects. There is less documentary information available that summarises findings in other projects.

There was no economic evaluation either of the Implementation Plans or of the completed works. Given the recognition that technologies that have environmental (i.e. public) benefits need also to have economic (i.e. private) benefits to ensure adoption, the lack of economic evaluation can be considered a gap in process.

Recommendations

Recommendations	
1	The CDI Program has delivered on its objectives and served its purpose to demonstrate this catchment-level intervention approach. Accelerated adoption of desired practices has occurred However, it is clear that there were difficulties and frustrations in implementation at all levels, and concerns about the universality of the approach. Given these difficulties, and the impracticality of implementing this approach over the wider dryland agricultural areas, the approach need not be repeated, nor implemented more widely in addressing land and water management issues in the agricultural areas.
2	The focus in public investment to addressing environmental challenges in agricultural land use, where there are limited public values at risk, should continue to be in the development of technologies that deliver environmental (i.e. public) and economic (i.e. private) benefits.
3	The CDI Program has highlighted the lack of private sector commercial support for NRM investments, which is a barrier to landholders implementing practices with confidence. Government needs to facilitate and support the development of demand and supply for these professional and commercial services, in partnership with organisations such as the Australian Agricultural Consultants Association, and the Grower Groups Alliance.
4	Given the long lag-time between action and response in hydrological functioning, maintaining M&E commitment is a critical requirement in realising the full value of the CDI investment. Given that resources are scarce, deciding what is worth monitoring to obtain maximised value information, and setting up and resourcing systems needs attention.
5	The CDI projects should be subjected to a full benefit-cost analysis as part of maximising the value of the public investment in this very large scale 'experiment' in environmental management in the agricultural areas.
6	Although the CDI projects are complete, the works put in place and how those works influence both farming systems and environmental outcomes over coming years needs to be tracked. The Government should retain the capacity to use these catchments as demonstrations, and as sites for research into the future.
7	In planning publicly funded programs that require participation of farming businesses for their success, Government needs to be more aware of the very different operating environments in each domain. This will require increased flexibility in planning the programs, and more preparedness to adjust the program as circumstances arise.

1

Introduction

1.1 Project Background

1.1.1 The National Action Plan for Salinity and Water Quality (NAPSWQ)

As the name suggests the NAPSWQ aimed to tackle salinity and water quality through:

1. setting regional targets for water quality and salinity;
2. helping regional communities develop and implement integrated regional/catchment natural resource management plans;
3. providing regional communities with advice and information for developing and implementing integrated management plans;
4. introducing changes to secure property rights for water, improving water pricing, and establishing effective controls on land-clearing in salinity risk areas;
5. clearly defining how partnerships can work effectively to address salinity and water quality; and
6. coordinating decision-making across governments.

1.1.2 Developing the CDI to deliver NAPSWQ objectives

The Western Australian Department of Agriculture and Food's Catchment Demonstration Initiative (CDI) was a priority project of the National Action Plan for Salinity and Water Quality (NAPSWQ). The CDI commenced in 2003 as part of a $6 million Joint State and Commonwealth Government program funded under the National Action Plan for Salinity and Water Quality bilateral agreement between the Commonwealth and the State. The initiative aimed to demonstrate viable *salinity management systems* in the agricultural area of Western Australia. The CDI sought to deliver its outcomes in partnership with NRM Regions by co-investment in targeted, large-scaled, catchment-based demonstrations of integrated salinity management practices (from *CDI Introductory Information Pack*).

Issues to be addressed through the CDI

As a priority project under the National Action Plan, the CDI projects needed to take account of the NRM priorities being identified in Regions as Regional NRM Groups developed their Regional Plans for 'accreditation'. These Regional Plans were to act as blueprints for future investments by the Region, and State and Commonwealth Governments. However, as the CDI ran ahead of the timeline for the accreditation of Regional Plans, in some Regions only interim Regional priorities were available.

Priorities in the draft Regional Plans for consideration in the Catchment Demonstration Initiative included:

1. Fragmentation of natural vegetation areas over the landscape.
2. Changing hydrology and water balance.
3. Existing farming systems inadequate in addressing hydrological changes in the landscape.
4. Decline in quality of soils and land.
5. Decline in quality of waterways and wetlands.
6. Loss of natural bio-diversity.

1 Introduction

CDI objectives

Ten objectives were devised to deliver the agreed outcome of a "*salinity management system*":

1. develop plans that manage salinity (recover, contain and adapt) and implement them at a catchment scale;
2. implement works to manage important and/or local assets (land, water, biodiversity, infrastructure);
3. demonstrate economically viable salinity management options;
4. make information available for wider adoption;
5. evaluate innovative practices;
6. monitor and evaluate systems to enable longer term outcomes to be demonstrated;
7. real costs of salinity management systems established and communicated;
8. develop group capacity to enable work started by the Initiative to be ongoing;
9. demonstrations are available for others to visit and learn from; and
10. partner groups to deliver packages and products that can be applied elsewhere.

History of CDI development

Development of the Initiative by the (then) Western Australian Department of Agriculture commenced in September 2002. The project was delayed as the State negotiated with the Commonwealth to include the CDI as part of the National Action Plan for Salinity and Water Quality Program. Between October 2002 and March 2003 the CDI Steering Committee further developed the project in consultation with State and regional project teams, regional NRM groups and other major stakeholders.

Proposed management arrangements

The intent was for the CDI to operate through catchment groups to demonstrate how salinity management practices could be utilised to recover saline land, restrict the future development of saline land and allow profitable uses of saline land and water. Salinity management practices might include engineering as well as plant-based options and it was considered that the CDI would complement the existing Engineering Evaluation Initiative[1].

1.2 The CDI projects

The projects were selected by agreement between State and Federal Government representatives in consultation with regional natural resource management bodies. Major elements of the works include:

[1] The Engineering Evaluation Initiative (EEI), a $4 M priority project under the National Action Plan for Salinity and Water Quality program, consists of three main programs:
• Evaluation of specific engineering options at farm scale
• Regional drainage planning
• Safe disposal.
The objectives of the EEI are to review the current knowledge on engineering options to mitigate dryland salinity and to clarify 'best practice' by establishing demonstration sites for a range of engineering options. This initiative encompasses a range of on-ground projects to examine the performance of specific engineering options (deep drains, groundwater pumping, siphon and relief wells, and surface water management), to identify ways of disposing of the water safely, and ways to improve once saline soil. The EEI will also consider the most appropriate mechanism to provide a way of assessing the costs and benefits of regional drainage as well as evaluating potential downstream impacts.

- **$1.7million** to plant perennial pastures, woody perennials, install surface water management structures, rehabilitate existing saline land and protect areas at risk in the 40,000ha **Upper Coblinine Catchment within the South-West Region.**
- **$1.2million** to demonstrate large-scaled engineering and water management system, perennial pastures, oil mallees and saltbush and develop uses for excess water in the 24,000ha **Wallatin and O'Brien Catchments,** near Kellerberrin in the Avon region**.**
- **$1.2million** to establish perennial pastures, riparian and remnant vegetation protection and build structures to manage surface water on the Jerramungup Plain in the 60,000**ha Fitzgerald River Catchment on the South Coast.**
- **$1million** to demonstrate commercial farm forestry, engineering, perennial pasture, salt land grazing and surface water management systems in the 42,000ha **Gillingarra-Koojan catchment** in the Northern Agricultural reg**ion.**

1.3 Program Theory of the CDI

1.3.1 Options for addressing water management at landscape scale

The *1996 Salinity Action Plan* (and the 1998 update) envisaged three levels of intervention to address water management at landscape scale and associated salinity issues:

1. Individual landholders – providing them with up-to-date, regionally specific information on best management practices
2. Recovery catchments – where a high level of intervention was justified because the catchment contained important public values (future water supply, biodiversity); and
3. Focus catchments – action at a catchment-by-catchment scale with each being about 20,000 to100,000 with 15-30 farm businesses (eventually across about 700 such catchments).

1.3.2 The CDI

The CDI was a project to test the last of these approaches – being intervention at catchment scale using best practice technologies to make a significant difference in water management. In addition, the CDI also was designed to test the value of this intervention as a demonstration beyond the catchment boundaries.

Simply stated, the theory is ….

Invest in research and planning, and community capacity
Invest in demonstrations and roll out projects
Farmers implement roll out projects with new knowledge, capacity and incentive funding
Other farmers see results and adopt without further investment in research and planning, community capacity, or incentive funding.
Theoretical advantage of CDI is in ongoing adoption at a cost less than direct and targeted incentive payments

1.4 Scope of Work for the Evaluation

The brief for the evaluation of the CDI required the following points to be addressed.

1. Review the Catchment Demonstration Initiative (CDI), aims, objectives and catchment selection process.
2. Evaluate the four approved Implementation Plans in terms of their ability to meet requirements of the CDI, State/Commonwealth Programs (National Action Plan for Salinity and Water Quality) and those of Regional NRM Groups.
3. Evaluate the Implementation Plans and changes made during the program, in terms of their ability to deliver the program outcomes and also meet local needs.
4. Compile materials from the projects that compare the original and completed plans and outputs (intent, works). Review the actual and/or forecast resource condition change (impact of the works) and basis (methodology). Use other available tools, expertise or knowledge to determine effectiveness of CDI works (if material is incomplete) and major learnings from the demonstrations.
5. Review the concept and application of Catchment Demonstrations, their value and recommend options for future use. Consider their use in terms of adoption, resource condition change, and capacity, knowledge and community benefit.
6. Consider their effectiveness in terms of engaging farmers in the catchment, their capacity, wider dissemination and uptake of results in the region, changes to the catchments resource condition and improvement in the knowledge base for salinity management (technical, social, economic).
7. Assess capacity to develop and implement similar plans in the wheat belt within the context of current investment guidelines and funding programs (NRM).
8. Consider how applicable this approach may be to a wider set of catchment groups. Review the projects learnings in the context of the process used, works undertaken and management (feedback from groups), role of partners/investments and resultant social, technical and financial capacity / skills it developed. Consider the pre-requisites for successful groups, if CDI is undertaken again.
9. Review opportunities to continue / re-start the program, or components of it (for example continuing M&E), benefits, and recommend resources and organisations to deliver these requirements.

1.5 About this Report

This Report aims firstly to provide a description of the CDI activities and outputs, and then secondly to use that information and other inquiry processes to address the questions contain in the project brief.

Section 2 presents the methodology used in undertaking this Review.

Section 3 provides information on the process involved in selecting the four CDI catchments, including the establishment of criteria, the call for submissions, and the assessment process.

Section 4 describes the four catchments, and the expected and actual processes and outcome from the activities and investment.

Section 5 addresses the evaluation questions.

Section 6 presents conclusions and recommendations against four over-arching themes.

Section 7 lists references used in this report and sources of further reading.

Additional information on the four catchments and the people consulted as part of the evaluation is presented in the **Appendices**.

2

Methodology

2.1 Methodology

The methodology followed for this evaluation was informed by the requirements set out in the scope of works provided by the Department of Agriculture and Food. It included six primary tasks as described below.

2.1.1 *Review of appropriateness of the CDI (Task 1)*

The review of the CDI primarily involved a desktop study of all archival information about the Initiative in relation to the National Action Plan for Salinity and Water Quality (NAPSWQ).

2.1.2 *Review and evaluate Implementation Plans (Tasks 2 and 3)*

In order to evaluate Implementation Plans a document and literature review was undertaken. All documents pertaining to the establishment and implementation of the CDI Program were provided by the Department including copies of meeting minutes of the CDI Steering Committee, project submissions, project progress reports (quarterly), variation request forms (and responses), administration files, as well as the complete Implementation Plans from each successful catchment.

These data were reviewed to gain an understanding of all aspects of the original and completed plans and how the processes of Plan development influenced 'catchment management thinking'.

2.1.3 *Review concept and application of catchment demonstrations (Task 4)*

Modern approaches to extension in agriculture have emphasised the need for landholders to learn about new approaches and practices, and build sufficient confidence that these practices are in their interests to adopt – as a critical part of the change process. Demonstrations provide an important place for this learning to occur and we appreciate that the ability of these catchments (and their communities) to deliver this 'service' into the future is an important component of the overall return on the investment in the CDI.

This evaluation has considered how the catchments delivered against this demonstration role including consideration of the factors that both promoted and hindered their use as demonstrations at the time they were in operation and how they might be used into the future.

2.1.4 *Assess capacity to develop similar programs (Task 5)*

A key component of this evaluation has been the collection of views from program participants, especially landholders to understand the benefits and challenges in implementing similar catchment-scale land use changes. A key factor to consider is the impact on on-ground NRM work given the shift in priorities for NRM investment by State and Commonwealth Governments.

2.1.5 *Review opportunities to continue/ restart program (Task 6)*

The CDI Program has been completed and this evaluation sought to review opportunities for extending the program further, either within the existing Catchments or elsewhere. Recommendations contained within this report address this task.

2.2 Consultation Process

The URS team was provided with the names of a large number of people who have been involved in various ways in the CDI Program. This included (current and past) Program Coordinators/Managers, Catchment Group Managers, consultants appointed to work with the four catchment groups, members

of CDI Steering Management Committees, Technical Advisory Groups, land-holders and others with an interest in the program.

Given time and resourcing constraints, the potential contacts were categorised according to the nature of their involvement, with the consultation process ensuring that an adequate number of people were spoken to across the categories and in each of the four CDI projects. The categorisation is shown below in Table 2-1 and the people consulted are presented in **Appendix A**.

Table 2-1 Categorising Program participants for consultation

Catchment	Sponsoring Organisation	Project Officer(s)	DAF (WA)	Consultant(s)	Landholders
Fitzgerald River, Wallatin, Upper Coblinine and Gillingarra	Organisation accountable for project works and fining management Normally EO of Project Committee	Working with landholder group to schedule works and ensure satisfactory completion	Provision of technical advice, membership of project Committee	Funded for developing the Implementation Plan	Local Committee in place, or formed to deliver the works

The questions, which guided the semi-structured interviews with those consulted, were framed around the evaluation questions, and are presented in **Appendix B**. Interviews typically took between 45 minutes and 90 minutes, with the duration depending on interviewees' level of involvement in the CDI program. Visits were made to three of the four catchments (it was not possible to arrange a visit to Gillingarra) to interview nominated catchment leaders and other participants in the catchment demonstration. Stakeholders in Gillingarra were interviewed by telephone.

2.3 Discussion Panel

Following consultation with the stakeholders involved in the delivery of the CDI a Discussion Panel was convened which brought together a number of 'experts' in various fields relevant to the evaluation. The members of the Discussion Panel are listed in Table A-2.

Panel members were provided with background material that described the broad program and the individual activities undertaken in the four catchment areas. The Discussion Panel was invited to review that material, seek justification for the statements made, and challenge the URS team's general observations about the CDI program. The discussion, which was lively and insightful was guided around four key areas with an opportunity for additional comments at the completion of deliberations.

1. The value of demonstration.
2. The need for Catchment scale planning.
3. The challenge for communities.
4. Managing the legacy.
5. Other comments.

Notes were taken of the deliberations and were used in finalising conclusions and recommendations against the Terms of Reference.

2.4 Analysis

Analysis of collected data has sought to query the CDI program against the evaluation questions presented in Section 0 and the four theme areas noted above. This analysis is reported in Sections 5 and 6.

2.5 Reporting

This Draft Report has been designed to present the whole story of the CDI Program, plus the outcomes from this evaluation.

3

Project Selection

3.1 CDI Catchment Areas and Implementation Groups

Four catchment groups were successful in their applications to the Department of Agriculture and Food, having been assessed as technically and economically sound. They were thought to have the ability to deliver 'realistic examples of the management of land, water, infrastructure and flora and fauna to contain, reduce or make productive use of salt-affected land'. The four CDI projects were:

1. Gillingarra-West Koojan ('Gillingarra') Catchment Demonstration;
2. Wallatin-O'Brien ('Wallatin Creek') Catchment Demonstration;
3. Upper Coblinine ('Upper Coblinine') Catchment Demonstration; and
4. Fitzgerald River ('Fitzgerald') Catchment Demonstration.

3.2 Process of implementing the CDI

3.2.1 Steering Committee

A Steering Committee was established in October 2002 to oversee the CDI which was being managed at the time by the Department of Agriculture for the Waters and Rivers Commission. The Steering Committee was also responsible for assessing submissions received.

A Terms of Reference guided the actions of the Steering Committee with their main roles being to:

1. define the outcome, objectives and other relevant investment principles for the Initiative,
2. identify key clients, stakeholders and partners of the Initiative,
3. identify opportunities for industry support and co-investment,
4. develop investment criteria upon which to select projects,
5. select projects for funding against established criteria,
6. monitor progress of each of the projects,
7. provide broad industry input, directions and peer review of the Initiative,
8. monitor and evaluate the outcomes of the Initiative,
9. develop mechanisms to resolve technical, economic and social issues brought about by the initiative or its projects, assist the team settle related jurisdictional and discipline-based issues,
10. proactively support the Initiative, its partners and promote a positive public image,
11. actively communicate the projects outcomes and key messages,
12. work with key stakeholders, the Commonwealth and State partners to deliver the projects outcomes on time and in accordance with the projects allocated budget.

3.2.2 Project Proposal Submissions

Project Proposal Pack

A Project Proposal Pack was prepared by the (then) Department of Agriculture and made available to parties interested in submitting a project proposal for the CDI. It was expected that submissions would be received by mid-May 2003 with selection of successful applications made by mid-July 2003.

The Project Proposal Packs made clear that any submission had to show:

1. Benefit to the State;
2. A range of landscapes and assets affected by high salinity risk were covered;
3. Demonstrations were applicable to a wide area and able to be readily adopted;

4. Involvement of partners and other investors;
5. Consistency across regional assessments and a balancing of regional priorities; and
6. An ability to proceed to implementation as efficiently as possible.

Project Inclusions

As the Catchment Demonstration Initiative (CDI) was a priority project of the National Action Plan for Salinity and Water Quality (NAPSWQ) the desired outcome of CDI was to have "salinity management systems demonstrated in selected catchments". The CDI project proposals were expected to include:

1. developed plans that manage salinity (recover, contain and adapt) being implemented at a catchment scale;
10. important and local assets (land, water and biodiversity) identified and in process of being recovered, contained or adapted;
11. economically viable salinity management options in place, that are available for wider adoption;
12. innovative practices evaluated;
13. monitoring and evaluation systems in place that can be used to report each of the projects longer term outcomes;
14. real costs of salinity management systems established and communicated;
15. groups which have developed capacity and have the commitment to complete the work started by the Initiative;
16. demonstrations available for others to visit and learn from; and
17. partners to groups who have better developed packages and products that can be applied elsewhere.

Each project also had to be consistent with the State's Salinity Investment Framework (SIF) principles and objectives of the Region's (then draft) NAPSWQ Plans.

3.2.3 What Selection Criteria were used?

Essential Criteria

Proposals were to demonstrate that the project had:

- A1. A clear vision and goals consistent with those of the Initiative.
- A2. Clear links to Regional NRM priorities.
- A3. Public and private benefits.
- A4. A design based on credible scientific information and methods.
- A5. Systems being evaluated which have a realistic chance of being profitable for landowners.
- A6. A high probability of success in making a measurable impact on the landscape.
- A7. Multiple salinity management practices.
- A8. A plan which will work in similar landscape.
- A9. A workable strategy for communicating progress and knowledge gained.
- A10. Management by a group/partnership with requisite resources, structure and experience to succeed.

Desirable Criteria

Proposals were to preferably demonstrate that the project had:

3 Project Selection

- A11. The involvement of project partners.
- A12. Addressed other NRM issues.
- A13. Included innovative practices.

3.2.4 Additional guidelines and direction for what was wanted

In early 2003 a series of Regional NRM Group meetings were conducted in which the CDI was explained. A number of questions were raised during these meetings that were then compiled by DAF and then presented in the Catchment Demonstration Initiative Introductory Information Pack. These questions are provided in Table 3-1 below.

Table 3-1 Questions and answers for prospective CDI applicants

Questions	Answers
Is CDI about the continuation of what catchment groups have been doing, or is it bigger than that?	CDI is about the demonstration of large scaled, multiple practices in priority catchments where plans will be or have been tested and evaluation systems are or will be put in place. It is about large areas of treatment reclaiming large areas of salinity, preventing large areas from developing, or making productive use of those areas.
Will groups with existing plans get priority over groups without plans?	Yes. Plans that have been developed and tested (that will work and are economic) take precedence over 'new' sites. CDI is about providing support for established groups with established plans. However where exceptional projects are received, the Steering Committee will look other proposals.
Will support be given to successful groups and how much money will they receive?	Successful groups will be encouraged to develop more detailed plans, both physical, monitoring and evaluation, communication and financial. The final level funding will be dependent on these plans being approved by the Steering Committee. The Department of Agriculture and others will assist successful groups to develop these detailed plans.
What role will the NRM Regions have in selection process eg. 'endorsing' priorities?	The CDI Steering Committee (CDISC) is responsible for the final decision on projects. However Regional NRM Groups will ensure the proposals are consistent with the priorities of the region and are reflected in their NAP strategies. Regional NRM Groups will be involved in helping review part of the applications.
Are we giving Regional NRM Groups and applicants clear criteria to work on?	Yes, Regional NRM Groups and applicants will receive criteria to enable them to apply. The project team and CDISC will use these criteria to analyse projects.
Can $ be for infrastructure protection?	Yes, although the basis of the Initiative is for the management of catchments as a whole. However benefits to public assets (such as infrastructure) will be important in assessing the value and required level of contribution of the project.
What if a group's planning is partly but not completely finished?	The CDI Project Team can provide advice to the group to ensure the plan is credible and that the group understands what is needed to meet the CDI criteria. The Project Team cannot assist groups with detailed planning in the application period.
What are the sorts of practices groups should consider?	Groups should consider salinity management in the context of their catchment. Those practices that are best suited to the area should be applied. However the Steering Committee will be looking for projects that include recharge (eg plant based) and discharge (eg plant and engineering based) based proposals, ie those that consider the management of water at a catchment scale.
What about 'risky practices'?	CDI is principally about ensuring practices, which have the greatest technical and economic chance of success, are put in place in a catchment context. However, if the Project Team and Steering Committee think it is justified, 'risky

3 Project Selection

Questions	Answers
	practices' can tested. Risky practices are those in that the Project Team consider are likely to be effective, but that there is little local data to support assessment of impacts. For example, lucerne or tree crops in a lower rainfall area than usually applicable, pumping palaeochannels and some other forms of drainage, evaporation basins in areas yet to evaluated, extracting minerals from saline water, solar ponds etc. A conclusion that a system / practice failed is a valid, but not preferred, outcome.
$ for $?	The CDI project will contribute $1 and the group another $1, cash or in-kind. Contributions above that will be considered favourably, especially where co-investment is available from partners (business, industry, R&D providers (CRC-University others). In kind contributions are appropriate. Levels of investment will be considered on a case by case basis.
Timeline for groups $ investment? (will the effect of the drought / seasonal conditions, be considered?)	The Steering Committee will look at individual proposals and review the timing of co-investment. One option maybe to use public money up front and community money later. This issue needs to be reviewed by the Steering Committee on a case by case basis.
Have any demonstration sites already been selected?	No. However some groups have contacted the CDI Project Team over the past 12 months. The selection will be based on the CDI criteria alone and the Steering Committee will be responsible for ensuring compliance and an equitable process.
Is the 20,000ha flexible?	20,000ha was mentioned in some very early discussions about CDI to convey the idea of suitable scale however this is not anything that is 'fixed'. Catchment size is only one factor. The project needs to be large enough to substantially change salinity or the risk of salinity and be matched to the landscape and the outcomes sought. Factors like the catchment's location, the scale of treatments required to obtain a major impact, their effectiveness, location of major land, water, biodiversity and other assets, etc need to be considered.
Do we want NRM Regions to identify priority groups?	We are keen that the NRM Regions work with our Project Team to ensure catchment and related groups in the region are aware of the project, the projects are consistent with regional priorities / strategies and to provide support with assessing proposals.
Can we use CDI $ for demonstrating alternative uses of saline land?	Yes, 'adaptation' (PUR$L) is part of the 3 categories of salinity management (Recovery, Containment and Adaptation). Successful projects should demonstrate catchment scaled management of salinity using two or three of these approaches.
Land salinisation focus only or could it include water salinisation?	Off site benefits like reduced river and water salinity may form part of the assessment of local and public benefit. The project has a land salinity focus.
Can money be used to establish separated, smaller sites in one larger project?	No. The project is about large areas of treatment having significant long-term impacts. These need to be applied as part of a catchment plan, not a series of disconnected actions.
Will CDI be working with Engineering Evaluation Initiative, if so how?	Yes. The Chairs of the Committees have a place on each Committee and it is envisaged that CDI will demonstrate EEI systems. EEI is targeted to evaluate practices / systems and fill key knowledge gaps. It is not a funding process for the establishment of 'routine' engineering options.
Is the main objective of CDI to increase adoption?	In the longer term the objective is to influence practice change. However CDI is only a four-year project and its performance must be first based on shorter-term indicators.

3 Project Selection

3.3 Selection Process

The Project selection decision tree as presented in the Catchment Demonstration Initiative Introductory Information Pack is shown below in Figure 3-1.

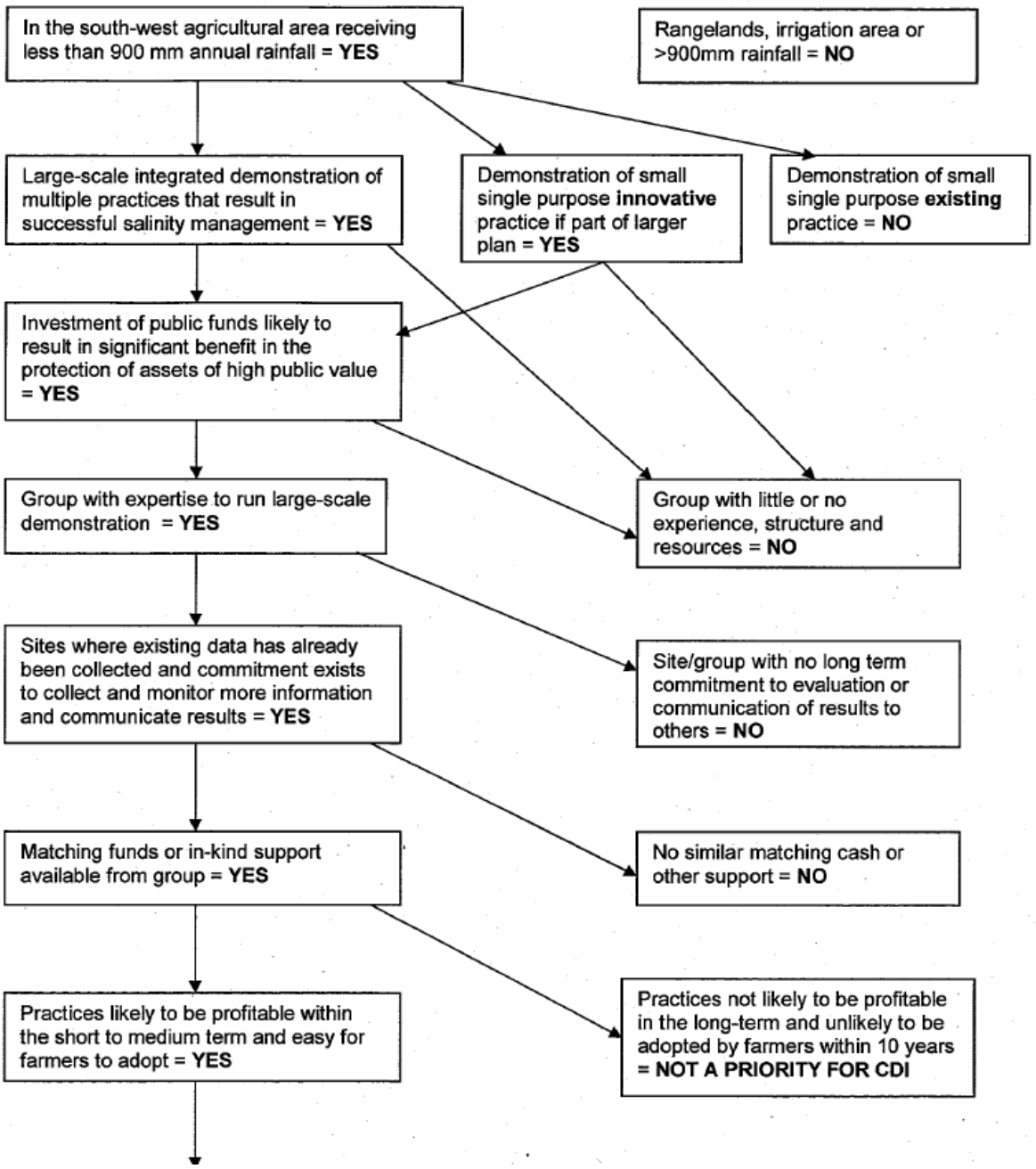

Figure 3-1 Selection process for CDI projects

3 Project Selection

Proposals were submitted to the relevant Regional NRM Group in four regions - Northern Agricultural Region, Central Agricultural Region, South West Agricultural Region and South Coast Agricultural Region. Submissions were, in the first instance, assessed by two panels - a Technical Assessment Panel (TAP) and a Regional Assessment Panel (RAP).

Membership of the TAP included, where possible, regional specialists, a member of Regional Council or relevant group (e.g. Executive Officer), economist and others specialists (e.g. Engineering / Farming systems, etc). Membership of the RAP were to be chosen by Councils, but were recommended to include Chair of Council, or Executive Officer (or both), nominated members, senior Agency staff. One member of the TAP was to also be on the RAP, or to be available to answer questions.

Each submission was first assessed by the Technical Assessment Panel. This technical assessment was then provided to the Regional Assessment Panel who assessed the proposals by incorporating the technical assessment with how well the proposals aligned with specific CDI criteria (see Section 3.2.3).

3.3.1 Submissions Received

In total, 24 submissions were received totalling some $23 million of investment. These 24 submissions, located according to the NRM region of origin, are presented below.

Northern Agricultural Region (5 submissions);

- Salinity management in the Gillingarra-West Koojan Catchment through the use of perennials.
- Youangarra Catchment Initiative.
- Integrated salinity management in the Canna Gutha sub-catchment.
- Broombush in the Midlands.
- Perenjori integrated catchment demonstration.

South-West Region (5 submissions);

- Fence Road catchment.
- Upper Coblinine catchment plan - Implementation Stage.
- Integrated Catchment water management demonstration initiative - Vision.
- Westwood total catchment management plan.
- Yilliminning Catchment.

South Coast Region (4 submissions);

- Gnowellen-Pendernup salinity and water management plan.
- Fitzgerald River Catchment integrated salinity management plan.
- Salinity management in the West River Catchment.
- Productive salinity management in Coramup and Bandy Creek catchments.

Wheatbelt Region (10 submissions);

- Botherling Springs - The complete package.
- Harvesting surface water for on-farm use including irrigation of high value tree crops (Kondinin-Bendering-Kurrenkutten, Lakes Alliance).
- South east Hyden integrated surface and groundwater management plan.
- Beacon River catchment Salinity management project.

- Avon Basin arterial channel scheme.
- NEWROC - Landscape recovery.
- Narembeen sustainable industries.
- East Yornaning water management project.
- 'Bringing it all together' - A whole of catchment approach to integrated water management (Wallatin Creek).
- Westonia - Muley Gully.

3.3.2 Assessment process

Initial assessments resulted in 11 projects being eliminated from consideration as they were not supported by the Regional Assessment Panels. However, the project from south-east Hyden, which had been listed as 'not supported' by the RAP was included in the assessment process of the CDI Steering Committee as it had been ranked number one by the Avon Catchment Council as it linked with the parallel Engineering Evaluation Initiative.

All 24 proposals were forwarded to the State Project Team along with the TAP and RAP reports for consideration at the CDI Steering Committee meeting in July 2003. From these deliberations seven projects were shortlisted into three categories as below:

Category 1 - Projects that best meet CDI objectives

- Upper Coblinine.
- Gillingarra-Koojan.
- Fitzgerald River.

Category 2 - Projects capable of being developed for CDI

- Wallatin Creek.

Category 3 - Projects as backup for Category 1 and 2 (and EEI)

- West River.
- Youangarra.
- South East Hyden.

To assist in the final decision-making members of the CDI Steering Committee travelled to the catchments of each of the short-listed projects to meet with delivery organisations and to visit a sample of sites proposed in the project submissions. A final decision on successful projects was taken in early August 2003.

3.3.3 Selected CDI projects

Four catchment groups were assessed as technically and economically sound. These four projects were thought to have the ability to deliver "realistic examples of the management of land, water, infrastructure and flora and fauna to contain, reduce or make productive use of salt-affected land".

- Gillingarra-West Koojan ('Gillingarra') Catchment Demonstration;
- Wallatin-O'Brien ('Wallatin Creek') Catchment Demonstration;
- Upper Coblinine ('Upper Coblinine') Catchment Demonstration; and
- Fitzgerald River ('Fitzgerald') Catchment Demonstration.

3 Project Selection

The following provides the funding and major elements of the works in each Catchment.

- **$1.7million** to plant perennial pastures, woody perennials, install surface water management structures, rehabilitate existing saline land and protect areas at risk in the 40,000ha **Upper Coblinine Catchment within the South-West Region.**
- **$1.2million** to demonstrate large-scaled engineering and water management system, perennial pastures, oil mallees and saltbush and develop uses for excess water in the 24,000ha **Wallatin and O'Brien Catchments, near Kellerberrin in the Avon region.**
- **$1.2 million** to establish perennial pastures, riparian and remnant vegetation protection and build structures to manage surface water on the **Jerramungup Plain in the 60,000ha Fitzgerald River Catchment on the South Coast.**
- **$1million** to demonstrate commercial farm forestry, engineering, perennial pasture, salt land grazing and surface water management systems in the 42,000ha **Gillingarra-Koojan catchment in the Northern Agricultural region.**

The location of these four catchments is shown in Figure 3-2.

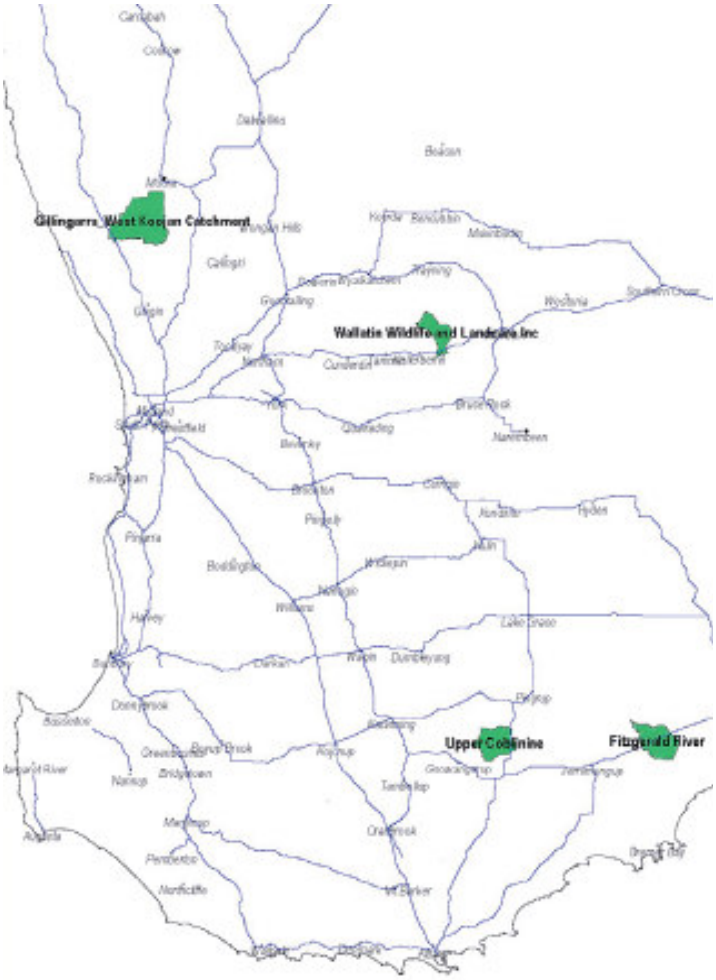

Figure 3-2 The four CDI projects

3.4 Developing an Implementation Plan

Following selection, each project was granted access to up to $125,000 in funds to develop a fully specified catchment plan. Each plan was to detail the required works, their impacts and a strategy for monitoring and evaluating their effectiveness. There was an additional requirement to develop a communications plan and financial management plan.

4

The CDI Projects

The following information has been sourced from the Implementation Plans developed in the first stage of this project, various progress reports and final reports, supplemented with observations by URS.

4.1 Upper Coblinine

4.1.1 Location and area

The Upper Coblinine catchment is located 20km north-east of Gnowangerup and 350 kms south-east of Perth in the Shire of Gnowangerup. It is part of the Lake Dumbleyung upper catchment and contributes to the Blackwood River system. The Catchment is 31 km north-south and 33km east-west covering an area of 44,000ha. Ninety two per cent of the catchment has been cleared for agriculture. There are 17 landholders in the catchment.

4.1.2 Biophysical issues

At the time of writing the Implementation Plan some 7 per cent of the Upper Coblinine Catchment had been lost to salinity and water-logging and a further 14 per cent was recognised as being at risk of imminent loss of production. High levels of salt storage were the result of poor drainage, low rainfall and high temperatures. The Catchment experienced poor drainage in the valley floors and frequent frosts in winter months. Although annual rainfall was low (364 mm) across the Catchment the valley was subject to water logging and flooding due largely to the convergence of waterways into a single narrow outlet point. Much of the Catchment has been cleared of native vegetation for agricultural purposes with approximately 8 per cent remaining native vegetation. The topography of the Catchment has been divided into two distinct areas: the shedding landscape (78%) having steeper slopes and well-defined drainage and the receiving landscape (22%) below the break of slope being flat with poorly defined drainage. Agricultural production is predominantly grain crops (wheat, barley, canola, lupins) with some livestock production (sheep, but low productivity).

4.1.3 Background to the CDI Project

Through the formation of the Upper Coblinine Catchment Group (UCCG) a catchment wide soil and water management plan was developed in 1997.

Modelling commissioned and funded by the UCCG between 2000 and 2004 found, contrary to assumptions, that the high saline areas along the Catchment valley were a result of high recharge below the break of slope rather than as a result of recharge from higher up in the Catchment. The modelling suggested a number of land management options to address this issue:

- Planting lucerne below the break of slope to address the level of recharge and lower the water table;
- Engineering works such as grade and interceptor bank to control waterlogging and recharge;
- Revegetation of the grade banks shelter belts above the break of slope and alley farming below the break of slope; and
- Key dams above the break of slope that could be pumped to irrigate sorghum crops to manage storage capacity and ensure dams acted as a storage buffer during rain events.

4 The CDI Projects

Additional modelling, based upon the results of the earlier studies and taking into account landholder agreed commitments, provided a further option. Option 5 was essentially the CDI Works Program and comprised initially:

- 2,898ha lucerne planted below the break of slope in 8 main blocks;
- 80km of new banks (as opposed to the 330km previously suggested through modelling);
- 1,400ha oil mallee trees planted below the new banks; and
- Seven new dams (without associated irrigation).

4.1.4 Objectives for the Upper Coblinine Group CDI Project

Modelling of Option 5 suggested that implementation would result in an annual 5 per cent reduction in recharge in the Catchment and an 11.4 per cent reduction in runoff. A second run of modelling was conducted that took account of new soil data. Results of this found that the greatest impact on surface runoff, recharge, salinity and waterlogging could be achieved through growing of lucerne below the break of slope. Modelling suggested that incorporating lucerne into cropping rotations above the break of slope would also be beneficial in drying the soil and decreasing waterlogging.

The CDI project for the Upper Coblinine Catchment extended the earlier work of the UCCG and was developed to better integrate the farm plan activities of each landholder in order to achieve the salinity and water management targets identified in the Plan.

4.1.5 Project governance and funding

The South West Catchments Council elected not to be the accountable body for the Upper Coblinine CDI. After some negotiation, the proponent (accountable for project funds) was determined as the Katanning LCDC. The Project Officer was employed by the KLCDC. The Upper Coblinine Catchment Group formed the Upper Coblinine Catchment Demonstration Initiative Management Committee (UC CDI MC) for the project, which included local landholders, State SC staff, KLCDC staff, and DAFWA staff. It was chaired by a UC landholder, and included several local landholders.

The Katanning Land Conservation District Committee received $1.7 million in funding to implement the Upper Coblinine CDI.

4.1.6 Implementation planning

The planning process

Landholders in this catchment have been planning Landcare activities and large-scale catchment management since 1997, and applied for CDI funds to implement a large part of these plans.

Consultant Kingston Harrop Pty Ltd and, later, the Blackwood Basin Group were appointed to develop the implementation plans, including a detailed works plans, monitoring and evaluation plans, a communications plan and a project budget. Discussions were held with landholders in the Catchment to consider the 'best management options to address salinity, waterlogging and related land degradation issues' (p. 33). Options to be implemented on individual properties were determined by the position of the property in the Catchment; the physical characteristics of the property and the land degradation issues affecting the property; the financial feasibility of implementing the options; and the level of support of the landholder.

4 The CDI Projects

Development of the Catchment Plan was completed in two phases.

- An initial planning exercise was completed by a farm management consultant, who had previously worked with the Upper Coblinine Group in undertaking socio-economic research, and whose son had delivered digital elevation modelling (DEM) to the group (funded by a group-administered landholder levy). The planning approach used the DEM data, and basically involved asking each group member what projects they wished to implement.
- At the request of the State Steering Committee, the plan was upgraded by the Blackwood Basin Group who finalised the Plan and included full costing. Most of the emphasis was on surface water management, and perennial vegetation to (i) remove surplus water by surface drainage from the catchment, (ii) increase on-farm water surface water storage and use, and (iii) introduction of perennials into the farming systems (pastures and trees).

These plans were accepted by the CDI Joint Steering Committee in November 2005, but implementation was delayed until March 2006, when the Katanning Land Conservation District Committee undertook the project management role.

Plan objectives, activities and intended outcomes

The Upper Coblinine Works Plan contained in the CDI Implementation Plan articulates the goal for the Upper Coblinine CDI to:

Implement and demonstrate recommended practices to combat salinity and land degradation in the Upper Coblinine Catchment in a sustainable and profitable manner so that future generations can make a successful living without compromising the natural assets

Three objectives for the CDI were defined:

- Control salinity, waterlogging and related issues by implementing recommended remedial works in the upper landscape to reduce water shedding to, and discharging on the valley floor;
- Control salinity, waterlogging and related issues by planting high water use perennials in the receiving landscape and salt tolerant species on the valley floor; and
- Control flooding, waterlogging and groundwater recharge in the valley floor by removing impediments to surface water flow in the receiving landscape.

The Work Plan provided a set of short-term (1 to 4 years or over the life of the CDI), medium term (5 to 9 years) and long term targets (10 to 20 years).

In refinement of the Option 5 discussed above, the works were designed to lower recharge by 5 per cent, reduce the area of saline land by 300 ha, establish 150 ha of saltbush and reduce the export of salt out of the catchment by 20 per cent.

CDI Farm Plans

Farm Plans were prepared for 14 of the Catchment's 17 landholders. These Plans articulated the CDI projects to be implemented on each landholding and the financial contributions of both landholders and CDI funding.

4 The CDI Projects

Financial Plan

A qualitative assessment of the costs and benefits of the Upper Coblinine CDI projects was completed. Combined with the results of a Benefit Cost Analysis compiled by Georeality Pty Ltd in 2001, this assessment suggested that implementation of the suite of projects would be "marginally profitable over the long term" (p93).

The Financial Plan recognised that the projects would contribute to whole of catchment benefits but that primary benefits would accrue to individual landholders. The costs of implementation were planned to be shared 50:50 between landholders and CDI funding (with the exception of the fences project which was funded 60% by landholders and 40% CDI).

Monitoring and Evaluation Plan

A Monitoring and Evaluation (M&E) Plan was prepared and set out the key indicators that were to be reported on for the Upper Coblinine CDI Program. These indicators align with State and Commonwealth requirements for natural resource management. A M&E Work Plan defined the elements to be measured (Groundwater levels and groundwater quality, soil condition, vegetation (extent, type and condition), water quality and water flows, extent of salinity, socio-economic impacts), how and when each element would be measured and who was responsible for data collection and reporting.

Communications Plan

The Communications Plan identified the key stakeholders in the Upper Coblinine CDI and how communication with each stakeholder was to be managed. The objectives of the Communications Plan centred on relationship building and maintenance, and how key messages about the CDI were communicated. A Communications Work Plan set out the actions that were to be taken in each of the years of the Program to deliver on the communication objectives of the CDI. The Communications Plan was reviewed annually and reported on through annual reporting.

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4.1.7 The Upper Coblinine CDI Project plan in summary

Table 4-1 below provides summary details of the project plan including the planned works and requested funding.

Table 4-1 The Upper Coblinine CDI Project Plan

Title	Project Details	CDI monies sought ($)	In Kind ($)
Upper Coblinine Catchment Plan – Implementation Stage	• Total Catchment (100%) – 40,000ha • Total Managed under Project – 40,000ha • Oil Mallees (560,000 seedlings, 2,200ha) • Lucerne pastures (10,000ha) • Fodder crops • Surface Water Controls (6 catchment dams) • Grade, level Banks and drains (333kms) • Productive use of saline water (1000ha) • Revegetation (800ha) • Saltbush (1000ha)	**$1,577,420 CDI** O/G works – $1,577,420 (100%) Comms – 0 M&E – 0 P/ Mgt – 0 (no break down of activities) $39 ha CDI **Total – $3,817,320**	· $2,239,900 · (Applicant Contributions) **$95 ha ALL**

4.1.8 Activities planned and completed

The Upper Coblinine Project received $1,700,000 from the CDI Program. Key investment areas were [Project Schedule November 2009]:

- Capacity Building - $170K (10% of total funds) for targeted communications, and employment and management of the project officer.
- On-ground –$1.2M (71% of total funds) in direct subsidies for a range of on-ground works to demonstrate management options for dryland salinity
- Planning –$170K (10% of total funds) for continuing review the Implementation Plan, updating of property management plans, development of Land for Wildlife strategies, and local project monitoring plans.
- Resource Assessment –$160K (9% of total funds) to demonstrate the implementation of a monitoring program designed to suit this project, and to be easily adapted to other catchment-scale on-ground projects.

Additional inputs were interest on funds held ($60,414) and cash and in-kind from landholders ($720,890). The total available funds were $2,452, 867, of which $2,427,127 was committed.

There are 17 landholders in the Upper Coblinine Catchment of which 14 have participated in the CDI.

The activities planned and undertaken are in Table 4-2.

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Table 4-2 Planned and actual activities in Upper Coblinine

Works Item	Amount Achieved	Initial planned activities	% of original target	Target after variation	% of new target
Fencing	186.7 km	360 km	52%	360 km	52%
Revegetation	263,580 seedlings	505,500 seedlings	52%	303,600 seedlings	87%
Dams	197,400m^3	115,000 m3	172%	186,400 m3	106%
Saltland Pastures	182.9 ha	516 ha	35%	138 ha	133%
Perennial Pastures	1190.3 ha	2898 ha	41%	1,206	99%
Banks above break of slope	22.9 km	55.8 km	41%	22.3 km	99%
Banks below break of slope	24.8 km	14.6 km	170%	22 km	113%
Commercial revegetation	7 ha	37.8 ha	19%	300 ha	2%

4.1.9 Issues as observed by URS

- The bio-physical challenges are considerable. The catchment includes areas of upland surrounding an extensive area of plains of low relief, with heavy 'Sunday' soils (poorly structured, sodic clays), showing evidence of frequent waterlogging and secondary salinity.
- The UC Group consists of about 20 landholders, with action in the group led by four large landholders, located on the better upper slopes. The impression gained is that the upland farmers drove the agenda. Several of the lowland farmers are believed to be in financial difficulty and were unable to contribute sufficiently to project outcomes.
- There was some expectation by some landholders that 'the CDI would fix the problem'. The degree to which the project will address the long-term water management issues is not clear, although some landholders recognise what the next steps need to be. Further, there seems to have been some difficulty in obtaining consistent advice on the implementation of surface water management technology.
- On the basis of the information available to the Selection Panel for the CDI, the UC Group seemed a good choice for the project initially – they had invested their own money in projects (DEMs, socio-economic research) and recognised the issues. However, unfamiliarity with public funding priorities, and some difficulties with community dynamics were factors not evident at the time of selection, and led to some of the issues referred to elsewhere.
- The variations in the targets shown in Table 4-2 reflect, in URS's view, a move away from investment to address public good issues (via revegetation, fencing of streamlines etc) to private good issues (increasing on-farm dam storage). This view would not be accepted by the UC Group, who claim the dams will reduce water lying on the extensive valley floors, and will reduce farmer demand for spray water. The shift in emphasis to dams was allowed by the State NRM Office on the basis that there would be some benefit in reduced flows onto the flat land in low runoff events. The underlying issue suggested by some observers of process is that the UC Group were operating within different values to the State NRM Office or the Katanning LCDC, which made reconciling preferred directions for investment difficult.

- The works achieved would not have occurred without CDI intervention. The demonstration of perennial pastures is welcomed, and is contributing to the increasing interest evident across the South Coast. However, there is no evidence that the UC experience will have made a significant unique contribution to adoption of this technology.
- The project occurred through a difficult sequence of years in the region (drought, frost), which inhibited progress, and contributed to the strained relationships. Further, it was clearly very hard work to hold landholders to the commitments made in the plan, given seasonal difficulties and changing grain and sheep prices. Some landholders had real difficulty in meeting their commitments in terms of time and matching dollars, which in part caused the relative shift to more financially attractive options (e.g. dams).
- The relationships between the KLCDC and State NRM Office, CDI management and the Upper Coblinine Group (principally four leading landholders, plus others) broke down towards the end of the project as a result of unclear roles and responsibilities in project direction and administration, and accountability in public funding, and very different values (URS view). It is unlikely that the Upper Coblinine Group will involve themselves again with externally funded programs.
- The contribution of a dedicated Project Officer was critical. Without her contribution in negotiating individual farmers' projects, and encouraging participation, little would have been achieved. However, given that she was employed by KLCDC her role with the Group became difficult towards the end of the project.
- The Plan was designed to reduce recharge across the catchment by 5 per cent. It will require many years monitoring to determine if this occurs. There are inadequate resources to maintain on-going monitoring although the KLCDC has accumulated sound baseline data.

4.2 Wallatin - O'Brien Creek ('Wallatin Creek')

4.2.1 Location and area

The Wallatin and O'Brien Creek Catchments are located in the Kellerberrin Shire in the central eastern wheatbelt, 240 km east of Perth. The total project area is 44 457 ha - Wallatin Creek Catchment (24, 447 ha), O'Brien Creek Catchment (9,870 ha) and Woolundra Lakes (10, 140 ha). Farming supports 27 families within the catchments.

4.2.2 Biophysical issues

The Wallatin and O'Brien Creek Catchments are typical of large areas of the wheatbelt, with areas of the catchment threatened by salinisation, and a relatively low percentage of the catchment retained under native vegetation. Approximately 6 per cent of the catchment is affected by secondary salinity. Some valley floor farms have up to 25 per cent of the arable land affected. The catchment faces increased salinity in its valley floor, hill sides and in the remnant vegetation on upper slopes.

4.2.3 Background to the CDI Project

The catchment has been, and is the location for a number of significant research projects by the CSIRO and others. Some of these projects and activities are summarised below.

- Previous research into the relationship between remnant vegetation block size and the viability of bird populations.

- Tree planting to prevent further salinity and increase the area of natural vegetation cover – over the last 15 years, vegetation cover has increased from 9 to 15 per cent.
- Investigations into groundwater management undertaken by the CSIRO and the Department of Agriculture and Food in respect of groundwater pumping, drainage and siphoning.
- the "Healthy Country" program investigating the relationship between production systems and salinity and water logging.
- the "Province, Paddock , Patch" joint project between CSIRO and GRDC to provide product information about crop nutrient requirements in relations to soil and seasonal variations.
- a RIRDC and CSIRO project to develop map-based tools for use at a farm scale that take landscape into account.
- a CSIRO project to understand the social dimension of best practice management for salinity and a further project investigating the achievements made to date with regard to nature conservation.

These various research activities have built a significant level of knowledge in the community about catchment characteristics and responses to intervention, and sound relationships with scientists in State Government agencies, CSIRO and universities. Further, the formation of the Wallatin Wildlife and Landcare Inc. Catchment Group is evidence of mature community cohesion and commitment to addressing the issues in the catchment.

4.2.4 Objectives for the Wallatin Creek CDI Project

The major resource condition target is to 'contain salinity over the next five years and keep it below 8 per cent by 2015'. The specific targets referred to in the original CDI Program (Wallatin Wildlife and Landcare Inc. 2004) were:

- 300 ha agricultural land *recovered* for productive use;
- 1,000 ha *contained* from further threat; and
- 400 ha *adapted* for productive salt land grazing.

4.2.5 Project governance and funding

The project delivery organisation for the Wallatin—O'Brien CDI Program was the Wallatin Wildlife and Landcare Inc. catchment group, contracted through the Avon Catchment Council[2] (ACC) Regional NRM Organisation. The Project Coordinator was employed by the ACC (now Wheatbelt NRM). The Steering committee for the Wallatin CDI Project included a DAFWA staff member from the Merredin office. The funding agreement for Wallatin-O'Brien CDI project was signed on 3 June 2005.

4.2.6 Implementation planning

The planning process

The CDI Steering Management Committee appointed Viv Read and Associates in December 2003 to prepare the implementation plans. A three day workshop series identified the project expectations of group members and provided strategic direction for the CDI Program. The plans were accepted by the NAPSWQ Joint Steering Committee in February 2005 and projects were subsequently negotiated with landholders and reviewed via Technical Advisory Groups prior to implementation. The CDI

[2] Following a name change the Avon Catchment Council is now known as Wheatbelt Natural Resource Management (NRM) Inc.

attracted research opportunities with many agencies and research institutions including a major partnership with CSIRO and GRDC (see Table 5-3 and references in Section 7.3).

Implementation Plan components

The Implementation Plan (December 2004) describes 17 demonstration projects of which eight were located in the O'Brien Catchment and nine in the Wallatin Catchment. Each individual project is profiled in the Implementation Plan which records the name of the primary stakeholders/landholder(s) and a reasonably detailed description of the nature of the issue being addressed along with the works including costings that are to be carried out.

Key investment areas noted in the Project Schedule were to:

- Demonstrate a systems-based approach to salinity management at a catchment scale will be demonstrated;
- Use scientifically-derived information and be related to measurable targets and indicators;
- Adopt a strategic approach to local, regional and state assets (including land, water and biodiversity);
- Demonstrate economically viable management options that are suitable for wider adoption;
- Establish monitoring and evaluations systems as a part of the project;
- Develop salinity management systems and idenfity cost-sharing arrangements for implementation;
- Idenfity the processes and capacity required by other catchment groups to implement similar salinity management systems;
- Develop partnership arrangements;
- Demonstration options, assessments, decision processes and other information and make them available for use by others.

Expected impacts of the works

The project was designed to "bring it all together" - recognising the substantial amount of past research that had already been undertaken in the two catchments. Natural resource and infrastructure assets threatened by salinity were identified. The proposed actions were targeted at improvement of these resource assets.

Assets include land used for agriculture; major tributaries (Yilgarn River); minor tributaries; native vegetation and revegetation; public and private infrastructure such as the main East West links of Great Eastern Highway and the National Rail network.

4.2.7 The Wallatin Creek CDI Project plan in summary

Table 4-3 below provides summary details of the project plan including the planned works and requested funding.

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Table 4-3 The Wallatin Creek CDI Project

Title	Project Details	CDI monies sought ($)	In Kind ($)
Bringing it all Together – A whole of Catchment approach to Integrated Water Management (**Wallatin Creek**)	• Total Catchment (100%) – 40,000ha • Total Managed under Project – 40,000ha • Lucerne (500ha) • Earthworks (1000km) • Oil Mallees (160ha) • Dams (50) • Specialty Timbers (95ha) • Seed orchard (16ha) • Saltland pastures (415ha) • Piezos (30)	**$2,335,252 CDI** O/G works – $2,265,252 (97%) M&E –$25,000 (1%) Comms – 0 P/Mgt – $45,000 (2 %) $58 / ha CDI **Total 4,175,655**	· $1,728,142 (landholder) · $112,260 (other) **$104 ha ALL**

4.2.8 Rolling-out the project

Following signing of the funding agreement in June 2005 it took considerable time to appoint a Project Manager to the role. Eventually a Project Manager was recruited with the position hosted for the WWL by the Shire of Kellerberrin. By December 2005 there was still a requirement to submit 6 Notices of Intent to Drain which delayed projects as did a lack of available practitioners with sufficient skills to devise engineering solutions.

Throughout the life of the project nine variation requests were submitted to the Project Steering Committee primarily for amending deliverable dates (e.g. because of problems with external funding and partnership arrangements; TAG requirements and seasonal issues). For example in a 2007 Quarterly Financial Report (QFR) the Group highlighted problems associated with having the Project Manager located within the Shire with only a portion of their time allocated to the CDI project - this was eventually resolved when the PM resigned from the shire position. Other QFRs referred to the impact that low rainfall had on the completion of all projects.

4.2.9 Activities planned and completed

Strategies in the Implementation Plan

Ten broad strategies are captured in the Implementation Plan and within each strategy a range of management options are described. For example, the “roll-out” project schedule describes Strategy 1 - Integrated Water Management which includes broad based banks, artificial waterways and integrated graded banks as management options to address surface water control. The 10 broad strategies are:

- Surface water management structures;
- Groundwater management;
- Perennial pastures

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- Creek-line restoration and riparian zone rehabilitation;
- Fencing to protect remnant vegetation;
- Monitoring and evaluation;
- Communications;
- Research collaborations; and
- Geophysical surveys.

Activities undertaken

The Wallatin CDI Management Team took a different approach to the other CDI projects. After recognising that an overall plan would have limited whole-of-catchment outcomes (thereby ignoring to an extent the original Plan), the Team encouraged participating landholders to try a range of innovative technologies on their properties as a means of researching the applicability of these technologies. This contrasted with the other three CDIs which were about 'fixing the problem', however ambitious this may have been.

Hence it is not possible to show a simple comparison between planned and actual activities. However, the understanding from our consultations is that the CDI funding was committed fully by the end of 2009. To the middle of 2009, the following investigations, trials and demonstrations had been implemented on properties in the catchment.

- Surface water management structures
  - Grade banks and waterways
- Groundwater management using;
  - Deep drains - 9.6kms; Siphons - 2 ; Slotted pipe das - 500m; Pumping Trials – 3 , Permanent installation 1.
- Perennial pastures to improve water use and reduce recharge.
  - Lucerne; Saltland species including Atriplex sp, Rhaghodia and Nypa TM ;Weeping Tagasaste
- Creek-line restoration and riparian zone rehabilitation
  - Riffles , Riparian zone rehabilitation ;Fencing of creeklines and revegetation
- Fencing to protect remnant vegetation- 400 hectares
- Monitoring and Evaluation
  - New bores to complete network and monitor projects and ongoing salinity risk; 140 groundwater bores monitored monthly; Dataloggers strategically placed and used at key sites, Telemetry monitoring of deep drain courtesy ACC and DOW
- Communications
  - DVD : Regular ongoing newsletters :Media articles : Series of Salinity Management Options containing economic details flyers; Summary sheets of each project: Planning templates for salinity options including timelines and budgeting: Journal articles and research papers. The demonstrations are described in 25 Factsheets produced by the group (see Section 7.2).
- Research Collaborations with:

  - CSIRO; GRDC, Edith Cowan University; Murdoch University; University of WA; Department of Water and Avon Catchment Council; Department of Environment and Conservation; Department of Agriculture and Food WA, University of Tokyo
- Geophysical surveys
  - Helicopter Electro Magnetics, EM 31, EM38. Ground penetrating radar

The Group held its last 'Open Day' in April 2010.

Value of CDI to landholders

The CSIRO social research (Measham 2009) followed changes in how landholders regarded constraints in their capacity to manage salinity. The two major constraints identified were 'knowledge' and 'finances' (Measham 2009). As shown in Table 4-4, a majority of landholders stated that participation in the CDI project had increased their knowledge of salinity management, with a minority also saying that it had led to an increase in their financial capacity, and skills.

Table 4-4 Landholders perceptions of the impact of CDI on their ability to manage salinity

Factor in managing salinity	Impact of CDI (number of landholders)		
	Increased	Decreased	Nil effect
Knowledge	16	0	7
Finances	5	0	18
Skills	3	0	20
Time	0	2	21
Labour	0	0	23

Adapted from Robertson *et al.* (2009), p. 3027.

4.2.10 Issues as observed by URS

- The Wallatin Wildlife and Landcare Inc. is an incorporated body, and is a mature group, who have had longstanding relationships and exposure to researchers and science. The Wallatin sub-catchment farmers have had a shared interest in past conservation works and were experienced in operating as a group, and managing project monies. The group had mature leadership and operational processes. Although the group already had a sound history, it appears that the project further strengthened community functioning.
- The catchments have been subject to many investigations over the years so started with relatively good technical information. This was greatly enhanced during the CDI project.
- CDI funding was also supplemented with GRDC funding through CSIRO to greatly expand the available resources available during the CDI project.
- All interviewed suggested they were able to undertake their roles well, but suggested the CDI process could have benefited from better terms of reference or operational templates to help get the project started.
- There was a bit of 'stop-start' with the original plan. The original plan was required to submit for funding but was not well accepted by the farmers. The initial plan had to be further developed before the group had major inputs by scientists and researchers, as in 'we needed the science before the planning'. The demonstration projects changed after the group got better information.

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- The recognition that the original plan did not have the technologies (i.e. trees were seen as being generally ineffective) that would deliver the target (holding salt encroachment to 8 per cent of the catchment) followed by the decision to pursue a range of investigations and technologies independently of a 'landscape-scale plan' demonstrates innovative thinking and a willingness to engage with other parties in researching issues and options.
- Following from the above points, it is evident that the approach to deciding research needs and methods was very sound. There was good interaction with research scientists, and the group used the available science. Through the process the group became more receptive to new ideas.
- Ongoing management, initial consulting, demonstration projects and roll-out projects had to link with CSIRO funding which got out of sequence – this meant that the group did not have the results of the demonstration before the roll out projects had to start. The demonstration just showed how to do it, not the results or what worked best, but farmers were still happy to co-invest.
- Demonstration projects were implemented, and they were followed by roll out projects applied by individual farmers. If they were funded then they were implemented. Not all were funded. The project involved all landholders - all were given opportunities to have a demonstration project, and all bar one had a roll out project (26/27).
- Social learning processes worked really well. The CSIRO social scientist's role was significant, it really helped the social processes and their learning. A key benefit was the social learning but the group also learnt to 'know what it doesn't know', participants are now receptive to learning and in a good position to adapt the learning to all NRM issues and future management issues.
- The value of CDI as a demonstration outside the catchment is uncertain – most interest was from other researchers and NRM officers rather than from other farmers.
- The technical advisory group (TAG) is considered to have worked very well – it took the pressure off the committee and helped get decisions based on the available knowledge. Maybe this approach could have been used across other projects.
- Successful implementation of the project was heavily reliant on having a good project manager. This group feels they had that and that it was fundamental to their successful project outcomes. This type of project is too big for a voluntary committee to manage. Having such a person available also requires continuity – often projects are dogged by staff turnover and loss of local knowledge and credibility.
- The ongoing value of CDI type projects seems to be uncertain, as is the need for an integrated catchment planning approach to salinity management. The project can probably be considered as meeting its objects in this catchment but the question of value for money, is it the best approach, and value as an ongoing demonstration is not clearly answered. Integrated projects require considerable resources. Perhaps this type of approach is best applied where a significant public asset is to be protected rather than productive values which might be addressed at the paddock scale.
- Processes with more direct investments in target activities may provide better value for money. Any future approach might address multiple issues, not just salinity. However, it is not easy to consider what mechanism would be able to be used.
- This process showed that even with a group with the history, maturity and knowledge that the Wallatin group has, this type of project was still a complex test.

4.3 Fitzgerald River ('Fitzgerald')

4.3.1 Location and area

The Fitzgerald River catchment is located approximately 20 kilometres east of Jerramungup townsite and approximately 400 kilometres south east of Perth. The total catchment encompasses an area of 104,000 ha of which 35% has been cleared of native vegetation for the purposes of agriculture.

The largest portion of the catchment is contained within the Fitzgerald River National Park and this portion remains in pristine or near pristine condition in respect to natural vegetation. Three agricultural sub-catchments, namely Jacup Cameron Creek, Sussetta and CBH were selected for the catchment demonstration. These sub-catchments comprise a total area of 29,513 hectares and are 83.5% cleared.

4.3.2 Biophysical issues

The Fitzgerald River rises in the Lake Magenta reserve, flows through an area of cleared farmland either side of the South Coast Highway (it cross the highway 30 km east of Jerramungup) and then enters the Fitzgerald River National Park. Groundwater levels have been rising within the farmland areas, and there are associated issues with waterlogging, and secondary salinity. Rising saline groundwater levels are resulting in increased saline streamflow into the Fitzgerald River. On-farm, there are issues associated with increasing soil acidity, and wind erosion and poor nutrient retention on sandy soils. The CDI project considered all of these issues in implementation planning.

4.3.3 Background to the CDI project

Landholders in the Shire of Jerramungup have a long history of taking a systematic approach to tackling the biophysical issues in the Shire. The Fitzgerald River Catchment Group has been involved in these endeavours, some of which were funded in the area through a NHT project. The group therefore had experience in working together, in understanding the biophysical issues and how they can be addressed, and the requirements in managing public funds. Through these prior experiences, the group also established sound relationships with Department of Agriculture and Food staff working in catchment hydrology and soil management.

The Fitzgerald River CDI has been largely developed on a platform of recommendations given in the Fitzgerald River Catchment Folder (2002), an amalgamation of catchment natural resource management (NRM) data. Recommendations specific to catchment management developed by state government NRM agencies in consultation and cooperation with landholders in the catchment have been employed to guide the on-ground works contained in the project.

4.3.4 Objectives for the Fitzgerald River CDI Project

Management Strategies

There are four broad management strategies described in the Works Plan:

1. Surface water management;
2. Improving soil condition (through lime and clay application);
3. Plant based solutions;

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4. Biodiversity Conservation (including fencing, livestock management through stock crossings).

Key Investment Areas

The Fitzgerald River CDI was designed to deliver in the following key investment areas:

- Demonstrate how a combination of integrated, salinity management practices in a given catchment can lead to the recovery of saline land and water, the restriction of further salinisation, and allow profitable use of saline landscapes.
- Design and commence the implementation of a catchment wide surface water management plan
- Increase water use and vegetative cover, and improve soil condition and nutrient balance through the establishment of deep-rooted and woody perennials, the establishment of a combination of long season annual pastures and summer crops and the amelioration of soils to address non-wetting and acidity
- Establish saltland pastures to rehabilitate and make productive use of saline land
- Improve protection and management of native remnant vegetation through fencing
- Protect and rehabilitate riparian zones through strategic fencing, revegetation and livestock crossing construction
- Increase the adoption of salinity management options across the wider landscape
- Investigate the options for and implications of'deep drainage' and implement actions if appropriate
- Assess impacts of discharging deep drains into Jacup-Cameron Creek (Fitzgerald River) through biological and physio-chemical monitoring

4.3.5 Project governance and funding

The Fitzgerald River Catchment Group is unincorporated, but there is a sound history of collaboration on previous NHT projects, and there are good relationships with the Fitzgerald Biosphere Group and Departmental and scientific staff. Funding management operated through the South Coast NRM (formerly the South Coast Regional Initiative Planning Team – SCRIPT). The Project Coordinator for most of the project's life was a local farmer, and previous employee of the FBG. The Department of Agriculture and Food was represented by a staff member from Albany.

The Fitzgerald River Catchment Demonstration Initiative Management Committee (FRCDIMC) was established to oversee the project and be responsible for making operational decisions in relation to the project in collaboration with the FBG and SCRIPT. The Committee comprised local landholders, and representatives of the Shire of Jerramungup, the Department of Agriculture and Food, the Department of Environment and Conservation and the South Coast NRM.

The Fitzgerald Biosphere Group (FBG) provided support to the project by way of administrative, reporting, employment, training and mentoring expertise. The FBG Trials Coordinator worked within the CDI project and was responsible for writing the monitoring and evaluation of the project using data collected by the Project Coordinator in consultation with project stakeholders. The FBG was also responsible for the generation of bi-annual reports as well as the final report to acquit the project to South Coast Regional Initiative Planning Team (SCRIPT).

The South Coast NRM (formerly SCRIPT) was responsible for the milestone reporting of the project, maintaining a watching brief on the CDI and acting as advocates on behalf of the project. South Coast NRM received grant funds from the State NRM Office and used the FBG as the principal program delivery agent.

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The funding agreement was signed on 6 January 2005, the first agreement signed in the CDI program.

4.3.6 Implementation planning

The planning processes

The Fitzgerald Biosphere Group (FBG) approached Catchment Group members and collated an initial wish list from each landholder to alleviate salinity and lower the water tables based on recommendations from the Fitzgerald River Catchment Folder (2003). These details were later refined and mapped identifying what was to be done, where and when. The FBG appointed Daniel Landcare Service in January 2004 to prepare the Implementation Plans which were accepted by the CDI Joint Steering Committee in December 2004.

Major partners in the project planning process included the South Coast Regional Initiative Planning Team (SCRIPT), Shire of Jerramungup, Department of Agriculture and Food, CSIRO (funded by GRDC), the (then) Department of Environment, the (then) Department of Conservation and Land Management and Main Roads WA.

Implementation Plan components

The Fitzgerald Works Plan

Proposed management actions described in the Implementation Plan include the planting of perennial, summer and long seasonal annual crops to reduce recharge, the planting of saltbush to rehabilitate salt scalds, the improvement of soil condition through lime and clay application where necessary to ensure the establishment of these crops, the establishment of a network of surface drains and dams to reduce waterlogging, and the fencing of remnant bushland and riparian vegetation and the construction of stock crossings over streams for biodiversity conservation.

The planting of deep-rooted, perennial pastures, such as lucerne, was aimed primarily at reducing recharge. Perennial plant options had already been identified for the Fitzgerald area (see Hill and Shiller 2003) and were being established by some landholders in the area. Limited planting programs for summer crops and long season annuals were included to further complement water use of the perennials, while planting of saltland pastures was included to lead to more productive use of salt affected land. An improvement in soil condition was related directly to the establishment of perennials, and the lime subsidy was only available in conjunction with lucerne establishment. The surface water management plan comprised 174 km of banks along with the construction of 29 dams. The banks were to be constructed with a maximum separation distance of 200m, and the dams of approximately 4000 m^3 capacity each.

The Works Plan is divided into four activities: Employment, Operating, Monitoring and Evaluation and Milestone Reporting. The work plan schedule in the Works (see Table 4-5) outlines the extent of the on-ground works (i.e. the ‘management actions’) to be completed annually.

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Table 4-5 Work Plan Schedule for Fitzgerald CDI

Phases	Year 1	Year 2	Year 3	Year 4
1. Employment				
Develop Project Coordinator job description and advertise	✓			
Appoint Project Coordinator	✓	.	.	.
Initiate training as per necessary for Project Coordinator	✓	✓	✓	✓
Advise project participants about bio-security requirements and review/update protocols annually	✓	✓	✓	✓
Manage Project Coordinator, providing regular reviews	✓	✓	✓	✓
Appoint drainage consultant to design deep drainage	✓	.	.	.
Apply for Notice of Intent to Drain	✓	.	.	.
Appoint drainage consultant to design 'W' drain on Sussetta	✓	.	.	.
Provide technical support	✓	✓	✓	✓
Administer/read/ record groundwater observations	✓	✓	✓	✓
Survey earthworks	✓	✓	✓	✓
2. Operating				
Proposed commercial farm forestry (hectares)	10	27	15	13
Proposed lucerne (hectares)	722	1700	756	1096
Proposed biodiversity revegetation (hectares)	11	36	45	24
Proposed other perennial pastures (hectares)	20	30	183	20
Proposed saltland pastures (hectares)	43	54	68	56
Proposed summer crops (hectares)	68	64	120	0
Proposed long seasoned annual pastures (hectares)	116	145	480	297
Proposed clay spreading (hectares)	35	20	83	76
Proposed lime application (tonnes)	926	1939	1539	1413
Proposed fencing (km)	43	49	40	34
Proposed stock crossings (number of)	6	8	4	6
Proposed dams (number of)	1	7	14	7
Proposed surface water earthworks (km's - incl 'W' drain)	47	45	47	35
Proposed deep drainage (km's)	8			
Construct appropriate culvert on Sussetta River Crossing South Coast Highway	.	✓	.	.
Implement communication plan	✓	✓	✓	✓
Administer project's financial, operating, meeting milestones. Reporting on & acquittal of project	✓	✓	✓	✓
3. Monitoring and evaluation				
Install monitoring weirs	✓	.	.	.
Install additional observations wells & piezometers	✓	.	.	.
Water testing species diversity annually	✓	✓	✓	✓
Water testing turbidity, pH and salinity, bimonthly	✓	✓	✓	✓
Testing of potable stored water, year 1 & 4	✓	.	.	.
Mapping on ground works on GIS annually	✓	✓	✓	✓

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Phases	Year 1	Year 2	Year 3	Year 4
Ongoing monitoring	✓	✓	✓	✓
Collate & store data using protocols detailed	✓	✓	✓	✓
Implement monitoring and evaluation	✓	✓	✓	✓
4. Milestone Reporting				
Bi-annually, July & January	✓	✓	✓	✓
Quarterly review	✓	✓	✓	✓

Monitoring and Evaluation Plan

A Monitoring and Evaluation Plan was prepared with a focus on measuring change in a number of selected resource condition indicators in order to assess whether the management actions have prevented, stabilised or reversed trends in salinity, reduced recharge by increasing water use, and improved biodiversity protection, soil condition, nutrient balance and productivity in the catchment.

Expected impacts of the works

The management actions, anticipated impacts and suggested indicators are presented in Table 4-6.

Table 4-6 Fitzgerald River CDI Project management actions and anticipated impacts

Action	Effect	Indicator
Establishment of Vegetation		
Plant lucerne	Increase water usage	Depth to groundwater
	Reduce recharge	Soil organic carbon
	Slow down groundwater rise	Total nitrogen in surface waters
	Increase soil organic matter	Total phosphorus in surface waters
	Improve soil structure	Potable water quality
	Increase soil nitrogen through fixation	Plant establishment and productivity
	Increase nutrient application	
	Increase pesticide and herbicide application	
Plant long season annuals and summer crops	Increase water usage	Depth to groundwater
	Reduce recharge	Soil organic carbon
	Slow down groundwater rise	Total nitrogen in surface waters
	Increase soil organic matter	Total phosphorus in surface waters
	Improve soil structure	Potable water quality
	Increase soil nitrogen through fixation	Plant establishment and productivity
	Increase nutrient application	
	Increase pesticide and herbicide application	
Plant saltbush, trees and natural vegetation	Reduce salt scalds	Location and size of salt affected land
	Adapt landuse	Depth to groundwater

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Action	Effect	Indicator
	Increase water usage	Plant establishment and productivity
	Reduce recharge	
	Slow down groundwater rise	
Improve soil condition		
Spread lime	Lower soil acidity	Soil pH
	Reduce available aluminium	Aluminium content
		Plant establishment and productivity
Spread clay	Reduce non-wetting	Plant establishment and productivity
Surface water management		
Construct grade banks and dams	Reduce waterlogging and inundation	Stream flow
	Increase crop productivity	Turbidity
	Reduce recharge	Surface water salinity
	Alter stream flow	Surface Water pH
	Alter stream velocity	
	Alter sediment transport	
	Alter stream chemistry	
	Increase capacity of farm stored water	
Biodiversity conservation		
Fencing of riparian zones, remnant blocks of vegetation and treated paddocks	Reduce degradation of remnant vegetation	Taxa Richness
	Enhance biodiversity	SIGNAL scores
	Improve water quality of streams	Fish presence
	Improve grazing management	Turbidity
	Improve weed and pest control	Surface water salinity
		Total nitrogen in surface waters
		Total phosphorus in surface waters
		Plant establishment and productivity
Stock Crossings	Reduce degradation of riparian zones	Taxa Richness
	Enhance biodiversity	SIGNAL scores
	Improve water quality of streams	Fish presence
		Turbidity
		Surface water salinity
		Total nitrogen in surface waters
		Total phosphorus in surface waters

The targets presented for critical indicators in the Works Plan are shown below in Table 4-7.

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Table 4-7 Targets in the Fitzgerald CDI Project

Indicator	Target
Depth to groundwater	Reduce the rate of watertable rise to 0.10 m/yr to 0.00 m/yr
Groundwater salinity	No specified target
Location and size of salt affected areas	No significant increase in AOCLP
Soil acidity	pH equal to, or greater than 5.5
Aluminium content	Measurable decline
Organic carbon	Averages approximating 2%
Macroinvertebrate Family Richness	Equal or greater than 10
SIGNAL score	More than 3.0
Fish presence	Four or more species
Surface water pH	Maintain present conditions
Streamflow	Maintain present conditions
Total nitrogen	Measurable decline
Total phosphorus	Measurable decline
Turbidity	Levels between 10-20 NTU
Surface water electrical conductivity	Measurable decline

4.3.7 The Fitzgerald River CDI Project plan in summary

Table 4-8 below provides details of the selected projects including the planned works and requested funding.

Table 4-8 The Fitzgerald River CDI Projects

Title	Project Details	CDI monies sought ($)	In Kind ($)
Fitzgerald River Catchment Integrated Salinity Management Plan.	• Total Catchment (100%) – 104,000ha including remnant vegetation and reserves • Total Managed under Project – 67,600ha • 29 Landholders • Perennial (7,500ha) • Saltland pastures (500ha) • Long season annual and summer crops (1,600ha) (after TAP comments the group agreed to plant this area to perennial pastures) • Clay Spreading (500ha) • Liming (10,000ha) • Surface water mgt (300km) • Deep drainage (20km) • Livestock crossing (10 demos) • Remnant fencing (40km) • Waterway protection fencing (120km) • Riparian revegetation (160ha)	**$1,132,600 CDI** O/G works – $1,006,000 (88%) M&E –$2,000 (1%) Comms –$9,000 (1%) P/Mgt – $115,600 (10%) $16 / ha CDI **Total $2,934,811**	· $1,529,800 (landholder) · $47,304 (FBG) · $10,000 (DAWA) · $204,867 (DCLM) · $4,000 (DEP) · $6,240 (Shire of Jerramungup) **$43 ha ALL**

4.3.8 Roll-out of the Project

From their quarterly reporting, the following information was obtained as an indication of the challenges that were experienced throughout the life of the CDI.

- March 2005 "very wet conditions in 2005 delayed some on-ground works". They had 280 mm rain in 24 hours which made it impossible for farmers to complete works. This led to a reduction in number of hectares planted to lucerne and thus the project was extended to the 4 sub-catchments to engage more farmers.
- Variation Request to delay some deliverables "due to impact of rain event, low commodity prices, land sales/leases and labour shortages reducing landholder capacity".
- June 2006 - "extremely dry start to winter" led to farmers deferring annual pasture planting → desperate need for stock feed so did not spray grasses/pastures out.
- Variation Request Jan 2007 - some questions regarding the implications of having to submit variations for items contained within the program (e.g. activity or budget items) on decision-making capability at the project level by the project steering committee and the ability to undertake timely adaptive management.
- QFR Dec 2006 - 2006 was a dry season with locusts having a bad effect on pasture and seed planted.
- 2008 - impact of high grain prices on farmers decisions to plant perennials, particularly those with no visible salt problem (compared to small subsidy).
- Apr - Jun 2008 - very dry climatic conditions leading to vulnerable top soils.
- State and federal governments acknowledge that outputs will **not** all be achieved.

4.3.9 Activities planned and completed

Works on-ground

The comparison between planned and actual activities is shown in Table 4-9.

Table 4-9 Planned and actual activities in the Fitzgerald CDI

Works Item	Amount Achieved	Initial planned activities	% of original target
Fencing	107 km	160 km	67%
Riparian revegetation	116 ha	160 ha	72%
Clay spreading	18 ha	500 ha	4%
Saltland Pastures	305 ha	500 ha	61%
Perennial Pastures	2,551 ha	7,500 ha	34%
Long season annual and summer crops	1,787 ha	1,600 ha	111%
Liming	2,128 ha	10,000 ha	21%
Surface water management	22 km	300 km	7%
Deep drainage	2.6 km	20 km	13%
Livestock crossing	5 demos	10 demos	50%
Dams	11 dams	nil	-

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A total of $1.13 million in CDI funds were spent on project activities. The main reason for the difference between the planned and actual works achieved was an initial reduction in the size of the 'target catchment' from 104,000 ha to 70,000 ha. Further, to obtain participation, a variation was obtained for the CDI to contribute to some works as follows:

- increase subsidy to farmers for clay spreading from $150/ha to $250/ha;
- deep drainage subsidy increased landholder contribution to 50% of total cost; and
- fencing subsidy increased form $800/km to $2000/km.

This increased in $/unit support led to a reduction in the extent to which actions could be applied.

Monitoring and Evaluation Plan

The M&E Plan includes the following activities.

- Network of Piezometers installed in the catchment and monitored on a regular basis.
- Photo point monitoring sites have been established to gain visual insight of potential change.
- CSIRO Nutrient Balance sites have been re-established in our selected drainage lines and continually monitored to assess changes in Phosphorous, Nitrogen, Turbidity, Salinity, pH levels and flow rates.
- Extensive testing of drinking water quality in an attempt to link environmental health with human health.
- Local lime quality analyses completed.
- Cost/benefit analysis of Saltland Pasture site.
- Run-off plots in the catchment to monitor transport processes of Phosphorous in our soils.
- Catchment scale soil sampling has been completed and will be used as benchmark to monitor change to soil health.
- Bi-annual monitoring of catchment streams for in-stream biodiversity changes.
- Pastures from Space monitoring have been set-up for 16 individual Landholders to allow them to measure individual pasture/density changes at a farm scale.
- Deep Drainage monitoring package has been set-up to evaluate the impacts of acidic drain water discharge on the surrounding environment.
- Pasture from Space technology has added a new dimension to pasture monitoring.

4.3.10 Issues as observed by URS

- The Fitzgerald River Catchment Group is a mature group of landholders, who have variable degrees of focus on the river's health, and who would seem to be comfortable working with each other, with Government and with scientists. Leadership was good. There was also good bio-physical information, again based on previous work, and knowledge held by farmers and Departmental staff.
- Notwithstanding the point above, there was some angst caused by a decision to reduce the size of the target catchment, with some of those landholders excluded not happy that they would not be able to access CDI funds. However, this did not seem to affect the workings of the group managing the project. Further, it was a sound test for the CDI concept of targeted funding, and the group decision was a good outcome.
- In completing the Plan, after obtaining a general view of what was required to address the biophysical issues, the consultant developed the plan at 'landholder-up' scale, in determining what and where each participating landholder wished to introduce the available technologies, and then

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amalgamating across the whole catchment. This may not be consistent with the theory of catchment planning, and is governed by application of the 'art of the possible'.

- The hydrological impact of the plan was modelled by the Department of Agriculture and Food, and the effects of implementation are supporting the improvements in groundwater behaviour predicted by the model. This is a good result.
- Developing a static catchment plan would seem to be difficult in this environment, where the farming system would seem to be very dynamic, with landholders moving between grazing and cropping quite rapidly according to market drivers.
- The Project Coordinator was seen by all participants (farmers, consultants, Departmental staff) as being critical to achieving uptake of the technologies. She lived locally, knew all landholders well and worked hard and effectively in pursuing project objectives. This was particularly important given that the project commenced a year late, and seasonal conditions were very difficult over the course of the project. In particular some landholders had real difficulty in meeting their commitments in terms of time and matching dollars.
- Overall it would seem that the original plan was overly ambitious, and perhaps based on some optimistic costings, as shown by the significant variations in CDI contributions. Even so, it was not always easy to persuade landholders to commit to their initial plans (see comments above).
- Although some activity targets were not met, there were good reasons in some cases. The group had been advised that CDI would not fund liming, which has a 100 per cent private benefit. The group tested a small section of deep drainage (2.6 km deep drain), and determined that it was not effective, and subsequently decided to not invest more funds in this technology. This was a good learning outcome for the group.
- There is a difference of opinion between external observers about the value of the project in demonstrating best practice perennial pastures technology. For some, the CDI investment was an opportunity to achieve/ demonstrate landscape scale changes in the farming system. For others, lucerne growing is not innovative in the district, is already well adopted, and the CDI mainly accelerated an existing trend. However, the accelerated adoption means that there is now change at landscape scale that can be used to determine the impact on hydrology, which has been done (see fourth dot point above).
- Project activities provided an opportunity for other parties (CSIRO, UWA and Departmental staff not directly involved) to undertake related investigations. This was a useful outcome.
- The project has finished with most landholders satisfied with their involvement. There is some question about the long-term impacts of the project, and a consideration of 'what comes next?' Conversely, some other informants close to the project, although recognising the good work done, query the long-term value of this approach to achieving adoption of new technologies and landscape management change. In part this is related to whether perennial pastures are really a 'new technology' along the South Coast.
- The good reputation of the Fitzgerald Group and its convenient location straddling the main Albany-Esperance Highway meant that the project has been able to extend its activities outside the catchment. Field days have been well attended by non-catchment landholders.
- While there are good baseline data, there are inadequate resources to maintain on-going monitoring.

4.4 Gillingarra-Koojan ('Gillingarra')

4.4.1 Location and area

The catchment is 42,000 ha and is located 32 km south of Moora, immediately to the north of the Moore River. The project area's northern boundary is Boxhall Road, its western boundary is Muchmulla Road and it extends 30km east of Gillingarra townsite. There are 24 landholders in the area.

4.4.2 Biophysical issues

Rising groundwater levels and associated effects are affecting the quality of surface water entering the Moore River and threatening significant areas of both public and privately owned remnant vegetation. Agricultural productivity is also affected by shallow groundwater levels, with associated waterlogging, an increased incidence of primary, but more commonly secondary salinity. The sandy soils to the west of the catchment are difficult to farm, and annual crop and pasture failures were common in the 1990s. Wind erosion was a major issue.

4.4.3 Background to the CDI Project

There is a view the Gillingarra-Koojan area is a difficult area in which to farm, given the percentage of the area that is affected by waterlogging (plains with low relief and poor external drainage), the percentage of the area (23%) affected by groundwater levels less than 2 mbgl, and low nutrient holding capacity in sandy soils. There is anecdotal information that property turnover has been relatively high, although the list of LCDC members shows that there are a few dominant families in the catchment. Off-farm employment is also believed to be important. There was an economic imperative for landholders to become involved in the CDI to improve productivity (Anon 2009).

The Gillingarra-Koojan Land Conservation District was gazetted in 1987, and is managed by a Land Conservation District Committee. At the time of commencement of the CDI the group had 46 active members, and maintained monthly meetings and a Newsletter (Peter 2003).

4.4.4 Objectives for the Gillingarra CDI Project

The objectives for the Gillingarra CDI Project were listed in the Implementation Schedule as follows.

- Assist the implementation of new and more sustainable (triple bottom line) farming systems or practices, in particular those based on the use of perennials, which will reduce groundwater rise.
- The use of perennials will be targeted primarily at areas of groundwater recharge in a series of 5 sub-catchment areas, although in some instances, and in one sub-catchment specifically, perennials will be used to take greater advantage of the freshwater available in discharge areas.
- Investment will also support the construction of shallow or better aligned and engineered shallow drains so as to prevent or reduce ponding of surface water and the associated negative effects on production and the environment.
- Implementing perennial based farming systems will involve supporting understanding of the methods used in establishing a range of perennials and in the changes required in livestock management practices when moving from an annual to a perennial based pasture system.

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4.4.5 Project governance and funding

The Gillingarra-Koojan Land Conservation District Group were the proponents for the CDI Project, and the Project was undertaken within the boundaries of the LCD. The office-bearers of the LCDC provided local coordination. The project was managed by the Northern Agricultural Catchment Council (NACC). There were delays in appointment of a Project Officer, with the role not being filled until 2007. The Project Officer was employed in this role by NACC. The late start in implementation resulted in an additional year (2009) being added to the project timetable. Activity in this final year was high.

The funding agreement was signed on 26 June 2006.

4.4.6 Implementation planning

The planning process

Planning was problematic. Consultants, Global Groundwater (Australian Bore Consultants 2005), were initially selected to complete the plan, but did not conclude their contract. In their place, a second consultant was appointed to complete the Implementation Plan, including detailed works plans, monitoring and evaluation plans, a communications plan and a project budget. Finally, a third consultant was engaged to identify the options for implementation within the remaining two years of the Project.

The plans were accepted by the CDI Joint Steering Committee in May 2006. The key investment areas were listed as:

- Establish more sustainable perennial based farming systems;
- Reduce levels of groundwater/water logging and improve soil condition and productivity;
- Reduce wind (and water) erosion of fragile soils;
- Reduce salinity/risk of salinity;
- Maintain/improve the quality of water entering Moore River and help preserve a high value natural asset;
- Protect remnant vegetation, including riparian and reserves; and
- Increase understanding of the management of effective use of water by perennials.

The Project Schedule noted funding to be allocated to salinity (70%) ; improving soil condition (5%), ; rivers and wetlands (10%) and native vegetation (5%).

Total investment between 2005 and 2008 amounted to $1,000,000.

Expected impacts

The anticipated impact of an increased area of perennial vegetation on groundwater levels was modelled by Australian Bore Consultants (2005),with the predictions from the model presented in Table 4-10.

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Table 4-10 Predicted effect of CDI works

Scenario	Project area with perennials		Project area with surficial watertable < 2 mbgl		Project area with surficial watertable 2 – 5 mbgl	
	Area (ha)	%	Area (ha)	%	Area (ha)	%
Actual conditions	10,250	24	9,587	23	4,276	10
Modelled under present land use	10,250	24	15,880	38	5,140	12
Modelled under selected CDI works	13,150	31	13,630	32	5,851	14
Modelled equilibrium under 100% native vegetation	42,210	100	1,719	4	2,149	5

Adapted from Australian Bore Consultants (2005), p. 21

The predictions show that the area affected by shallow groundwater levels would be expected to continue increasing under 'business as usual' conditions (row 2), with an increased area under perennial vegetation slowing the rate of spread.

4.4.7 The Gillingarra CDI Project plan in summary

Table 4-11 below provides details of the planned works and requested funding.

Table 4-11 The Gillingarra CDI Project

Title	Project Details	CDI monies sought ($)	In Kind ($)
Salinity management in the **Gillingarra -West Koojan** Catchment through the use of perennials	• Total ha – 34,900ha • Total Managed under project – 34,900ha (inc. 4,900ha of remnant vegetation) • Perennial pastures (3720ha) • Tagasaste and Broombush (350ha) • Pines (150ha) • Hardwood Plantations (19ha) • Revegetation (35ha) • Fencing (500km) • Water supplies – pipes (100km) • Deep drains (6km) • Dams (2) • Liming (4,000ha) • Claying (100ha) • Raised Bed (100ha)	**$1,081,618 CDI** O/G works – $829, 882(76%) M&E –$55,000 (5%) Comms –$18,000 (2%) P/Mgt –$178,736 (17%) $31 / ha CDI **Total $2,163,236**	· Assume same **$72 / ha ALL**

4.4.8 Roll-out of the Project

The notes in the Administration File indicate that the relationships between the Gillingarra Group, the State NRM Office (SNRMO) and the Northern Agricultural Catchments Council (NACC) were difficult at various stages of the project.

- Very little information was submitted to the State NRM Office (SNRMO) from the Gillingarra Group. Their quarterly financial reporting was complete but brief and no additional/supplementary information was provided.
- The group submitted 8 variation requests primarily to extend deadlines but also to amend some of the outputs (e.g. Output 10 went from 120 ha to 4,000 ha; Output 10 went from 216 ha to 20 ha; Output 10 went from 3,179 ha to 2,000 ha in November 2008)
- The appointment of a Project Officer was undertaken by NACC as part of the revision of the CDI Workplan. The appointment met stiff opposition from some members of the LCDC, given that the appointee was based in Geraldton, almost three hours driving from Gillingarra.
- The review conducted in 2009 (Anon 2009) reported that 'having a project officer was one of the keys to the success of the CDI. …. The person they appointed was passionate, experienced, and with a good understanding of agriculture and agronomy.' (p. 10).
- By December 2009 they had expended approximately $740,000 of the $1.1 million received.

4.4.9 Activities planned and completed

The comparison between planned and actual activities is shown in Table 4-12. The Final Report shows that a total of $1.165 million was committed through the Project, comprising $1.075 million from CDI and $88,000 in interest. Although the CDI component was fully committed, it is clear that plan variations during the process resulted in a different pattern of activities to that originally envisaged.

Table 4-12 Planned and actual activities in Gillingarra-Koojan

Works Item	Amount Achieved	Initial planned activities	% of original target
Tree plantings and farm forestry	80 ha	169 ha	47%
Saltland Pastures	21 ha	Not mentioned	-
Perennial Pastures/ tagasaste	2,121 ha	4,070 ha	52%
Riparian and native vegetation areas fenced	3,461 ha	Not mentioned	-
Riparian fencing	73 km	500 km	15%
Revegetation	Not recorded	35 ha	-
Water supplies		100 km	-
Deep drains		6 km	-
Dams		2	-
Claying		100 ha	-
Raised beds		100 ha	-

4.4.10 Issues as observed by URS

- The difficulty in planning the project related in part to the loose structure of the group and their unfamiliarity in working with each other and with external parties. These difficulties could only be resolved by bringing in people with long experience in working with landholders. This resulted in a considerable delay in project implementation and some difficulties in the relationships between the State NRM Office and the Gillingarra-Koojan Group.

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- A more technically (engineering and surface water management) orientated plan was not accepted by the majority of farmer participants. Some were frustrated with the initial process. The setup, planning and management was seen as being poor to start with. Planning happened without enough input, or ownership, by farmers. It was difficult to get the group to function in the early stages.
- It was shown to be very hard and a big step to take an LCDC group to the level required to develop and then implement, an integrated plan. Getting a good project manager was a key to the eventual success of a simpler plan based predominantly on perennial plant options.
- The first plan was not what the joint steering committee (farmers) wanted. The process then required input to re-motivate the group, to get the group back together to redevelop the plan, to get some local ownership, and to reinvigorate the group.
- Perennial pastures, including tagasaste were a new technology for this area, and the CDI investment took away the financial risk for participating landholders. The results have been positive, with landholders appreciating the bio-physical and assumed financial benefits. Departmental staff and landholder testimony (contained in the Final Report) suggest that adoption will continue.
- Any integrated project needs to consider the state of the participants as much as the environmental issues. Many of the properties in this catchment have regularly changed hands. It has been a difficult environment in which to achieve a viable farming operation, and is seen as being an environment with significant operational risk. The CDI programme took a lot of the risk out of trialling perennial pastures and trees to the point that some 2,000 hectares were planted, and 3,500 hectares of remnant vegetation fenced.
- The contribution made by the Project Officer was critical. Prior to appointment of this person, progress was slow. The officer selected had the right mixture of skills, experience and enthusiasm to ensure that activities were implemented. One view was that implementation would not have occurred without the Project Officer.
- It might not have been a project that demonstrated a range of available technologies but it achieved a significant adoption of pragmatic options that were seen as providing hydrological benefits and productivity benefits. Productivity benefits were critical to gaining any adoption or participation. The project took a pragmatic approach. It might have failed as a broad demonstration of innovative technologies but it achieved some adoption in an area that has struggled financially.
- Critical for ongoing adoption is the need for further work. The hydrological benefits need to be monitored and evaluated, as do the farm management and financial effects of perennials within the farm systems. The economics have not been evaluated. Should they be shown to be positive then it is felt that this project would lead to continuing self motivated adoption and associated environmental benefits.
- This project demonstrated the difficulty of an integrated planning approach. The initial plan tended towards an integrated approach but the plan, or actions that were adopted tended towards a paddock scale set of actions. Ultimately it was not integrated and it was not a demonstration but it did achieve some adoption and the bottom line might be just as effective. Suggestions were that an integrated approach is best where a target public resource and objectives for that resource are clearly defined.

5

Addressing the evaluation questions

5.1 Review of the aims, objectives and catchment selection process.

The question – 'review the Catchment Demonstration Initiative (CDI) aims, objectives and catchment selection process'.

5.1.1 The CDI aims and objectives

Ten objectives were devised for the CDI Program:

- develop plans that manage salinity (recover, contain and adapt) and implemented at a catchment scale;
- implement works to manage important / local assets (land, water, biodiversity, infrastructure);
- demonstrate economically viable salinity management options;
- make information available for wider adoption;
- evaluate innovative practices;
- monitor and evaluate systems to enable longer term outcomes to be demonstrated;
- real costs of salinity management systems established and communicated;
- groups capacity developed to enable work started by the Initiative to be ongoing;
- demonstrations available for others to visit and learn from; and
- partner groups to deliver packages and products that can be applied elsewhere.

5.1.2 Review of the aims and objectives

Comparison with other catchment-scale interventions

The CDI was established by the WA Government explicitly to test the value of well-resourced catchment-scale intervention to achieve accelerated adoption of practices that would address hydrological threats to agricultural and other values.

Considerable work has already been done in catchment scale intervention. In the water resource and natural diversity recovery catchments, intensive, publicly-funded research, development and implementation has occurred. The investment has been high (e.g. estimated $9 million at Toolibin Lake).

As noted in Section 1.3, the role for planning and action at catchment scale was envisaged in the *Salinity Action Plan* in 1998. This form of intervention in catchments with no significant non-agricultural values (cf. biodiversity and water supply values in the 'recovery catchments') was envisaged as a viable approach for the several hundred of these catchments across the agricultural areas. In these non-'recovery catchments', initial programs were Rapid Catchment Appraisal (RCA) and Focus Catchment planning. RCA planning produced brief reports for catchment communities detailing the catchment's hydrological status, and then a range of often generic suggestions for intervention.

The Focus Catchment planning was much more intensive and approximated the detail required for an Implementation Plan under CDI (for example, see the Fence Road Focus Catchment Plan), and the

planning addressed many of the objectives of the CDI, although it has less emphasis on the value of the intensive intervention as a demonstration. Further, although there was considerable work done in planning in Focus Catchments, and in evaluating the likely environmental and economic impacts at desktop scale, there was little public investment into implementing the plans.

The CDI therefore followed logically from programs in Rapid Catchment Appraisal and Focus Catchment planning, and in particular took the latter into landscape scale implementation. It can be argued that the CDI program represented the 'ultimate' in 'agricultural catchment' planning and action and as such it has been useful to use the CDI to test the total approach thoroughly.

Alignment with Regional NRM aims and objectives

The aims and objectives for the CDI align with the priorities for intervention shown in the Regional Strategies produced under the NAPSWQ by the regional NRM organisations in the agricultural areas in the late 1990s and early 2000s. Relevant priorities for each of the Regional NRM Groups under NAPSWQ are:

South West Catchments Council

- Conservation of native vegetation and biodiversity.
- Salinity and hydrology management.
- Sustainable drain management.
- Best landuse management practices.

Avon Catchments Council (now Wheatbelt Catchment Council)

- Managing a change in culture - By 2005 increase the level of activity across the region that is consistent with natural resource objectives.
- Managing hydrological processes - By 2005 ensure 70 per cent of the local population is aware of hydrological scenarios affecting the region.
- By 2010 improve water use by 3 per cent across the region by increasing the use of water that falls on the landscape.

South Coast Regional Initiative Planning Team (SCRIPT) (now South Coast NRM)

- Ensure ideas and information pertaining to regional resource management and rural community development are disseminated rapidly throughout the region.
- To implement actions that conserve, protect and remediate natural resources and ecological processes of the South Coast region.
- To research, develop and extend profitable farming systems that use more water and protect soil from erosion.
- To progressively adopt and extend sustainable farming systems which are ecologically sustainable, highly profitable and self-reliant.

Northern Agricultural Catchments Council

- Sustainable land use systems implemented to ensure our agricultural soils are improved and managed in a healthy, productive and sustainable way.
- Species and ecological community diversity, and ecological process, maintained, protected and enhanced for all terrestrial, aquatic and marine habitats.
- Conserve, maintain and enhance the ecological processes and species richness of waterscapes, and minimise the impacts to water quality.

- Water resources managed to facilitate regional development, enable sustainable allocation and maintain environmental values.

Alignment with SIF Principles

Western Australia developed the Salinity Investment Framework (SIF) to improve the quality and accountability of decision making and to improve the allocation of public investment in salinity management at both State and Regional levels. The SIF uses eight guiding principles. CDI Proposals were required to consider principles 1, 2 and 4. These principles for public investment in salinity in WA (extract from SIF reports) are:

- 1. The top priority public investments are those which generate the greatest public benefits per dollar of public investment.
- 2. Direct financial assistance to landholders to undertake salinity action should be strategic and should not exceed the public benefits of that result.
- 4. Where the public priority is low but there are extensive private assets at risk, public investment should be aimed at industry development.

It is not clear how well the aims for CDI considered these three criteria, which, it could be argued, would invalidate public investment for direct landscape change within catchments with limited public asset values. It is URS's understanding that the planning of the CDI program overlapped with the development of the SIF, which may have made it difficult to align the two processes.

In implementing the CDI program, the Steering Committee required applicants to show that their project would deliver public and private benefits, and to show a commitment to cost sharing in implementing works. However, in discussion with landholder members of the catchment groups, it was evident that expected private benefits was the main (and sometimes the only) rationale for involvement in the project. Thus the SIF philosophy would not appear to have been communicated to, or understood by applicants.

5.1.3 Catchment selection process

As shown in Section 3, the Steering Committee, supported by the State NRM Office, established a thorough and transparent process in calling for submissions, assessing those submissions and then in negotiating arrangements. Some observations on the strengths and weaknesses of the process follow.

Strengths

- The selection criteria were public, the selection process was transparent, and the checks and balances were in place. It is hard to see how the process could have been improved upon without increasing Program administration costs to unacceptable levels.
- The process was able to be justified to at least two groups that were concerned that they had 'missed out' on selection. There would appear to be no on-going legacy of discontent resulting from the selection decision-making process. This is a good outcome.

Weaknesses

- Not surprisingly, it is evident that that catchment selection process favoured groups with a track record of successful management of public funds (as in Wallatin Creek and Fitzgerald), which in

turn made it easier for them to submit a credible application. Thus their existing advantage in seeking external support will have been strengthened further through CDI.

- In an attempt in part to address the issue above, there was some desire to have CDI catchments located in each of the four agricultural NRM regions. This was achieved, but at the cost of selection of at least one group (Gillingarra) that might not have otherwise been successful. This regard for 'spatial and political equity' created difficulties for the management of the CDI program in due course.
- It is in the nature of uncertainty that good decisions can have bad outcomes. The choice of the Upper Coblinine Catchment was regarded as sound by all those consulted, on the basis of their past activity and quality of application. However, during the life of the project, it became evident that the group's and others' understanding of the purpose of the project diverged, which resulted in deteriorating relationships between the parties. However, it is unlikely that it would have been possible to recognise future problems on the basis of the documentary, verbal and anecdotal information provided to the assessment panel.

5.2 Evaluation of the Implementation Plans

The question – 'evaluation of the four approved Implementation Plans in terms of their ability to meet the requirements of the CDI, State/Commonwealth Programs (National Action Plan for Salinity and Water Quality) and those of Regional NRM Groups', and 'evaluation of the Implementation Plans and changes made during the program, in terms of their ability to deliver the program outcomes and also meet both local needs'.

5.2.1 Variation in development of Implementation Plans

About 7 to 10 per cent of project funds were committed to developing the Implementation Plans. This was perhaps an under-estimation of the requirement, which should perhaps have seen up to 15 per cent of the budget committed to initial plan development and subsequent reviews. If the cost of administering the number of variations approved after plan 'sign-off' in each of the catchments was included as an item in planning, it is likely that the percentage of funding allocated to planning may have reached this higher amount.

Planning for the successful groups was challenging for all consultants, and thus there was considerable variation in how the implementation plans were developed and used by the four groups. In two cases, the initial plans had to be re-done by different consultants. The degree of preparedness for detailed planning also varied, with some issues arising where scientific information to back up the planning was found to be inadequate. Conversely, the Upper Coblinine Group had a clear picture of what they wanted to achieve, but initial plan development occurred mainly at a farmer-by-farmer basis, followed by aggregation upwards to catchment scale.

5.2.2 The value of the Implementation Plans

All of the plans were informed by previous work describing resource condition issues to be addressed and indicative options for practices that could address those issues. Land type mapping, salinity risk assessment, soil acidity risk assessment and groundwater records and trends assembled for the National Land and Water Resource Audit and for the regional NRM strategies in the late 1990s and early 2000s provided substantial baseline information on which to build an Implementation Plan.

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Previous research work had identified options for perennial pastures in the Fitzgerald River Catchment (Hill and Shiller 2003) and in the Gillingarra area (Peter 2003). The Wallatin group had a long history of researching the requirements for biodiversity conservation in a largely cleared landscape. The Sustainable Grazing on Saline Lands (SGSL) Program had increased knowledge in the area of establishment and management of saline pastures.

At a catchment-specific level, the degree of hydrological modelling to guide development of implementation plans varied between the four catchments, from basic modelling in the case of the Fitzgerald to groundwater investigation and monitoring that was undertaken for Wallatin, and DEM and surface hydrology modelling that had been done previously in Upper Coblinine. The initial implementation plan for Gillingarra included a hydrological assessment, largely focused on surface water management, whereas in the second plan there was more emphasis placed on control of groundwater rise using perennial vegetation.

Overall, the Implementation Plans provided the imperative to pull together all the available biophysical baseline information and threats to resource condition and match it against available technologies in addressing the threats. As noted in the previous section, this was a challenging process in all situations, with the planning rigour required exposing gaps in the knowledge base to inform implementation. To the extent that the planning process developed group knowledge and awareness of issues and options, it was a useful contribution by the CDI Program.

The lack of benefit-cost assessment is concerning. Recent work by David Pannell and his colleagues (see the INFFER process) has built on the SIF process of targeting public investment at the assets that will generate the highest public return. Although the CDI involved roughly 50: 50 Government: landholder investment, there was neither a thorough assessment of the likely returns from individual technologies (as in surface water works vs perennials), nor an assessment of the collective benefit:cost ratio for the whole of the catchment works. The exception was in Wallatin Creek where the group recognised that the original Plan would not deliver the desired outcome, and the project shifted emphasis to researching technologies followed by 'roll-out' projects.

5.2.3 Implementing the plans

Three of the groups struggled to achieve implementation of the 'signed off' plans. The reasons included:

- Seasonal difficulties (frost, drought) and low commodity prices affecting landholders' ability to commit to cost-sharing for works;
- Changes in farm business plans (crops >>> livestock, and vice versa) meant that some original plans for fencing and earthworks could not be accommodated;
- As well as financial constraints, implementation was affected by the time constraints on landholders, either in doing the work themselves, or in arranging for contractors to build fences and complete earthworks etc; and
- A lack of technical expertise affecting implementation of surface water works in Upper Coblinine and perennial pastures establishment in Gillingarra, although both problems were overcome before the end of the projects.

In summary, the difficulty in developing a 'fixed' plan and then steadily progressing through implementation of the agreed actions over a three to four year period is evident. The number of variations submitted to the State NRM Office for changes to the plans indicates the need to keep

changing the plan to meet changed circumstances and ideas – in short to achieve an acceptable compromise between what had been agreed 'then', and what was desired 'now'.

The role of the Project Officers in driving the 'push to implement' was critical. They were involved in day-to-day negotiations with landholders about minor and major changes to previously agreed plans, which then had to be followed through with variations agreed by the State NRM Office. Sometimes this involved changes in emphasis across the whole catchment, as in Upper Coblinine with increased investment in surface water storages (see Table 4-2) and in Gillingarra with greater proportional investment in perennial pastures (see Table 4-12).

The impression gained by URS is that managing the implementation process in this dynamic environment was hard and sometimes stressful work, and those interviewed for this evaluation were full of praise for the work done by the Project Officers in each case.

Finally, that landholders were able to commit an average of $1.5 million / catchment (dollar and in-kind contribution) in agreed works within four years is a significant achievement in 'accelerated adoption', which was a desired outcome of the Program. This scale of activity is significantly greater than that achieved in the Alcoa Catchments Program (which operated in the Avon Basin in the 1990s), where about $250,000 was invested in each of the five catchments over a similar period. The challenge of 'time and dollar' availability in programs of this nature is addressed in Section 6.

5.3 Comparing planned and actual activities

The question – 'compile materials from the projects that compare the original and completed plans and outputs (intent, works). Review the actual and/or forecast resource condition change (impact of the works) and basis (methodology). Use other available tools, expertise or knowledge to determine effectiveness of CDI works (if material is incomplete) and major learnings from the demonstrations'.

5.3.1 Activities

As a result of the need for compromise and flexibility in implementing the plans, there is considerable variation between planned and actual activities, as shown for Upper Coblinine (Table 4-2), Fitzgerald (Table 4-9) and in Gillingarra (Table 4-12). In reviewing these data, some points stand out.

- In some cases the planning used optimistic (i.e. low) prices for materials and works, with the costs actually incurred being much higher. This reduced the 'amount' of implementation for the available dollars. In part this was due to delays in implementation in some situations until Year 3, by which time costs had increased significantly.
- Plans which included private-only actions, such as liming and claying were not encouraged by the State NRM Office and hence were not implemented.
- The length of deep drainage planned for Fitzgerald was not achieved because a short length of 'trial drain' demonstrated to the landholders that the technology was ineffective. The money ear-marked for drain excavation, sensibly, was shifted into more beneficial activities.
- Revision of original plans show a subtle shift in investment towards on-ground works that have a high ratio of private:public good. This is very evident in the investment in dams in Upper Coblinine, which was justified by the landholders because of the difficulty in getting the funds committed. The State NRM Office agreed to the shift in priorities, on the basis that increased dam capacity on the

slopes would reduce inundation on the valley floors from low overland flows. However, the public good benefits may not have justified the cost.

- As discussed earlier, it has been suggested that the Upper Coblinine Group were operating within different values to the State NRM Office or the Katanning LCDC, which made reconciling priorities for action difficult. However, some commentators suggest it is likely that the values exhibited by the Upper Coblinine Group approximate those held in many rural communities, which represents a challenge to Government in the design of projects that ask landholders to act to deliver a fair return in terms of public good.

5.3.2 Impacts on resource condition

Given the long lag time between action and outcome in natural resource management, determining the actual resource condition changes that have been/ are being/ and will be achieved by the CDI Project is not straight forward.

The data presented in Table 5-1 rely variously on predicted outcomes from project activities, some measurements, and information provided by those interviewed. Further, it is not easy to relate the catchment-wide targets for resource condition change in the project objectives with the expected impacts of discrete activities undertaken. A more complete picture of resource condition trends as a result of CDI activities will need to come from several years of monitoring, as discussed elsewhere.

The information shown indicates that in all CDI projects the activities will have already delivered resource condition benefits, although they are modest in scale to date. Longer-term impacts will come from activities already implemented, but where the lag effects prevent detection now of the benefits, and from further implementation of technologies, especially perennial pastures in the Fitzgerald and Gillingarra areas.

The loss of modelling capacity to measure the value of the activities in the Upper Coblinine is concerning, and the uncertainty about on-going monitoring referred to previously (and again in Sections 6.1.4) means that benefits still not yet realised may not be observed. A recommendation for committing resources to monitoring is made in Section 6.2.

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Table 5-1 Indicative impacts on resource condition

CDI Project	Main intended resource condition change	Actual resource condition change	Comments
Upper Coblinine	• Annual 5% reduction in recharge in the Catchment • 11.4% reduction in runoff	• 76 ha of saline land adapted for productive salt land grazing • Unable to assess impact of project activities on waterlogging, recharge or salt export	• Unable to assess impact of project activities because company that developed catchment model is no longer in business in WA
Wallatin	• Maintain salinity in the catchment at 8 per cent • 300 ha agricultural land recovered for productive use • 1,000 ha contained from further threat • 400 ha adapted for productive salt land grazing	Based on project sheets … • 130 ha of agricultural land recovered • 470 ha of remnant bushland recovered/ protected • 265 ha of land contained from further threat • 116 ha adapted for productive saltland grazing	• Several projects involving drainage and pumping are not able to report impact yet, but if successful will increase area recovered and contained. • Geophysical work has defined issues in several hundred more hectares
Fitzgerald	• Reduce groundwater rise to 0 m/year • No significant increase in AOCLP	• Groundwater monitoring undertaken by DAFWA is showing that perennial pastures introduction will prevent groundwater rise • Increased area planted to trees will have improved native habitat • Project demonstrated that deep drainage has limited value in improving resource condition	• Success of perennial pastures is likely to result in further adoption, which in turn will lead to further resource condition improvement
Gillingarra	• 6% reduced area with groundwater less than 2 mbgl.	• Perennial pastures effective in preventing groundwater rise on site. • Only 52% of expected plantings achieved which will prevent target being reached • 2,630 ha of riparian vegetation fenced along the Moore River will have improved bank stability and vegetation health • 3,461 ha of remnant vegetation fenced which will improve vegetation health and diversity	• Success of perennial pastures is likely to result in further adoption, which in turn will lead to further resource condition improvement

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5.4 Review the concept and effectiveness of catchment demonstrations

The question – 'review the concept and application of Catchment Demonstrations, their value and recommend options for future use. Consider their use in terms of adoption, resource condition change, and capacity, knowledge and community benefit'.

The question – 'consider their effectiveness in terms of engaging farmers in the catchment, their capacity, wider dissemination and uptake of results in the region, changes to the catchments resource condition and improvement in the knowledge base for salinity management (technical, social, economic)'.

These two questions are best considered together. Based on all of the material available, URS has prepared a summary of the potential strengths and weaknesses of the concept and effectiveness of catchment demonstrations, shown in Table 5-2. These are assessed against the criteria presented in the questions above. Community benefit is interpreted to mean public benefit.

Table 5-2 Strengths and weaknesses of catchment demonstrations (CDs)

Criteria	Potential strengths	Potential weaknesses
Progressing adoption	• Can accelerate adoption of desired practices through financial incentive, strong leadership, and sound executive support (e.g. Project Officers) • Group learning can encourage people to adopt practices that individually they are uncertain about. • The CD can implement technologies that have a high 'adoptability'.	• The 'push to spend' can result in sub-optimal investment in poor technologies or mainly private good activities • Implementation will tend to favour better resourced community members who are better able to commit their own resources • CDs will struggle in an environment where there are no easily available 'adoptable' technologies
Resource condition change	• Accelerated adoption provides an opportunity to achieve meaningful resource condition change, but only if the plan is based on sound biophysical knowledge.	• The average improvement in resource condition as a result of a catchment demonstration may be small (less than 10%)
Engaging farmers	• Financial incentives attract participation and reduce private risk • Farmers engage well in shared experiential learning in their own area	• Farmers without time and financial resources may not be able to engage • Farmers may not be able to adhere to original plans, even over short timetables
Community capacity	• Catchment demonstrations may build further capacity in an already strong community • Knowledge and decision making ability can be strengthened • Responsibility in managing public funds can be developed	• Catchment demonstrations may not build capacity, where it is at a low level prior to commencement, and may increase conflict between landholders and funders • The need to plan, followed by the 'push to implement' may stress community organisational, time and dollar resources
Knowledge base	• Can exploit and then build on existing scientific and experiential knowledge • Evidence of shared learning and confidence (e.g. perennial pastures at Gillingarra, Fact Sheets from Wallatin) • Opportunity for research by other parties (e.g. CSIRO, UWA)	• Where knowledge is inadequate for planning, CDs will be sub-optimal • Technical support may not be available to support planning or implementation

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Criteria	Potential strengths	Potential weaknesses
Community benefit	• Coherent planning at catchment scale can maximise the benefits for the community • Cost sharing arrangements, if properly applied will ensure the wider community gets a 'dividend' from landholder investment.	• The 'push to implement' may result in a shift towards private benefit in the works implemented • Local catchment community may be expecting the CD works to 'solve all problems' • The evidence from the CDI is that the works implemented will deliver a positive but relatively small public benefit
Regional impact	• Visible CDs can have a considerable impact regionally • The opportunity to showcase new technologies • Rapid adoption provides a case study for later R&D	• Farmers outside the catchment may discount the value of 'subsidised adoption' • Simply accelerating the adoption of accepted technologies may not attract regional interest

URS suggests that catchment demonstrations do not have inherent 'strengths and weaknesses'. How well they deliver is a function of the operating context, more than an inherent feature of catchment demonstrations.

This summary suggests that catchment demonstrations (CDs) can be effective and deliver value for money, if the settings are right (in terms of community capacity and baseline information), there is shared understanding of purpose and process, and most importantly, there are realistic and economically profitable technologies to employ (i.e. have a high 'adoptability') and good technical support. The key factor, identified in the interviews and reinforced by members of the Discussion Panel, is the need for CDs to operate within a community with sound, open, confident and mature social processes. Establishment of a CD in a community that has a lesser capacity may not provide full value, and further, it cannot be expected to generate community capacity.

Two of the CDI projects in the Program operated in communities with high existing capacity, and ran relatively well. The other two struggled, and although considerable works were achieved, the governance arrangements in both were problematic, and in the case of one group, soured the experience for all involved. Further, the transaction costs associated with managing these two projects, although not identified separately, are likely to have been considerable.

Our understanding is that there was considerable variation between the catchments in how the processes and actions were used as demonstrations. In some cases, they were very effective at communicating the work within the catchment only, whereas in other cases, they have been used effectively for external communications. More could still be done, which is a point considered in a later section.

5.5 Assess capacity for separate plans in the wheatbelt

The question – 'assess capacity to develop and implement similar plans in the wheatbelt within the context of current investment guidelines and funding programs (NRM)'.

The development of the Implementation Plans, and their translation into works on the ground was problematic in all four projects. It emerged that development of 'static plans' at the commencement of a four year project, followed by strict implementation of those plans is not realistic. The dynamism in

WA farming systems, seasonal fluctuations, changing markets, changing personal preferences and the constant introduction of new technologies exposed the flaws in this 4-year planning approach.

It is worth contrasting the CDI planning approach to the very long planning and implementation processes that have been used in water resource and natural diversity catchments where there is an clear external value to protect (e.g. Toolibin Lake, Wellington Reservoir). In these areas, there has been intensive acquisition of data, on-ground research and development and frequent adjustments to plans to address new issues as they emerge (e.g. surface water management at Toolibin Lake). This is a scale of planning activity that cannot be justified by agricultural values alone.

Rather than invest in strict planning at catchment scale in agricultural landscapes, a preferred approach such as that adopted by the Wallatin Wildlife and Landcare Inc. may be to test and develop technologies suitable for local use to the point where they are attractive for general adoption. This is similar to the industry development programs such as Sustainable Grazing Systems and Productive Use for Saline Lands. Both worked within a group-learning environment, both considered new (to the local area) technologies that would have economic and environmental benefits, and both considered how these technologies can be incorporated at farming system and landscape scale.

5.6 The wider applicability of the approach

The question – 'consider how applicable this approach may be to a wider set of catchment groups. Review the projects learnings in the context of the process used, works undertaken and management (feedback from groups), role of partners/investments and resultant social, technical and financial capacity / skills it developed. Consider the pre-requisites for successful groups, if CDI is undertaken again'.

Catchment planning, and implementation to address threats to natural assets has been underway for many years. However, it remains a challenging area in bio-physical terms, in the face of economic imperatives, and at whole of community scale. The successes have been mixed, although in a number of notable cases, catchment groups that started in the 1980s or 1990s, have evolved into highly effective, systems R&D groups that are refining farming systems and land uses within their areas – for example the Facey Group, the Liebe Group and in Victoria the Birchip Group. However, these groups are the exception, and the Wallatin Wildlife and Landcare Inc. could be considered as a member of this category.

5.6.1 The role of the Government

The CDI invested approximately $6 million of public funds to implement works across 144,000 ha ($42/ha). These works will result in improvements in resource condition, although in no case will a new hydrological equilibrium be established as a result of the works. On-going adaptation and innovation to address existing and emerging difficulties will always be required.

Assuming all of the dryland farming areas would benefit from an intervention such as the CDI, and using the average investment of $42/ha would require approximately $600 million dollars (assuming 15 million dryland ha). It is not feasible to expect Government to invest this amount of money, or for the farming community to be asked to contribute an equivalent level of funding in this manner. In short, extrapolating the CDI model to the whole of the agricultural areas is not realistic, or sensible.

Even a more modest extension of the approach could be risky. As noted previously, the approach was successful where it was able to work within the group's values, capacity and experiences, had

good technologies to demonstrate and where there was a shared sense of purpose and process. The essential prerequisite is community capacity. Given that only 24 catchment groups applied for CDI support, out an estimated 500 or so catchments across the agricultural areas, suggests that the groups themselves recognise that they are not able to take on such a responsibility. Further, of the groups selected, two of these are recognised at state level as having good capacity, thus they are outliers in this area of capacity and not the norm.

5.6.2 Partner investments

The WA and Commonwealth Governments decision to invest in the catchment demonstrations triggered the CDI Program. It also ensured investments by other parties, principally landholders and research and development organisations. The sources of investment in the CDI Program, the organisations represented and the numbers of people involved are presented in Table 5-3, based on the individual final funding reports, and other project information.

Although the level of cash and in-kind investment is a rough estimate at best, the amount of partner involvement and the large number of organisations involved is testament to the value of focused R, D & E investments in rural areas in attracting and facilitating additional effort by third parties.

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Table 5-3 Partner investment and involvement in the CDO Program

	Financial contributions				
	WA and Commonwealth Governments**	**Landholders**	**Other organisations***		
Upper Coblinine	$1.646 m	$0.721 m	In-kind estimate $0.200 m	49 regular 62 less regular	DAFWA, BBG, Gnowangerup Aboriginal Corp, Curtin Volunteers, Shire of Gnowangerup, Shire of Kent, Landmark, Landcare Australia Ltd, SPA, Lucerne Growers Association, Katanning LCDC, Blackwood Basin Group, Land for Wildlife
Wallatin	$1.279	$1.728 m	Cash and in-kind estimate $0.250 m	Not available	DAFWA, CSIRO, CRC Future Farming, DOW, GRDC, SPA, Wheatbelt Development Commission, DEC, Shire of Kellerberrin, Grain & Graze Program, Lucerne Growers Association, CRC LEME, Curtin University, WWF, Wheatbelt NRM, Murdoch University, Edith Cowan University
Fitzgerald	$1.116 m	$1.530 m (from project plan)	Cash and in-kind estimate $0.300 m	48 regular 142 less regular	DAFWA, CSIRO, CENRM, Murdoch University, Precision Agriculture, WANTFA, FBG, Friends of Fitzgerald National Park, DOW, DEC, Geoscience Australia, Centre of Soil Health, UWA, Jerramungup District High School, South Coast NRM
Gillingarra	$1.103 m	Estimate $1.100 million	In-kind estimate $0.060 m	25 regular 6 less regular	DAFWA, Evergreen Group, South West Aboriginal Land and Sea Council, Northern Agricultural Catchments Council
Total	**$5.144m**	**$5.079 m**	**$0.810 m**		

* Where there are no financial details, the contributions of other organisations are estimated on the basis of the voluntary labour contributed. As such these estimates may only be accurate at an order of magnitude level

** includes interest on Government funds, but does not include unspent funds

5.7 Opportunities to continue the Program

The question – 'review opportunities to continue / re-start the program, or components of it (for example continuing M&E), benefits, and recommend resources and organisations to deliver these requirements'.

The arguments presented in the previous sections do not support either a continuation of the CDI program or its recommencement in the same form. However, maximising the value of the work done in the CDI will require some on-going commitment.

Given the long lag times between decision, action and bio-physical response in natural resource management intervention, on-going scrutiny and data collection is critical if the full value of projects is to be revealed. For example, research into the hydrological impact of tree planting generates data over decadal scales. Too often, NRM programs do not contain this commitment to long-term data collection. In the second aspect, consideration needs to be given to re-starting the total CDI program, either within existing or new catchments.

Review of the documents and feedback from CDI participants shows that in most cases sound data have been collected and stored on the works completed, and on the condition of key catchment biophysical indicators at the time of implementation. This provides an excellent baseline for measuring future trends and the long-term impacts of the works completed. It is concerning that no one group was able to demonstrate that adequate systems and resources are either available, or have been committed to enable this essential long-term M&E to continue. Without sound monitoring, benefits will go unrecorded, and further knowledge acquisition will not occur. The point is raised again in the following section.

6 Discussion and recommendations

6.1 Discussion

The discussion is presented against four themes

6.1.1 The use of the projects as demonstrations

- As well as achieving 'accelerated adoption' within the catchment, the CDI was about influencing behavioural change at up to regional scale. The use of the projects as demonstrations varied considerably, but the overall impression is there has been less value gained through extension than could have occurred. This is an opportunity that could still be captured, particularly given the long lag-time between action and response in NRM.
- There is an argument about whether the CDI was about expanding the area of existing technologies or exploring new technologies. It was about both, with accelerated adoption of perennials being valuable in achieving large scale land use change on the south coast, whereas at Gillingarra, perennials represented a new technology for that community. In both cases there is now landscape scale land use change that can be used to assess impacts over future years. The Wallatin group used the opportunity to explore innovative technologies at Wallatin, backed by good science, followed by roll-out at paddock-scale. All of these approaches were within the aim of CDI, and represent substantial achievements.
- As well as demonstrating works on the ground, there was an opportunity to demonstrate community processes, collective decision-making, responsible investment of public funds and shared learning. However, while this occurred well in two projects, it was much less satisfactory in the other two projects. The former would have provided good demonstrations; the latter two would not have been suitable for that purpose.

6.1.2 The need for Catchment scale planning?

- As noted in Section 1.3.1, a role for intervention at catchment scale in agricultural areas was envisaged in the *Salinity Action Plan*. Agricultural (as opposed to recovery) catchment planning and action can now be critiqued after the experiences of Rapid Catchment Appraisal, Focus Catchment planning, and now the CDI. Clearly there is a role for catchment planning and action when one landholder's management of water affects others. It is becoming clear that in the case of groundwater management, this is not often the case. Thus an important argument for operating at biophysical catchment scale has been challenged.
- Collective planning, action and learning are successful approaches to developing knowledge and practice change, as shown by the experiences of farmer grower groups and programs such as Sustainable Grazing on Saline Lands (SGSL). However, these groups are not normally defined by or confined to biophysical catchment boundaries, and instead link through community processes and industry interests. Although the CDI operated within catchment boundaries, the projects could have operated within other types of groups. Further, advice received by URS is that there may only have been another three catchment groups within the Avon Basin with the maturity to have taken on a CDI project. If the biophysical imperative for operating at catchment scale is not strong, then it may be preferable to work within preferred and perhaps stronger social, community or industry groupings.
- Catchment planning and action requires good baseline data, sound technologies and access to good technical skills and knowledge. In three of the CDI projects, perennial pastures provide economic and environmental benefits. In the fourth (Wallatin), the project looked for technologies with these characteristics. Across the drier land agricultural areas, profitable technologies to

address rising saline groundwater do not exist. Planning for implementation without suitable technologies has little value. Similarly, without adequate baseline information, planning occurs in an environment of uncertainty with no ability to link planned actions to expected outcomes. Finally, the difficulty in accessing good technical skills was an on-going problem in all projects, although over time, the matters were resolved to a degree. Expecting landholders within a group to invest their own time and money in technologies with uncertain outcomes and in the absence of sound technical support is unrealistic.

- The lack of private sector commercially-based support for investments in NRM activities is a barrier to landholders accessing the required skills and knowledge to implement required practices with confidence. The dearth of private sector activity in areas such as surface water management, saline pastures establishment and perennial pastures establishment contrasts with the abundant availability of commercial services in crop and annual pastures agronomy.
- The difficulty in establishing a fixed four year plan in a dynamic agricultural environment has already been noted. The consequence in the CDI was the need for numerous variations requiring approval, compromises in implementation, and some evident stress for Project Officers, local committees and State management. A flexible approach that is better aligned to the challenges facing agricultural businesses is required.
- The theory of how public funds should be invested to achieve public outcomes is well understood. However, in implementation, inevitable compromises will be made. Attempting to adhere to a purist model of cost sharing is not likely to work. Most practitioners in this area recognise that to achieve a public good outcome will require differing cost share arrangements according to case-by-case circumstance. In the Fitzgerald CDI project, one desired outcome was critical mass in adoption of perennial pastures to enable detection of hydrological change – which required some amendment to the original rules.
- An advantage offered by intensive intervention through the CDI projects is that the locations and activities can be subjects for investigations by other parties. This occurred in the Wallatin Creek and Fitzgerald CDI Projects, with the involvement of CSIRO and UWA research scientists. This value-adding of the original investment needs to be encouraged and then recognised in any assessment of the overall value of such a Program.
- The CDI projects were, in part, about accelerated adoption achieving practice change at landscape scale. This occurred in three of the four catchments, owing to the existence of feasible technologies (principally perennial pastures). They were not about 'fixing salinity'; although the impression gained from some people involved is that they now believe the job is done. This view does not account for the need for farming systems to adapt continually to new challenges and opportunities as they emerge.

6.1.3 The challenge for communities

- Previous sections have highlighted the critical importance of good social processes and community capacity as a foundation for effective catchment-scale action. The importance of good governance, involving clear responsibilities and accountabilities in achieving smooth operations and good decision-making was evident. Where governance was contested, and responsibilities unclear, problems emerged which lessened the effectiveness of the project. Related to this is the importance of good relationships and trust between people, both within the catchment groups, and between groups and other parties.

6 Discussion and recommendations

- In each case, the Project Officers played a vital role in facilitating group processes, acting as an intermediary between Government and landholders, in helping interpreting plans to action on the ground, and in data capture and storage. This contribution needs to be emphasised and recognised. Several people interviewed stated that the projects would not have been completed without the drive and commitment from their Project Officers.
- The CDI projects were challenging for the 'host' communities in a number of ways. Over a reasonably short period of time (three to four years), groups of 15 to 20 landholders were required to invest significant public and private dollars in new technologies. In planning the CDI, the challenges of 'time and dollar scarcity' may not have been fully appreciated by Government decision-makers. Although all catchment groups were able to complete their projects, for which they deserve praise, perhaps too many compromises were made in how the funds were invested. Further, there is an impression that the groups are ready now for a rest from this period of relatively hectic and at time stressful activity.
- Committing to the CDI project required 'catchment thinking' and the application of 'catchment knowledge'. For some landholders this was difficult, and seemingly unnecessary, with their main focus being the works that they were applying on their farm, and not how these could contribute to catchment-wide outcomes. The manner in which some of the implementation planning occurred reinforced this approach, with individual landholders' desired works captured in isolation, prior to aggregation upwards into a 'catchment plan'. This is not unexpected, and highlights the importance of having technologies that can make both private and public contributions wherever they are applied.
- The 'gap' between the concept of the CDI as planned and executed at State Government level, and the challenges facing landholders in putting the concept into practice in the face of seasonal and commodity price difficulties may not have been fully appreciated at the start of the program. Thus while Government can plan and operate in one 'space' (e.g. $6 million, four projects, four groups, five years), landholders have to plan and operate in another 'space' (changing prices, frost 'wipe-outs', droughts, changing interest rates). The two spaces may not be aligned, yet it is not easy for each party to flex to the others needs.

6.1.4 Managing the legacy

- The CDI has been a significant public investment and will leave a legacy of lasting land use change in the four catchments. However, it is unclear how this legacy will be maintained and its value maximised.
- Based on discussions with participants in all CDI projects, it is apparent that the groups intend to 'take a break' after the intense activity in implementing the on-ground activities. While this time will be used by some to reflect on the project activities, there was little evidence that participants have considered what priorities/ plans/ strategies will be pursued in their catchments into the future. Government should maintain a watching brief on these catchment groups and be prepared to facilitate and support future NRM activities.
- All projects have compiled good baseline data on biophysical state and the works installed. Tracking trends through time is essential, and the means to monitor (e.g. piezometers, photo-standards etc) are mostly in place. However in all projects it is unclear what systems and resources have been committed to ensure that on-going monitoring and analysis is undertaken.
- The work done in the four catchments have generated a range of new knowledge, both scientific and experiential. This knowledge needs to be properly captured. The Wallatin Creek group have

prepared a number of Fact Sheets documenting the outcomes from their individual projects. There is less documentary information available that summarises findings in other projects.

- There was no economic evaluation either of the Implementation Plans or of the completed works. Given the recognition that technologies that have environmental (i.e. public) benefits need also to have economic (i.e. private) benefits to ensure adoption, the lack of economic evaluation can be considered a gap in process.

6.2 Recommendations

1. The CDI Program has delivered on its objectives and served its purpose to demonstrate this catchment-level intervention approach. Accelerated adoption of desired practices has occurred However, it is clear that there were difficulties and frustrations in implementation at all levels, and concerns about the universality of the approach. Given these difficulties, and the impracticality of implementing this approach over the wider dryland agricultural areas, the approach need not be repeated, nor implemented more widely in addressing land and water management issues in the agricultural areas.
2. The focus in public investment to addressing environmental challenges in agricultural land use, where there are limited public values at risk, should continue to be in the development of technologies that deliver environmental (i.e. public) and economic (i.e. private) benefits.
3. The CDI Program has highlighted the lack of private sector commercial support for NRM investments, which is a barrier to landholders implementing practices with confidence. Government needs to facilitate and support the development of demand and supply for these professional and commercial services, in partnership with organisations such as the Australian Agricultural Consultants Association, and the Grower Groups Alliance.
4. Given the long lag-time between action and response in hydrological functioning, maintaining M&E commitment is a critical requirement in realising the full value of the CDI investment. Given that resources are scarce, deciding what is worth monitoring to obtain maximised value information, and setting up and resourcing systems needs attention.
5. The CDI projects should be subjected to a full benefit-cost analysis as part of maximising the value of the public investment in this very large scale ‘experiment’ in environmental management in the agricultural areas.
6. Although the CDI projects are complete, the works put in place and how those works influence both farming systems and environmental outcomes over coming years needs to be tracked. The Government should retain the capacity to use these catchments as demonstrations, and as sites for research into the future.
7. In planning publicly funded programs that require participation of farming businesses for their success, Government needs to be more aware of the very different operating environments in each domain. This will require increased flexibility in planning the programs, and more preparedness to adjust the program as circumstances arise.

7

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7.1 Project Plans and Major Reports

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Wallatin Wildlife and Landcare Inc. (2004). *Bringing it all Together: A Whole of Catchment Approach to Integrated Water Management*, The Wallatin and O'Brien Catchment Demonstration Initiative.

7.2 Examples of information products produced by CDI Projects

Fitzgerald River CDI (various). *A word from the Paddock*. A series of information notes describing project activities on individual farms in the catchment.

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Wallatin Wildlife and Landcare (Inc.) (2010*). Value of the CDI to local farmers*. Video presentation.

Wallatin Wildlife and Landcare (Inc.) (various*). Project Sheets*. A series of information notes describing individual project activities (e.g. Lucerne (W2), Kodj Kodjin Salinity Control W4), Mid-slope Saltland Rehabilitation (W7))

Wallatin Wildlife and Landcare (Inc.) (various*). Technical Sheets*. A series of information notes describing a range of technologies including groundwater pumping, geophysics, saline pastures establishment, salinity risk assessment, deep drains, use of siphons and lucerne establishment.

7.3 Examples of papers and reports from partners

The CDI Projects provided data and information that has been reported in a number of papers and reports written by research workers in partner organisations. A sample of documents is presented.

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Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of Department of Agriculture and Food and only those third parties who have been authorised in writing by URS to rely on the report. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 8 December 2009.

The methodology adopted and sources of information used by URS are outlined in this report. URS has made no independent verification of this information beyond the agreed scope of works and URS assumes no responsibility for any inaccuracies or omissions. No indications were found during our investigations that information contained in this report as provided to URS was false.

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A

Appendix A Consultation processes

The people consulted as part of this evaluation and the purpose of the contact is shown in Table A-1.

Table A-1 People consulted as part of this evaluation

Name	Organisation	Purpose of contact
Steering Committee and CDI administration		
Barbara Morell	DAFWA	CDI Manager, Perth
Sue Walker	PGA	Steering Committee member
Garry English	SCNRM	Steering Committee member
John Holley	DAFWA	Funding arrangements for the Upper Coblinine CDI project
Kevin Goss	FFICRC	Steering Committee member
Richard George	DAFWA, Bunbury	Chair, Steering Committee
Rob Kelly	CSIRO	Steering Committee member
Sue Walker	PGA	Steering Committee member
Upper Coblinine CDI Project		
Greg Hales	BBG	Consultant, implementation planning
Harry Weir	Kingston Harrop	Consultant, implementation planning
Jill Richardson	KLCDC	Project Manager, Upper Coblinine Project
Ella Maesepp	KLCDC	Project Officer, Upper Coblinine Project
Damien Hills	DAFWA (formerly SWCC)	Implementation planning for Upper Coblinine CDI Project
Simon Hill	Upper Coblinine Catchment Group	Chairperson, Upper Coblinine Project Steering Committee
Steve Tunbridge	DAFWA	Member, Upper Coblinine Project Steering Committee
Wallatin Creek		
Glenyce Batchelor	WNRM (formerly ACC)	Project Officer, Wallatin Creek
Renee Manning	DAFWA, Merredin	Member, Wallatin Project Steering Committee
Peter Sullivan	Wheatbelt NRM	Funding Manager, Wallatin Project
John Nicholls	Wallatin Group	Chairperson, Wallatin Creek CDI Project
Liz Kington	Wheatbelt NRM	Implementation planning for Wallatin Creek CDI Project
Viv Read	Viv Read and Associates	Consultant, implementation planning
Sue McFarlane	Wallatin Group	Committee member, Wallatin Creek CDI Project
Fitzgerald		
Rob Edkins	SCNRM	Funding Manager, Fitzgerald
Carolyn Daniel	Daniel Landcare Service	Consultant, implementation planning
Ed Barrett-Lennard	DAFWA	Discussion Panel
Linda Lee	Formerly FBG	Project Officer, Fitzgerald Project
Rob Edkins	SCNRM	Funding Manager, Fitzgerald

Appendix A

Name	Organisation	Purpose of contact
Tim Overheu	DAFWA Albany	Technical adviser, Fitzgerald Project
Rob Lester	Fitzgerald Group	Member, Fitzgerald CDI Committee
Trevor and Alison Ross	Fitzgerald Group	Chairperson, Fitzgerald CDI Committee
Anne Sparrow	Fitzgerald Biosphere Group	FBG supported implementation of Fitzgerald CDI Project
Gillingarra		
Mike Clarke	DAFWA	Member, Gillingarra CDI Project Committee
Mark Weston	NACC	Project Officer, Gillingarra Project
Sue Middleton	Consultant	Consultant, implementation planning
Richard Nixon	Australian Bore Consultants	Consultant, Gillingarra CDI Project
Tim Wiley	Department of Agriculture and Food	Technical support provided in perennial pastures establishment
Viv Read	Viv Read and Associates	Consultant, implementation planning

The members of the Discussion Panel are shown below in Table A-2.

Table A-2 The Discussion Panel

Name	Organisation	Area of expertise
Natarsha Woods	Wheatbelt NRM	Regional NRM, change management
Liz Kington	Wheatbelt NRM	Regional NRM, investment in catchment management
Andrew McTaggart	URS Australia	Water resource management
Ed Barrett-Lennard	Department of Agriculture and Food	Management of saline lands, salt land agronomy, change management
Sally Marsh	UWA	Resource economics, adoption of new practices

B

Appendix B Stakeholder interview questions

Involvement

- Please describe your involvement/ experience with CDI? – what was your role?
- Where you able to successfully undertake your role?
- What might have helped to improve outcomes associated with your responsibilities?

The process

- How well did the catchment group members, project officers and/or consultants work together?
- What is your understanding of the organisational structure for the delivery of CDI in your catchment?
- Did the project include all/most of catchment farmers?
- Did the project bring the community together to provide catchment rather than farm level outcomes?
- What worked well, what didn't, what might be improved?

The Plan

- How well did the plan address the key NRM issues in the catchment?
- Was there technical agreement of what actions were required?
- Was there farmer agreement of what actions were required, or would provide the most benefits?
- What mix of private and catchment benefits is it likely to provide?
- How did the plan address cost-sharing and benefit-sharing between public and private interests?

Implementation

- How well has the plan been implemented?
- Where all the proposed activities undertaken?
- What were any difficulties, how were they overcome, or how could they be avoided?
- With experience would there be a different priority put on different activities? If so what?
- What worked well, what didn't, what might be improved?

Benefits

- Of any benefits gained (water management, ecological, sustainable production, social) - what has been the most important? Why?
- Has there been any approach to qualify or value them?
- What changes in been delivered in the catchment – to the knowledge base? Community cohesion and cooperation? Linkages between landholders and scientists?
- Have the CDI activities influenced other catchments/ landholders/ NRM decision makers?
- Will demonstrations be enough or will technical help and funds be required to achieve adoption in other areas?

Monitoring

- Are monitoring arrangement in place to assess long term catchment outcomes?
- Are monitoring arrangements in place to assess the value of this CDI project to other catchments?

Going forward

- From the perspective of your involvement, what went well?
- What would you like to see with any continuation?
- What has the CDI programme added to improving approaches to nrm?

Appendix B

- Was the CDI project value for money?
- Should the CDI process be repeated?
- What is your suggestion for Government about projects in NRM similar to CDI?

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