NORTHERN AUSTRALIA IRRIGATION FUTURES

Providing new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia

National Program for Sustainable Irrigation

CDS23 – FINAL REPORT APPENDICES

December 2007

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The contents of this publication do not purport to represent the position of the Project Partners[1] in any way and are presented for the purpose of informing and stimulating discussion for improved decision making regarding irrigation in northern Australia.

[1] The Project Partners are: CSIRO, Land and Water Australia, National Program for Sustainable Irrigation, CRC for Irrigation Futures, and the Governments of Australia, Queensland, Northern Territory and Western Australia.

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These Appendices form part of and should be read in conjunction with the Northern Australia Irrigation Futures NPSI CDS23 Final Report, which contains a synthesised view of all the NAIF work carried out to date and a summary of the key take home messages.

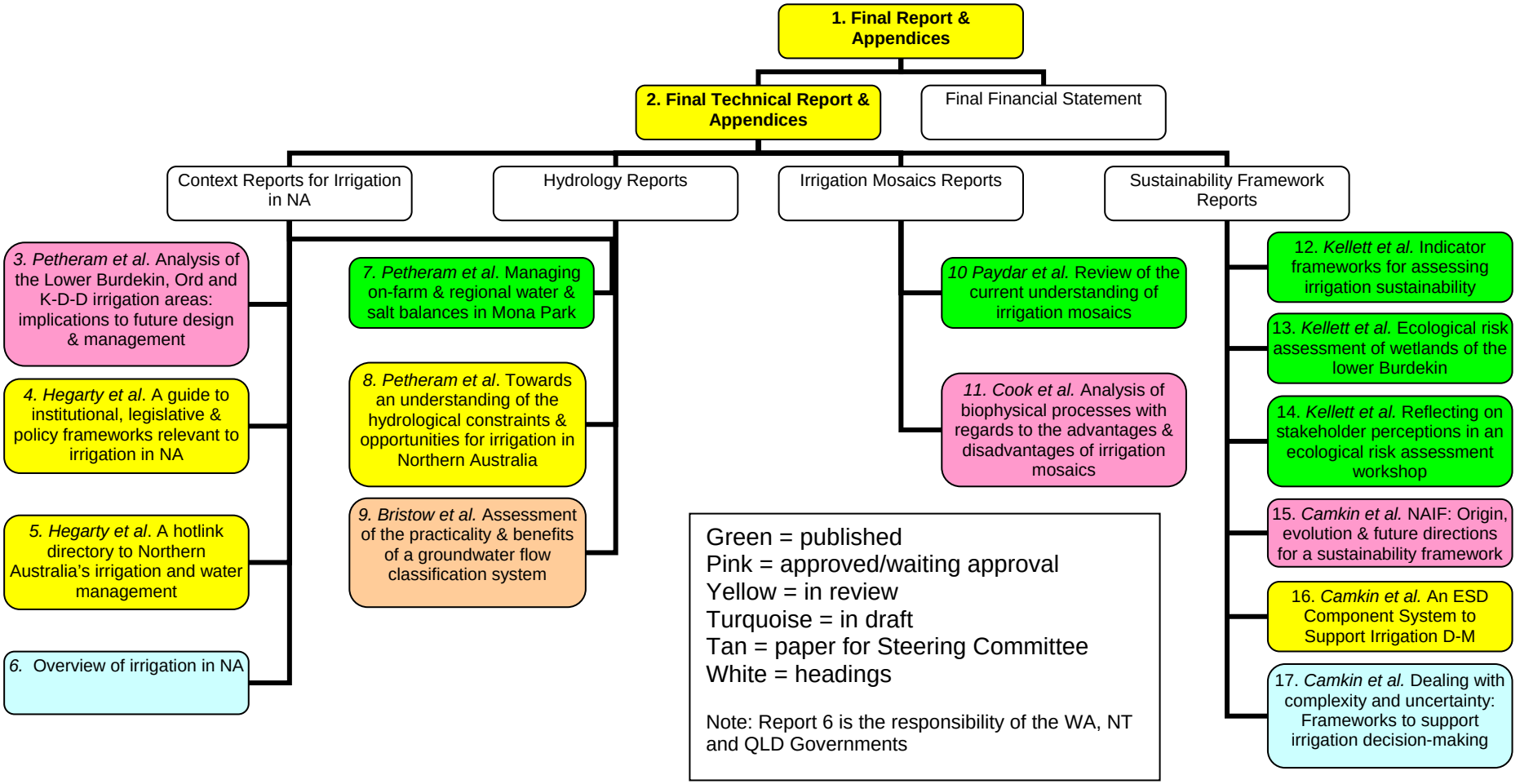
Appendix 1

NORTHERN AUSTRALIA IRRIGATION FUTURES

NPSI CDS23 FINAL REPORT STRUCTURE

DECEMBER 2007

NAIF NPSI CDS23 FINAL REPORT STRUCTURE



Appendix 2

NORTHERN AUSTRALIA IRRIGATION FUTURES

STEERING COMMITTEE TERMS OF REFERENCE AND MEMBERSHIP

DECEMBER 2007

NAIF STEERING COMMITTEE

TERMS OF REFERENCE (as at 02/05/06):

OBJECTIVE

The Steering Committee will provide strategic advice and guidance to the project to ensure:

1. Robustness of the technical and scientific quality of the project, and
2. That the project secures adequate resourcing to develop, test, and deliver an acceptable framework to stakeholders that will help improve the quality of debate and decision making regarding the future of irrigation in northern Australia.

It will do this, subject to contractual requirements of the project, by:

1. Maintaining a close working relationship with the Project Leader and broader project team
2. Ongoing review and endorsement of project goals and objectives, timelines and implementation / delivery strategies
3. Identifying strategic project risks and endorsement of actions to address these risks
4. Identifying, influencing and assisting the project team to secure appropriate funding and other support for the project to meet its goals
5. Identifying key data sources and activities (competing & synergistic) important to the success of the project
6. Assisting with communication between the project and key stakeholders in line with advice received from the Stakeholder Reference Group
7. Identifying comparable work being undertaken by other agencies / organisations
8. Collaborating closely with the Stakeholder Reference Group

COMPOSITION:
A small committee comprising people with specific skills and knowledge relevant to the project meeting its objectives and representatives of the major project funders

Key characteristics required of members will include skills in and knowledge of:

- northern Australia environments (hydrology, landscapes, ecology) and environmental issues relevant to irrigation in northern Australia
- tropical river systems
- indigenous issues relevant to water and irrigation in northern Australia
- the design and operation of irrigation systems in northern Australia
- social and economic issues relevant to irrigation in northern Australia
- stakeholder engagement and communication
- policy and decision making frameworks
- strategic research and delivery of practical outputs
- funding for strategic research and development projects
- project management and project delivery

Representation on the SC committee will be drawn from major funders, including the:

- Australian Government (eg DAFF, LWA, CRC IF, DEH)
- Queensland Government (eg NRMW)
- Northern Territory Government (eg NRETA)

- Western Australian Government (eg DoW)
- Public/Private investors (eg NPSI)

Steering Committee Membership at 31/10/07

1. Ian Atkinson, CRC for Irrigation Futures
2. Tom Crothers, QLD Department of Natural Resources and Water
3. Kevin Devlin, SunWater
4. Andrew Kelly, North Burdekin Water Board
5. Ian Lancaster (Chair), NT Department of Natural Resources, Environment & The Arts
6. Anwen Lovett, Land and Water Australia / NPSI
7. John Ruprecht, WA Department of Water
8. Christine Schweizer, Australian Department of Environment and Water Resources

Appendix 3

NORTHERN AUSTRALIA IRRIGATION FUTURES

STAGE 2 WORK PLAN

DECEMBER 2007

NORTHERN AUSTRALIA IRRIGATION FUTURES

Providing new knowledge, tools, and processes to support debate and decision making regarding irrigation in northern Australia



Keith L. Bristow, Jeff Camkin, Cuan Petheram, Bart Kellett, Freeman Cook, Di Popham & others

CSIRO Land and Water / CRC IF / NT, QLD, WA & Australian governments

STAGE 2 WORK PLAN

1 DECEMBER 2005

SECTION 1. PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide details on the Stage 2 Work Plan for the Northern Australia Irrigation Futures (NAIF) project. Importantly, the Work Plan provides a balance between the need for timely delivery of specific outputs, the need to maintain flexibility to adjust to learnings and opportunities that arise during the course of the project and the ultimate objective of the project, which is to provide new knowledge, tools and processes that communities and governments aspire to use for long-term strategic decision making (50+ years).

The NAIF project follows an active participatory research model. It has been and continues to be expected that changes to the project Work Plan will be required from time to time. Proposed amendments to this Work Plan will be provided to the NAIF Steering Committee for approval as part of the Project Status and Summary Reports.

This Work Plan was approved by the NAIF project Steering Committee on 1 December 2005.

SECTION 2. THE STAGES OF THE NAIF PROJECT

The NAIF project currently has two stages: Project Initiation and Definition; and Development and Testing a Sustainability Framework. If the project is successful in delivering a sustainability framework that is of practical use to decision-makers, including individuals, communities and governments, a third stage supporting the utilisation of the sustainability framework is envisaged. The Stages of the NAIF project are represented in Figure 1.

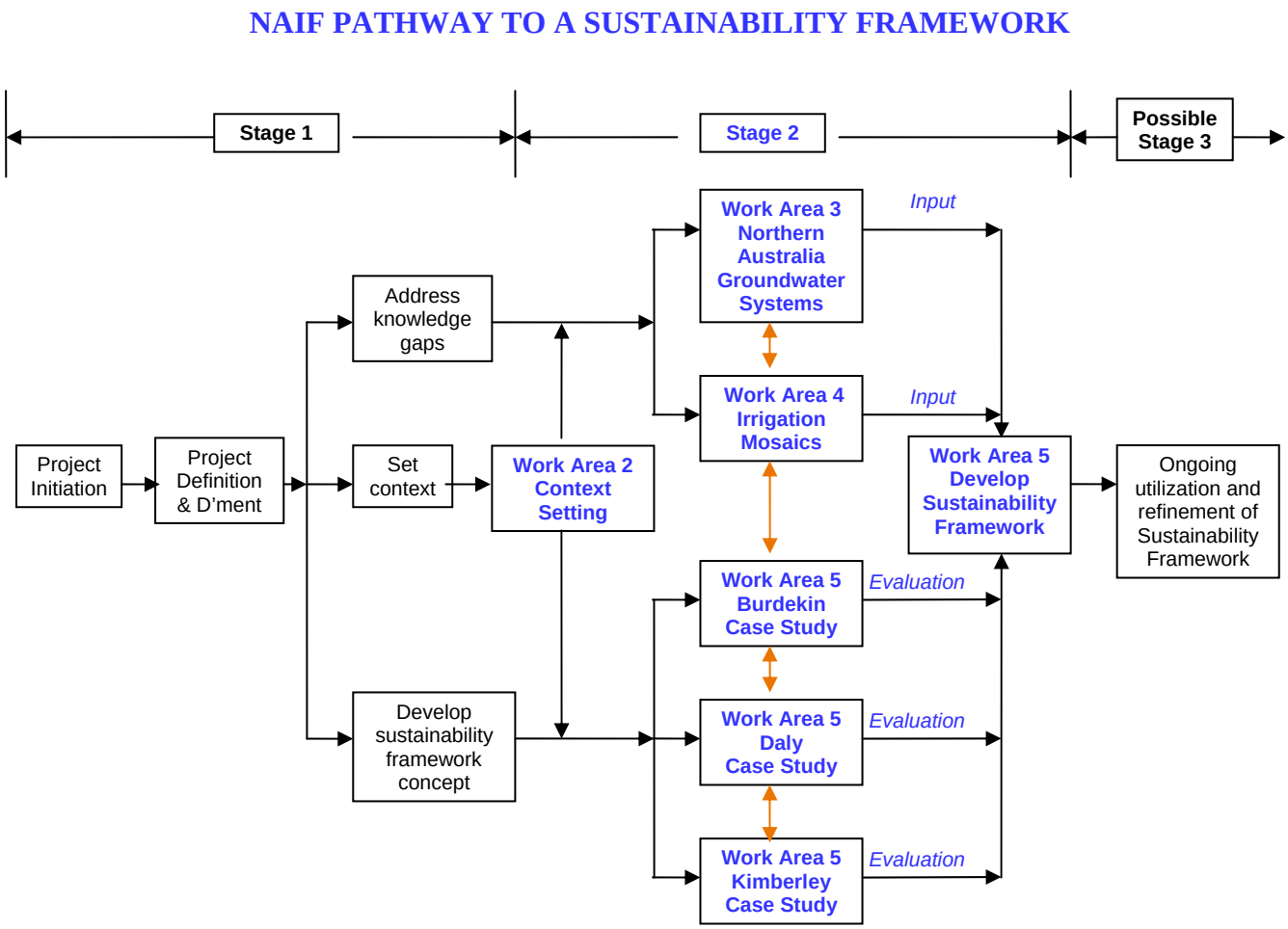


Figure 1. *The stages and components of the NAIF project. Work Area 1 is Project Management and Delivery which cuts across all other work areas.*

Stage 1: Project Initiation and Definition

Stage one of the NAIF project was launched during the Australian National Committee on Irrigation and Drainage (ANCID) conference in October 2003. Stage 1 focussed on engaging a broad range of clients and stakeholders, and formulating a Work Plan, project team and funding arrangements for Stage 2.

The outputs and outcomes from Stage 1 are documented in:

- Milestone 1 Report (November 2003)
- Milestone 2 Report (June 2004)
- Draft Milestone 3 Report (May 2005).

The main outcome of project activities to date, as reported in the Milestone 2 Report, were the widespread support for the project and for proceeding with a Stage, establishment of a project team and budget for review and approval by key stakeholders, including the Steering Committee, the National Program for Sustainable Irrigation and the CRC for Irrigation Futures. There was strong support for the NAIF project to be linked to key case study sites.

The Milestone 2 Report noted that because of limited time and resources, the NAIF project will need to be clear about what it can address and what others need to address. A key part of managing this issue will be awareness of and development of linkages with other activities and initiatives.

In developing the Work Plan for Stage 2 of NAIF, Milestone 2 Report noted that activities will need to be detailed and allowance made for changing these activities through time as the project evolves. This is deemed necessary in such a complex project and to ensure that the project is continually building on new knowledge and learnings. It also demonstrates the need for peer review on some specific aspects of the project to ensure there is strong justification for any new direction or to reinforce that the current approach is the most appropriate.

The Report also noted that the NAIF project will need to be fully integrated into the CRC IF suite of projects to ensure it contributes to core CRC IF activities and captures relevant CRC IF input, particularly in addressing some of the social, economic and institutional issues associated with sustainable irrigation in northern Australia.

A draft Milestone 3 Report was submitted in May 2005 and is awaiting updated work plans prior to approval by the Steering Committee and NPSI.

Stage 2: Developing, Testing and Applying a Sustainability Framework

Stage 2 of the NAIF project focuses on developing, testing and applying a sustainability framework. The Project Schedule requires and the Steering Committee has requested that a detailed Work Plan be prepared which indicates, in particular, the key activities, deliverables, timelines and responsibilities.

Section 3 to this document details the revised Stage 2 Work Plan. In preparing this Work Plan, the Project Team has taken into consideration the outcomes of Stage 1, further comments from the Steering Committee and stakeholders, and learnings from NAIF project activities to date in both Stage 1 and Stage 2.

A primary consideration in reviewing the Work Plan was the need to meet a range of Steering Committee and stakeholder interests and to ensure the development of the sustainability framework proceeds in a way that provides the best likelihood that it will be both supported and of practical use to individuals, community groups, governments and others making decisions in relation to the future of irrigation in northern Australia.

SECTION 3. THE STAGE 2 WORK PLAN

On 26-27 May 2004 a workshop of Australian governments associated with northern Australia irrigation (WA, NT, QLD and Commonwealth) was held in Darwin in the presence of some of the key project stakeholders (NPSI, CRCIF). The workshop provides considerable guidance for the development of the Stage 2 Work Plan.

Key Issues
The key issues identified at the Darwin workshop were:

1. Meeting indigenous needs and taking account of indigenous knowledge
2. Institutional arrangements to address scale
3. Focus on groundwater and conjunctive use
4. Irrigator behaviour and management
5. COAG water reform framework
6. Role of decision support tools and trade-off analysis
7. Move to private investment environment (all states)
8. Emphasis on biophysical (vs socioeconomic knowledge needs and gaps)
9. Database management
10. Communication and delivery.

Key Implications
The key implications for NAIF emanating from the workshop were grouped into content and process, and summarised as:

Content

- The importance of independent groundwater systems in the future of irrigation development in northern Australia and as a key component in the biophysical component of the sustainability framework;
- The importance of irrigation system design where indigenous communities are involved;
- The development of more specific produce definitions and delivery systems. This will be important to both developing cash resourcing opportunities as well as providing greater appreciation of benefits and confidence in the project by different stakeholders;
- Clarification of whether the project will develop decision support systems and if so, the types of support systems envisaged;
- Better definition is needed between the interface of the biophysical components with socioeconomics, or with social, economic and institutional components of the framework; and
- There are significant differences in northern Australia regarding the possible scale, shape and design of irrigation developments.

Process

- Significant opportunities are present in linking with other State/Territory and Commonwealth initiatives to both extend the skills available to the project and to enhance its resourcing for meeting its objectives;
- The project may need to focus on key issues should it be limited by cash resources and success with linking with other initiatives;
- A strong communication strategy will need to be developed including the effective engagement with key stakeholders, development of a common language, and the management of expectations. As engagement of communication imperatives can be

resource demanding, the resourcing of such communication requirements should be recognised and resources made available to the project;
- The design of specific engagement processes for indigenous communities and the injection into project skills of some appreciation of the indigenous view of landscape and the associated design of irrigation developments; and
- Further clarification will be required in developing useful types of decision support tools and how far the framework extends to addressing the need for tradeoffs between environmental, social and economic benefits and costs across a range of spatial scales.

Conclusions and Recommendations
The conclusions and recommendations from the Darwin workshop were:

1. There was a high level of support and strong indications of prospective involvement evident from all governments who participated in the workshop. Given the support for developing the sustainability framework evident at the workshop, it is appropriate for a work plan or business plan to be developed for Stage 2 of the NAIF project.

   Recommendation: A work plan be developed for Stage 2 of the project that recognises the important linkages of existing and prospective State and Commonwealth initiatives.

   Recommendation: NAIF needs to further engage with some specific agencies not represented at the workshop (eg EPA and DPIF Queensland, Tropical Savannas CRC etc).

2. The work plan needs to specifically address issues raised at the workshop and identified in this report.

   Recommendation: NAIF needs to specifically address in its Stage 2 work plan: a communications strategy, the linkages to other initiatives, and specific products and delivery systems.

3. It is evident that the Steering Committee for the NAIF project engages a wide range of key stakeholders.

   Recommendation: In discussions with key contacts in each State/Territory that the Project Leader and Steering Committee ensure as far as possible that all agencies are well connected to the project through the key contacts in each State/Territory.

The outcomes of the Darwin workshop, later Steering Committee guidance and considerations by the Project Team have formed the view that Stage 2 NAIF activities should be grouped under the following five work areas:

- Project Management and Delivery
- Context Setting and Northern Australia Inventory
- Understanding Groundwater Systems of Northern Australia
- Understanding Irrigation Mosaics
- Developing, Testing and Applying a Sustainability Framework.

The activities to be undertaken under each of these work areas are detailed below. Lead responsibility and the main assisting officers are indicated. Most project team members will make small contributions to many activities across the project.

This revised Stage 2 Work Plan pre-supposes a higher level of emphasis on case studies. More emphasis on the development of the sustainability framework through the application of concepts developed in Stage 1 and the early part of Stage 2 to real case studies will help ensure that the final framework is supported and has practical application. Increased emphasis on the case studies will also:

- Demonstrate that the NAIF project will provide for the incorporation of ecological, social, economic and cultural values in a comprehensive sustainability framework;
- Ensure that the risks and limitations of irrigation in northern Australia are clearly identified;
- Focus the role of the Stakeholder Reference Group on the conversion of lessons from the case studies into a sustainability framework;
- Ensure the Stakeholder Reference Group has the opportunity to understand the direct relevance of decisions about irrigation in northern Australia to the future of those individuals and communities; and
- Meet the expectations of the NT, QLD and WA governments for assistance in the resolution of important current issues where it is consistent with the NAIF project objectives.

It is essential that we demonstrate that the sustainability framework is a practical tool. For each case study area we will have significant knowledge and they are ideal areas to test the framework. The three case study sites represent a Greenfield (Kimberley), semi-developed (Daly) and highly developed irrigation system (Burdekin), each providing additional insight. For example, the Burdekin case study will provide insights into the changes required, if any, to improve the sustainability of the system and its surrounds (such as the Great Barrier Reef). Each case study will inform the development of sustainability indicators relevant to northern Australia.

The increased emphasis on the case studies will require a shift in the application of the 0.3 FTE in-kind support commitment from the NT, QLD and WA governments. Initially, the in-kind support would be largely hydrogeology expertise applied in the Context Setting and Northern Australia Inventory, and Understanding Groundwater Systems of Northern Australia work areas. From March 2006 the focus would start to shift to the need for in-kind support from officers who understand the issues in the Case Study areas and have a good relationship with the key stakeholders. Different officers may be required for these functions.

Work Area 1: Project Management and Delivery

Activity 1.1: Project monitoring, reporting and oversight

Description: A Project Monitoring and Reporting Strategy will be prepared to provide for continuous monitoring and reporting of project progress and to enable timely adaptation to address issues and take opportunities that arise. The Strategy will outline the processes to be used in monitoring, reporting and improving the performance of the project to ensure that the deliverables and project outcomes are achieved and that duplication of reporting requirements is minimised.

Deliverables: (i) Project monitoring and reporting strategy (20 December 2005); and (ii) Project reporting (ongoing).

Who: Keith Bristow is the NAIF Project Leader and has overall responsibility for project oversight. Jeff Camkin has lead responsibility for project monitoring and reporting, including preparation of the NPSI milestone reports.

Timeframe: 1 January 2005 to 30 June 2007.

Activity 1.2: General stakeholder engagement and communications

Description: The NAIF project is addressing highly emotive and politically sensitive issues concerning water systems and irrigation in Northern Australia. There are also large expectations of the project and strongly polarised views (pro-development versus pro-protection) about northern Australia and the role irrigation may or may not play in its future. The Stakeholder Participation Plan and Communication Risk Management Plan will address relevant matters including risk management and communication products, stakeholder engagement, the Stakeholder Reference Group and the role of peer review.

Deliverables: (i) Communication Risk Management Plan (31 December 2005); (ii) Stakeholder Participation Plan (31 January 2006); (iii) Coordination of the Stakeholder Reference Group (ongoing); and (iv) General stakeholder engagement and communication activities (ongoing).

Key Linkages: Tropical Rivers Program stakeholder network and communications.

Who: Jeff Camkin has lead responsibility for stakeholder management. The Communication Risk Management Plan will be delivered by an external contract.

Timeframe: 1 January 2005 - 30 June 2007.

Activity 1.3: Maximising beneficial links

Description: The NAIF project is well positioned to link with and support other programs, NRM regional bodies, local governments and communities, and the Commonwealth, WA, NT and QLD governments who have responsibilities for northern Australia.

Deliverables: To be agreed with Steering Committee on an ongoing basis depending on opportunities.

Key Linkages: Land and Water Australia's Tropical Rivers Program, CRC for Irrigation Futures Sustainability Challenge project, CRC for Irrigation Futures Mark 2 Research Plan (especially systems harmonization and solute signature analysis and salt movement in the root zone), the Goulburn-Broken Irrigation Futures project, the ANCID 2006 Conference in Darwin, the CSIRO/UNE/CRCIF Planning for Change and Framework for Organisational and Institutional Arrangements project and other Commonwealth, NT, QLD and WA government initiatives.

Who:	Keith Bristow has lead responsibility for ensuring that appropriate beneficial linkages with other programs are achieved. All project team members are expected to significantly contribute in this area. The commitment of resources is to be assessed and determined as opportunities arise.
Timeframe:	1 January 2005 – 30 June 2007.

Work Area 2: Context Setting and Northern Australia Inventory

Activity 2.1: Review of institutional frameworks relevant to irrigation in northern Australia

Description: The policy, legislation and institution arrangements relevant to water and irrigation and water management in northern Australia are reviewed to identify formal control structures and influences on communities and decision-makers.

Deliverables: Report "Guide to Northern Australia Institutional Frameworks" (December 2005).

Key Linkages: Tropical Rivers Program.

Who: Patrick Hegarty has lead responsibility for this activity with assistance from Keith Bristow and Jeff Camkin.

Timeframe: August 2005 – 31 December 2005.

Activity 2.2: Review of past and present irrigation in northern Australia

Description: An overview of irrigation in northern Australia will be presented, providing an information platform for all of the other components of the project. An overview of the major irrigation schemes will be presented with emphasis placed on trying to capture key bio-physical information (eg groundwater flow system characteristics) and key sustainability issues. This study will help identify key knowledge gaps, improve understanding of the risks and limitations of irrigation in northern Australia, and equip governments and communities to learn from past mistakes and successes.

Deliverables: Report "Overview of Irrigation in Northern Australia" (31 May 2006)

Key Linkages: Proposal from NPSI and CRCIF for a book *Common hydrogeological features in Australian irrigation areas.*

Who: Cuan Petheram has lead responsibility for this activity with assistance from Keith Bristow and QLD, NT and WA government in-kind support.

Timeframe: 18 July 2005 – 31 May 2006.

Activity 2.3: Comparisons of the Daly, Ord and Lower Burdekin irrigation systems

Description: This work will compare the development history of the Ord, Daly and Lower Burdekin as they relate to key bio-physical features of these areas. It is anticipated that through comparing these three quite different systems (within a whole of catchment context) key learnings about irrigation in northern Australia will be captured, including the risks and limitations to it, and that the differences between the schemes will serve to highlight some of these learnings. It is anticipated that this study will be a very powerful tool for communicating key messages.

Deliverables: Report "Comparisons and learnings from the Daly, Ord and Burdekin irrigation systems" (31 May 2006).

Key Linkages: Local land and water managers, NT, WA, QLD hydrology programs.

Who: Cuan Petheram has lead responsibility for this activity with assistance from Tony Smith (Ord) and QLD, NT and WA government in-kind support.

Timeframe: 3 October 2005 – 31 May 2006.

Work Area 3: Understanding Groundwater Systems of Northern Australia

Activity 3.1: Review of tropical groundwater systems

Description: This work will synthesise existing geological, geomorphological and hydrogeological studies of northern Australia with a view to providing an overview of the general characteristics of groundwater flow systems in the northern and key issues relating to irrigation within a catchment context, including an improved understanding of the risks and limitations. This activity will set the context for investigating the potential for a groundwater flow system classification system for northern Australia and provide: (1) a knowledge platform for other researchers; and (2) a summary for irrigation investors and policy makers which identifies key bio-physical issues that should be addressed before irrigation is developed further in northern Australia.

Deliverables: Report "State of knowledge of groundwater flow systems in northern Australia" (31 August 2006).

Key Linkages: WA, NT, QLD and Commonwealth government hydrology programs and databases.

Who: Cuan Petheram has lead responsibility for this activity with assistance from Keith Bristow and QLD, NT and WA government in-kind support.

Timeframe: 18 July 2005 – 31 August 2006.

Activity 3.2: Assessment of the practicality and benefits of developing a groundwater flow classification system for northern Australia

Description: Work on developing a groundwater flow classification system for northern Australia has been proposed and is under further consideration. A proposal will be put to the Steering Committee confirming whether or not this work should be undertaken.

Deliverables: Recommendation to Steering Committee on further work (31 May 2006).

Key Linkages: Possible joint NT, WA and QLD government submission under the Raising National Water Standards Program of the Australian Water Fund for collation of current groundwater data across northern Australia to facilitate analysis of groundwaters and groundwater-surface water interactions.

Who: Keith Bristow has lead responsibility for facilitating a decision on whether or not to proceed with the classification system, supported by Cuan Petheram. Minimal NAIF resources are allocated to this activity at this time. Resourcing will need to be considered if the Steering Committee determines that the classification work should go ahead. If it does go ahead the subsequent activity will be led by Cuan Petheram with assistance from Keith Bristow and in-kind support from the WA, NT and QLD governments.

Timeframe: 1 July 2005 – 31 May 2006.

Work Area 4: Understanding Irrigation Mosaics

Activity 4.1: Review of the current understanding of irrigation mosaics

Description: An understanding of the concept of irrigation mosaics is considered important in the north – particularly given the existing developments in the Douglas-Daly area and the patchwork of small scale development association with the pastoral industry already in place. This style of development is relatively new to Australia although similar developments can be seen in some groundwater based systems.
This review will focus on an examination of national and international experience in this area and provide specific direction on the need for additional research and the subsequent construction of a framework for the analysis and modelling tools. The review of the literature on this and similar problems will be used to determine what existing modelling tools can be used to provide an understanding of irrigation mosaics. From this review a framework will be constructed for the analysis and modelling tools.

Deliverables: Report "Current understandings of irrigation mosaics" (31 August 2006).

Key Linkages: CSIRO L&W Griffith.

Who: Freeman Cook has lead responsibility for this activity with assistance from Keith Bristow and Cuan Petheram.

Timeframe: 1 November 2005 – 31 August 2006.

Activity 4.2: Application of modelling and analysis tools to northern Australia

Description: The modelling tools will be used to analyse possible irrigation scenarios for northern Australia. These scenarios will be developed to assist the assessment of the impacts of irrigation on northern Australia, including irrigation mosaics identified in Activity 2.2. Review processes will include normal CLW review for a technical report, SC and CRCIF review, and potentially review through publication in an international journal.

Deliverables: Report "Research findings, modelling results and applications for irrigation mosaics in northern Australia" (28 February 2007).

Key Linkages: CSIRO L&W Griffith.

Who: Freeman Cook has lead responsibility for this activity with assistance from Keith Bristow and Cuan Petheram.

Timeframe: 1 July 2006 – 28 February 2007.

Activity 4.3: Further development of irrigation mosaics modelling and analysis tools

Description: If required, further development of analysis techniques and modelling tools of specific relevance to northern Australia, based on knowledge gained from the review and application phases (Activities 4.1 and 4.2). These will be constructed using dimensionless variables so that they are applicable at a wide range of mosaic scales. Both analytical steady-state and numerical models and tools will be developed.

Deliverables: Irrigation mosaics modelling and analysis tools (31 January 2007).

Key Linkages: CSIRO L&W Griffith and Griffith University.

Who: Freeman Cook has lead responsibility for this activity with assistance from Keith Bristow and Cuan Petheram.

Timeframe: 1 July 2006 – 31 January 2007.

Work Area 5: Developing, Testing and Applying a Sustainability Framework

5.1: Background work to the development of a Sustainability Framework

Activity 5.1.1: Application of Bayesian networks to farm scale nitrate leaching

Description: Reviewed the process of developing a Bayesian network as a mechanism for supporting decision making; limitations of the process identified and recommendations developed.

Deliverables: Bayesian network model. Contributes knowledge to "Developing a Sustainability Framework for northern Australia: lessons from NAIF research and a proposed approach" (Completed).

Key Linkages: Ecological Risk Assessment work, Centre for Water Studies, Melbourne University & UWA.

Who: Bart Kellett has completed this activity as part of his PhD program.

Timeframe: February 2005 – August 2005.

Activity 5.1.2: Analysis of Sustainability Indicator Frameworks for assessing irrigation sustainability

Description: Reviewed indicator frameworks and their application for better understanding irrigation sustainability; recommended the use of two indicator frameworks for supporting decision making.

Deliverables: Report "Indicator Frameworks for Assessing Irrigation Sustainability" (Completed).

Who: Bart Kellett has completed this activity as part of his PhD program.

Timeframe: February 2004 – January 2005.

Activity 5.1.3: Establish sustainability framework concept

Description: Reviewed literature on the irrigation development process, decision making processes, visioning, planning and assessment, monitoring and reporting; established the Sustainability Framework concept.

Deliverables: PhD Confirmation Report. Contributes knowledge to "Developing a Sustainability Framework for northern Australia: lessons from NAIF research and a proposed approach" (Completed).

Key Linkages: Ecological Risk Assessment work, Centre for Water Studies, Melbourne University & UWA.

Who: Bart Kellett has completed this activity as part of his PhD program.

Timeframe: February 2004 – August 2004.

Activity 5.1.4: Application and evaluation of ecological risk assessment

Description: Participation in 3 workshops and evaluation of one workshop; identified limitations of practitioners' approaches to the workshop process and made recommendations for future application.

Deliverables: Report "Ecological Risk Assessment for the wetlands of the Lower Burdekin" (reviewed and pending release from CSIRO management - Completed).

Key Linkages: Ecological Risk Assessment work, Centre for Water Studies, Melbourne University & UWA.

Who: Bart Kellett has completed this activity as part of his PhD program.

Timeframe: November 2004 – November 2005.

Activity 5.1.5: Triple bottom line reporting – Participation in action research to develop TBL reporting methodology

Description: Contributed to the development of the research project plan through discussion and presentations and conducted evaluations of participatory meetings; identified research processes effective for engaging stakeholders (Completed).

Deliverables: Evaluation reports of participatory meetings.

Key Linkages: CRCIF Sustainability Challenge.

Who: Bart Kellett has completed this activity as part of his PhD program.

Timeframe: April 2004 – September 2005.

Activity 5.1.6: Understanding control structures and influences in northern Australia

Description: The policy, legislative, and institutional frameworks relevant to water and irrigation in Northern Australia were reviewed and documented in Activity 2.1. This work will develop a framework to help communities obtain up-to-date information to identify relevant control structures and influences on their decisions.

Deliverables: Tools to assist individuals & communities to identify control structures and influences relevant to their decisions on irrigation in northern Australia (30 April 2006).

Key Linkages: Tropical Rivers Program's "Assessment of social and economic values of Australia's tropical rivers" and CSIRO L&W Policy and Economic Research Unit.

Who: Patrick Hegarty as lead responsibility for this activity with assistance from Keith Bristow and Jeff Camkin.

Timeframe: 1 December 2005 – 30 April 2006.

5.2: Develop Sustainability Framework Concepts

Activity 5.2.1: Develop Sustainability Framework Concepts

Description: This work will consolidate learnings from Activities 5.1.1 to 5.1.6 and flesh-out the Sustainability Framework concept already established. The Activity 5.2.1 report will describe the tangible and intangible benefits that the sustainability framework will deliver for the community, including government and other decision-makers. In preparing this document, consideration will be given to the structure required for the NAIF final report and supporting documents, which will be brought together under Activity 5.6.1.

Deliverables: (i) Journal Paper "A Sustainability Framework for designing and evaluating irrigation planning processes: An approach for Northern Australian Communities" (31 March 2006); and (ii) Recommended approach for finalising and delivering the Sustainability Framework (31 March 2006).

Who: Bart Kellett will prepare the journal paper as part of his PhD thesis. Jeff Camkin will prepare the recommendations for the Steering Committee on the approach to finalising the Sustainability Framework, with assistance from Keith Bristow, Cuan Petheram and Bart Kellett.

Timeframe: November 2005 – 31 March 2006.

5.3: Douglas-Daly-Katherine Case Study

Activity 5.3.1: Case study development

Description: The objectives of the case study, resourcing, key stakeholders, case study approach and project management arrangements will be agreed with the NAIF NT key contact and documented.

Deliverables: (i) Operational Agreement between NAIF and the NT key contact (January 2006); and (ii) Stakeholder Engagement Strategy (31 January 2006).

Key Linkages: Relevant government departments and processes to be identified.

Who: Jeff Camkin has lead responsibility for this activity in conjunction with the NT NAIF key contact.

Timeframe: 1 December 2005 – 31 January 2006.

Activity 5.3.2: Collating existing information and research activity

Description: Existing information and knowledge, current research activities and knowledge and research gaps will be examined. Information from Activities 2.2 and 2.3 will provide and important input to this Activity.

Deliverables: Report "State of knowledge relevant to irrigation in the Douglas-Daly-Katherine catchment" (31 July 2006).

Key Linkages: Relevant government departments and processes to be identified.

Who: NT Government staff are expected to take lead responsibility for coordinating this activity. The report will be prepared by Jeff Camkin with assistance by Keith Bristow, Cuan Petheram & Bart Kellett.

Timeframe: 1 February 2006 – 31 July 2006.

Activity 5.3.3: Exploring visions, future scenarios and response options

Description: The NAIF project will work with relevant government and other stakeholders towards: (i) identifying community values and aspirations for the case study area, including for the role of irrigation and the limitations and risks associated with it; (ii) describing catchment attributes (ecological, social and economic), including a description of the resources within the catchment, representing opportunities and constraints for the community; (iii) develop alternative future scenarios and identify factors or actions that might bring about those scenarios; and (iv) establish a set of possible responses to the scenarios, at a range of levels (eg farm, scheme, catchment, state) and at different stages of the irrigation development process (eg visioning, planning and assessment, and monitoring and reporting).

Deliverables: Report "Community visions for irrigation in the Douglas-Daly-Katherine, future scenarios and response options, and learnings for the sustainability framework" (31 March 2007).

Key Linkages: Relevant government departments and processes to be identified.

Who: Jeff Camkin has lead responsibility for coordination of the process, with input and assistance from NT Government staff in engaging local stakeholders, and Keith Bristow, Cuan Petheram and Bart Kellett in report preparation.

Timeframe: 1 March 2006 – 31 March 2007.

5.4: Kimberley Case Study

Activity 5.4.1: Case study development

Description: The location and objectives of the case study, resourcing, key stakeholders, case study approach and project management arrangements will be agreed with the NAIF WA key contact and documented.

Deliverables: (i) Operational Agreement between NAIF and the WA key contact (January 2006); and (ii) Stakeholder Engagement Strategy (31 January 2006).

Key Linkages: Relevant government departments and processes to be identified.

Who: Jeff Camkin has lead responsibility for this activity in conjunction with the WA NAIF key contact.

Timeframe: 1 December 2005 – 31 January 2006.

Activity 5.4.2: Collating existing information and research activity

Description: Existing information and knowledge, current research activities and knowledge and research gaps will be examined. Information from Activities 2.2 and 2.3 will provide and important input to this Activity.

Deliverables: Report "State of knowledge relevant to irrigation in an area of the West Kimberley" (31 July 2006).

Key Linkages: Relevant government departments and processes to be identified.

Who: WA Government staff are expected to take lead responsibility for coordinating this activity. The report will be prepared by Jeff Camkin with assistance by Keith Bristow, Cuan Petheram & Bart Kellett.

Timeframe: 1 February 2006 – 31 July 2006.

Activity 5.4.3: Exploring visions, future scenarios and response options

Description: The NAIF project will work with relevant government and other stakeholders towards: (i) identifying community values and aspirations for the case study area, including for the role of irrigation and the limitations and risks associated with it; (ii) describing catchment attributes (ecological, social and economic), including a description of the resources within the catchment, representing opportunities and constraints for the community; (iii) develop alternative future scenarios and identify factors or actions that might bring about those scenarios; and (iv) establish a set of possible responses to the scenarios, at a range of levels (eg farm, scheme, catchment, state) and at different stages of the irrigation development process (eg visioning, planning and assessment, and monitoring and reporting).

Deliverables: Report "Community visions for irrigation in an area of the West Kimberley, future scenarios and response options, and learnings for the sustainability framework" (31 March 2007).

Key Linkages: Relevant government departments and processes to be identified.

Who: Jeff Camkin has lead responsibility for coordination of the process, with input and assistance from WA Government staff in engaging local stakeholders, and Keith Bristow, Cuan Petheram and Bart Kellett in report preparation.

Timeframe: 1 March 2006 – 31 March 2007.

5.5: Lower Burdekin Case Study

Activity 5.5.1: Case study development

Description: The location and objectives of the case study, resourcing, key stakeholders, case study approach and project management arrangements will be agreed with the QLD NAIF key contact and documented.

Deliverables: (i) Operational Agreement between NAIF and the QLD key contact (January 2006); and (ii) Stakeholder Engagement Strategy (31 January 2006).

Key Linkages: Relevant government departments and processes to be identified.

Who: Jeff Camkin has lead responsibility for this activity in conjunction with the QLD NAIF key contact.

Timeframe: 1 December 2005 – 31 January 2006.

Activity 5.5.2: Collating existing information and research activity

Description: Existing information and knowledge, current research activities and knowledge and research gaps will be examined. This will be largely achieved through the Lower Burdekin Knowledge Platform synthesis of current understanding of the biophysical functioning of the Lower Burdekin. Information from Activities 2.2 and 2.3 will provide and important input to this Activity.

Deliverables: Report "State of knowledge relevant to irrigation developments in the Lower Burdekin" (31 July 2006).

Key Linkages: Lower Burdekin Knowledge Platform. Other relevant government departments and processes will be identified.

Who: QLD Government staff are expected to take lead responsibility for coordinating this activity. The report will be prepared by Jeff Camkin with assistance by Keith Bristow, Cuan Petheram & Bart Kellett.

Timeframe: 1 February 2006 – 31 July 2006.

Activity 5.5.3: Exploring visions, future scenarios and response options

Description: The NAIF project will work with relevant government and other stakeholders towards: (i) identifying community values and aspirations for the case study area, including for the role of irrigation and the limitations and risks associated with it; (ii) describing catchment attributes (ecological, social and economic), including a description of the resources within the catchment, representing opportunities and constraints for the community; (iii) develop alternative future scenarios and identify factors or actions that might bring about those scenarios; and (iv) establish a set of possible responses to the scenarios, at a range of levels (eg farm, scheme, catchment, state) and at different stages of the irrigation development process (eg visioning, planning and assessment, and monitoring and reporting).

Deliverables: Report "Community visions for irrigation in the Lower Burdekin, future scenarios and response options, and learnings for the sustainability framework" (31 March 2007).

Key Linkages: Relevant government departments and processes to be identified.

Who: Jeff Camkin has lead responsibility for coordination of the process, with input and assistance from QLD Government staff in engaging local stakeholders, and Keith Bristow, Cuan Petheram and Bart Kellett in report preparation.

Timeframe: 1 March 2006 – 31 March 2007.

5.6: Develop Sustainability Framework

Activity 5.6.1: Consolidation of the learnings from case study activities

Description: A collective analysis and evaluation of the case study activities to identify findings for incorporation into a Sustainability Framework for supporting community decision making regarding irrigation in Northern Australia.

Deliverables: Report "Towards a Sustainability Framework for supporting community decision making regarding irrigation in northern Australia: Lessons from three case studies" (30 April 2007).

Key Linkages: CRCIF and others to be identified.

Who: Jeff Camkin will prepare this report with assistance from Keith Bristow, Cuan Petheram & Bart Kellett. The report will draw on work by Bart Kellett as part of his PhD thesis.

Timeframe: 1 December 2006 – 30 April 2007.

Activity 5.6.2: Finalisation of the sustainability framework

Description: This activity will consolidate all learnings from the NAIF project work areas of Context Setting and Northern Australian Inventory, Understanding Groundwater Systems of Northern Australia, Understanding Irrigation Mosaics, and Developing, Applying and Testing a Sustainability Frameworks (including conceptual development and the further development, testing and application of the framework through the case studies).

Deliverables: A Sustainability Framework for supporting community decision making regarding irrigation in northern Australia (15 June 2007).

Key Linkages: CRCIF, NWC and others to be identified.

Who: Jeff Camkin will have responsibility for finalising the sustainability framework, with contributions from all project team members, Steering Committee, Stakeholder Reference Group and others.

Timeframe: 1 March 2007 – 30 June 2007.

SECTION 4. ALLOCATION OF HUMAN RESOURCES

Table 1 provides a summary of human resources on the NAIF project. Total FTEs are shown, together with the number of days nominally available for each NAIF work area in a 12 month period. As the project shifts from context work to the delivery of the sustainability framework the allocation of officer time will change.

The table includes the expected use of the WA, NT and QLD government in-kind support to the project up to 30 June 2006.

Table 1. Allocation of human resources

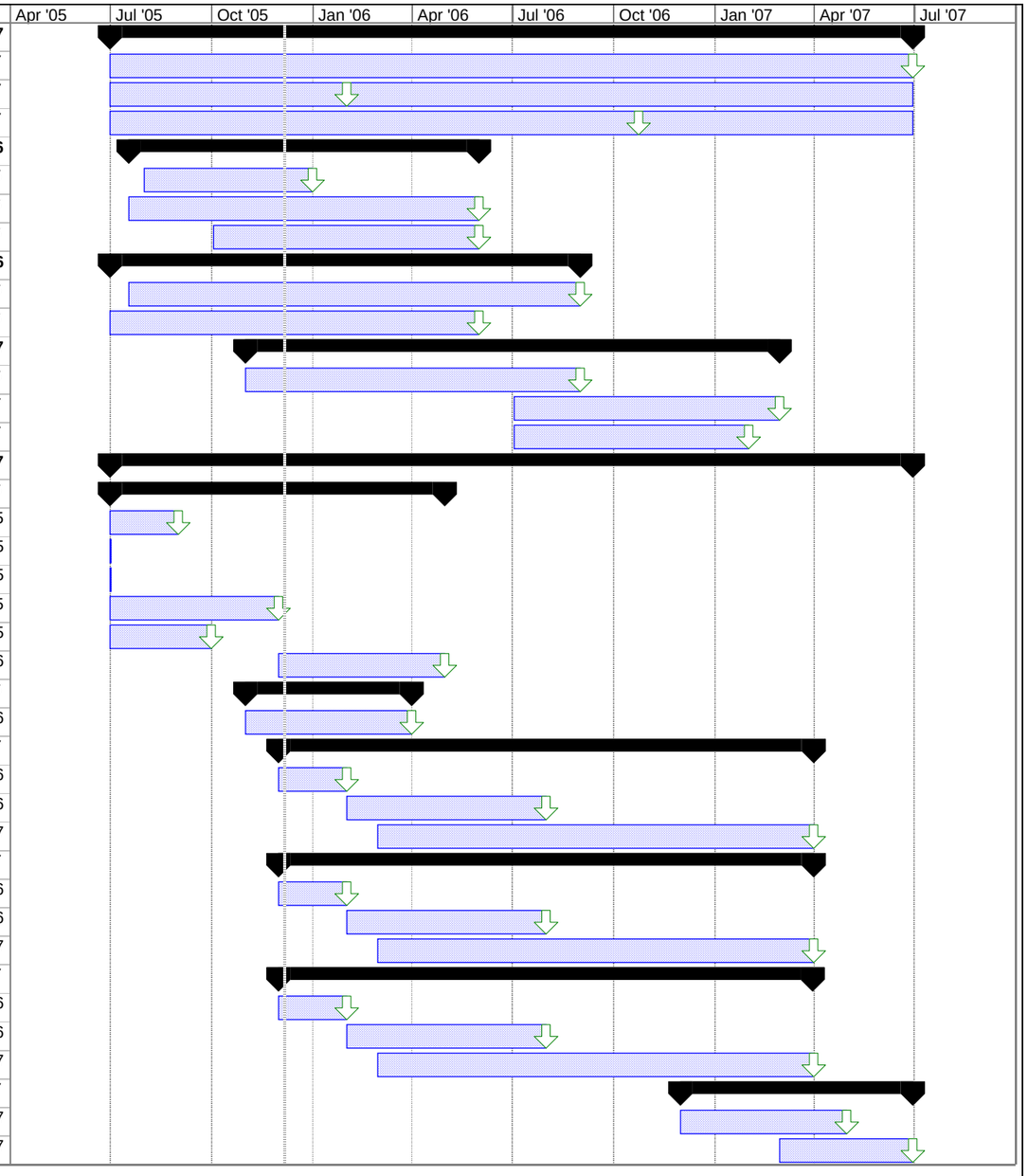
	FTE available to NAIF	**Total days available to NAIF** [1]	**Days on project management & oversight**	**Days on context setting**	**Days on irrigation mosaics**	**Days on tropical groundwater systems**	**Days on sustainability framework**
Keith Bristow	0.5	115	20	5	22	46	22
Jeff Camkin	1.0	230	60	10			160
Cuan Petheram	0.5	115		35	5	70	5
Irrigation Scientist [2]	0.2	46			40	3	3
Di Popham	0.2	46	46				
Patrick Hegarty	0.2	46		23			23
QLD Government	0.3	69		21	7	14	27
NT Government	0.3	69		21	7	14	27
WA Government	0.3	69		21	7	14	27
Sub-Total	**3.5**	**805**	**126**	**136**	**87**	**161**	**294**
Bart Kellett [3]	1.0	230		46			184
TOTALS	**4.5** [4]	**1,035**	**126**	**182**	**87**	**161**	**478**

[1] There are 7.21 hours in the working day and 230 working days in the year.
[2] An Irrigation / Water Systems Scientist will be recruited. Freeman Cook, CSIRO Land and Water, will assist with the Understanding Irrigation Mosaics work area until the position is filled.
[3] Bart Kellett is a PhD student. The allocation of his time is based on the assumption that there is full alignment between his PhD studies and the needs of the NAIF project. If this does not occur, the proportion of his time that can be considered allocated to the NAIF project will reduce, as will the total resources for the project.
[4] Based on the existing commitment from QLD, NT and WA Governments for 0.3 FTE in kind support. The application of this support will shift from initially hydrogeological input to knowledge of case study site issues and stakeholder relationships.

ATTACHMENTS

Attachment 1: NAIF Stage 2 Work Plan Gantt Chart 1 December 2005

ID	Task Name	Start	Finish
1	**1. PROJECT MANAGEMENT AND DELIVERY**	**Fri 1/07/05**	**Fri 29/06/07**
2	*1.1 Project monitoring, reporting and oversight*	*Fri 1/07/05*	*Fri 29/06/07*
3	*1.2 General stakeholder engagement and communications*	*Fri 1/07/05*	*Fri 29/06/07*
4	*1.3 Maximising beneficial links*	*Fri 1/07/05*	*Fri 29/06/07*
5	**2. CONTEXT SETTING AND NORTHERN AUSTRALIA INVENTORY**	**Mon 18/07/05**	**Wed 31/05/06**
6	*2.1 Review of institutional frameworks relevant to irrigation in northern Australia*	*Mon 1/08/05*	*Sat 31/12/05*
7	*2.2 Review of past and present irrigation in northern Australia*	*Mon 18/07/05*	*Wed 31/05/06*
8	*2.3 Comparisons of the Daly, Ord and Lower Burdekin irrigation systems*	*Mon 3/10/05*	*Wed 31/05/06*
9	**3. UNDERSTANDING GROUNDWATER SYSTEMS OF NORTHERN AUSTRALIA**	**Fri 1/07/05**	**Thu 31/08/06**
10	*3.1 Review of tropical groundwater systems*	*Mon 18/07/05*	*Thu 31/08/06*
11	*3.2 Assessment of the practicality and benefits of developing a groundwater flow classification system for northern*	*Fri 1/07/05*	*Wed 31/05/06*
12	**4. UNDERSTANDING IRRIGATION MOSAICS**	**Tue 1/11/05**	**Wed 28/02/07**
13	*4.1 Review of the current understanding of irrigation mosaics*	*Tue 1/11/05*	*Thu 31/08/06*
14	*4.2 Application of modelling and analysis tools to northern Australia*	*Mon 3/07/06*	*Wed 28/02/07*
15	*4.3 Development of irrigation mosaics modelling and analysis tools*	*Mon 3/07/06*	*Wed 31/01/07*
16	**5. DEVELOPING, TESTING AND APPLYING A SUSTAINABILITY FRAMEWORK**	**Fri 1/07/05**	**Fri 29/06/07**
17	*5.1 Background Work to the Development of a Sustainability Framework*	*Fri 1/07/05*	*Sun 30/04/06*
18	5.1.1 Application of Bayesian networks to farm scale nitrate leaching	Fri 1/07/05	Wed 31/08/05
19	5.1.2 Analysis of sustainability indicator frameworks for assessing irrigation sustainability	Fri 1/07/05	Fri 1/07/05
20	5.1.3 Establish sustainability framework concept	Fri 1/07/05	Fri 1/07/05
21	5.1.4 Application and evaluation of ecological risk assessment	Fri 1/07/05	Wed 30/11/05
22	5.1.5 Triple bottom line reporting - participation in action research to develop TBL reporting methodology	Fri 1/07/05	Fri 30/09/05
23	5.1.6 Understanding control structures and influences in northern Australia	Thu 1/12/05	Sun 30/04/06
24	*5.2 Develop Sustainability Framework Concepts*	*Tue 1/11/05*	*Fri 31/03/06*
25	5.2.1 Develop sustainability framework concept	Tue 1/11/05	Fri 31/03/06
26	*5.3 Douglas-Daly-Katherine Case Study*	*Thu 1/12/05*	*Sat 31/03/07*
27	5.3.1 Case study development	Thu 1/12/05	Tue 31/01/06
28	5.3.2 Collating existing information and research activity	Wed 1/02/06	Mon 31/07/06
29	5.3.3 Exploring visions, future scenarios and response options	Wed 1/03/06	Sat 31/03/07
30	*5.4 West Kimberley Case Study*	*Thu 1/12/05*	*Sat 31/03/07*
31	5.4.1 Case study development	Thu 1/12/05	Tue 31/01/06
32	5.4.2 Collating existing information and research activity	Wed 1/02/06	Mon 31/07/06
33	5.4.3 Exploring visions, future scenarios and response options	Wed 1/03/06	Sat 31/03/07
34	*5.5 Lower Burdekin Case Study*	*Thu 1/12/05*	*Fri 30/03/07*
35	5.5.1 Case study development	Thu 1/12/05	Tue 31/01/06
36	5.5.2 Collating existing information and research activity	Wed 1/02/06	Mon 31/07/06
37	5.5.3 Exploring visions, future scenarios and response options	Wed 1/03/06	Fri 30/03/07
38	*5.6 Develop Sustainability Framework*	*Fri 1/12/06*	*Fri 29/06/07*
39	5.6.1 Consolidation of the learnings from case study activities	Fri 1/12/06	Mon 30/04/07
40	5.6.2 Finalisation of the Sustainability Framework	Thu 1/03/07	Fri 29/06/07



Project: NAIF Stage 2 Work Plan Gant
Date: Tue 6/12/05

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Appendix 4

NORTHERN AUSTRALIA IRRIGATION FUTURES

MONITORING AND EVALUATION PLAN

DECEMBER 2007

NORTHERN AUSTRALIA IRRIGATION FUTURES

Providing new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia

MONITORING AND EVALUATION PLAN

CSIRO Land and Water / NPSI / CRC IF / NT, QLD, WA & Australian Governments

(Updated 10 March 2006)

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[1] The Project Partners are: CSIRO, Land and Water Australia, National Program for Sustainable Irrigation, CRC for Irrigation Futures and the Governments of Australia, Queensland, Northern Territory and Western Australia.

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National Program for Sustainable Irrigation
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Australian Government
Queensland Government
Northern Territory Government
Western Australian Government

Steering Committee

Greg Claydon (Chair) - Queensland Department of Natural Resources and Mines
Murray Chapman - National Program for Sustainable Irrigation
Ross Dalton - Australian Government Department of Agriculture, Forestry and Fisheries
Kevin Devlin - Sunwater
To be advised - Cooperative Research Centre for Irrigation Futures
Andrew Kelly - Ord Irrigation Cooperative
To be advised - WA Office of Water Strategy
Ian Smith - NT Department of Environment, Natural Resources and the Arts
Anwen Lovett - Land and Water Australia

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MONITORING AND EVALUATION PLAN

1. EXECUTIVE SUMMARY

Deciding on whether to irrigate in northern Australia, and if so what irrigation should look like, where it should be located, and how it should be managed, requires improved understanding of river and catchment attributes and the risks associated with irrigation.

The Northern Australia Irrigation Futures (NAIF) project is funded by a suite of private and public investors including the National Program for Sustainable Irrigation (NPSI), the Australian Government and the Governments of Western Australia, Queensland and the Northern Territory with the goal of providing new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia.

Northern Australia holds iconic status for many Australians. Consequently, there is widespread interest and a broad range of views about the future of northern Australia and the role that irrigation might play in that future. Effective strategies are required to engage the many interested parties to ensure that important issues are identified and considered. These are detailed in the NAIF Stakeholder Engagement and Communication (SE&C) Strategy.

This document sets out the Monitoring and Evaluation (M&E) Plan for the NAIF project. It has always been recognised that the NAIF research project is a challenging one that will require a high degree of adaptability to achieve success. The project funders, Steering Committee (SC) and Project Team have all demonstrated an understanding and willingness to adapt the project design in response to new knowledge and feedback. This M&E Plan is based on a continuation of the principles of adaptive and participatory management.

The Project Team will work with the SC, the Stakeholder Reference Group (SRG) and other key stakeholders to provide information about the performance of the project and to adapt the project, as required, to optimise project outcomes. On-going and increasing demand for NAIF project outputs, ongoing and increasing requests for input from the project team into other activities, and ongoing involvement and increasing numbers of collaborators and co-funders will serve as a guide to the success of the project.

This M&E Plan is designed to:

- Assist the Project Team, SC and the funding organisations to decide if the project and its priorities, targets and actions need to be changed, and where attention should be focussed
- Support the use of an adaptive management approach to ensure continuous improvement based on new knowledge and experience as the project progresses
- Support the assessment of project outputs, outcomes and overall success
- Determine accountability for monitoring, evaluating and reporting outcomes and
- Establish regular reporting systems for accountability to SC and the State and Australian Government project investors.

This Plan provides the project goals and objectives, describes the performance indicators, lists the data sources, identifies project risks, indicates the reporting regime and allocates responsibilities for implementation. Information gained from multiple different sources will be used to provide a holistic evaluation of the project.

The main ongoing mechanisms for reviewing the NAIF project will be the SC, the SRG, normal CSIRO pre-publication procedures and external science review processes for journal publications etc. An independent Expert Panel will be established to provide an external review of the project and its outputs at several key points.

The original NAIF Project Application Form listed the anticipated outcomes as:

- By 2007 leading stakeholders (Governments, communities, investors, land and water managers) will be more informed and able to use the sustainability framework including key biophysical datasets and sustainability indicators when debating and making decisions regarding irrigation in northern Australia
- By 2007 testing of existing northern irrigation management systems and practices against the sustainability framework and indicators will have commenced
- By 2010 relevant State and Australian policies will have adopted the framework and sustainability indicators
- By 2015 a sustainable irrigation industry in northern Australia will be functioning that delivers a wide range of economic and social benefits whilst minimising environmental impacts.

The application proposed that the project outputs would:

> *"strongly influence a range of policy, regulation, management and institutional requirements across northern Australia, especially in meeting COAG and NWI water reform requirements and minimising the environmental footprint associated with irrigation developments. The project will provide regulatory organisations within each State and Territory appropriate and consistent guidelines for the environmental assessment of proposed irrigation developments in northern Australia."*

It is anticipated that the first two outcomes will be assessable within the duration of the current NAIF project. It will not be possible to fully answer the question of what broader and longer term impacts the NAIF project has during the course of the project. However, it will be possible to gain an understanding of trends by capturing stakeholder perspectives on the NAIF project, its activities and outputs, degree of influence and likelihood of contributing significantly to the outcomes which are sought. Stakeholder perspectives will be benchmarked and changes captured through repeatable questionnaires and Project Status Reports will, therefore, include narrative examples that indicate progress towards the project outcomes.

Highlights in this M&E Plan include:

- April and October 2006 – Project Status Reports for SC approval
- June 2007 – Final Project Status Report for SC approval
- May 2006 and November 2006 – NPSI Milestone Reports for LWA approval
- September 2006 – NPSI Financial Statement for LWA approval
- External review of key project reports, including *"Recommended approach for finalising and delivering the sustainability framework"* and *"Towards a sustainability framework for supporting community decision making regarding irrigation in northern Australia: lessons from three case studies"*

- External review of the research prior to preparation of the project final report
- Workshops in QLD, NT and WA between the project team and key stakeholders to discuss the research prior to preparation of the final report
- July 2007 – NPSI Milestone Final Report for LWA approval
- September 2007 – NPSI Final Financial Statement for LWA approval.

Monitoring, evaluation and reporting on this M&E Plan is through the SRG and the SC, and is part of the NPSI Milestone Reporting process. Changes to the project approved by the SC will be reflected in updates to the Work Plan. The amended Work Plan will be provided to the NPSI Program Coordinator with the next Milestone Report.

2. INTRODUCTION

Northern Australia holds an iconic status for many Australians. The interplay between the landscapes, rivers and strongly monsoonal weather patterns has resulted in unique and diverse ecological systems that will need special care to retain their integrity. At the same time, with some 70 per cent of Australia's available fresh water discharging from our tropical rivers, there are pressures from various quarters to extract some of the water for irrigated agriculture. There is, however, widespread recognition that mistakes were made in the past in southern Australia, and internationally, where many irrigation systems are now degraded or degrading. No one wants to see those mistakes repeated in northern Australia.

Deciding on whether to irrigate in northern Australia, and if so what irrigation should look like, where it should be located, and how it should be managed, requires improved understanding of river and catchment attributes and the risks associated with irrigation. Various studies are underway to improve that understanding and ensure decisions are made with the best information available about the long term implications for tropical catchments.

The NAIF project has been established as a collaborative arrangement between the Australian, QLD, NT and WA governments to provide new knowledge, tools and processes, including an overarching sustainability framework, to support debate and improved decision making on these complex issues in northern Australia. It is expected that the project will also provide new information and tools with which to consider the sustainability of new and existing irrigation in southern Australia.

The project will draw on past experience of irrigation and development new knowledge of groundwater systems and irrigation mosaics to build understanding of risks associated with irrigation and of key landscape attributes critical to sustainable irrigation in northern Australia. This knowledge will be used to provide the information required in the framework.

The NAIF project comprises of two key phases. Project initiation in 2003 was funded through Land and Water Australia's (LWA) National Program for Sustainable Irrigation and funding through the CRC for Irrigation Futures (CRC IF) for PhD students to undertake research consistent with the NAIF objectives. Subsequent to that, the QLD, NT, WA and Australian Governments provided additional resources to the research by funding a new position of Sustainability Specialist. While the initial research under the LWA/NPSI program concludes in mid 2007, further follow-on work is anticipated as the funding agreement for the Sustainability Specialist position with the NAIF project extends to October 2008.

A Steering Committee with representation from the key funding partners and expertise in key project areas has been established to help guide the project.

The project schedule under the LWA / CSIRO agreement requires the development and implementation of a monitoring and evaluation strategy to provide for continuous monitoring and reporting of project progress and to enable timely adaptation to address issues and take opportunities that arise.

This document sets out the M&E Strategy for the NAIF research project.

3. NAIF PROJECT MANAGEMENT FRAMEWORK

The considerable risks associated with the NAIF project are widely acknowledged. The project is attempting to provide a framework to address extremely complex and difficult issues of sustainability on a perhaps unprecedented scale. The project area covers the entire tropics of Australia, which encompasses many local, state and national jurisdictions, numerous complex, and in many cases poorly understood hydrological systems, and an extensive range of stakeholders with sometimes competing interests and values.

Extensive changes are taking place in water resources and irrigation management across Australia. The COAG National Water Initiative, which continues and refines the significant progress Australia has made in water resource management since 1994, has focussed political attention and community expectations on shifting towards more sustainable use of our water and land resources. There is, therefore, also widespread acknowledgement of the very considerable benefits that will accrue from a successful NAIF project.

Strong project management is critical to achieving success and the NAIF Project Management Framework (Figure 1) has been established for that purpose.

The Stage 2 Work Plan provides a detailed account of the approved activities to be carried out by the Project Team and others. The Work Plan includes a Gantt chart showing project activities, timelines and linkages to assist project management on an ongoing basis and against which progress will be assessed.

The SC has responsibility for guiding the project to help ensure appropriate outputs are created and useful outcomes are achieved. The SC is responsible for approving the NAIF Work Plan and changes to it required from time to time to address issues and opportunities. Changes to the Work Plan that have a significant impact on the project or its deliverables will also be reflected in the NPSI Milestone Reporting process.

The Sustainability Specialist is responsible for maintaining the NAIF Project Management Framework, in consultation with the Project Team, and for reporting progress to the SC in accordance with the Monitoring and Reporting Plan.

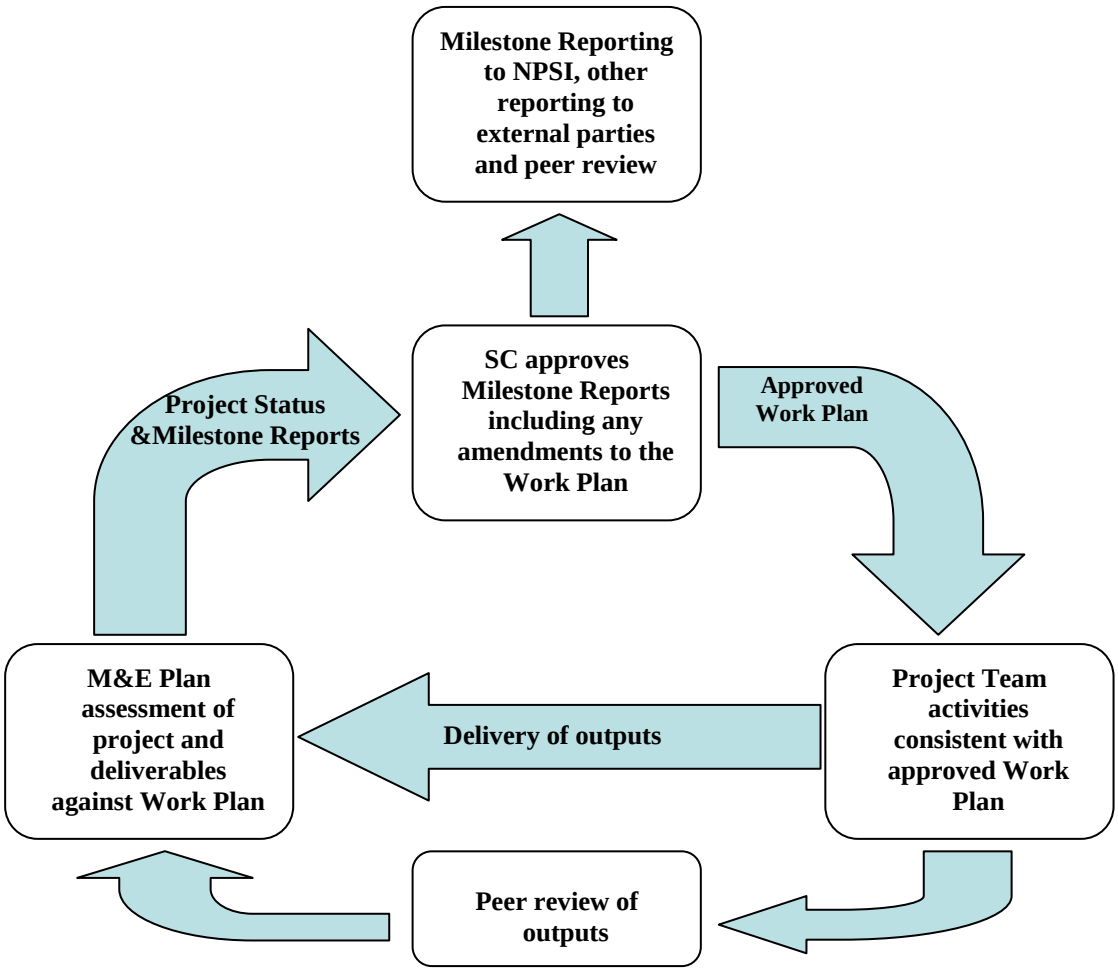

Figure 1. The NAIF Project Management Framework

4. PROJECT GOAL AND OBJECTIVES [2]

Project Goal

The NAIF project goal is "To provide new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia".

[2] The NAIF project goal and objectives were redefined by the Steering Committee on 14 February 2006.

Project Objectives

The NAIF project objectives are to:

1. Delineate key landscape attributes (including soil & water resources, climate, vegetation, rivers, near shore marine environments, & where appropriate links to people, industries, markets) relevant to ecologically sustainable irrigation across northern Australia

2. Use key landscape attributes to develop sustainability indicators and associated management criteria covering a range of scales (field, farm, district, irrigation scheme, catchment) for northern Australia

3. Develop an overall framework that, through their involvement, is embraced by policy makers, regulators, investors and managers, to help ensure any irrigation is managed in a consistent, ecologically sustainable manner in northern Australia

4. Use a number of linked case studies and stakeholder input to support and inform development and testing of the framework

5. Through provision of a robust framework, contribute tools and knowledge to support considered debate, decision making and long term strategic planning for northern Australia & Australia as a whole.

5. DEFINITION OF MONITORING AND EVALUATION

"*Monitoring is a continuing function that aims primarily to provide managers and the main stakeholders with regular feedback and early indications of progress or lack thereof in the achievement of intended results. Monitoring tracks the actual performance or situation against what was planned or expected according to pre-determined standards. Monitoring generally involves collecting and analysing data on implementation processes, strategies and results, and recommending corrective measures.*

Evaluation is a time bound exercise that attempts to assess systematically and objectively the relevance, performance and success of ongoing and completed project activities. Evaluation can also address outcomes or other development issues. Evaluation is undertaken selectively to answer specific questions to guide decision-makers and/or project managers, and to provide information on whether underlying theories and assumptions used in project development were valid, what worked and what did not work and why. Evaluation commonly aims to determine relevance, efficiency, effectiveness, impact and sustainability. Evaluation is a vehicle for extracting lessons from operating experiences and determining the need for modifications to the strategic results framework. Evaluation should provide information that is credible and useful, enabling the incorporation of lessens learned into the decision-making process."[3]

[3] UNDP Handbook on Monitoring and Evaluation for Results.

6. PURPOSE OF THE MONITORING AND EVALUATION PLAN

This M&E Plan is designed to:

- Assist the Project Team, SC and the funding organisations to decide if the project and its priorities, targets and actions need to be changed, and where attention should be focussed
- Support the use of an adaptive management approach to ensure continuous improvement based on new knowledge and experience as the project progresses
- Support the assessment of project outputs, outcomes and overall success
- Determine accountability for monitoring, evaluating and reporting outcomes and
- Establish regular reporting systems for accountability to SC and the State and Australian Government project investors.

This M&E Plan provides the project goals and objectives, describes the performance indicators against which success can be measured, lists the sources of data to enable measurement, identifies the risks to success, indicates the reporting regime and allocates responsibilities for implementation of the Plan.

The development of this M&E Plan has been guided by SC considerations, analysis of project communications risk, the NAIF Stage 2 Work Plan and the NPSI Milestone Reporting Framework. The Plan meets the NPSI Milestone requirement and will assist in assessment and management of the NAIF project, including the NPSI component.

7. MONITORING AND EVALUATION DESIGN

Guiding Principles

It has always been recognised that the NAIF research project is a challenging one that will require a high degree of adaptability to achieve success. The project funders, SC and Project Team have all demonstrated an understanding and willingness to adapt the project design in response to new knowledge and feedback. This M&E Plan is based on a continuation of the principles of adaptive and participatory management.

Considerations in Design

Monitoring and evaluation, reporting and decision-making are all critical to adaptability. The following roles and relationships are important to achieving project success:

The Steering Committee was established on 11 March 2004 to provide strategic advice and guidance to the project. It is the primary mechanism for engagement and communication with the project funding and partner organisations. Membership of the SC is designed to provide both expertise in key project areas and representation of the key funding partner organisations. The SC meets on a regular basis to review progress and provide advice on project direction.

The NPSI Program Coordinator (Murray Chapman) is responsible for overseeing delivery of the project on behalf of LWA and for advising LWA in relation to performance against the project brief. This is principally achieved through the NPSI Milestone Reporting process.

CSIRO, through the Land and Water Division, is the organisation contracted to manage and deliver the NAIF project.

The Project Team, led by the Principal Investigator (Dr Keith Bristow), is responsible for day to day project activities and for reporting on project progress. This is achieved in partnership with Australian, QLD, NT and WA Government agency staff, and other collaborating organisations.

The Stakeholder Reference Group (SRG) is a primary mechanism for linking with key stakeholders. The SRG provides independent advice to assist and guide the project, particularly in relation to potential impacts on stakeholders.

The Stakeholder Network is a forum for dissemination of information to individuals and organisations who wish to be kept informed about the NAIF project and an important mechanism for both input and feedback on the project.

Methods

Information gained from multiple different sources will be used to provide a holistic evaluation of the project. In some cases, a Performance Indicator requires only a simple numeric response. In other cases, multiple methods of gathering information are required to provide a reasonable assessment against a criterion.

To keep M&E costs in perspective, attempts have been made to identify data sources that are already available to the Project Team or which can be incorporated into existing project activities. The primary sources of data are:

- The NAIF database, managed by CSIRO Land and Water which holds all project data
- Minutes of all Steering Committee meetings, which are held on the project database
- The NAIF Website, which is frequently updated with information on project activities and events, reports, publications, media releases and linkages with other projects and programs
- Formal and informal feedback, which will be sought from a range of sources, including questionnaires for the SC, SRG, and/or SN, and internal and external reviews in relation to specific and general aspects of the project.

In accordance with the principles of participatory monitoring and evaluation the SC and the Project Team will be important sources of advice for monitoring and evaluation.

8. THE ROLE OF EXTERNAL REVIEW

The main ongoing mechanisms for reviewing the NAIF project will be through the SC, SRG and/or SN questionnaires, and normal CSIRO pre-publication procedures which include external review processes for journal publications etc. An independent Expert Panel will be established to provide an external review of the project and its outputs at several key points, including:

- Review of the key report *"Recommended approach for finalising and delivering the Sustainability Framework"*

- Review of the key report *"Towards a Sustainability Framework for supporting community decision making regarding irrigation in northern Australia: lessons from three case studies"*
- Review of the Research prior to preparation of the project final report
- Review of the NAIF Final Report and Sustainability Framework.

In addition, a workshop including the project team and key stakeholders will be held in WA, NT and QLD to discuss the research prior to preparation of the final report.

9. ASSESSMENT OF THE PROJECT OUTCOMES

The original NAIF Project Application Form listed the anticipated outcomes as:

- By 2007 leading stakeholders (Governments, communities, investors, land and water managers) will be more informed and able to use the sustainability framework including key biophysical datasets and sustainability indicators when debating and making decisions regarding irrigation in northern Australia
- By 2007 testing of existing northern irrigation management systems and practices against the sustainability framework and indicators will have commenced
- By 2010 relevant State and Australian policies will have adopted the framework and sustainability indicators
- By 2015 a sustainable irrigation industry in northern Australia will be functioning that delivers a wide range of economic and social benefits whilst minimising environmental impacts.

The application proposed that the project outputs would:

> *"strongly influence a range of policy, regulation, management and institutional requirements across northern Australia, especially in meeting COAG and NWI water reform requirements and minimising the environmental footprint associated with irrigation developments. The project will provide regulatory organisations within each State and Territory appropriate and consistent guidelines for the environmental assessment of proposed irrigation developments in northern Australia."*

It is anticipated that the first two outcomes will be assessable within the duration of the current NAIF project and to some extent these have been incorporated into the assessment against project outputs in Section 10. However, the most aspirational of the stated outcomes, that by 2010 the framework will be adopted and that by 2015 irrigation in northern Australia will be sustainable, by definition fall outside of the project timeframe.

It will not be possible to fully answer the question of what broader and longer impacts the NAIF project has during the course of the project. However, it will be possible to gain an understanding of trends by capturing stakeholder perspectives on the NAIF project, its activities and outputs, degree of influence and likelihood of contributing significantly to the outcomes which are sought. Stakeholder perspectives will be captured through repeatable questionnaires to measure change against a benchmark and Project Status Reports will include narrative examples that indicate progress towards the project outcomes.

10. ASSESSMENT OF THE PROJECT OUTPUTS

The following achievement criteria, performance indicators, data sources and risk apply to the assessment against project outputs:

Achievement Criteria	Performance Indicators	Data Sources	Risks
A comprehensive, practical and usable framework for supporting debate and decisions about irrigation in northern Australia	• Progress towards SF	• SC feedback on progress, as reported in Status Reports, recorded in SC minutes. External review of report *Recommended approach for finalising and delivering the SF*	
	• Framework developed and 'tested' through effective case studies	• Report *Towards a SF for supporting community decision making regarding irrigation in northern Australia: Lessons from three case studies* published on website	• Inability to establish case studies which contribute significantly to the SF
	• External review of SF & associated research	• Documented feedback on research and draft SF from independent review, SRG, case study stakeholders, SN and the workshop on SF in each State	
	• SF is documented, approved for release and available to stakeholders	• Approval recorded in SC minutes. SF available via NAIF website	
	• Adoption of the framework by policy and regulatory agencies and investors and managers	• Feedback from SC, SRG, SN questionnaires, workshop on SF in each state and other stakeholders on likelihood of adoption	• Adoption hard to measure within project timeframe. Project Team/SC unable to influence agency & other decision makers to use SF

Achievement Criteria	Performance Indicators	Data Sources	Risks
	• Acceptance of framework by key stakeholders	• Documented feedback from SC, SRG, SN questionnaires, workshop on SF in each state, correspondence and media items in response to release of SF	• Lack of ownership of the framework by decision-makers and/or other stakeholders
Understanding of key biophysical features relevant to irrigation in northern Australia	• Comprehensive collation and interpretation of key knowledge and understandings of northern Australian landscapes • Publication of reports approved by SC in accordance with work plan	• Documented feedback from SC, SRG, SN questionnaires and independent review • Approval recorded in SC minutes & list of available publications on NAIF website	• Insufficient research of north Australian landscapes and their function completed to allow reasonable interpretation. Insufficient in-kind or other support from State and Cth agencies to support analysis and interpretation
Description of the nature and spatial distribution of key landscape attributes of importance in siting and managing sustainable irrigation schemes in northern Australia	• Range of communications and publications addressing key knowledge and understandings of northern Australian landscapes and their implications to sustainable irrigation available to broad audience	• List of available publications on NAIF website	• Project team is unsuccessful in securing appropriate communications support and meeting required timeframes. Insufficient in-kind and other support from State and Cth agencies to support analysis and interpretation

Achievement Criteria	Performance Indicators	Data Sources	Risks
Successful project communications	• Communication and Stakeholder Engagement (C&SE) Plan developed and operational • Stakeholder Reference Group (SRG) established and operating as per TOR • Stakeholder Network established and receiving quarterly project updates. • Effective linkages with other key projects and programs established • Publication of reports according to work plan	• Approval of C&SE Plan recorded in SC minutes and reported in NPSI Milestone Report. • Project records on number of contacts with SRG members. Feedback from SRG members • Project records on number of members of Stakeholder Network and contacts with Stakeholder Network • Project records of requests for NAIF involvement in other projects and programs. Project records of cross participation and coordination. • List of available publications on NAIF website	• Key stakeholders unwilling to join SRG • The small resource base significantly limits linkages with other key projects and programs
Effective implementation and coordination	• SC established and operating as per TOR. Number of meetings held • Expenditure consistent with budget projections • Project partners maintain investment for project duration • Project staff and PhD students appointed • Research undertaken as per agreed Work Plan	• Minutes of SC meetings • Project Financial Statements approved by LWA • CSIRO/DAFF Deed of Grant and CSIRO/WA/NT/QLD Govt Funding Agreements approved • Advice from PI. • Approval of Status Reports recorded in SC minutes	• Changes to SC membership reduce 'ownership' • Not all budgeted financial resources available or are insufficient • One or more partners withdraw funding early • Inability to attract suitably qualified PhD students • Key research staff are not retained

Achievement Criteria	Performance Indicators	Data Sources	Risks
	• Project is completed by agreed date.	• Final Report provided to LWA by agreed date. Final Project Financial Statement approved by LWA	• Maintaining completion date creates stakeholder unrest due to insufficient time to develop trust and productive working partnerships
Monitoring and Evaluation	• M&E Plan developed, approved and implemented • Information is appropriate for day to day management of the M&E Plan	• Approval of M&E Plan and status recorded in SC minutes & NPSI Milestone report • Advice on implementation of M&E Plan recorded in SC minutes	• Duplication of reporting for multiple purposes (NPSI, CRC IF, Cth/States/NT funding) increases project overhead costs

11. RISKS

With multiple funding sources, multiple reporting requirements and numerous internal and external stakeholders, there are a range of important project risks which have been identified above. Using this M&E Plan the SC will have an ongoing mechanism for monitoring those risks and the actions being taken to minimise their potential impacts. Strategies to address the risks will be prepared by the Project Team for consideration by SC and NPSI as required.

12. REPORTING MECHANISMS

Three different reports will be delivered under this M&E Plan.

NPSI Milestone Reports
Milestone Reports are the primary tool used by the LWA/NPSI program to assess delivery against the NPSI Project Schedule. These Reports provide the Project Team's advice to NPSI on performance against the Key Deliverables and associated Achievement Criteria for the project for the reporting period. The timetable for these reports is established in the Project Schedule. The format follows the NPSI *'Guidelines for Milestone Reporting'* and *'Guidelines for preparing and submitting final reports to Land and Water Australia'*.

Project Status Reports
Project Status Reports are provided to the SC with the Draft Milestone Reports to assist its role in guiding the project. The Project Status Reports provide an assessment of project status and contain the following sections:

1. A statement on project status summarising performance against the Work Plan, key outputs, achievements and learnings, issues and opportunities and their implications for the project
2. Assessment of the project against the Achievement Criteria and Performance Indicators provided in Section 10 of this Plan. Typically not all criteria and indicators are addressed in each report
3. Narratives indicating progress against the project outcomes
4. An overview of the project budget and expenditure against the contributions from the Governments towards the Sustainability Specialist position
5. Recommendations to the SC to address identified issues and opportunities.

Financial Statements
Financial Statements are required at times specified in the LWA/CSIRO project agreement. The format for these reports is consistent with NPSI requirements for financial statements (Form FI-F-08).

13. REPORTING TIMETABLE

The following reports will be produced under this M&E plan during the remainder of the LWA/NPSI project:

	Due	Report Type	Comments
1	31/01/06	M&E Plan (draft) to SC	SC endorsement expected on 14/02/06
2	31/01/06	Milestone 4 Report to NPSI	For LWA approval. SC endorsement expected on 14/02/06
3	01/04/06	Project Status Report and Draft Milestone 5 Report to SC	For consideration of Project Status Report & endorsement of draft Milestone Report
4	01/05/06	Milestone 5 Report to NPSI	For LWA approval
5	30/09/06	Financial Statement 2005/06 to NPSI	For LWA approval
6	31/10/06	Project Status Report and Draft Milestone 6 Report to SC	For consideration of Project Status Report & endorsement of draft Milestone Report
7	30/11/06	Milestone 6 Report to NPSI	For LWA approval
8	30/06/07	Project Status Report and Draft Milestone 7 – Final Report to SC	For consideration of Project Status Report & endorsement of draft Milestone Report
9	31/07/07	Milestone 7 – Final Report to NPSI	For LWA approval
10	30/09/07	Final Financial Statement 2006/07 to NPSI	For LWA approval

14. IMPLEMENTATION OF CHANGES RESULTING FROM THE M&E PLAN

Changes to the project approved by the SC will be reflected in updates to the Work Plan. The amended Work Plan will be provided to the NPSI Program Coordinator with the next Milestone Report.

15. RESPONSIBILITIES FOR IMPLEMENTING THE M&E PLAN

The Sustainability Specialist (Jeff Camkin) has responsibility for preparation of the M&E Plan, for its ongoing operation and for preparation and delivery of the Milestone Reports and Project Status Reports.

The Principal Investigator (Dr Keith Bristow) has responsibility for approval of the NPSI Financial Statements, Milestone Reports and Project Status Reports, and has overall responsibility for the NAIF project.

CSIRO Land and Water Project Management Accountants are responsible for the preparation of the NPSI Financial Statements.

All Project Team members have responsibility for the maintenance and provision of data and information relevant to implementation of the M&E Plan.

16. MONITORING, EVALUATION AND REPORTING EFFORT

The estimated Project Team effort required for development and implementation of the M&E Plan to 30 September 2007, in terms of work days, are:

Deliverables	**Total Person Days**
1 x Draft M&E Plan	5
2 x Milestone Reports to NPSI	8
1 x Final Milestone Report to NPSI	20
3 x Project Status Reports to SC	10
2 x Financial Statements to NPSI	2
M&E data management	10
TOTAL DAYS	**55**

17. PUBLIC AVAILABILITY

This M&E Plan will be provided to the SRG and will be made available to other parties upon request.

This M&E Plan is subject to the Copyright and Disclaimer information on page 2.

Appendix 5

NORTHERN AUSTRALIA IRRIGATION FUTURES

STAKEHOLDER ENGAGEMENT AND COMMUNICATION STRATEGY

DECEMBER 2007

NORTHERN AUSTRALIA IRRIGATION FUTURES

Providing new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia

STAKEHOLDER ENGAGEMENT AND COMMUNICATION STRATEGY

CSIRO Land and Water / NPSI / CRC IF / NT, QLD, WA & Australian Governments

(Updated 10 March 2006)

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The contents of this publication do not purport to represent the position of the Project Partners[1] in any way and are presented for the purpose of informing and stimulating discussion for improved decision making regarding irrigation in northern Australia.

[1] The Project Partners are: CSIRO, Land and Water Australia, National Program for Sustainable Irrigation, CRC for Irrigation Futures and the Governments of Australia, Queensland, Northern Territory and Western Australia.

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Project Partners

CSIRO
Land and Water Australia
National Program for Sustainable Irrigation
CRC for Irrigation Futures
Australian Government
Queensland Government
Northern Territory Government
Western Australian Government

Steering Committee

Greg Claydon (Chair) - Queensland Department of Natural Resources and Mines
Murray Chapman - National Program for Sustainable Irrigation
Ross Dalton - Australian Government Department of Agriculture, Forestry and Fisheries
Kevin Devlin - Sunwater
To be advised - Cooperative Research Centre for Irrigation Futures
Andrew Kelly - Ord Irrigation Cooperative
To be advised - WA Office of Water Strategy
Ian Smith - NT Department of Environment, Natural Resources and the Arts
Anwen Lovett - Land and Water Australia

Project Team

Dr Keith Bristow (Principal Investigator)
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STAKEHOLDER ENGAGEMENT AND COMMUNICATION STRATEGY

1. EXECUTIVE SUMMARY

Deciding on whether to irrigate in northern Australia, and if so what irrigation should look like, where it should be located, and how it should be managed, requires improved understanding of river and catchment attributes and the risks associated with irrigation.

The Northern Australia Irrigation Futures (NAIF) project is funded by a suite of private and public investors including the National Program for Sustainable Irrigation (NPSI), the Australian Government and the Governments of Western Australia, Queensland and the Northern Territory with the goal of providing new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia.

Northern Australia holds iconic status for many Australians. Consequently, there is widespread interest and a broad range of views about the future of northern Australia and the role that irrigation might play in that future. Effective strategies are required to engage the many interested parties to ensure that important issues are identified and considered.

This document sets out the Stakeholder Engagement and Communication (SE&C) Strategy for the NAIF research project. The aim of this SE&C Strategy is to significantly increase stakeholder awareness of the NAIF research project intent, activities and outputs in order to improve stakeholder engagement, enhance support for the project and maximise project benefits.

The main stakeholder engagement and communication objectives are:

Awareness
- To raise overall awareness of the project, its intent, activities, outputs and benefits.
- To raise awareness of the linkages between the NAIF project and other research projects.
- To ensure stakeholders are aware of the project and how to be involved.

Attitudes
- To reduce communications risks by encouraging an informed view of the project.
- To manage expectations of what the project can and can't deliver.

Behaviours
- To encourage key stakeholders to engage in project activities.
- To provide tools for project partners and collaborators to communicate the project intent, activities, outputs and benefits.

The Strategy identifies target audiences, segments them by audience type and communication needs, and establishes sub-strategies for each segment. The following key stakeholders groups have been identified:

Group 1 – Key R&D funding and partner organisations
Group 2 – Government (local, state/territory, national)

Group 3 – Researchers
Group 4 – Non-government interest groups and peak bodies
Group 5 – Case Study area stakeholders drawn from all groups
Group 6 – General community across northern and southern Australia
Group 7 – Media (local, regional, state and national)

The primary stakeholder engagement and communication tools are:

- The project Steering Committee (SC) will provide guidance on strategic direction, adaptation and engagement with the key project funding and partner organisations.
- The Stakeholder Reference Group (SRG) will provide links with key stakeholder groups and an understanding of the issues of importance to stakeholders.
- A Stakeholder Network will be maintained for input into the project and for distribution of information.
- Briefings will be held for Australian, QLD, NT and WA government Ministers, their staff and agencies.
- Key project reports will be reviewed and published following CSIRO and external science review processes for journal/conference publications.
- Meetings will be held with representatives of key stakeholder organisations to develop understanding of the NAIF project intent, activities, outputs and benefits.
- General and specific presentations, exhibitions and posters will be used at conferences, workshops etc to directly inform large numbers of stakeholders.
- A regular NAIF Newsletter will be distributed through the Stakeholder Network.
- The NAIF website will be updated regularly with details of the project, project reports and publications, and hot links to other relevant projects, programs and organisations.
- Media releases will be distributed to local, regional and national media, as appropriate, in relation to key project milestones.
- A collation of frequently asked questions and answers, and a standard PowerPoint presentation, will be available to assist project spokespeople and other stakeholders deliver consistent messages about the project.

Highlights in this SE&C Strategy include:

March 2006 and every quarter thereafter – The Northern Australia Irrigation Futures News will be distributed to the Stakeholder Network.

April 2006, October 2006 and June 2007 (Final Report) - Delivery of Project Status Reports and draft NPSI Milestone Reports to the SC for approval.

June 2006 and June 2007 - Briefings for Australian and State/Territory Ministers, their staff and agencies, as appropriate, linked to key project milestones and prior to the release of the final report.

October 2006 - Presentations on NAIF research at the ANCID 2006 conference and other NAIF activities to take advantage of the concentration of stakeholders in Darwin at that time.

Monitoring, evaluation and reporting on this Strategy is through the Stakeholder Reference Group and the Steering Committee, and is part of the NPSI Milestone Reporting process.

2. INTRODUCTION

Northern Australia holds an iconic status for many Australians. The interplay between the landscapes, rivers and strongly monsoonal weather patterns has resulted in unique and diverse ecological systems that will need special care to retain their integrity. At the same time, with some 70 per cent of Australia's available fresh water discharging from our tropical rivers, there are pressures from various quarters to extract some of the water for irrigated agriculture. There is, however, widespread recognition that mistakes were made in the past in southern Australia, and internationally, where many irrigation systems are now degraded or degrading. No one wants to see those mistakes repeated in northern Australia.

Deciding on whether to irrigate in northern Australia, and if so what irrigation should look like, where it should be located, and how it should be managed, requires improved understanding of river and catchment attributes and the risks associated with irrigation. Various studies are underway to improve that understanding and ensure decisions are made with the best information available about the long term implications for tropical catchments.

The NAIF project has been established as a collaborative arrangement between the Australian, QLD, NT and WA governments, NPSI and the CRC IF to provide new knowledge, tools and processes, including an overarching sustainability framework, to support debate and improved decision making on these complex issues in northern Australia. It is expected that the project will also provide new information tools and processes with which to consider the sustainability of new and existing irrigation in southern Australia.

The project will draw on past experience of irrigation and development new knowledge of groundwater systems and irrigation mosaics to build understanding of risks associated with irrigation and of key landscape attributes critical to sustainable irrigation in northern Australia. This knowledge will be used to provide the information required in the framework.

The NAIF project comprises of two key phases. Project initiation in 2003 was funded through the NPSI and also funding through the CRC IF for PhD students to undertake research consistent with the NAIF objectives. Subsequent to that, the QLD, NT, WA and Australian Governments provided additional resources to the research by funding a new position of Sustainability Specialist. While the initial research under the LWA/NPSI program concludes in mid 2007, further follow-on work is anticipated as the funding agreement for the Sustainability Specialist position with the NAIF project extends to October 2008.

A Steering Committee with representation from the key funding partners and expertise in key project areas has been established to help guide the project.

The project schedule under the LWA / CSIRO agreement requires the development and implementation of stakeholder engagement and communication strategies to drive and direct activities over the course of the project. The strategies will help manage project risk, protect and enhance the reputation and credibility of the project, and help maximise project benefits.

This document sets out the SE&C Strategy for the NAIF research project. The Strategy identifies the target audiences and segments them by audience type and communication needs. Sub-Strategies are provided for each segment. Status of the strategies will be reported through the NPSI Milestone Report process.

3. THE NAIF PROJECT MANAGEMENT FRAMEWORK

The challenges associated with the NAIF project are widely acknowledged. The project is attempting to provide a framework to address extremely complex and difficult issues of sustainability on a perhaps unprecedented scale. The project area covers the entire tropics of Australia, which encompasses many local, state and national jurisdictions, numerous complex, and in many cases poorly understood hydrological systems, and an extensive range of stakeholders with sometimes competing interests and values.

Extensive changes are taking place in water resources and irrigation management across Australia. The COAG National Water Initiative, which continues and refines the significant progress Australia has made in water resource management since 1994, has focussed political attention and community expectations on shifting towards more sustainable use of our water and land resources. There is, therefore, also widespread acknowledgement of the very considerable benefits that will accrue from a successful NAIF project.

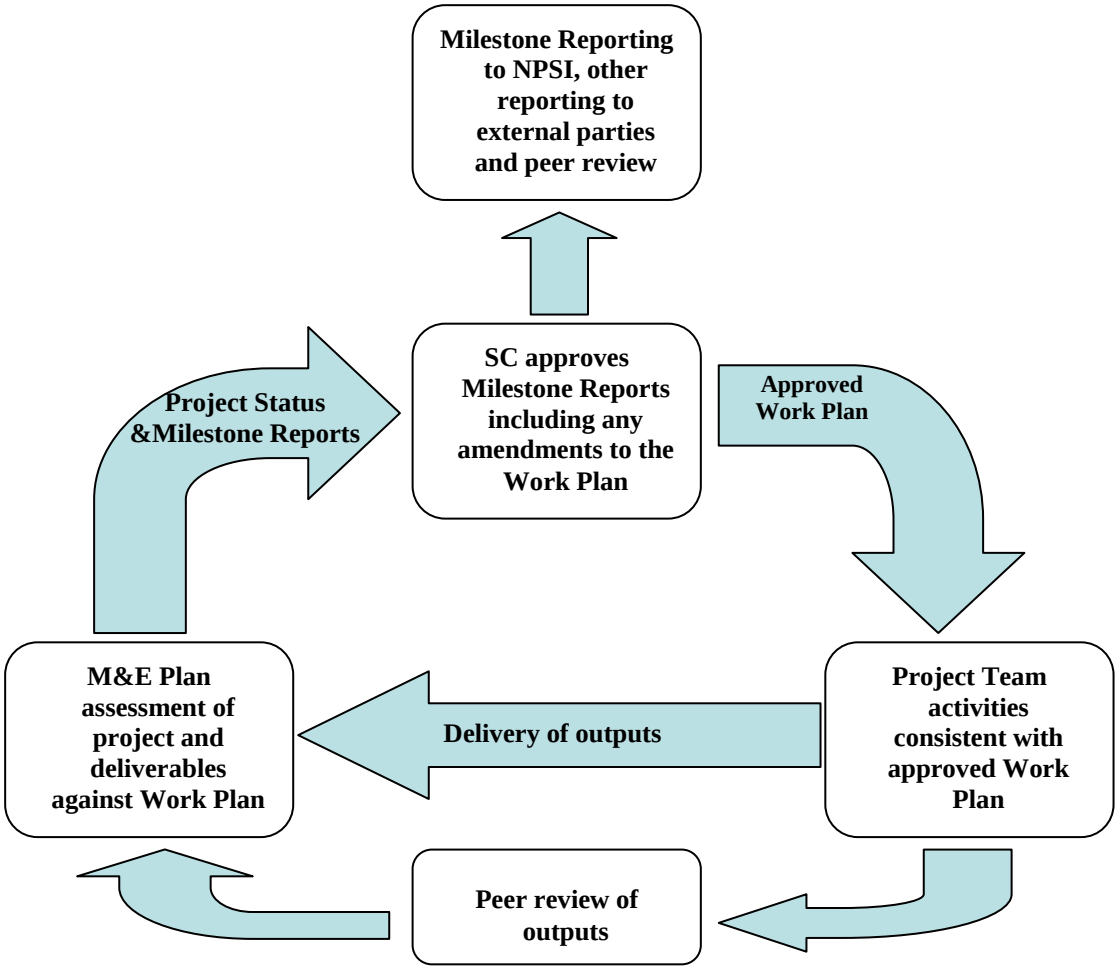

Figure 1. The NAIF Project Management Framework

Strong project management is critical to achieving success and the NAIF Project Management Framework (Figure 1) has been established for that purpose.

The Stage 2 Work Plan provides a detailed account of the approved activities to be carried out by the Project Team and others. The Work Plan includes a Gantt chart showing project activities, timelines and linkages to assist project management on an ongoing basis and against which progress will be assessed.

The SC has responsibility for guiding the project to help ensure appropriate outputs are created and useful outcomes are achieved. The SC is responsible for approving the NAIF Work Plan and changes to it required from time to time to address issues and opportunities. Changes to the Work Plan that have a significant impact on the project or its deliverables will also be reflected in the NPSI Milestone Reporting process.

The Sustainability Specialist is responsible for maintaining the NAIF Project Management Framework, in consultation with the Project Team, and for reporting progress to the SC in accordance with the Monitoring and Reporting Plan.

4. PROJECT GOAL AND OBJECTIVES [2]

Project Goal

The NAIF project goal is "To provide new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia".

Project Objectives

The NAIF project objectives are to:

1. Delineate key landscape attributes (including soil & water resources, climate, vegetation, rivers, near shore marine environments, & where appropriate links to people, industries, markets) relevant to ecologically sustainable irrigation across northern Australia

2. Use key landscape attributes to develop sustainability indicators and associated management criteria covering a range of scales (field, farm, district, irrigation scheme, catchment) for northern Australia

3. Develop an overall framework that, through their involvement, is embraced by policy makers, regulators, investors and managers, to help ensure any irrigation is managed in a consistent, ecologically sustainable manner in northern Australia

4. Use a number of linked case studies and stakeholder input to support and inform development and testing of the framework

5. Through provision of a robust framework, contribute tools and knowledge to support considered debate, decision making and long term strategic planning for northern Australia & Australia as a whole.

[2] The NAIF project goal and objectives were redefined by the Steering Committee on 14 February 2006.

5. THE NEED FOR A STAKEHOLDER ENGAGEMENT AND COMMUNICATION STRATEGY

There is widespread interest and a broad range of views about the future of northern Australia and the role that irrigation might play in that future. As a result, there is concern amongst some stakeholder groups that some research projects may generate increased support for irrigation in northern Australia. These concerns have been raised with respect to the NAIF research project.

Since its inception the NAIF project has taken a fairly ad hoc approach to communications. Apart from a flurry of media coverage at its launch in 2003, the project has received little public attention. Most communications about the project have been through existing R&D communication channels, and have not made their way into the domain of general public information.

By early 2005 it had become apparent that the project had attracted a number of critical opponents who sought to question certain elements of the project. Initially criticisms were made through informal consultations and more recently documented through letters and in the public domain through media interviews and media reports.

A communications risk assessment was undertaken to identify the various sources of communications risk faced by the project and determine both the likelihood and impact of those risks on the project's reputation, credibility and efficacy. Key issues and considerations are detailed in Section 7 of this strategy.

Effective strategies need to be put in place to engage the many interested parties, at a range of levels of involvement, to ensure that all important issues are captured and the project continues to make good progress. Communication strategies are needed to address not only those individuals and organisations that wish to be directly involved in the project but also those who simply wish to receive information about the research and project findings.

Improved stakeholder and broader community awareness and understanding of the intent, activities and outcomes of NAIF research project are expected as a result of this SE&C Strategy. The Strategy establishes important opportunities for interested parties to put their views forward, to provide important data and information and to benefit from the information, tools and processes that will be generated through this research.

A list of all NAIF project publications and significant workshops and meetings facilitated by or involving NAIF is at Attachment 1. An updated list of NAIF publications, reports and other important information is available at **http://www.clw.csiro.au/naif/index.html**.

There is a need to significantly increase the level of stakeholder engagement and project communications through the remainder of the NAIF research project.

6. CURRENT AND PREVIOUS RESEARCH

The NAIF research project currently has two stages: Project Initiation and Definition; and Development and Testing a Sustainability Framework. If the project is successful in delivering a sustainability framework that is of practical use to decision-makers, including

individuals, communities and governments, a third stage supporting the utilisation of the sustainability framework is envisaged. The Stages of the NAIF project are represented in Figure 2.

Stage one of the NAIF research project was launched during the Australian National Committee on Irrigation and Drainage (ANCID) conference in October 2003. Stage 1 focussed on engaging a broad range of clients and stakeholders, and formulating a work plan, project team and funding arrangements for Stage 2.

The main outcomes of project activities in Stage 1 were the widespread support for the project and for proceeding with a Stage 2, establishment of a project team and budget for review, and approval by key stakeholders, including the SC, NPSI and CRC IF, for proceeding with Stage 2. There was strong support for the NAIF research project to be linked to key case study sites.

Reviews of Stage 1 noted that because of limited time and resources, the NAIF research project would need to be clear about what it can address and what others need to address. A key to managing the issue would be the development of linkages with other activities and initiatives.

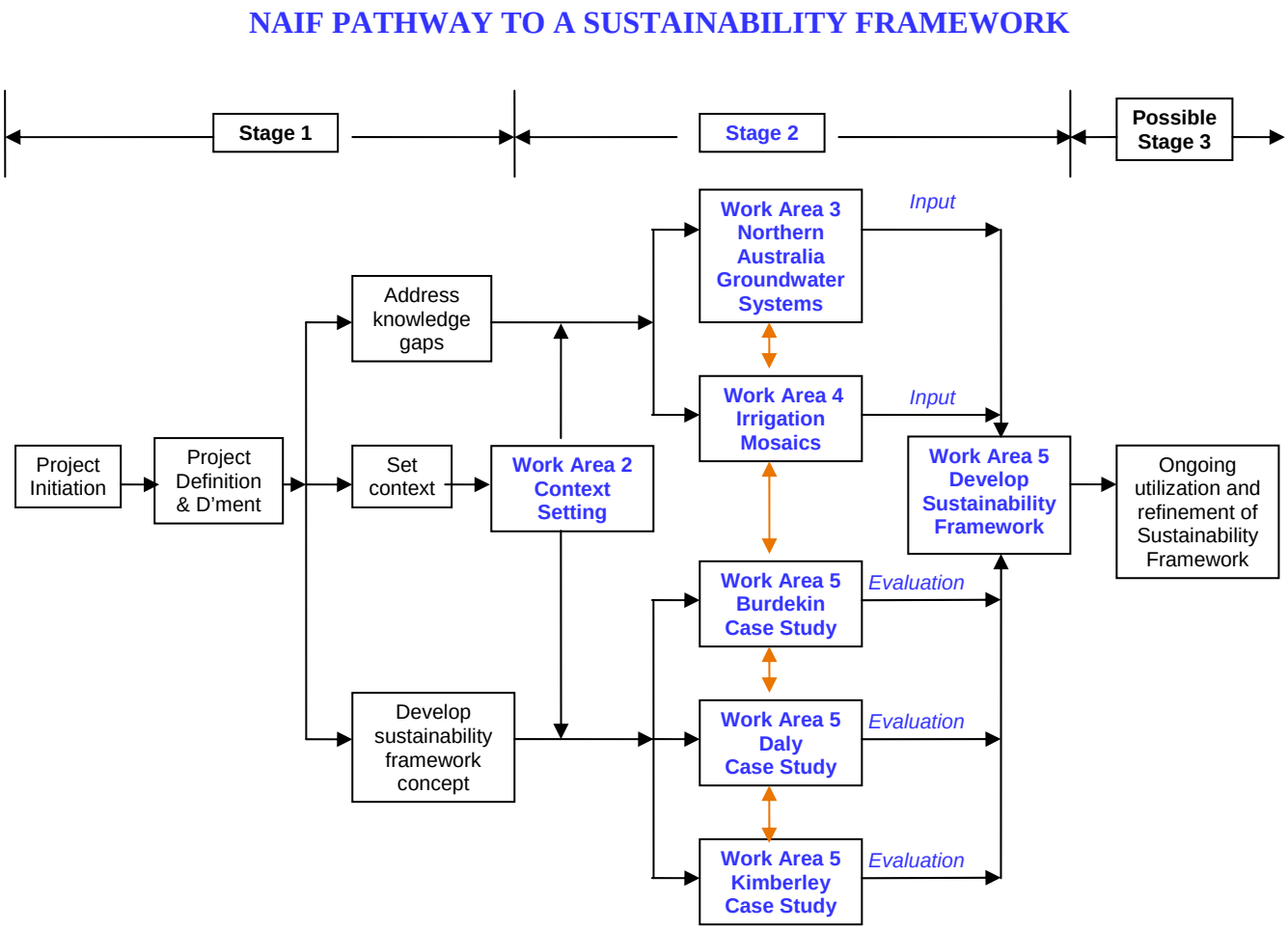

Figure 2. Key stages and components of the NAIF project.

Of particular importance to the development of the Stage 2 Work Plan was a workshop of Governments associated with the future of northern Australia (WA, NT, QLD & Australian). The workshop was held in Darwin on 26-27 May 2004 in the presence of some of the key project partners and stakeholders, including NPSI and the CRC IF. The report of the Darwin workshop, and other consultations, is available on the NAIF website at http://www.clw.csiro.au/naif/documents/Report_Darwin_Workshop_220604.pdf.

The key issues identified at the Darwin workshop were:

- Meeting indigenous needs and taking account of indigenous knowledge
- Institutional arrangements to address scale
- Focus on groundwater and conjunctive use
- Irrigator behaviour and management
- COAG water reform framework
- Role of decision support tools and trade-off analysis
- Move to private investment environment (all states)
- Emphasis on biophysical (vs socioeconomic knowledge needs and gaps)
- Database management
- Communication and delivery.

The key implications for the NAIF project emanating from the workshop were grouped into content and process, and summarised as:

Content

- The importance of independent groundwater systems in the future of irrigation development in northern Australia and as a key component in the biophysical component of the sustainability framework;
- The importance of irrigation system design where indigenous communities are involved;
- The development of more specific produce definitions and delivery systems. This will be important to both developing cash resourcing opportunities as well as providing greater appreciation of benefits and confidence in the project by different stakeholders;
- Clarification of whether the project will develop decision support systems and if so, the types of support systems envisaged;
- Better definition is needed between the interface of the biophysical components with socioeconomics, or with social, economic and institutional components of the framework; and
- There are significant differences in northern Australia regarding the possible scale, shape and design of irrigation developments.

Process

- Significant opportunities are present in linking with other State/Territory and Australian Government initiatives to both extend the skills available to the project and to enhance its resourcing for meeting its objectives;
- The project may need to focus on key issues should it be limited by cash resources and success with linking with other initiatives;
- A strong communication strategy will need to be developed including the effective engagement with key stakeholders, development of a common language, and the management of expectations. As engagement of communication imperatives can be resource demanding, the resourcing of such communication requirements should be recognised and resources made available to the project;

- The design of specific engagement processes for indigenous communities and the injection into project skills of some appreciation of the indigenous view of landscape and the associated design of irrigation developments; and
- Further clarification will be required in developing useful types of decision support tools and how far the framework extends to addressing the need for tradeoffs between environmental, social and economic benefits and costs across a range of spatial scales.

A primary consideration in finalising the Stage 2 Work Plan was the need to meet a range of SC and stakeholder interests and to ensure the development of the sustainability framework proceeds in a way that provides the best likelihood that it will be both supported and of practical use to individuals, community groups, governments and others making decisions in relation to the future of irrigation in northern Australia. A case study approach will be taken to achieve this.

The Stage 2 Work Plan was approved by the SC on 1 December 2005. In addition to the development of a sustainability framework, Stage 2 will deliver improved understanding of the hydrology of northern Australia and an understanding of the concepts of irrigation mosaics and there application in northern Australia.

7. KEY ISSUES AND CONSIDERATIONS

A communication risk assessment was undertaken for the NAIF project. A key issue identified in that assessment for consideration in the development of this SE&C Strategy was public and private criticisms on several aspects of the project including: (i) that it had a pro-development bias; (ii) that it was not effectively engaging or properly managing relationships with stakeholders (eg indigenous groups and environmental NGOs) beyond the immediate project partners; and (iii) that it posed a significant threat to the ecological integrity and biological diversity of Australia's tropical rivers and wetlands because it did not meet the accepted definition of ecologically sustainable development.

Many of the current issues and concerns about the project, particularly the perception of a pro-development bias, can be related to deficiencies with project communications. Specifically, the project has not yet successfully addressed through communications a few core negative perceptions about the project amongst key stakeholders.

Opportunities exist to reduce communications risk by:
- Establishing agreed key messages for the project that address specific stakeholder concerns
- Establishing agreed protocols for communicating with key stakeholders
- Improving document management and
- Improving coordination of communication and engagement activities.

Projects with a high-risk profile and a complex network of stakeholders and interest groups such as NAIF require a comprehensive communications strategy in order to manage communications-based risk and protect and enhance the reputation and credibility of the project. This confirms the need to develop a comprehensive communication strategy that will drive and direct communications over the life of the project and that is integrated with a stakeholder engagement strategy.

8. STAKEHOLDER ENGAGEMENT AND COMMUNICATION AIMS

The aim of this SE&C Strategy is to significantly increase stakeholder awareness of the NAIF research project intent, activities and outputs in order to improve stakeholder engagement, develop support for the project and maximise project benefits.

9. STAKEHOLDER ENGAGEMENT AND COMMUNICATION GUIDELINES

The behavioural guidelines for this SE&C Strategy are to:

- **Clarify** the objectives and goals of engagement and evaluate the appropriateness of techniques.
- **Understand** related processes and be clear about how the engagement fits in with official decision-making processes.
- **Manage** information in an accessible way without using complex concepts or jargon.
- **Support** the development of capacity in understanding and applying the research concepts.
- **Ensure** transparent identification of stakeholder groups and invitations to be involved.
- **Build** trust with and between participants for the long term.
- **Allocate** sufficient time to develop process, build partnerships and strengthen networks.
- **Encourage** feedback and ensure flexibility to adapt to that feedback.

10. STAKEHOLDER ENGAGEMENT AND COMMUNICATION OBJECTIVES

The main stakeholder engagement and communication objectives are:

Awareness
- To raise overall awareness of the project, its intent, activities, outputs and benefits.
- To raise awareness of the linkages between the NAIF project and other research projects.
- To ensure stakeholders are aware of the project and how to be involved.

Attitudes
- To reduce communications risk by encouraging an informed view of the project.
- To manage expectations of what the project can and can't deliver.

Behaviours
- To encourage key stakeholders to engage in project activities.
- To provide tools for project partners and collaborators to communicate the project intent, activities, outputs.

11. STRATEGIC APPROACH

Because of the iconic status of northern Australia to so many Australians, every audience for communicating messages about the NAIF project is also a stakeholder or potential stakeholder. It is difficult and unnecessary to separate strategies for communication from strategies for stakeholder engagement in these circumstances and, consequently, the approach taken is to establish a combined SE&C Sub-Strategy for each of the identified Stakeholder Groups.

Key strategies are:

- Building direct, productive relationships wherever possible
- Utilising media and stakeholder networks to communicate where direct relationships are not possible
- Building strong linkages between NAIF and other relevant research and researchers
- Facilitating information sharing and information sharing networks
- Demonstrating how NAIF is contributing to a broad range or research and societal goals
- Harnessing third party advocates to assist and communicate research outputs
- Using a matrix of communication tools in a sustained program

12. STAKEHOLDER GROUPS

The following key stakeholders and target audience groups have been identified at three levels. Details of individuals and organisations in each of these groups are drawn from a NAIF Project Stakeholder Network database, which is continually updated.

Level 1 Stakeholders

Group 1 – Key R&D funding and partner organisations
- CSIRO
- Land and Water Australia
- National Program for Sustainable Irrigation
- CRC for Irrigation Futures
- Australian Government Department of Agriculture, Fisheries and Forestry
- Queensland Department of Natural Resources and Mines
- Northern Territory Department of Environment, Natural Resources and the Arts
- Western Australian Department of the Premier and Cabinet
- Project Team

Level 2 Stakeholders

Group 2 – Government
- Relevant Australian Government agencies and Ministers
- Relevant Queensland Government agencies and Ministers
- Relevant Northern Territory Government agencies and Ministers
- Relevant Western Australian Government agencies and Ministers
- Northern Australia local governments

Group 3 – Researchers
- CSIRO
- Universities
- Cooperative Research Centres
- Australian Government
- Queensland Government
- Northern Territory Government
- WA Government

Group 4 – Non-government interest groups and peak bodies
- Environmental NGOs
- Indigenous organisations
- Irrigation industry organisations
- Fishing NGOs

Group 5 – Case Studies
- Case study area governments, researchers, non-government interest groups, general community and media.

Level 3 Stakeholders

Group 6 – General community
- General scientific community
- Northern Australian residents
- Other Australian residents

Group 7 – Media
- National media
- QLD, NT, WA and ACT state media
- QLD, NT and WA regional and local media

13. STAKEHOLDER ENGAGEMENT AND COMMUNCIATION TOOLS

Steering Committee
The SC was established on 11 March 2004 to help ensure appropriate outputs are created and useful outcomes are achieved. The SC is the primary mechanism for setting the strategic direction of the project, for providing guidance in adapting to emerging priorities, and for engaging and communicating with the key project funding and partner organisations.
This tool is particularly relevant to Stakeholder Group 1.

Stakeholder Reference Group
The NAIF is intended to be a primary mechanism for linking with key stakeholders. Attempts will be made to ensure that the SRG is representative of the key stakeholders but, where this is not possible attempts will be made to secure members that have an understanding of likely stakeholder views on critical issues. This tool is particularly relevant to Stakeholder Group 4.

NAIF Stakeholder Network
A Stakeholder Network database of people who wish to be involved or kept informed about the NAIF project has been established. This tool is particularly relevant to Stakeholder Groups 2, 3, 4 and 6.

Government briefings
As major project funding partners, senior management briefings will be provided for Australian, QLD, NT and WA government Ministers, their staff and agencies. This tool is particularly relevant to Stakeholder Groups 1 and 2.

Publication of scientific research
All key project reports are reviewed and published through normal CSIRO pre-publication procedures and external science review processes for journal/conference publications. New publications are advertised on the NAIF website and in the NAIF Newsletter. Publications will include a summary Research Bulletin of the project and its key findings of relevance to end users at project completion. This tool is particularly relevant to Stakeholder Group 3.

Meetings with key stakeholder representatives
The development of personal relationships between NAIF and key stakeholders is critical to generating understanding and trust. Meetings with key stakeholder representatives play a critical role in this. Where possible and necessary, meetings will be supported with exchange of correspondence confirming issues discussed, agreements reached and outstanding matters for further consideration. This tool is particularly relevant to Stakeholder Group 4.

Presentations, exhibitions and posters
Presentations, exhibitions and posters at conferences, workshops etc are an important mechanism for directly informing larger numbers of key stakeholders through their organisations. Presentations, exhibitions and posters are on the NAIF project in general and on specific components of the research, depending on the needs of the audience and the project. This tool is particularly relevant to Stakeholder Group 4.

Newsletters
The Stakeholder Network receives regular updates on NAIF project. A Northern Australia Irrigation Futures Newsletter will be created and distributed electronically quarterly. The need for hard copy distribution will be reviewed after 12 months. This tool is particularly relevant to Stakeholder Groups 2, 3, 4 and 6.

Web site
The NAIF project website has been established and is updated regularly. It contains details of the project, project reports and publications, hot links to other relevant projects, programs and organisations, and provides an opportunity for feedback to the project team. This tool is particularly relevant to Stakeholder Groups 2, 3, 4 and 6.

Media releases and press advertisements
Media releases are used to reach local, regional and national audiences at important milestones in the project. Advertisements will generally only be used to support information distributed through stakeholder networks, for example supporting calls for expression of interest in the Stakeholder Reference Group. This tool is particularly relevant to Stakeholder Groups 6 and 7.

Key messages and Q&A

Key messages and a series of questions and answers (Attachment 2) have been prepared to help project spokespeople and other stakeholders deliver consistent messages and improve understanding of the NAIF research project. This tool is relevant to all Stakeholder Groups.

Template PowerPoint presentation

A template PowerPoint presentation will be prepared for use by the SC, Project Team and other collaborating organisations to assist dissemination of the core messages about the NAIF project.

14. SUB-STRATEGY 1: KEY R&D FUNDING AND PARTNER ORGANISATIONS

Key R&D Funding and Partner Organisation Stakeholders

- CSIRO
- Land and Water Australia
- National Program for Sustainable Irrigation
- CRC for Irrigation Futures
- Australian Government Department of Agriculture, Fisheries and Forestry
- Queensland Department of Natural Resources and Mines
- Northern Territory Department of Environment, Natural Resources and the Arts
- Western Australian Department of the Premier and Cabinet
- NAIF Project team

Primary Objectives of Sub-Strategy

The primary objectives of engaging and communicating with the key R&D Funding and Partner Organisations are:

- To report on project progress and direction
- To seek guidance on project direction
- To support project outcomes by encouraging use of project outputs
- To demonstrate value for money from funding contributions

General approach

The SC is the primary mechanism for setting the strategic direction of the project, for providing guidance in adapting to emerging priorities, and for engaging and communicating with the key project funding and partner organisations. Terms of Reference for the SC are at Attachment 3.

Stakeholder Engagement and Communication Tools

The SC was established on 11 March 2004 to provide strategic advice and guidance to the project to ensure that it secures adequate resourcing to develop, test and deliver an acceptable framework to stakeholders to ensure sustainable development, management and improvement of irrigation systems in tropical Australia. The SC meets in person occasionally, with other meetings held by telephone conference call. SC members will be provided Project Status Reports and draft NPSI Milestone reports one month prior to forwarding Milestone Reports to NPIS. The SC will receive updates on relevant specific issues at each SC meeting.

In addition to the SC meetings, the Principal Investigator and Sustainability Specialist interact regularly with SC members, and direct personal contact between the Project Team and SC members is expected on an as needs basis.

Key Issues

At inception, it was recognised that the composition of the SC may need to adapt over time. The current composition has been questioned by some stakeholder groups who consider that it has insufficient expertise in indigenous and environmental issues. The Steering Committee composition will be reviewed against the Terms of Reference to determine whether changes should be made to address the concerns raised.

The Stakeholder Engagement and Communication Plan for Key R&D Funding and Partner Organisations follows (Table 1).

Table 1: Stakeholder Engagement & Communication Plan for Key R&D Funding and Partner Organisations

Action	Responsibility	Timeframe
Steering Committee meetings	Chairman/DP	As required, but at least quarterly
Review of Steering Committee membership and any proposed changes to SC agreed	KB/JC/SC	31/3/06
Standard Q&As available for use by all SC members	JC	14/2/06
Summary of the NAIF project as a PowerPoint presentation available for use by all SC members	JC	31/3/06
Project Status Reports & NPSI Milestone Reports to SC	JC	1/4/06 & 31/10/06
Project Final Report to SC	JC	30/6/07
Presentation to NPSI Investors Forum	KB	14/10/06 & October 2007

15. SUB-STRATEGY 2: GOVERNMENT RELATIONS

Government Relations Stakeholders

- Relevant Australian Government agencies and Ministers
- Relevant Queensland Government agencies and Ministers
- Relevant Northern Territory Government agencies and Ministers
- Relevant Western Australian Government agencies and Ministers
- Northern Australia local governments

Primary Objectives of Sub-Strategy

- To ensure all levels of Government have sufficient understanding of the NAIF project
- To generate support for the project
- To support project outcomes by encouraging use of project outputs

General approach

Briefings by SC members and the project team are the main method of direct engagement with relevant federal, state and local government agencies and their Ministers.

Stakeholder Engagement and Communication Tools

Opportunities for personal briefings of Ministers, their advisors and key agency staff will be sought through the life of the project. Letters providing updates on the NAIF project and seeking face to face briefings will be forwarded to Ministers and relevant agencies at regular intervals.

Key Issues

Ministers and senior agency staff are inevitably busy and they may need to be convinced of the benefits of receiving briefings on the NAIF project. SC members will assist the project team in creating opportunities for formal briefings for relevant Minister and their agencies briefings and will take other opportunities as they arise.

The Stakeholder Engagement and Communication Plan for Government Relations follows (Table 2).

Table 2: Stakeholder Engagement and Communication Plan for Government Relations

Action	**Responsibility**	**Timeframe**
Briefing for relevant Australian Government Ministers on project plan, key messages & engagement and communication strategies	KB &/or JC & SC member	30/06/06
Briefing for relevant Australian Government Ministers on Final Report	KB &/or JC & SC member	30/06/07
Briefing for relevant QLD Government Ministers on project plan, key messages & engagement and communication strategies	KB & GC	30/06/06
Briefing for relevant QLD Government Ministers on Final Report	KB & GC	30/06/07
Briefing for relevant NT Government Ministers on project plan, key messages & engagement and communication strategies	KB &/or JC & IS	30/06/06
Briefing for relevant NT Government Ministers on Final Report	KB &/or JC & IS	30/06/07
Briefings for relevant WA Government Ministers on project plan, key messages & engagement and communication strategies	JC & WA SC member	30/06/07
Briefings for relevant WA Government Ministers on Final Report	JC & WA SC member	30/06/07
6 monthly letter from SC Chairman to update above Ministers on project status	JC	March 2006, Sept. 2006, March 2007
Separate briefings for relevant NT, QLD and WA government agency staff	SC members to arrange	6 monthly
Letter from SC Chairman to Chairman National Water Commission advising of the NAIF project plan, key messages and engagement and communication strategies.	JC	30/4/06
Letter from SC Chairman to Chairman National Water Commission advising of the NAIF Final Report	JC	30/7/07
Letter from SC Chairman to QLD, WA and NT Ministers and Departments for Local Government advising them of the NAIF project plan, key messages and engagement and communication strategies.	JC	30/4/06
Letter from SC Chairman to QLD, WA and NT Ministers and Departments for Local Government advising them of the NAIF Final Report	JC	30/7/07

16. SUB-STRATEGY 3: RESEARCHERS

Researcher Stakeholders
- CSIRO
- Universities
- Cooperative Research Centres
- Australian Government
- Queensland Government
- Northern Territory Government
- WA Government

Primary Objectives of Sub-Strategy
- To identify and cultivate linkages between NAIF project and other research projects and programs
- To raise awareness of NAIF outputs for use in other research projects
- To facilitate sharing of information and reports between relevant research projects.

General approach
The general approach to engaging and communicating with other researchers will be through existing research networks.

Stakeholder Engagement and Communication Tools
All key NAIF project research will be published through normal CSIRO procedures and will be available to a broad national and international audience. Existing networks of researchers and research organisations will be utilized to raise awareness of the NAIF project and opportunities for presenting NAIF research to conferences will be sought on an ongoing basis. Regular meetings of leaders of key projects across the north (NAIF, Tropical Rivers Inventory etc) will be established to share knowledge, ensure relevant linkages are built between projects and duplication is minimised. Summaries of the meetings will be posted on the websites for each project to inform the wider community about the collaboration and outcomes.

Key Issues
Some stakeholders have expressed concerns about potential for contradiction between the LWA Tropical Rivers Inventory and Assessment Program (TRIAP) and the NAIF project. Meetings to ensure strong linkages and collaboration between these projects and Charles Darwin University have been established on a regular basis, chaired by NAIF.

The Stakeholder Engagement and Communication Plan for Researchers follows (Table 3).

Table 3: Stakeholder Engagement and Communication Plan for Researchers

Action	**Responsibility**	**Timeframe**
Chair NT research collaboration tele-meetings (NAIF, TRIAP, CDU, NT Dept. of NRETA	JC	Bi-monthly
Tropical Rivers Program membership on NAIF Steering Committee and vica versa	KB	Ongoing
Publication of NAIF reports in scientific journals	KB	Various
Presentations at key scientific conferences, workshops and meetings as opportunities arise	KB/JC/BK/CP/FC	Various
Regular communications between NAIF and SKI proposal proponents	KB	Various

17. SUB-STRATEGY 4: NON-GOVERNMENT INTEREST GROUPS AND PEAK BODIES

Non-Government Interest Group Stakeholders and Peak Bodies

- Environmental NGOs
- Indigenous organisations
- Irrigation industry organisations
- Fishing NGOs
- Pastoral industry organisations

Primary Objectives of Sub-Strategy

- To identify issues of importance to key stakeholders for consideration in NAIF activities
- To inform stakeholders on research activities, outputs and outcomes.

General Approach

The main approach to stakeholder engagement and communication with non government interest groups is the development of direct relationships between NAIF project team and representatives of stakeholder organisations.

Stakeholder Engagement and Communication Tools

The SRG is a primary mechanism for engaging and communicating with key stakeholder groups and for seeking feedback on the NAIF research and future research. A copy of the Terms of Reference for the SRG is at Attachment 4. The SRG will provide an important point of reference for feedback on current research and guidance on future research.

Opportunities for the project team to meet with representatives of key stakeholder organisations will be taken throughout the course of the project. The purpose of these meetings will be to update stakeholder organisations on progress, to identify issues that need to be addressed and, where appropriate, to encourage membership on the SRG.

Key Issues

Stakeholder Reference Group – A request for Expressions of Interest for membership of the SRG was advertised nationally in August 2005. The SC subsequently endorsed all nine nominations as members of the SRG. While the current members of the SRG bring significant knowledge and skills relevant to the NAIF project, some key stakeholder groups remain unrepresented. Membership of the SRG will remain open and the unrepresented key stakeholder groups will continue to be encouraged to join.

Indigenous stakeholder needs - The specific needs of indigenous communities in stakeholder engagement and communication are recognised. The Northern Land Council is represented on the SRG and the project team will also work with the North Australian Indigenous Land and Sea Management Alliance to address the need for effective engagement with indigenous communities.

ANCID 2006 – The Australian National Committee on Irrigation and Drainage Annual Conference will be held on 15-18 October 2006 in Darwin. The Conference will focus national attention on irrigation in northern Australia and should draw participation and interest from a range of key stakeholder groups. This provides a major opportunity to raise awareness of the NAIF project and to engage key stakeholders. Presentations on NAIF

research at the ANCID 2006 conference, a face to face meeting of the SRG and other NAIF activities will make the most of the concentration of stakeholders in Darwin at that time.

The Stakeholder Engagement and Communication Plan for Non-Government Interest Groups follows (Table 4).

Table 4: Stakeholder Engagement and Communication Plan for Non-Government Interest Groups

Action	**Responsibility**	**Timeframe**
General		
Presentations at the following forums: - RiverSymposium 2006 - ANCID 2006 - Others TBA	 JC et al JC et al	 Sept. 2006 Oct. 2006
SRG		
Establish SRG	KB	30/09/05
Review of SRG membership	JC	28/2/06
Encourage unrepresented sectors to join SRG	JC	Ongoing
Face to face meeting during ANCID conference	JC	18/10/06
Indigenous community needs		
Work with SRG, NAILSMA and others to identify and address specific needs of northern aboriginal communities as they relate to NAIF project engagement and communication	JC	Ongoing
Environmental NGOs		
Meet with NAEA to address and resolve any misunderstandings about the NAIF project	KB/JC/Chairman	By 30/4/06
ANCID conference		
Proposed NAIF activities during ANCID conference to SC for approval	JC	31/05/06

18. SUB-STRATEGY 5: CASE STUDIES

It is essential that the research project deliver a sustainability framework that is demonstrably a practical tool. Three case study sites are proposed to help achieve this. The three case study sites will provide insights to inform the development of the sustainability framework.

The case studies will also:

- Allow the NAIF project to link closely with and draw from other activities taking place in the case study areas
- Help ensure that the sustainability framework can provide for the incorporation of ecological, social, economic and cultural values by those wishing to use the framework
- Ensure that risks and limitations of irrigating in northern Australia are clearly identified
- Ensure the Stakeholder Reference Group has the opportunity to understand the direct relevance of decisions about irrigation in northern Australia to the future of those individuals and communities.

Case Study Stakeholders
Case study area stakeholders are likely to include local stakeholders listed in all other groups. These stakeholders will be identified in conjunction with the SC member for each jurisdiction.

Primary Objective of Sub-Strategy

- To ensure that practical issues of importance to local stakeholders are identified for inclusion in the development of a sustainability framework
- To identify commonality and differences between case study areas to inform development and testing of the framework.

General Approach
Existing state/territory government networks will be used to identify relevant stakeholders and issues of importance to them. Where possible, existing government processes will be used as the mechanism for stakeholder engagement in each case study area.

Stakeholder Engagement and Communication Tools
The stakeholder engagement and communication tools for each case study will be developed in collaboration with the SC member from that state government jurisdiction and outlined in the Case Study work plans.

Key Issues
The success of the case studies will be very dependent on contributions from the relevant state governments and on stakeholder engagement in the case study areas. Operational Plans and Case Study Stakeholder Engagement and Communication Plans are being developed in consultation with the relevant SC member from each of the QLD, NT and WA governments.

The Stakeholder Engagement and Communication Plan for Case Studies follows (Table 5).

Table 5: Stakeholder Engagement and Communication Plan for Case Studies

Action	**Responsibility**	**Timeframe**
Finalise QLD Case Study Operational Plan and Stakeholder Engagement and Communication Strategy	JC/QLD SC member	31/3/06
Finalise NT Case Study Operational Plan and Stakeholder Engagement and Communication Strategy	JC/NT SC member	31/3/06
Finalise WA Case Study Operational Plan and Stakeholder Engagement and Communication Strategy	JC/WA SC member	31/3/06

19. SUB-STRATEGY 6: GENERAL COMMUNITY

General Community Stakeholders
- General scientific community
- Northern Australian residents
- Other Australian residents

Primary Objective of Sub-Strategy
- To make detailed information about the NAIF research project intent, activities, outputs and benefits available to the broader community across Australia and internationally.

General Approach
The use of mass media and electronic information will be the primary mechanism for reaching the largest possible audience in the general community across Australia.

Stakeholder Engagement and Communication Tools
A Northern Australia Irrigation Futures Newsletter will be produced every quarter for distribution through the Stakeholder Network. Brief simple language fact sheets will be prepared to summarise key project outputs, such as technical reports. Newsletters and fact sheets will be available through electronic links (NPSI, CRC IF etc) in addition to the NAIF website.

Key Issues
Nil.

The Stakeholder Engagement and Communication Plan for General Community follows (Table 6).

Table 6: Stakeholder Engagement and Communication Plan for General Community

Action	**Responsibility**	**Timeframe**
Establish and maintain Stakeholder Network database	DP	Completed
Distribute NAIF Project Newsletter to Stakeholder Network	JC/DP	Quarterly
Fact sheets on key project research activities prepared	JC	According to Work Plan
Maintain NAIF website with regular updates on project plan, activities, outputs and communications.	KB/JC/DP	Ongoing

20. SUB-STRATEGY 7: MEDIA

Media Stakeholders

- National media
- QLD, NT and WA state media, Canberra Times
- Regional and local media

Primary Objectives of Sub-Strategy

To provide appropriate opportunities for local, state/territory and national media to present factual and objective stories about the NAIF project intent, activities, outputs and benefits.

General Approach

The general approach to engagement with media stakeholders is to proactively prepare a range of products relating to key project activities and milestones, and to respond to media opportunities as they arise.

Stakeholder Engagement and Communication Tools

A list of standard NAIF project FAQs will be available for the SC and project team to respond to media interest. There will be at least one media release every six months about the status of the project, key milestones, key issues or project outputs.

Key Issues

The following opportunities/options for media statements have been identified:

- Item on changes to SC membership to increase environmental and indigenous expertise – 1st quarter 2006
- Item on commencement of case studies – 2nd quarter 2006
- Item on research leading to report *Overview of Irrigation in northern Australia* – 3rd quarter 2006
- Item on NAIF activities at ANCID Conference – 4th quarter 2006
- Item on research leading to report *State of knowledge of groundwater flow systems in northern Australia* – 4th quarter 2006
- Item on research leading to report *Current understandings of irrigation mosaics* – 1st quarter 2007
- Item on research leading to report *Research findings, modelling results and applications for irrigation mosaics in northern Australia* – 2nd quarter 2007
- Item on completion of case studies – 2nd quarter 2007
- Item on release of NAIF Final Report / sustainability framework – 3rd quarter 2007
- Other opportunities that arise as the project progresses.

Potential media target list

The following list identifies potential targets for proactive media activity. For each individual media activity, a more refined target list will be produced to ensure the relevance and appropriateness of each target to the media activity.

- National Newspapers - The Australian, The Australian Financial review
- Regional and Country Newspapers – eg the Bowen Independent, The Northern Miner (Charters Towers), Townsville Bulletin, Katherine Times, Broome Advertiser and Kimberley Echo
- Local newspapers in each case study area

- Metropolitan Newspapers - The Daily Telegraph, The Sydney Morning Herald, Herald Sun, The Age, The Courier Mail, The Advertiser, The West Australian, Canberra Times
- Trade - Water (Australian Water Association), Irrigation Australia, Habitat Australia, Ecos Magazine
- Radio - ABC, ABC Country Hour and local radio in each case study area

The Stakeholder Engagement and Communication Plan for Media follows (Table 7).

Table 7: Stakeholder Engagement and Communication Plan for Media

Action	**Responsibility**	**Timeframe**
FAQs provided to SC and project team	JC	31/3/06
Communications protocols and key messages approved by SC	JC	31/3/06
Media releases linked to key project milestones	KB/JC	Every 6 months
Agree communications protocols with ANCID, LWA and NPSI prior to ANCID conference in October 2006	JC/KB	30/06/06
Maintain watching brief on issues of interest (media/stakeholder) and report relevant issues to SC	KB/JC	Ongoing
Direct contact will be made with key northern Australia media to explain the intent, activities and deliverables of the NAIF project	JC	Ongoing

21. RESPONSIBILITIES AND PROTOCOLS

Responsibilities

Role of the Steering Committee
The role of the Steering Committee with respect to stakeholder engagement and communications will be to:

- Review and agree on the SE&C Strategy
- Facilitate briefings for relevant Government Minister's and their agencies
- Facilitate awareness
- Decide on a communications approach to significant issues as they arise and are identified by the communications manager
- Approve media statements (note – CSIRO media approval processes will also need to be met)
- As individuals, assist the development of relationships between the project and key stakeholders.

Role of the Stakeholder Reference Group
The stakeholder reference group is a key to how we manage our external relationships. The aim of the SRG is to facilitate greater understanding about the project with stakeholders and providing a mechanism for them to give feedback. We do not expect participants to necessarily agree with or support the project and the aim is not to convince members of the SRG to support or endorse the project. The SRG will provide advice on the project, in particular, how to convert the learnings from local case studies into a framework that has applicability across northern Australia.

Role of the Principal Investigator
Dr Keith Bristow, the Principal Investigator, has overall responsibility for the NAIF project. Dr Bristow will have primary responsibility for Sub-Strategy 3 – Researchers.

Role of the Sustainability Specialist/Communications Manager
Jeff Camkin will assist Dr Bristow in building and maintaining effective engagement and communication with various Australian, WA, NT and QLD Government Departments, key local Governments, and various environment and community groups, including regional NRM bodies.

Responsibility for managing communications should rest with a single point of contact within the Project Team. As project communications manager, Jeff Camkin will provide that point of contact for the NAIF project.

The communications manager will be responsible for:

- Making decisions about media interview opportunities
- Identifying forward-looking media and communications opportunities
- Developing and managing the implementation of the SE&C Strategy
- Drafting media statements
- Drafting project updates
- Drafting fact sheets and summary presentations (as PowerPoint presentations)
- Ensuring compliance of Project Team with communication protocols (including CSIRO and other partner protocols if appropriate).

Project Media Spokesperson

The number of spokespeople should be limited to as few as possible to minimise the risk of straying off-message and to provide a sense of continuity to the project. Where media communications are proactively developed or where there is sufficient time to develop a written statement, Jeff Camkin will typically be the media spokesperson as communications manager for the project. Dr Keith Bristow will be the spokesperson where the focus is on detailed scientific issues.

Either party, as appropriate, will take the role of media spokesperson where short timeframes are available prior to responding or where local content is particularly important (for example, where there is media interest following a meeting or presentation. Where possible, the Communications Management Team will discuss the proposed responses.

Approvals

Project Media Statements
Require approval of the Communications Management Team, which consists of the SC Chairman Greg Claydon, Dr Keith Bristow and Jeff Camkin

NAIF web page updates
Additions and changes to be approved by Dr Keith Bristow and Jeff Camkin

Scientific publications
To be approved by normal CSIRO procedures. Publications which include potentially sensitive material of a scientific or political nature require the approval of the communications team. SC members will be given the opportunity to comment prior to publication of material that is scientifically or politically sensitive.

Project Reports
Project Milestone Reports are to be approved by the Steering Committee.

Project updates and communiqués
Project updates and communiqués are to be approved by the Communications Management Team.

Correspondence
Correspondence of a general nature will be approved by Dr Keith Bristow or Jeff Camkin. Correspondence that includes or responds to potentially sensitive material of a scientific or political nature will require approval of the Communications Management Team. SC members will be given the opportunity to comment on such correspondence.

22. MONITORING AND EVALUATION

The NAIF Monitoring and Evaluation Plan requires reports against the SE&C Strategy to be included in each Milestone Report, including evidence of NAIF taking a proactive approach to identify key audiences, issues and strategies to address them.

This SE&C Strategy will be reviewed informally on an ongoing basis and formally during

January 2007. Recommendations from the review will be put to the SC for consideration at its first meeting in 2007.

23. PUBLIC AVAILABILITY

This SE&C Strategy will be provided to the SRG and will be made available to other parties upon request.

This SE&C Strategy is subject to the Copyright and Disclaimer information on page 2.

24. LIST OF ATTACHMENTS

The following are provided as attachments to this report:

NUMBER	DESCRIPTION
Attachment 1	Stakeholder engagement and communication activities to date
Attachment 2	Key messages and FAQS
Attachment 3	Steering Committee Terms of Reference
Attachment 4	Stakeholder Reference Group Terms of Reference

ATTACHMENT 1

Updated 6-1-05

STAKEHOLDER ENGAGEMENT & COMMUNICATION ACTIVITIES TO DATE

NAIF Publications:

Kellett, B.M., Walshe, T. & Bristow, K.L. 2005. Ecological Risk Assessment of the Wetlands of the Lower Burdekin. CSIRO Land and Water Technical Report No. 26/05. 30 pp.

Bristow, K.L. & S. MacKinnon. 2005. Northern Australia Irrigation Futures (NAIF) - Research, Frameworks and Sustainability. IAA Journal, Vol 20 No. 2 pp. 54-55.

Kellett, B., Bristow, K.L. & P.B. Charlesworth. 2005. Indicator Frameworks for Assessing Irrigation Sustainability. CSIRO Land and Water Technical Report No. 01/05

NAIF Presentations at Conferences, Workshops and Meetings

Bristow, K.L., Petheram, C. & Kellett, B.M. 2005. Irrigation in northern Australia – is it worth the risk? ASA-SSA national Conference, 6-10 November, Salt Lake City, Utah, USA (Agron. Abstr. 2005 CD-ROM)

Kellett, B.M., Bristow, K.L., Moore, G., Beilin, R. and F.h.s. Chiew. 2005. Reflecting on stakeholders' perceptions in an ecological risk assessment workshop. In: Proceedings of the Environmental Research Event Conference. 29th November – 2nd December, 2005, Hobart, Tasmania.

Bristow, K.L. & C. Petheram. 2005. Irrigation and groundwater systems in northern tropical Australia. ANCID Conference, Mildura, Victoria (24-26 October 2005)

Bristow, K.L. 2005. Northern Australia Irrigation Futures. Land and Water Australia Sustainable Irrigation Program Investors Forum, Mildura, Victoria (23 October 2005)

Bristow, K.L. 2005. The Northern Australia Irrigation Futures Project. Environmental Research Institute of the Supervising Scientist (ERISS), Darwin, Northern Territory (7 October 2005)

B.M. Kellett & K.L. Bristow. 2005. Risk and Resilience for Adaptive Irrigation Planning. CRC for Irrigation Futures Annual Forum, Mildura, Victoria (19-21 September 2005)

Bristow, K.L., C. Petheram & B.M. Kellett. 2005. Northern Australia Irrigation Futures: An update. CRC for Irrigation Futures Annual Forum, Mildura, Victoria (19-21 September 2005)

Bristow, K.L., Jolly, P., Smith, I., Petheram, C. & P.B. Charlesworth. 2005. Groundwater systems and their potential role in irrigation in northern Australia. Workshop on Groundwater Surface Water Interaction in the Tropics, Darwin, NT, Australia (26-27 May 2005)

Kellett, B.M. Bristow, K.L., Charlesworth, P.B., Malano, H., Moore, G. & F. Chiew. 2005. Accounting for stakeholders' assumptions and cultural understandings in environmental risk assessment for irrigation: A groundwater nitrate case study. Irrigation Association of Australia (IAA) Conference on Restoring the Balance. Townsville, QLD, Australia (17-19th May 2005)

Bristow, K.L., Charlesworth, P.B., Thayalakumaran, T., Narayan, K.A. & C. Petheram. 2005. Water and irrigation management on the Burdekin coastal floodplain. OzWater WaterShed Conference, , Townsville, QLD, Australia (5-7th May)

Bristow, K.L. 2005. Northern Australia Irrigation Futures. Northern Australia Environment Alliance, Brisbane, QLD (22 February 2005)

Kellett, B.M. 2005. A Sustainability Framework to Guide Irrigation Development in Northern Australia. BBIFMAC Office, Ayr (14 February 2005)

Kellett, B.M. 2005. A Sustainability Framework to Guide Irrigation Development in Northern Australia. The University of Melbourne, Melbourne (4 February 2005)

Bristow, K.L. 2005. Northern Australia Irrigation Futures. SunWater, Ayr, QLD (1 February 2005)

Bristow, K.L. 2005. Irrigation within a broader sub-catchment context: The lower Burdekin. CSIRO Floreat Park, Perth, WA (28 January 2005)

Bristow, K.L. 2005. Northern Australia Irrigation Futures. WA Water Task Force, Perth. (27 January 2005)

Bristow, K.L. 2004. Northern Australia Irrigation Futures. CRC for Irrigation Futures Sustainability Challenge Workshop, Stamford Airport Hotel, Sydney, (17 November 2004)

Kellett, B.M. 2004. A Sustainability Framework to Guide Irrigation Development in Northern Australia. PhD Introductory Seminar, CSIRO Land and Water, Davies Laboratory, Townsville (15 October 2004)

Bristow, K.L. 2004. Northern Australia Irrigation Futures: An Update. ANCID Conference, Barossa Valley, Tanunda, South Australia (10-13 October 2004)

Bristow, K.L. 2004. Northern Australia Irrigation Futures. Land and Water Australia Sustainable Irrigation Program Investors Forum, Barossa Valley, Tanunda, South Australia (10 October 2004)

Bristow, K.L. 2004. Northern Australia Irrigation Futures. CRC for Irrigation Futures Annual Workshop, University of Western Sydney, Sydney (20 September 2004)

Kellett, B.M. 2004. A Sustainability Framework to Guide Irrigation Development in Northern Australia. CRC for Irrigation Futures Annual Workshop, University of Western Sydney, Sydney (20 September 2004)

Bristow, K.L. 2003. Northern Australia Irrigation Futures: Building a basis for developing sustainable irrigation across northern Australia. ANCID Conference, Shepparton, Victoria, Australia (19-22 October 2003)

Bristow, K.L. 2003. Northern Australia Irrigation Futures: Building a basis for developing sustainable irrigation across northern Australia. Land and Water Australia Sustainable Irrigation Program Investors Forum, Shepparton, Victoria, Australia (19 October 2003)

Radio:

Northern Australia Irrigation Futures. ABC North West WA Radio News (6 May 2004)

Water futures. Curtin FM Seeling Solutions with Retirees WA (27/3/2003)

Television:

Tropical river systems and North Australian Irrigation Futures. ABD6 State Television News, Darwin (2 February 2004)

WORKSHOPS, SEMINARS AND MEETINGS FACILITATED BY OR FEATURING NAIF

(Participant numbers (#) does not include NAIF team members or NAIF consultants)

Seminars Meetings Workshops	Date	#	Organisations Represented
2005			
Meeting, Office of Water Strategy, Perth	7 December	3	• Office of Water Strategy • Dept of Water • Dept of Agriculture
Meeting, Water Smart Australia, Canberra	2 December	≈ 30	• National Water Commission • National Farmers Federation • Victorian Farmers Federation • Cotton Australia • Twynam Agricultural Group • Ricegrowers Association of Australia • Irrigation Association of Australia • NSW Irrigators Council • South Australian Murray Irrigators • SunWater • CRC for Irrigation Futures • National Program for Sustainable Irrigation • SA Murray Darling NRM Board • NT Agricultural Association • Pratt Water • Aust. National Committee on Irrigation & Drainage • Cth Dept of Agriculture, Forestry & Fisheries • Southern Rural Water • CSIRO (Jeff Camkin)
Meeting, CSIRO, Perth	2 December	3	• Dept of Water
Meeting, Office of Water Strategy, Perth	1 December	10	• Office of Water Strategy • WA Irrigation Review Steering Committee • Dept of Water (formerly Dept of Environment) • Dept of Agriculture • Water Corporation
Cross Project Collaboration tele-meeting	1 December	2	• NT Dept Natural Resources, Environment & the Arts • Environmental Research Institute of the Supervising Scientist
Meeting, CSIRO, Perth	1 December	1	• Dept of Industry Resources
Meetings, Darwin	23-24 November	10	• NT Dept Natural Resources Environment & the Arts • NT Dept of Primary Industries, Fisheries and Mining • Amateur Fishing Association of NT • NT Horticultural Association • Charles Darwin University • Environmental Research Institute of the Supervising Scientist • CSIRO Sustainable Ecosystems • Aust. National Committee on Irrigation & Drainage
Meetings	21-22	12	• Aust. National Committee on Irrigation & Drainage

Seminars Meetings Workshops	Date	#	Organisations Represented
organised by ANCID, Darwin	November		• NT Dept Natural Resources, Environment & the Arts • Ord Irrigation Cooperative • NT Dept of Primary Industries, Fisheries and Mining • Charles Darwin University • Environmental Research Institute of the Supervising Scientist
Cross Project Collaboration tele-meeting	31 October	4	• NT Dept Natural Resources, Environment & the Arts • Environmental Research Institute of the Supervising Scientist • Charles Darwin University
Meeting, Environmental Research Institute of the Supervising Scientist (ERISS), Darwin	7 October	12	• SSD • Environmental Research Institute of the Supervising Scientist • NT Dept Natural Resources, Environment & the Arts • NT Dept of Primary Industry, Fisheries and Mining • Cth Department of Environment and Heritage • WWF • CSIRO
Meeting, Northern Australia Groundwater Systems, NRETA, Darwin	3-5 October	6	• NT Dept Natural Resources, Environment & the Arts • QLD Dept of Natural Resources and Mines • CSIRO
CRC IF Annual Research Forum, Mildura	19-21 September	>80	• CRC Irrigation Futures • CSIRO Land and Water • QLD Dept Natural Resources, Mines and Energy • National Program for Sustainable Irrigation • Land and Water Australia • VIC Dept of Primary Industries • University of Melbourne • University of Southern Queensland • University of South Australia • University of Western Sydney • Charles Sturt University • NSW Agriculture • South Australian Research and Development Institute
Meeting, Sustainability Challenge, North Burdekin Water Board Case Study, Ayr	27 July	14	• North Burdekin Water Board • South Burdekin Water Board • CSR • QLD Dept of Natural Resources and Mines • Burdekin Shire Council • Canegrowers • CSIRO • University of New England • BSES
Meeting, Sustainability Challenge, North	30 June	6	• North Burdekin Water Board • CSIRO • University of New England

Seminars Meetings Workshops	Date	#	Organisations Represented
Burdekin Water Board Case Study, Ayr			• BSES
Workshop, Lower Burdekin Knowledge Platform, Ayr	17 June	≈ 30	• North Burdekin Water Board • South Burdekin Water Board • Sunwater • Burdekin Dry Tropics Board • Burdekin Shire Council • Canegrowers • QLD Dept of Natural Resources and Mines • BBIFMAC • QLD Dept of Primary Industry and Fisheries • BSES • James Cook University ACTFR
ERA workshop, Ecological Risk Assessment for the Wetlands of the Lower Burdekin	1 June	25	• North Burdekin Water Board • South Burdekin Water Board • Burdekin Dry Tropics Board • Townsville City Council • Canegrowers • Dept of Natural Resources and Mines • BBIFMAC • Dept of Primary Industry and Fisheries • EPA • ACTFR • University of Melbourne • University of Western Australia • Great Barrier Reef Marine Park Authority • Australian Sweet Forage Pty Ltd • Earth Environmental Consulting • Haughton Catchment Committee • Creek to Coral Waterwatch • CRC for Irrigation Futures • Burdekin Productivity Services Ltd • Monash University • CSIRO Land and Water
NT Stakeholder Meeting, Darwin	30 May	≈ 26	• NAIF Steering Committee • NT Dept Infrastructure Planning and Environment • NT Dept Business Industry & Resource Development • CSIRO • Environmental Research Institute of the Supervising Scientist • Land & Water Australia • NT Agricultural Association • NT Cattleman's Association
Workshop: Groundwater surface water interaction in the tropics, Darwin	26-27 May	≈ 40	• SKM • QLD University of Technology • QLD Dept Natural Resources & Mines • Charles Darwin University • CSIRO • NT Dept Infrastructure Planning and Environment • NT Dept Business Industry & Resource Development

Seminars Meetings Workshops	Date	#	Organisations Represented
			• EWL Sciences Pty Ltd • Australian National University • Ord Irrigation Cooperative
ERA Workshop: Irrigation in the Katherine-Daly region, Darwin	18 May	≈ 25	• NT Dept Infrastructure Planning and Environment • NT Dept Business Industry & Resource Development • Charles Darwin University • NT Horticultural Association • Environmental Research Institute of the Supervising Scientist • Cth Department of Environment and Heritage • CSIRO
Darwin meetings	17 May	7	• Sue Jackson, CSIRO • Peter Jacklyn, CRC Savanna's • Peter Jolly et al, NT DIPE
SunWater, Ayr	10 March	1	• Shaun Davidge – Project Manager: Water for Bowen
Sustainability Challenge Project Meeting, Charles Sturt University, Albury	25 February	≈ 20	• CRC Irrigation Futures • CSIRO Land and Water • QLD Natural Resources and Mines • South Australian Research and Development Institute • University of Western Sydney • Charles Sturt University • NSW Agriculture
Northern Australia Environment Alliance (NAEA), Brisbane	22 February	4	• Stuart Blanch – Manager Freshwater WWF Australia • Kerryn O'Connor - Wilderness Society • Henry Boer - Queensland Conservation Council • Matthew Durack – CRC IF
CRC IF Sustainability Challenge, Townsville, Ayr	15-17 February	≈ 10	• CRC IF Sustainability Challenge (Christen, Shepherd) • North Burdekin Water Board • BBIF MAC • SunWater
BBIFMAC, Ayr	14 February	10	• Burdekin Bowen Integrated Floodplain MAC
University of Melbourne – Confirmation Seminar, Melbourne	4 February	25	• University of Melbourne • CRC for Irrigation Futures • National Program for Sustainable Irrigation
Sunwater, Ayr	1 February	3	• SunWater
WA Water Task Force, Perth	27 January	≈ 15	• See minutes of meeting
2004			
CRC IF Sustainability Challenge Project Workshop, Sydney	17 November	23	• CRC Irrigation Futures • CSIRO Land and Water • SunWater • QLD Natural Resources and Mines • South Australian Research and Development Institute

Seminars Meetings Workshops	Date	#	Organisations Represented
			• University of Western Sydney • Charles Sturt University • NSW Agriculture
ERA Workshop Townsville	10 November	25	• CSIRO Land and Water • National Program for Sustainable Irrigation • Monash University • Australia Centre for Tropical Freshwater Research • NT Dept of Infrastructure, Planning and Environment • QLD Dep. of Primary Industries • QLD Dept of Natural Resources and Mines • Ord Land and Water • Burdekin Bowen Integrated Floodplain MAC • Burdekin Dry Tropics Board • CSR
Seminar – Kellett; CSIRO Davies Laboratory Townsville	15 October	25	• CSIRO Land and Water • CSIRO Sustainable Ecosystems • QLD Environmental Protection Agency • QLD Natural Resources and Mines • North Queensland Area Consultative Committee • Individual Farmers
CRC IF Annual Conference	20 September	100	• CRC Irrigation Futures • CSIRO Land and Water • QLD Dept Natural Resource Mines and Energy • National Program for Sustainable Irrigation • Land and Water Australia • Victoria Department of Primary Industries • University of Melbourne • University of Southern Queensland • University of South Australia • University of Western Sydney • Charles Sturt University • NSW Agriculture • South Australian Research and Development Institute
Brisbane Workshop	3 August	18	• QLD Dept of Primary Industries and Fisheries • QLD Environmental Protection Agency • QLD Dept Natural Resources Mines and Energy • QLD Dept State Development and Innovation • CSIRO Sustainable Ecosystems • CRC Irrigation Futures • Land and Water Australia
Darwin Workshop	26-27 May	20	• Cth Bureau of Rural Sciences • CSIRO Land and Water • National Program for Sustainable Irrigation • Cth Dept of Fisheries, Forestry & Agriculture • NT Dept of Business, Industry & Resource Development • CRC for Irrigation Futures • Land and Water Australia • Cth Dept of Environment and Heritage • Environmental Research Institute of the Supervising Scientist

Seminars Meetings Workshops	Date	#	Organisations Represented
			• QLD Dept of Natural Resources, Mines & Energy • NT Dept of Infrastructure, Planning & Environment • WA Dept of Environment • WA Dept of Agriculture
Kununurra Meeting 2	7 May	2	• WA Dept of Agriculture
Kununurra Meeting 1	7 May	1	• WA Dept of Environment
Kununurra Seminar	6 May	9	• WWF • Ord Cucurbit Growers • WA Dept of Agriculture • Ord Land and Water • Ord Irrigation • Ord Irrigation Coop • Kimberley Primary Industries Association
Broome Seminar	5 May	6	• Environs Kimberley • Kimberley Land Council • Gray's Organic Produce • Individual Farmers • Kimberley Area Consultative Committee • Kimberley Sustainable Regions Advisory Committee
Karratha Seminar	5 May	3	• WA Dept of Environment • WA Dept of Agriculture
Perth Seminar	4 May	10	• WA Farmers Federation • WA Dept of the Premier and Cabinet • Irrigation Association of Australia, WA Region • CSIRO Land & Water • WA Dept of Environment • WA Dept of Industry and Resources • Conservation Council of WA • Pastoralists and Graziers Association of WA

ATTACHMENT 2

KEY MESSAGES RELEVANT TO ALL STAKEHOLDER GROUPS

KEY MESSAGES	DETAILS
The aim of the NAIF research project is to provide new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia	• The NAIF project will provide knowledge and tools to support debate and decision-making about the future of irrigation in northern Australia. • The major output of the project will be a sustainability framework, which will help ensure decisions about irrigation in northern Australia can be made according to the principles of ecologically sustainable development (ESD). • The sustainability framework will also provide knowledge to assess existing irrigation systems in northern Australia with the aim of making those systems more sustainable. • The NAIF project will not make decisions about current or potential irrigation in northern Australia – these decisions will remain the responsibility of the relevant governments and communities. The sustainability framework aims to support that decision-making.
The sustainability framework is being developed in consultation and cooperation with the people of northern Australia	• The end-users of the sustainability framework – community groups, governments and individuals will participate in its development through several on-ground case studies across northern Australia and through other stakeholder engagement activities. • The NAIF project recognises the important role of indigenous communities in debate and decision-making about the future of irrigation in northern Australia and will provide for the incorporation of indigenous knowledge and considerations. • A Stakeholder Reference Group, including environmental, indigenous, community, agricultural and irrigation interests, has been formed to provide knowledge and express points of view about irrigation in northern Australia to the project.
The sustainability framework will be practical and robust	• Case study sites have been selected to represent a range of geographic, economic and social factors present across northern Australia: the Kimberley in WA, the Daly in the NT and the Burdekin in QLD. • Important and technically complex aspects of the sustainability framework will be subject to peer review. • A case-study approach combined with peer-review ensures that the sustainability framework will be practical, objective, transparent and best practice. • The NAIF project acknowledges other important research examining irrigation and sustainability in northern Australia and will work closely with these programs, including the LWA Tropical Rivers Program and the CRC IF Sustainability Challenge.

KEY MESSAGES	DETAILS
The NAIF project will deliver the sustainability framework by July 2007	• The sustainability framework will be developed through the case study process, which will run from January 2006 until March 2007. The framework will be finalised by July 2007 and further follow on projects are expected. • As part of the development of the sustainability framework, the project will also deliver a range of reports and tools that will provide knowledge on the current state of irrigation in northern Australia, ecological risk assessments and bio-physical information about surface and groundwater interactions.
The NAIF research project is a co-operative effort between Australia's leading federal research organisations and the governments of QLD, NT and WA	• The NAIF project is funded through a partnership between LWA and the NT, QLD and WA governments, and is being managed by CSIRO. • The project is being overseen by a Steering Committee which has both representation of the funding partners and expertise in key project areas, including the environment, sustainable irrigation and indigenous communities.

NAIF PROJECT FREQUENTLY ASKED QUESTIONS (FAQS)

The following are a series of potentially negative or ambiguous questions that may be asked about the project. These questions and answers are provided to improve understanding of the project and to correct misunderstandings.

Q. Isn't this just a pro-irrigation project?

A: No, not at all. The aim of the NAIF project is to provide new knowledge, tools and processes to support debate and decision making regarding irrigation in Northern Australia. The major output of the project, a sustainability framework, will help ensure that any decisions made are consistent with the principles of ecologically sustainable development.

Q: What is LWA doing being involved in a pro-irrigation project?

A: Firstly, this is not a pro-irrigation project. While I cannot speak on behalf of others, the driving motive for partners in this project is *sustainability* – to ensure that any decisions about irrigation in Northern Australia are made according to the principles of ecologically sustainable development.

Q. Isn't this project all about making maps that will identify areas for future development?

A: No, it isn't. The project will develop a framework so that future decisions about whether or not to irrigate can be made based on actual knowledge of river and groundwater systems and according to the principles of environmental, economic and social sustainability.

Q: How can you can you say the sustainability framework is comprehensive when it only covers bio-physical factors?

A: The sustainability framework will provide for social, economic and cultural linkages, which will be identified and incorporated through the case study process, in addition to bio-physical factors. We recognise that our knowledge is continually building, and the framework will be specifically designed to allow for incorporation of future data across all these factors as it becomes available.

Q: Why does the steering committee have representatives of two irrigation organisations and no environmental representative?

A: The sustainability framework must take into consideration current knowledge of irrigation systems. The Steering Committee includes members who have broad expertise about irrigation systems and techniques and as such provide an important source of knowledge to the project.

Q: You have been accused of "collaborating with agricultural industries". Is this the case?

A: We are collaborating with all stakeholders to develop the sustainability framework. This includes environmental groups, community groups and indigenous groups as well as agricultural and irrigation groups, researchers and government.

Q: How can you say the project is independent when it is being funded by government and has government representatives on the steering committee?

A: The project is guided by a Steering Committee which aims to have both representation of the funding partners and expertise in key project areas, including the environment, sustainable irrigation and indigenous communities. The NAIF project also includes a number of mechanisms to ensure it is transparent and objective, such as an open and consultative case-study process to develop the framework, independent peer review of important and technically complex aspects of the framework and collaboration with other independent research projects and initiatives.

Q: Who are the relevant experts on the SC for: (i) environmental issues; (ii) indigenous issues; (iii) economic issues; (iv) social issues?

A: Membership of the Steering Committee is currently under review to ensure that it has appropriate expertise. Any changes to the Steering Committee membership will be announced as soon as possible.

Q: The NAEA has been very vocal about this project. Why aren't they on the steering committee or reference group?

A: We aim to have a Steering Committee with both representation of the funding partners and expertise in key project areas, including the environment, sustainable irrigation and indigenous communities. The NAIF project also includes a number of mechanisms to ensure it is transparent and objective, such as an open and consultative case-study process to develop the framework, independent peer review of important and technically complex aspects of the framework, collaboration with other independent research projects and initiatives, and a key Stakeholder Reference Group. NAEA has been formally invited to join the Stakeholder Reference Group and we encourage them to do so.

Q: But they refused, right? Doesn't this undermine your credibility if the peak ENGO is not on board?

A: No, not at all. Whether the NAEA decides to be part of the process is a matter entirely for them, but we have made the invitation and would encourage them to participate. In any case, we will always listen to stakeholder concerns and welcome any useful contributions they or anyone else may wish to make to the project.

Q: There have been criticisms that the project management of the NAIF is not sufficient to ensure the project will be delivered on time. Is this correct?

A: We have recently revised our work plan for Stage 2 of the project and have significantly bolstered the resources dedicated to project management, engagement with stakeholders and development of the sustainability framework. We are confident the project will achieve its objectives.

Q: There has been a lot of turnover in staff within the project – why has this been?

A: The level of staff turnover within the project has not been any greater than average for similar-sized research projects. It is good to have some staff turnover as it brings new skills and ideas to the project. Importantly, the Project Leader, Dr Keith Bristow, has been with the project since its inception.

Q: On what basis were the case study sites chosen?

A: Case study sites have been selected through discussions with the Steering Committee and others and aim to represent a range of geographic, economic and social factors present across Northern Australia. The case study sites will be the Burdekin in Queensland, the Daly River in the Northern Territory and a site yet to be determined in Western Australia. These will largely represent a fully developed, partially developed and undeveloped area.

Q: It has been suggested that the senior project staff do not have sufficient experience in sustainability issues and are effectively pro-irrigation. Is this correct?

A: No, that is not correct. The project staff have a range of skills and experience and as a group have expertise in all aspects of sustainability, including the bio-physical, environmental, social and economic factors of irrigation. In addition and to ensure transparency and objectivity, technically complex aspects of the sustainability framework will be also subject to peer review. We have also developed close links with the Tropical Rivers Program and other programs, and will draw on additional knowledge and expertise as appropriate.

Q: It is unclear how this project will work with related research projects and policy initiatives. How will you ensure this will happen?

A: The NAIF project acknowledges other important research examining irrigation and sustainability in Northern Australia. The work plan specifically identifies and specifies linkages to other programs such as including the Land & Water Australia's Tropical Rivers Program, the CRC for Irrigation Futures Sustainability Challenge and CSIRO's Land and Water Policy and Economic Research Unit. For example, NAIF chairs monthly meetings of NAIF, Tropical Rivers Inventory and Assessment Program, Charles Darwin University and the NT Department of Natural Resources, Environment and the Arts to ensure cross-collaboration between researchers and government policy makers.

Q: What decisions will the NAIF project be making about irrigation in northern Australia?

A: The NAIF project will not be making any decisions about irrigation in northern Australia - communities and governments will continue to make those decisions, as they have done in the past. The NAIF project is about providing the knowledge, tools and processes so that communities and governments can make more informed decisions to help achieve long term sustainability.

Q: Will the NAIF research really make a difference?

A: Clearly many past decisions have not adequately addressed environmental issues. This can be seen from the many problems experienced in southern Australia and elsewhere around the world. In some cases, the problems currently being experienced have been caused by inadequate understanding of the potential impact of irrigation on catchments and communities. Our aim is to help governments and communities to learn from and avoid repeating those mistakes in northern Australia by providing them with better knowledge, tools and processes than they currently have.

ATTACHMENT 3

NAIF STEERING COMMITTEE – TERMS OF REFERENCE [3]

Objective:
The Steering Committee will provide strategic advice and guidance to the project to ensure that it secures adequate resourcing to develop, test, and deliver an acceptable framework to stakeholders to ensure sustainable development, management and improvement of irrigation systems in tropical Australia.

It will do this by:

- Maintaining a close working relationship with the Project Leader and project team.
- Ongoing review and approval of project goals and objectives, timelines and implementation / delivery strategies.
- Identifying strategic project risks and approving actions to address these risks
- Identifying, influencing and securing appropriate funding for the project to meet its goals.
- Identifying key data sources and activities (competing & synergistic) important to the success of the project.
- Assisting with communication between the project and key stakeholders in line with advice received from the Stakeholder Reference Group.
- Identifying comparable work being undertaken by other agencies/organisations.
- Collaborating closely with the Stakeholder Reference Group.

[3] Membership and Terms of Reference of the Steering Committee are currently under review.

ATTACHMENT 4

STAKEHOLDER REFERENCE GROUP - TERMS OF REFERENCE

The Stakeholder Reference Group will advise and assist the Northern Australia Irrigation Futures Project to ensure the project has a robust stakeholder engagement strategy which meets the requirements of a broad network of stakeholders.

The Stakeholder Reference Group will act as a conduit in:

1. Working with stakeholders to identify key environmental, economic, social and cultural sustainability issues of relevance in meeting project objectives
2. Collaborating closely with the Steering Committee
3. Maintaining regular communication with the Sustainability Specialist, Project Leader and Steering Committee on key issues affecting stakeholder engagement and stakeholder issues
4. Identifying stakeholders and their requirements to assist the project in developing and delivering a robust stakeholder engagement strategy
5. Identifying opportunities for effective partnerships between the project and other stakeholders
6. Helping facilitate interagency and inter organisational collaboration and cooperation

Appendix 6

NORTHERN AUSTRALIA IRRIGATION FUTURES

REPORT ON MONITORING AND EVALUATION PLAN

DECEMBER 2007

Background

It has always been recognised that the NAIF research project is a complex and challenging project that requires a high degree of adaptability to achieve success. From the outset, the project funders, Steering Committee (SC) and Project Team have all demonstrated an understanding and willingness to adapt the project design in response to new knowledge and feedback. A Monitoring and Evaluation (M&E) Plan for the NAIF research project was finalised in March 2006. This is a report on performance against that M&E Plan to inform the NPSI Final Report.

Objectives

The aim of the M&E Plan is to:

- Assist the Project Team, SC and the funding organisations to decide if the project and its priorities, targets and actions need to be changed, and where attention should be focussed
- Support the use of an adaptive management approach to ensure continuous improvement based on new knowledge and experience as the project progresses
- Support the assessment of project outputs, outcomes and overall success
- Determine accountability for monitoring, evaluating and reporting outcomes and
- Establish regular reporting systems for accountability to SC and the State and Australian Government project investors.

Monitoring and Reporting Deliverables

Monitoring and Reporting Deliverables	**Status**
1 x M&E Plan	Endorsed by SC
3 x Project Status Reports to SC	8 Project Status Reports provided to SC, one for each SC meeting
2 x Milestone Reports to NPSI	Milestone Reports 4, 5 and 6 approved by NPSI.
1 x Final Report to NPSI	Draft Final Report forwarded to NPSI on xx/10/07.
2 x Financial Statements to NPSI	2005/06 Statement provided. 2006/07 Statement due 1/1/08

Assessment against Milestone 7 (Final) Deliverables

A report against the NAIF NPSI Milestone 7 (Final Report) deliverables is attached (Attachment 1).

Assessment against Project Achievement Criteria

An assessment of project outputs against achievement criteria, performance indicators, data sources and project risks identified in the NAIF M&E Plan is attached (Attachment 2).

Assessment against Anticipated Outcomes

This section provides a statement of achievement against each of the four original anticipated outcomes from NAIF.

1. **By 2007 leading stakeholders (Governments, communities, investors, land and water managers) will be more informed and able to use the sustainability framework including key biophysical datasets and sustainability indicators when debating and making decisions regarding irrigation in northern Australia**

Initially NAIF aimed to *"…deliver a framework based on sustainability indicators and management criteria at a range of scales (field, farm, district, scheme, and catchment) to support planning, development, implementation and management of new schemes, and if necessary, modification of existing schemes across northern Australia."* While much of the initial aim remained, thinking about the framework shifted considerably as the research progressed. As issues of complexity, uncertainty, managing risk and adaptive management emerged through the research, the focus shifted away from developing a sustainability framework based on a set of biophysical indicators. As the social process of irrigation decision making became more prominent, the focus shifted towards a framework or suite of simple tools that could support communities and decision makers deal with complexity and uncertainty in a comprehensive, transparent and inclusive way that addresses the important environmental, social, economic and external issues relevant to a particular location or irrigation decision. We also examined the use of new and emerging web-based environments to enhance the ability to manage irrigation within a catchment context.

Our research has found that, above all else, decisions about the future of irrigation in northern Australia are about people and relationships, and no single framework can hope to ensure sustainability. It is possible, however, to help catchment communities and governments on the journey towards sustainability by developing knowledge, tools and processes that reflect this reality and support those charged with making decisions about these complex issues.

From May 2004 to October 2007 NAIF facilitated or featured in more than 160 significant conferences, workshops, seminars, meetings etc for a total of more than 3,200 participants. This level of activity increased awareness of the NAIF project, providing opportunities to identify key audiences, their issues and strategies to

address them, and provided numerous opportunities to inform a wide range of stakeholders about NAIF and the thinking and products it was delivering. A series of invited workshops, chaired by the relevant state or territory SC member, was held around Australia as part of the NPSI final reporting process. Feedback from the workshops was generally very positive about NAIF and supportive of the activities and outputs being generated. The following statements reflect the response to the NAIF research, ideas for the future and products being delivered:

Understanding the Complexity of Irrigation Systems in Northern Australia
"While each of the take home messages are important, it is important not to lose the connectivity between them. Probably the biggest take home message is the complexity of the (irrigation) system and the need to manage that complexity." Doug Hall, WA Industry Development Officer, Irrigation Australia.

Irrigation Mosaics
"A recurring theme in discussions was the opportunities available for mosaic-style smaller scale developments, reflecting the limited availability of good quality land. This will also allow maintenance of the interconnectedness of the tropical savannah." Northern Australia Land and Water Taskforce communiqué, 28 September 2007.

"Work on the concept of mosaics could be extended, once again with some ground truthing of concepts and utilising monitoring data to improve and prove up the concept. The use of mosaics is especially applicable to the Northern Territory where irrigable soils are naturally mosaiced across the landscape." NAIF sub-committee draft communiqué, 23/10/07.

Frameworks to help achieve sustainable irrigation in northern Australia
"Mr Lancaster says one of the aims of the (NAIF) *project was to establish a sustainability framework or tree chart of the Daly to show where all the knowledge gaps are. It looks at asking the questions so answers can be given, from all points from social, cultural, environmental and economic perspectives...what we need to do now though is get a lot of this conceptual research down onto the ground. I'd like to get the sustainability framework worked out with some of my advisory committees and look at whole of catchment scale, right down to farm scale."* Ian Lancaster, Director Resource Management, NT Department of Natural Resources, Environment and the Arts, ABC Country Hour, 25 September 2007.

"The component trees idea is good. Clear steps to show why a decision was made - transparent management of the number of issues considered". Ann Withell, Northern Australia Land and Water Futures Assessment Group, Australian Department of Environment and Water Resources, September 2007.

2. By 2007 testing of existing northern irrigation management systems and practices against the sustainability framework and indicators will have commenced

A prototypical framework has been developed for the Lower Burdekin to demonstrate the concepts. Testing of existing northern irrigation management systems against the framework has not yet commenced but there is recognition of how the framework could support those assessments, and future use of the framework is now being discussed. The following statements are indicative of the likelihood of its application:

"This (Lower Burdekin Knowledge Platform) is a very, very useful path that will deliver best practice environmental management". Michael Hoey, Chairman, North Burdekin Water Board.

"I have had further thought on the knowledge platform concept and believe that this will be 'the' most valuable resource for knowledge dissemination for future Agriculture in the NT. Primarily due to the separation (tyranny of distance) of production areas, and the fact that the vast majority of our producers are on-line and computer literate it is logical to utilise this system to engage them and facilitate knowledge brokering." Tim West, Environmental development Officer, NT Horticultural Association / NT Agricultural Association.

"A really, really powerful system potentially". Lyall Hinrichsen, QLD Department of Natural Resources and Water.

"We believe that the component systems work could be further developed particularly once the concept has been trialled in some "real life" situations. There are plans to upgrade the Burdekin Knowledge platform and other research teams such as the Tropical Rivers and Coastal Knowledge Consortium are looking at knowledge sharing systems which may present opportunities to utilise some of the work so far developed as part of the Sustainability Framework project theme. Work on the concept of mosaics could be extended, once again with some ground truthing of concepts and utilising monitoring data to improve and prove up the concept. The use of mosaics is especially applicable to the Northern Territory where irrigable soils are naturally mosaiced across the landscape." NAIF sub-committee draft communiqué, 23/10/07.

3. By 2010 relevant State and Australian policies will have adopted the framework and sustainability indicators

The NAIF framework of an ESD Component Tree System, catchment based knowledge platforms and science, policy and stakeholders operating in an integrated way, has been demonstrated through a Lower Burdekin prototype, as requested by the SC. These ideas were discussed at NAIF NPSI Final Workshops in Brisbane, Ayr, Darwin, Kununurra and Perth in September and will be addressed at the Canberra workshop in November 2007. It is not possible yet to determine whether the QLD, NT, WA and Australian Governments will incorporate the framework into policy and decision making. However, the following statements give an indication of the movement towards that outcome:

"Future and ongoing development of northern Australia's land and water resources must take place in a strategic framework that is ecologically, culturally and economically sustainable*…"* Prime Minister of Australia, National Plan for Water Security, January 2007.

"The sustainability framework and component trees are really relevant to the Northern Australia Land and Water Futures Assessments." Anya Lam, Northern Australia Land and Water Futures Assessment Group, Australian Department of Environment and Water Resources, September 2007.

"Such knowledge requires good science, supported by sound measurement and monitoring practice. The Taskforce noted that for much of the northern Gulf and Cape York Pensinsula regions, detailed on-the-ground and in-stream information are often sparse, and that previously collected information is often not readily accessible. A system focussed on the north, which captures this information, and makes it accessible to those who need it, is essential to support informed decision making". Northern Australia Land and Water Taskforce Communiqué, 28 September 2007.

4. **By 2015 a sustainable irrigation industry in northern Australia will be functioning that delivers a wide range of economic and social benefits whilst minimising environmental impacts.**

While the adoption of the NAIF frameworks may support movement towards a sustainable irrigation industry in northern Australia, achievement of this outcome is well beyond the influence of this single framework and the NAIF project in general. The following quote from NAIF sub-committee draft communiqué (October 2007) best demonstrates the likely contribution of NAIF towards this goal:

"The (NAIF) project has already had a significant positive impact on inter-jurisdictional cooperation between the 3 governments in the North but also with community and industry stakeholders and other research programs. The sub-committee agrees that the continuation of this project model would contribute greatly to help to ensure that any expansion of irrigation in the north of Australia is done in a sustainable manner." NAIF sub-committee draft communiqué, 23/10/07.

Assessment against Statement of Influence

The following statement in the original project proposal is an indication of the anticipated influence of NAIF.

"strongly influence a range of policy, regulation, management and institutional requirements across northern Australia, especially in meeting COAG and NWI water reform requirements and minimising the environmental footprint associated with irrigation developments. The project will provide regulatory organisations within each State and Territory appropriate and consistent guidelines for the environmental assessment of proposed irrigation developments in northern Australia."

This is backed up by actual experiences such as briefing the Australian Government's Northern Australia Land and Water Taskforce.

"We did not appreciate in 2004 that the issues NAIF is covering would be so relevant now and that we would be in a position of influencing Senators". Kevin Devlin, SunWater and NAIF SC member.

Overall Influence
NAIF has had and is having a considerable influence across a range of stakeholders, best represented by the following quote from the NAIF sub-committee draft communiqué:

"*The NAIF project has so far focussed the research on three main areas associated with irrigation in Northern Australia with various levels of rigour. These included:*

- *Preliminary conceptual work on the use of mosaics as an alternative to broad acre irrigation*
- *Tropical water systems including goods and services, Water quality, water quantity and ground water / surface water interactions and*
- *A sustainability Framework which included a component systems approach to understanding complex social-ecological systems and the use of emerging tools and on-line technology*

This work has been lauded by an extensive range of interested parties including the North Australian Task force, community groups, industry and academia. The challenge now is to ensure that the work is utilised and that the project concepts are extended into new areas or the development and implementation of existing research."

Encouraging Research Collaboration
"*The NAIF project has been driving and creating cross-collaboration and this has been led by the internal management of NAIF (project team). Not only inter-jurisdictional collaboration, but also the inter-project collaboration has been vital."* Ian Lancaster, Director Water Resource Management, NT Department of NRETA and NAIF SC Chairman.

Connecting Northern Jurisdictions
"Making networks, especially interstate, which provide opportunity for discussion of issues, forming relationships and the verbal communication between stakeholders have all been an extremely beneficial outcome of the NAIF project. The inter-state networks are very valuable and are helping with day to day management. This project will facilitate better relationships between NRW and CSIRO and with the Burdekin stakeholders, and this is the catalyst of what this project has driven." Tom Crothers, QLD Department of Natural Resources and Water and NAIF SC member.

Developing Long Term Science/Policy/Stakeholder Relationships
"NAIF has highlighted irrigation and engaged with the community to develop relationships. The project has highlighted the importance of relationships and has achieved that – it has learnt from the mistakes of previous initiatives. The long term engagement has been valued by stakeholders who disparage the fly in fly out style that often occurs". John Ruprecht, Director Water Resource Management, WA Department of Water and NAIF SC member.

Developing International Networks
A NAIF coordinated visit by Dr Chaves, lecturer in water resource management at the University of Brasilia, has resulted in a proposed visit by Dr Benedito Braga (Director of the National Water Agency of Brazil, Vice President of UNESCO-IHP and Vice President of the World Water Council) in 2008 to discuss opportunities for interaction between Brazil and Australia on water and irrigation management.

NAIF has also arranged for Dr Mark Dent (Programme Director, Environment & Development at the Centre for Environment & Development, University of KwaZulu-Natal, South Africa) to visit Australia during February-March 2008 to discuss lessons derived from a cross-comparison of Australian and South African experiences regarding water resource and water reform.

Meeting Funder Expectations
"We are really very positive about NAIF. A great example of research arriving at a time when it can inform policy" Anwen Lovett, Manager Sustainable Primary Industries, Land and Water Australia. LWA/NAIF teleconference, 21/9/07.

"NAIF is coming to a close - hope it is only the first phase of more". Michael Robinson, CEO Land and Water Australia, ANCID Conference, Bundaberg, 21/8/07.

Attachment 1

REPORT AGAINST NAIF NPSI MILESTONE 7 (FINAL REPORT) DELIVERABLES

Achievement Criteria	Comments
1. Generic deliverables achieved. Generic deliverables are: (i) all project reports and communications in electronic and hard copy formats as specified by LWA Communications; (ii) Photographic record depicting project milestones in a digital format suitable for web and PowerPoint presentations; (iii) At least one media release and updates supplied to LWA Communications and copied to Program Coordinator; and (iv) What knowledge assets the project has generated in the milestone period (if any).	All generic deliverables achieved. (i) Final Report and associated Final Technical Report, and all NAIF reports have and will continue to be provided to LWA in hard copy and electronic format. (ii) An extensive NAIF collection of photographs have been used throughout NAIF reports and presentations. (iii) Media release "Irrigation mosaics – do they have a role in northern Australia" released on 12/9/07. (iv) NAIF knowledge assets feature in NPSI Final Report and Final Technical Reports.
2. Work plan deliverables achieved (as per Gantt Chart) (a) Report 'Research findings, modelling results and applications for irrigation mosaics in northern Australia' (b) Report 'A sustainability framework for supporting community decision making regarding irrigation in northern Australia: Lessons from three case studies'	(a) Two mosaics reports: (a) 11. Cook, F.J., Xevi, E., Knight, J.H., Paydar, Z. & K.L. Bristow. 2007. Analysis of biophysical processes with regard to advantages and disadvantages of irrigation mosaics. CSIRO Land and Water Science Report No. ??/07, CRC for Irrigation Futures Technical Report No. 09/07 61 pp. (b) Paydar, Z., Cook, F.J., Xevei, E. and K.L. Bristow. 2007 Review of the current understanding of irrigation mosaics. May 2007. CSIRO Land and Water Science Report No. 40/07, CRC for Irrigation Futures Technical Report No. 08/07. 31 pp. (b) SC has been kept informed and has consistently guided the SF direction, which is reflected in changes to the work plan. In November 2006 the SC endorsed a conceptual framework and requested a prototype be developed for the Lower Burdekin catchment. Prototype is now under development. There is a balance between delivering a prototype and documenting the story. Several reports have been prepared in relation to the SF. The report *Camkin, J.K., Kellett, B.M. and Bristow, K.L. 2007. NAIF: Origin, Evolution*

	and Future Directions for the Development of a Sustainability Framework. CSIRO Land and Water Science Report No.xx/07 / CRC for Irrigation Futures Technical Report No. xx/07 xx pp. documents the research up to and including the response from the NAIF SC in November 2006. It has been externally reviewed and updated. Another report, nominally titled *Dealing with complexity and uncertainty: Frameworks to support irrigation decision making in northern Australia* will document the research, prototype development and application in the lower Burdekin post November 2006. A prototype knowledge platform environment is in development and demonstration will commence in November.
3. Independent review of the research	External review has been sought for all significant reports. Some reports specifically require review by the governments of WA, NT and QLD because they detail specific policies of those governments. This has been difficult to achieve as government water agencies have limited resources and are extremely busy. This will delay finalisation of some reports as they cannot be published without confirmation of content and only government officers are in the position to do so.
4. Report on project response to independent review provided to SC	SC has endorsed a process of parallel review by SC and external reviewers. Following that, the NPSI Final Report will be modified (if needed) and forwarded to SC for endorsement before forwarding to LWA.
5. Combined workshop in each state with all project members and key stakeholders	Workshops held in Brisbane (7/9/07), Ayr (14/9), Darwin (24/9), Kununurra (25/9) and Perth (28/9). Meetings were also held in Broome (26/9). An additional workshop will be held in Canberra on 29/11/07 coinciding with the next NAIF SC meeting. A summary of the workshops is an appendix to the Final Report and a selection of comments from the workshops is included in the Final Report.
6. Final major report to peer review standard with all technical reports used in the research project carried as attachments	The Final Technical Report includes a summary of each technical report and carries all the NAIF technical reports as appendices.
7. Final report against SE&C Strategy including advice on outstanding issues for stakeholders	A report against the NAIF SE&C Strategy is an appendix to the NPSI Final Report.
8 Steering Committee meeting held and final report approved	SC meeting on 28/11/07 in Canberra will consider the NPSI Final Report.
9. Final short report in LWA format (12 pages) together with statement on the knowledge assets generated by	Draft report circulated to external reviewers on 30/10/2007, to SC members on xx/xx/xx and to LWA on xx/xx/xx.

the project	
10 Summary Research Bulletin of the project and its key findings of relevance to end users	LWA have offered assistance in preparing this. Format of Final Report and Final Technical Report will support preparation with potential for further Summary Reports on each research area.
11. Final Report approved by LWA	Will follow endorsement by SC.

Assessment of Project Outputs against Achievement Criteria, Performance Indicators, Data Sources and Project Risks identified in the NAIF Monitoring and Evaluation Plan

Achievement Criteria	Performance Indicators	Data Sources	Risks	Assessment / Comments
A comprehensive, practical and usable framework for supporting debate and decisions about irrigation in northern Australia	• Progress towards SF • Framework developed and 'tested' through effective case studies • External review of SF & associated research • SF is documented, approved for release and available to stakeholders • Adoption of the framework by policy and regulatory agencies and	• SC feedback on progress, as reported in Status Reports, recorded in SC minutes. External review of report *Recommended approach for finalising and delivering the SF* • Report *Towards a SF for supporting community decision making regarding irrigation in northern Australia: Lessons from three case studies* published on website • Documented feedback on research and draft SF from independent review, SRG, case study stakeholders, SN and the workshop on SF in each State • Approval recorded in SC minutes. SF available via NAIF website • Feedback from SC, SRG, SN questionnaires, workshop on SF in each state and other	• Inability to establish case studies which contribute significantly to the SF • Adoption hard to measure within project timeframe.	• SC endorsement in October 2007 of conceptual SF and request for prototype development. • Strong support from Lower Burdekin Water Futures group and members for prototype development for Lower Burdekin. • External review of Origin, evolution and future directions report completed. • Will be considered by SC on 28/11/07. • NT, WA and QLD SC

Achievement Criteria	Performance Indicators	Data Sources	Risks	Assessment / Comments
	investors and managers • Acceptance of framework by key stakeholders	stakeholders on likelihood of adoption • Documented feedback from SC, SRG, SN questionnaires, workshop on SF in each state, correspondence and media items in response to release of SF	Project team/SC unable to influence agency & other decision makers to use SF • Lack of ownership of the framework by decision-makers and/or other stakeholders	members have indicated potential uses for SF in each jurisdiction. • Strong support indicated at Final Workshops.
Understanding of key biophysical features relevant to irrigation in northern Australia	• Comprehensive collation and interpretation of key knowledge and understandings of northern Australian landscapes • Publication of reports approved by SC in accordance with work plan	• Documented feedback from SC, SRG, SN questionnaires and independent review • Approval recorded in SC minutes & list of available publications on NAIF website	• Insufficient research of north Australian landscapes and their function completed to allow reasonable interpretation. • Insufficient in-kind or other support from State and Cth agencies to support analysis and interpretation	• Captured in Final Technical Report and up to 18 NAIF reports. Will be considered by SC on 28/11/07. • Some reports are delayed pending external review by Govt. agency staff and others.
Description of the nature and spatial distribution of key landscape attributes of importance in siting and managing	• Range of communications and publications addressing key knowledge and understandings of	• List of available publications on NAIF website	• Project team is unsuccessful in securing appropriate communications	• Up to 18 reports, 6 editions of NAIFNEWS, 5 media releases including one through CRC IF on irrigation mosaics

Achievement Criteria	Performance Indicators	Data Sources	Risks	Assessment / Comments
sustainable irrigation schemes in northern Australia	northern Australian landscapes and their implications to sustainable irrigation available to broad audience		support and meeting required timeframes. Insufficient in-kind and other support from State and Cth agencies to support analysis and interpretation	
Successful project communications	• Communication and Stakeholder Engagement (SE&C) Strategy developed and operational • Stakeholder Reference Group (SRG) established and operating as per TOR • Stakeholder Network established and receiving quarterly project updates. • Effective linkages with other key projects and programs established • Publication of reports according to work plan	• Approval of SE&C Plan recorded in SC minutes and reported in NPSI Milestone Report. • Project records on number of contacts with SRG members. Feedback from SRG members • Project records on number of members of Stakeholder Network and contacts with Stakeholder Network • Project records of requests for NAIF involvement in other projects and programs. Project records of cross participation and coordination. • List of available publications on NAIF website	• Key stakeholders unwilling to join SRG • The small resource base significantly limits linkages with other key projects and programs	• SE&C Strategy endorsed by SC in April 2006 • >160 significant meetings, workshops, seminars, conferences for combined audience > 3,200 people. • SRG established and operating late 2005 but high time costs & limited benefits overall. • >300 member network. 6 editions of NAIFNEWS e-newsletter published. • NAIF chairs monthly telemeeting with TRACK, TRIAP, NT govt. • Some papers still in drafting or review. List of available papers on NAIF website

Achievement Criteria	Performance Indicators	Data Sources	Risks	Assessment / Comments
				• Formal process for release of and communication regarding final reporting developed by LWA/CSIRO communications for endorsement by SC
Effective implementation and coordination	• SC established and operating as per TOR. Number of meetings held • Expenditure consistent with budget projections • Project partners maintain investment for project duration • Project staff and PhD students appointed • Research undertaken as per agreed Work Plan • Project is completed by agreed date.	• Minutes of SC meetings • Project Financial Statements approved by LWA • CSIRO/DAFF Deed of Grant and CSIRO/WA/NT/QLD Govt Funding Agreements approved • Advice from PI. • Approval of Status Reports recorded in SC minutes • Final Report provided to LWA by agreed date. Final Project Financial Statement approved	• Changes to SC membership reduce 'ownership' • Not all budgeted financial resources available or are insufficient • One or more partners withdraw funding early • Inability to attract suitably qualified PhD students • Key research staff are not retained • Maintaining completion date creates stakeholder unrest due to insufficient time to develop trust and	• SC established 11/04/04. 23 mtgs to 28/11/07 of which 5 were face-to-face. • On budget • All commitments maintained • Funded appointments made & no loss of team members. • Research delivered as per changes to evolving work plan approved by SC/NPSI.

Achievement Criteria	Performance Indicators	Data Sources	Risks	Assessment / Comments
		by LWA	productive working partnerships	• Penultimate Final Report provided by due date. Will be updated following return of reviewer's comments and endorsed by SC. Some outstanding reports will be completed after final report.
Monitoring and Evaluation	• M&E Plan developed, approved and implemented • Information is appropriate for day to day management of the M&E Plan	• Approval of M&E Plan and status recorded in SC minutes & NPSI Milestone report • Advice on implementation of M&E Plan recorded in SC minutes	• Duplication of reporting for multiple purposes (NPSI, CRC IF, Cth/States/NT funding) increases project overhead costs	• M&E Plan endorsed by SC in April 2006. • While monitoring and reporting overheads have remained high they have reduced somewhat since completion of the Stage 2 Work Plan, M&E Plan & SE&C Strategy.

Appendix 7

NORTHERN AUSTRALIA IRRIGATION FUTURES

REPORT ON STAKEHOLDER ENGAGEMENT AND COMMUNICATION STRATEGY

DECEMBER 2007

Background

A Stakeholder Engagement and Communication (SE&C) Strategy for the NAIF research project was finalised in March 2006. The aim of this SE&C Strategy is to significantly increase stakeholder awareness of the NAIF research project intent, activities and outputs in order to improve stakeholder engagement, enhance support for the project and maximise project benefits. This is a report on performance against that SE&C Strategy to inform the NPSI Final Report.

Objectives

The main stakeholder engagement and communication objectives were to:

Awareness
- Raise overall awareness of the project, its intent, activities, outputs and benefits
- Raise awareness of the linkages between the NAIF project and other research projects
- Ensure stakeholders are aware of the project and how to be involved.

Attitudes
- Reduce communications risks by encouraging an informed view of the project
- Manage expectations of what the project can and can't deliver

Behaviours
- Encourage key stakeholders to engage in project activities
- Provide tools for project partners and collaborators to communicate the project intent, activities, outputs and benefits.

Stakeholder Groups

The SE&C Strategy identifies target audiences, segments them by audience type and communication needs. The following sub-groups were identified:

1. Key R&D funding and partner organisations
2. Government (local, state/territory, national)
3. Researchers
4. Non-government interest groups and peak bodies
5. Case Study area stakeholders drawn from all groups
6. General community across northern and southern Australia
7. Media (local, regional, state and national).

Actions

The SE&C Strategy established sub-strategies for each stakeholder group including key messages relevant to each group. Protocols for the role of the SC, SRG, and Project Team were established and answers to frequently asked questions developed for circulation to the SC.

The status of the 48 actions identified in the SE&C Strategy is shown in Table 1.

Table 1. Status of SE&C Strategy Actions

Sub Group	# Actions Proposed	# Actions Completed	Comments
1	7	7	All actions completed.
2	14	4	6 actions pending completion of Final Reporting. 4 incomplete actions were personal briefings for Ministers and Govt. staff. This need was overestimated as NAIF SC members have kept agencies and Ministers informed
3	5	4	Joint NAIF / TRACK SC membership not yet achieved. NAIF does however Chair the monthly cross-project telemeeting which involves Michael Douglas (Director of TRaCK) who acts as an interface between NAIF and TRaCK, including the TRaCK SC.
4	9	9	Some actions (eg working with others to identify specific needs of indigenous communities) are ongoing
5	3	3	All actions completed
6	4	4	All actions completed
7	6	6	All actions completed
TOTAL	**48**	**37**	**Of the remaining 11 actions, 4 are incomplete, 1 is in progress, and 6 are not yet due.**

Communication Achievements

A wide range of communication activities have taken place in accordance with the SE&C Strategy and these are reported in Section 4.3 to this Report. Key communication achievements:

- 6 editions of NAIFNEWS published at http://www.clw.csiro.au/naif/index.html and distributed to the NAIF Stakeholder Network of more than 300 organisations and individuals
- 5 NAIF media releases (Attachment 1)
- 26 NAIF media items: 11 print, 10 radio and 5 television (Attachment 2)
- 5 initial and 6 final NPSI workshops
- 1 journal paper, 3 technical reports, 4 project reports, 4 popular articles in newsletters and industry magazines
- More than 160 significant conferences, workshops, seminars, meetings etc facilitated by or featuring NAIF with total participation exceeding 3,200 (Attachment 3)
- Briefing the Northern Australia Land and Water Taskforce, Darwin, July 2007
- Multiple presentations at 2003, 2004, 2005, 2006 and 2007 Australian National Committee on Irrigation and Drainage Conferences
- Multiple presentations featured at 2006 and 2007 River*symposium*
- Featured at 2006 Northern Australia Water Use Experts Summit
- Hosted visit by Dr Henrique Chaves, University of Brasilia, Brazil. Dr Chaves delivered 11 presentations on water resource management in Brazil to a total audience of 630 participants, mostly in northern Australia and Canberra.

Evidence of a proactive approach to identifying audiences, issues and strategies to address them

From May 2004 to October 2007 NAIF facilitated or featured in more than 160 significant conferences, workshops, seminars, meetings etc for a total of more than 3,200 participants. This level of activity increased awareness of the NAIF project and provided opportunities to identify key audiences, their issues and strategies to address them. A series of invited workshops, chaired by the relevant state or territory SC member, was held around Australia as part of the NPSI final reporting process. Feedback from the workshops was very positive about NAIF and supportive of the activities and outputs being generated. The report on the NPSI Final Workshops is an appendix to the NSPI Final Report.

Demonstrations of influence

NAIF has had and is having a considerable influence across a range of stakeholders, best represented by the following quote from a October 2007 draft communiqué from the NAIF sub-committee, consisting of the WA, NT and QLD representatives on the Steering Committee: *"This (NAIF) work has been lauded by an extensive range of interested parties including the North Australian Task force, community groups, industry and academia.".* Following are further demonstrations of influence:

Influencing Policy Makers on Sustainable Irrigation for Northern Australia
"The (NAIF) project has already had a significant positive impact on inter-jurisdictional cooperation between the 3 governments in the North but also with community and industry stakeholders and other research programs. The sub-committee agrees that the continuation of this project model would contribute greatly to help to ensure that any expansion of irrigation in the north of Australia is done in a sustainable manner." NAIF sub-committee draft communiqué, 23/10/07.

Understanding the Complexity of Irrigation Systems
"While each of the take home messages are important, it is important not to lose the connectivity between them. Probably the biggest take home message is the complexity of the (irrigation) system and the need to manage that complexity." Doug Hall, WA Industry Development Officer, Irrigation Australia.

Irrigation Mosaics
The NAIF research on irrigation mosaics has captured widespread attention, resulting in several media items and other representations of interest. *"A recurring theme in discussions was the opportunities available for mosaic-style smaller scale developments, reflecting the limited availability of good quality land. This will also allow maintenance of the interconnectedness of the tropical savannah."* Northern Australia Land and Water Taskforce communiqué, 28 September 2007.

""Work on the concept of mosaics could be extended, once again with some ground truthing of concepts and utilising monitoring data to improve and prove up the concept. The use of mosaics is especially applicable to the Northern Territory where irrigable soils are naturally mosaiced across the landscape." NAIF sub-committee draft communiqué, 23/10/07.

Frameworks to Support Irrigation Decision Making

The National Plan for Water Security (NPWS), released by the Prime Minister in January 2007 notes that *"Future and ongoing development of northern Australia's land and water resources must take place in a strategic framework that is ecologically, culturally and economically sustainable…".* NAIF is developing a framework based on the use of ESD component trees, catchment based knowledge platforms and integration of science, policy and stakeholders to support irrigation decision making in northern Australia. The following is from the October 2007 draft NAIF sub-committee communiqué: *"We believe that the component systems work could be further developed particularly once the concept has been trialled in some "real life" situations. There are plans to upgrade the Burdekin Knowledge platform and other research teams such as the Tropical Rivers and Coastal Knowledge Consortium are looking at knowledge sharing systems which may present opportunities to utilise some of the work so far developed as part of the Sustainability Framework project theme".*

"The Taskforce noted that for much of the northern Gulf and Cape York Peninsula regions, detailed on-the-ground and in-stream information are often sparse, and that previously collected information is often not readily accessible. A system focused on the north, which captures this information, and makes it accessible to those who need it, is essential to support informed decision making." Northern Australia Land and Water Taskforce communiqué, 28 September 2007. NAIF is delivering a prototype catchment based knowledge platform that may meet this need. The following is from Tim West, Environmental development Officer, NT Horticultural Association / NT Agricultural Association following a briefing on the NAIF concepts: *"I have had further thought on the knowledge platform concept and believe that this will be 'the' most valuable resource for knowledge dissemination for future Agriculture in the NT. Primarily due to the separation (tyranny of distance) of production areas, and the fact that the vast majority of our producers are on-line and computer literate it is logical to utilise this system to engage them and facilitate knowledge brokering."*

Encouraging Research Collaboration

"*The NAIF project has been driving and creating cross-collaboration and this has been led by the internal management of NAIF (project team). Not only inter-jurisdictional collaboration, but also the inter-project collaboration has been vital."* Ian Lancaster, Director Water Resource Management, NT Department of NRETA and NAIF SC Chairman.

Connecting Northern Jurisdictions

"Making networks, especially interstate, which provide opportunity for discussion of issues, forming relationships and the verbal communication between stakeholders have all been an extremely beneficial outcome of the NAIF project. The inter-state networks are very valuable and are helping with day to day management. This project will facilitate better relationships between NRW and CSIRO and with the Burdekin stakeholders, and this is the catalyst of what this project has driven." Tom Crothers, QLD Department of Natural Resources and Water and NAIF SC member.

Developing Long Term Science/Policy/Stakeholder Relationships

"NAIF has highlighted irrigation and engaged with the community to develop relationships. The project has highlighted the importance of relationships and has achieved that – it has learnt from the mistakes of previous initiatives. The long term engagement has been valued by stakeholders who disparage the fly in fly out style that often occurs". John Ruprecht, Director Water Resource Management, WA Department of Water and NAIF SC member.

Developing International Networks
A NAIF coordinated visit by Dr Chaves, lecturer in water resource management at the University of Brasilia, has resulted in a proposed visit by Dr Benedito Braga (Director of the National Water Agency of Brazil, Vice President of UNESCO-IHP and Vice President of the World Water Council) in 2008 to discuss opportunities for interaction between Brazil and Australia on water and irrigation management.

NAIF has also arranged for Dr Mark Dent (Programme Director, Environment & Development at the Centre for Environment & Development, University of KwaZulu-Natal, South Africa) to visit Australia during February-March 2008 to discuss lessons derived from a cross-comparison of Australian and South African experiences regarding water resource and water reform.

Meeting Funder Expectations
"We are really very positive about NAIF. A great example of research arriving at a time when it can inform policy" Anwen Lovett, Manager Sustainable Primary Industries, Land and Water Australia. LWA/NAIF teleconference, 21/9/07.

"NAIF is coming to a close - hope it is only the first phase of more". Michael Robinson, CEO Land and Water Australia, ANCID Conference, Bundaberg, 21/8/07.

Reflections on Engagement and Communications

General Stakeholder Engagement
Engaging stakeholders in a project that spans northern Australia has been challenging but, guided by the SC endorsed SE&C Strategy, this has been a feature of the NAIF project. The communications risk assessment undertaken in late 2005 provided important guidance for the SE&C Strategy and ongoing communications, and the main project risks identified through that process were successfully managed. Willingness to deal individually and directly with key stakeholders contributed significantly to this success. Subtle shifts in focus indicated through changes to the project objectives and the language and key messages from the project team and SC were also very important in helping to reduce concerns (particularly from environmental groups) about the intent of NAIF.

Stakeholder Reference Group
In August 2005 a media release invited expressions of interested from *"people passionate about the future of northern Australia"* to join the NAIF SRG. Nine nominations were received, ranging from individuals to representatives of organisations. The process did not attract the representative SRG membership that was intended but all nominations were subsequently endorsed by the Steering Committee. An additional member with experience in local government was later added to fill an identified gap. The 10 member SRG, consisting of three members from each of WA, NT and QLD and one from NSW, provided a point of reference for the project team and SC. This was largely through one-on-one conversations between the project team and individual SRG members. In October 2006 the SRG met face to face with the SC and project team. Key reflections on the SRG are:

- At the call for EOIs NAIF did not attract some key stakeholders. This may have been because NAIF did not have a sufficiently high profile at the time
- A fully representative SRG for this project would greatly exceed the 10 members originally envisaged and may not be possible or workable

- Some stakeholders did not wish to be part of the SRG because of perceptions about the intent of the project and preferred one-on-one consultation
- Operating the SRG through one-on-one conversations was too time consuming and was largely abandoned in favour of other approaches
- SC members consider that the one meeting with the SRG in Darwin was a valuable experience, particularly in highlighting the strength and range of stakeholder views about irrigation in northern Australia
- Cost effective approaches to engaging stakeholders over such a broad issue and area need to be considered for future NAIF activity.

"The SC and SRG meeting held in Darwin last October was excellent - quite enlightening and educational to see the difference of opinions across the broad stakeholder group". John Ruprecht, WA Department of Water and NAIF SC member.

Areas for improvement

Despite the successes, it seems that there can never be enough consultation and some weaknesses in engagement internally (CSIRO, CRC IF and LWA/NPSI) and with some external stakeholders have occurred at different times through the project. Some stakeholder groups were not effectively engaged, while others were engaged in the later part of the project. The key reflection is that this style of personal engagement is critical to projects of this nature but the level of effort required for a project of this scale was not fully recognised nor fully incorporated into project planning and funding. This is an important lesson for future projects.

Attachment 1

NAIF MEDIA RELEASES

Irrigation Mosaics - do they have a role in northern Australia?
Media Release issued 12 September 2007

Darwin expert appointed Chair of NAIF Steering Committee
Media Release issued 19 October 2006

Water on Agenda at Burdekin Forum
Media Release issued 17 August 2006

Sustainability Specialist joins Northern Australia Irrigation Futures Project -
Media Release issued 19 October 2005

Stakeholder Reference Group - Expression of Interest
Media Release issued 12 August 2005

Attachment 2

NAIF MEDIA ITEMS

RADIO

Bristow, K.L. 2007. Small scale irrigation more profitable: researchers. ABC Northern Territory (24 September 2007)

Bristow, K.L. 2007. Water scientists to meet on NT irrigation. ABC On Line Australia. (24 September 2007)

Camkin, J. 2006. Northern Australia Irrigation Futures project. ABC Central Australia (Alice Springs) NT Country Hour (17 October 2006).

Bristow, K.L. 2006. Ecological consequences from diverting runoff from Australia's northern rivers. ABC North Queensland (Townsville) (17 October 2006)

Bristow, K.L. 2006. Ecological consequences from diverting runoff from Australia's northern rivers. ABC Far North (Cairns) (17 October 2006)

Bristow, K.L. 2006. Ecological consequences from diverting runoff from Australia's northern rivers. ABC Darwin (16 October 2006)

Irrigation and the Watershed Sustainability Index. ABC North Queensland (Townsville) (28 August 2006)

Lower Burdekin Water Forum. ABC North Queensland (Townsville) (24 August 2006)

Bristow, K.L. 2004. Northern Australia Irrigation Futures. ABC North West WA Radio News (6 May 2004)

Bristow, K.L. 2003. Water futures. Curtin FM Seeling Solutions with Retirees WA (27 March 2003)

TELEVISION

Bristow, K.L. 2006. Drought producing calls for farmers to head to northern Australia. ABC6 State Television News, Darwin (16 October 2006)

Bristow, K.L. 2006. Moving farmers to northern areas will not solve the problems of most primary producers . ABC2 State Television News, Canberra (16 October 2006)

Bristow, K.L. 2006. Scientists don't believe that moving farmers is the answer to the drought . ABC2 State Television News, Sydney (16 October 2006)

Bristow, K.L. 2006. Scientists do not believe moving farmers is the answers for most farmers . ABC2 State Television News, Brisbane (16 October 2006)

Bristow, K.L. 2004. Tropical river systems and North Australian Irrigation Futures. ABD6 State Television News, Darwin (2 February 2004)

PRINT MEDIA

Bristow, K.L. 2007. Sugar cops a real caning. The Townsville Bulletin (13 September 2007)

Petheram, C. 2007. Hands Off, Warning we do not have enough water to share. The Townsville Bulletin (13 August 2007).

Camkin, J. 2007. Don't repeat errors of south in north: expert. The West Australian. (26 January 2007)

Bristow, K.L. 2007. Push for inquiry into farming the north. The Australian Financial Review. (5 January 2007)

Bristow, K.L. 2006. Darwin expert heads water project. Kimberley Echo (26 October 2006)

Bristow, K.L. 2006. Travelling north - nothing but a pipedream, Sydney Morning Herald. (21 October 2006)

Water tops the agenda at Burdekin Forum, Australian Canegrower (28 August 2006)

From the Mayor's Desk, Lower Burdekin Water Forum, Ayr Advocate (18 August 2006)

Students spend holiday researching science, The Science Network WA (26 July 2006)

Camkin, J. 2006. Northam students join CSIRO research scheme. Avon Valley Advocate (20 July 2006)

Bristow, K.L. 2006. Wagga at the Water Fore. Southern Weekly Magazine (29 May 2006).

Attachment 1

WORKSHOPS, SEMINARS AND MEETINGS FACILITATED BY OR FEATURING NAIF

Last updated on 29 October 2007 by DP

(Participant numbers (#) does not include NAIF team members or NAIF consultants)

Seminars Meetings Workshops	Date	#	Organisations Represented
2007			
Lower Burdekin Water Futures Meeting, Townsville	31 October	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW • BRIA • BDTB
ASPIRE Meetings, Perth	30 October	50	• Representatives from research institutes, government departments, engineering companies, consultants, tertiary institutions interested in the design, management and maintenance of water systems
Burdekin Water Planning Meeting, Burdekin	24 October	20	• BSES • DPI&F • CSR • BRIAC • BIFMAC • ACTFR • CSE • NBWB • RWUE • Farmers
Lower Burdekin Water Futures Meeting, Ayr	10 October	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW • BRIA
Nth Australia Cross Project Collaboration tele-meeting	4 October	1	• NRETA • CSIRO

Seminars Meetings Workshops	Date	#	Organisations Represented
NAIF workshop Perth	28 September	17	• Dept of Water • Dept of Agriculture & Food • Pastoral & Graziers Assn • NPSI • WA Farmers • Irrigation Australia • Marsden Jacobs Associates • Dept of Premier & Cabinet • ARCWIS • CSIRO
NAIF meetings, Broome	26 September	6	• Environs Kimberley
NAIF workshop Kununurra	25 September	18	• Dept of Water • Tropical Forestry • Brolga's Environment • Ord Irrigation • Oasis Farms • Ord Catchment Reference Group • Shire of Wyndham East Kimberley • ABC Rural • Gogo Station • Aust Dept of Environment & Water • CSIRO
NAIF workshop Darwin	24 September	19	• NRETA • NT Horticultural Assn • Landcare • DEWR • National Landcare Program • Centrefarm • Above Capricorn Tech • WWF • TRACK • GHD • DPI • CSIRO • Charles Darwin University
NAIF workshop Ayr	14 September	21	• NRW • Burdekin Shire Council • EPA • James Cook University • NBWB • Recreational Fishing • Sunwater • Davco Farming • BRIAIC • BSES • CSR Sugar • CSIRO
CRC IF Annual Research Forum Townsville	10-13 September	100	• Partner and student organisations across Australia

Seminars Meetings Workshops	Date	#	Organisations Represented
NAIF workshop Brisbane	7 September	20	• NRW • CSIRO • DPI • EPA • Canegrowers • SRDC • Dept of Premier & Cabinet • QFF • Growcom • Swancorp
Riversymposium, Brisbane	3-6 September	100	• Various national & international delegates attending sessions featuring NAIF
John Williams workshop & field trip Burdekin	27 & 28 August	25	• NBWB • SBWB • BSES • CSIRO • NRW • SunWater • BBIFMAC • BDTNRM • Davco Farming
Trent Road Meeting Ayr	24 August	9	• Burdekin Shire Council • NBWB • SBWB • NRW • NRC • BRIA
Burdekin Workshop, Ayr	23 August	15	• NBWB • SBWB • SunWater • NRW • Burdekin Shire Council • BDTB
ANCID Conference Bundaberg	20-22 August	100	• Various conference delegates from across Australia
NPSI Investors Forum Bundaberg	19 August	50	• Various conference delegates from across Australia
Cuan Petheram Seminar	3 August	20	• CSIRO • Other interested organisations
Nth Australia Cross Project Collaboration tele-meeting	2 August	3	• TRIAP • NRETA • CDU
Lower Burdekin Water Futures Meeting, Ayr	27 July	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW • BRIA
Northern Australia Land & Water Taskforce	24 July	15	• NA Taskforce Members • NT government • Other stakeholder organisations

Seminars Meetings Workshops	Date	#	Organisations Represented
Presentation to Steering Committee of the WA Government's New Opportunities for Tropical and Pastoral Agriculture project.	17 July	10	• WA government • Other stakeholders
Jeff Camkin Seminar	5 July	15	• CSIRO
Lower Burdekin Water Futures Meeting, Ayr	28 June	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW • BRIA
CLW/JCU Familiarisation Day, Townsville	27 June	40	• CSIRO • JCU • ACTFR
Water for Healthy Country GBR Theme Integration Meeting	21 & 22 June	40	• CSIRO
Non-point solution reference group meeting, South Africa	21 May	15	• International
Trent Road Mtg, Ayr	15 May	9	• Burdekin Shire Council • NBWB • SBWB • NRW • NRC • BRIA
Lower Burdekin Water Futures Meeting, Ayr	8 May	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
NWC Mtgs, Darwin	3 May	10	• DPIFM • NWC • NRETA • CDU • NLC • GHD
BDTB Mtg	27 April	3	• BDTB • SBWB • NBWB
SRDC Mtg, Brisbane	26 April	4	• SRDC

Seminars Meetings Workshops	Date	#	Organisations Represented
Lucy Reading & David Lockington, Brisbane	26 April	2	• UQ • NRW QLD
CRC IF Planning Mtg, Coogee Sands	23&24 April	20	• CRC IF members
Nth Australia Cross Project Collaboration tele-meeting	5 April	4	• TRIAP • NRETA
NWC meeting & seminar presentation	4 April	25	• NWC • DEWR • Land and Water Australia
Dept of Heritage Mtg	4 April	2	• DEH
NAIF SC tele-meeting	3 April	8	• SC members
NAIF SC Sub-committee mtg, Perth	26& 27 March	10	• State SC reps • KT Studios • Wild Fisheries & Aquaculture
Rotary Club Presentation, Townsville	20 March	40	• Local business organisations
ESD Outcomes & Nth Aust Irrigation Workshop, Brisbane	16 March	20	• QLD NRW
Lower Burdekin Water Futures Meeting, Ayr	9 March	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
Trent Road Meeting, Ayr	8 March	9	• Burdekin Shire Council • NBWB • SBWB • NRW • NRC • BRIA
Nth Australia Cross Project Collaboration tele-meeting	1 March	2	• TRIAP • CDU
CRC IF System Harmonisation Meetings, Wagga	22 & 23 February	30	• CSIRO • CRC IF • DPI NSW • UWS • UNE • NSW AGRICULTURE • ETC

Seminars Meetings Workshops	Date	#	Organisations Represented
IAA/ANCID Meeting, Burdekin	6 February		• IAA • ANCID • NBWB • SBWB • SUNWATER
Nth Australia Cross Project Collaboration tele-meeting	1 February	1	• TRIAP
Lower Burdekin Water Futures Meeting, Ayr	1 February	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
2006			
Nth Aust Cross Project Collaboration tele-meeting	18 December	3	• CDU • NRETA
American Geophysical Union Meetings, San Francisco	11-15 December	70	• International organisations • In excess of 10,000 delegates
CRC IF Annual Research Forum, Narrabri	4-6 December	110	• CRC Irrigation Futures • CSIRO Land and Water • QLD NRW • National Program for Sustainable Irrigation • Land and Water Australia • VIC Dept of Primary Industries • University of Melbourne • University of Southern Queensland • University of South Australia • University of Western Sydney • Charles Sturt University • NSW Agriculture • South Australian Research and Development Institute

Seminars Meetings Workshops	Date	#	Organisations Represented
North Australia Water Use Experts Summit, Darwin	1 & 2 December	50+	• NWC • CDU • DOW WA • NRETA NT • NAILSMA • ERISS • WATER CORPORATION NT • LWA • WATER CORPORATION WA • CSIRO • GRIFFITH UNI • DALY RIVER MANAGEMENT ADVISORY COMMITTEE • LWRRDC • DNRW QLD • CENTRAL LAND COUNCIL • DESERT KNOWLEDGE CRC • VARIOUS LAND COUNCILS • VARIOUS AUSTRALIAN GOVERNMENT DEPARTMENT REPRESENTATIVES • WWF • TRACK • UNI OF WA • MTSRF
NWC Northern Rivers Workshop, Darwin	30 November	30	• NRETA • NWC • NRW QLD • DOW WA • LWA • TRACK • NAILSMA
NAIF SC tele-meeting	21 November	10	• All organisations represented on SC
Lower Burdekin Water Futures Meeting, Ayr	20 November	12	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
Nth Aust Cross Project Collaboration tele-meeting	16 November	3	• Charles Darwin University • Northern Territory Department of Natural Resources, Environment and the Arts • Tropical Rivers Inventory & Assessment Project
Sediment & Nutrient Modelling workshop, Brisbane	1-2 November	30+	• Various workshop attendees
Lower Burdekin Water Futures Meeting, Ayr	26 October	15	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW

Seminars Meetings Workshops	Date	#	Organisations Represented
AWA Water in the Bush Conference, Darwin	20 October	50+	• Various conference delegates
NAIF SC & SRG face to face meeting	18 October	16	• SC members • SRG members
ANCID Conference 2006, Darwin	15-17 October	100	• Various conference delegates
NPSI Investors Forum, Darwin	15 October	20	•
Lucy Reading PhD Planning Meeting	13 October	12	• University of Queensland • SunWater • Natural Resources & Water • South Burdekin Water Board
Nth Aust Cross Project Collaboration tele-meeting	5 October	1	• Tropical Rivers Inventory & Assessment Project
Lower Burdekin Water Futures Meeting, Ayr	29 September	9	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
CRC IF 3rd year review meetings, Sydney	26 & 27 September	10	• CRC IF • Charles Sturt University • Victorian Environmental Assessment Council • Landcare Research New Zealand Limited • DEST
NWC tele-meeting re RNWS program	14 September	20	• National Water Commission • DoW WA • NRETA NT • Dept of Natural Resources and Water, QLD • NAILSMA, NT
Nth Aust Cross Project Collaboration tele-meeting	7 September	4	• Charles Darwin University • Northern Territory Department of Natural Resources, Environment and the Arts • Tropical Rivers Inventory & Assessment Project
9th International River*symposium*, Brisbane	4-7 September	140	• Various national & international delegates attending sessions featuring NAIF
Henrique Chaves presentation to Murray Darling Basin Commission, Canberra	31 August	25	• Murray Darling Basin Commission
Henrique Chaves presentation to National Water Commission, Canberra	31 August	10	• National Water Commission

Seminars Meetings Workshops	Date	#	Organisations Represented
National Water Commission meeting, Canberra	30 August	8	• National Water Commission
Bureau of Rural Sciences meeting, Canberra	29 August	2	• Bureau of Rural Sciences
Henrique Chaves Seminar in Canberra	29 August	25	• CSIRO
Lower Burdekin Water Forum incorporating Henrique Chaves Seminar, Ayr	24 August	80	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW • Local stakeholders • Local irrigators
Lower Burdekin Water Futures Meeting, Ayr	24 August	12	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
NAIF / SF presentation and discussion for NT government	22 August	3	• NRETA • DPIRD
Henrique Chaves seminar in Darwin	22 August	25	• Charles Darwin University • Australian Water Association • NT Dept of NRETA • ERISS • Other government and non-government stakeholders
Henrique Chaves seminar in Kununurra	21 August	25	• Ord Irrigation Cooperative • Department of Water • Department of Agriculture • Other government and non-government stakeholders
Henrique Chaves seminar & discussion with WA Dept of Water	18 August	20	• Department of Water
CRC IF Studentship Mtgs, Perth	18 August		• CSIRO •
Henrique Chaves seminar, CSIRO	18 August	50	• CSIRO • Department of Water • Department of Agriculture • Water Corporation • Other government and non-government stakeholders
Dept of Water WA, Perth	17 August	3	• Department of Water, WA

Seminars Meetings Workshops	Date	#	Organisations Represented
Asia Water Forum 2006, Kuala Lumpur	14-16 August	37	• Ministry of Natural Resources & Environment, Malaysia • Ministry of Water Energy & Communications, Malaysia • Puncak Niaga Holidings • Africa-Asia Eco-Partnership Program • ANZ Investment Bank Asia • Asian Development Bank • Wide Bay Water Corporation Australia • Ranhill Water Services • Lanka Rainwater Harvesting Forum Sri Lanka • Department of Water Resources Management Vietnam • Manila Water Company Phillipines • Ministry of Settlement and Regional Infrastructure Indonesia • International Water Management Institute • Urban Development and Water Supply Sri Lanka • Global Environment Centre • Other South East Asian government and industry bodies
Nth Aust Cross Project Collaboration tele-meeting	8 August	2	• Charles Darwin University • Northern Territory Department of Natural Resources, Environment and the Arts • Tropical Rivers Inventory & Assessment Project
Peter Fitch – Monitoring Meetings, Burdekin	2 August	5	• CSIRO • NBWB
Bart Kellett – stakeholder interviews across the North	various	32	• One on one interviews with key individuals across the Burdekin, Douglas/Daly and Ord catchments
CRC IF Studentship Meetings, Brisbane	26-30 July	5	• NRMW
Lower Burdekin Water Futures Meeting, Ayr	21 July	10	• Burdekin Shire Council • North Burdekin Water Board • South Burdekin Water Board • SunWater • NRMW
CRC IF Sugar Industry Meetings, Burdekin	20 July	6	• BSES • CSIRO • DPI NSW • CRC IF
Nth Aust Cross Project Collaboration tele-meeting	18 July	4	• Charles Darwin University • Northern Territory Department of Natural Resources, Environment and the Arts • Tropical Rivers Inventory & Assessment Project

Seminars Meetings Workshops	Date	#	Organisations Represented
Australian Earth Science Convention, Melbourne	3-6 July	50	• AESC conference attendees
Lower Burdekin Water Forum	28 June	8	• NRMW • SBWB • NBWB • Sunwater • Burdekin Shire
NAIF Project Team meetings, Townsville	26-30 June	0	• NAIF
CRC LEME & SBWB Meetings, Ayr	14 June	10	• CRC LEME • South Burdekin Water Board
Nitrogen workshop / research meeting, Brandon BSES	8 June	6	• CSIRO • BSES • RWUE • farmer
Nth Aust Cross Project Collaboration tele-meeting	1 June	4	• Charles Darwin University • Northern Territory Department of Natural Resources, Environment and the Arts • Tropical Rivers Inventory & Assessment Project
Mtgs with Burdekin Water Boards, Ayr	22 May	12	• NBWB • SBWB
Water Inovations Festival, HELP & CRC IF meetings, Wagga	16-18 May	50	• CRC IF • UNE • DPI VIC • Landcare Research New Zealand Limited • Other various participant organisations
NAIF Mtg with NWC	11-12 May	17	• National Water Commission • QLD Dept Natural Resources, Mines & Water • NT Dept Natural Resources, Environment & Arts
IAA Conference, Brisbane	8-10 May	30	• IAA conference attendees
Nth Aust Cross Project Collaboration tele-meeting	4 May	4	• NT Dept Natural Resources, Environment & Arts • Environmental Research Institute of the Supervising Scientist • Charles Darwin University
Local Government Conference, Sarina	4 May	50	• NQ local government association members
Meeting, DNRMW, Brisbane	20 April	3	• NAEA/WWF • NAEA/Wilderness Society • NAEA/Queensland Conservation

Seminars Meetings Workshops	Date	#	Organisations Represented
Meeting, Dept of Water, Perth	11 April	10	• Department of Water • Office of Water Strategy • Department of Agriculture • Water Corporation • Department of Industry Resources
Nth Aust Cross Project Collaboration tele-meeting	7 April	4	• Environmental Research Institute of the Supervising Scientist, NT • Charles Darwin University
Meeting, Perth	6 April	3	• WA Department of Water • South Africa Dept. of Water Affairs and Forestry
Indigenous Values of Water Workshop, Darwin	5 & 6 April	28	• University of Melbourne • CSIRO • Northern Land Council • Daly River Aboriginal Reference Group • Murray Lower Darling Rivers Indigenous Nations • Australian National University • Kimberley Land Council • NT Department of Resources, Environment and Arts • Aboriginal Areas Protection Authority • Wadjigan • Wagiman
Colloquium on Sustainable Landscapes – Future Dilemmas and Opportunities, CSIRO Perth	4 April	≈ 70	• South Africa Dept of Water Affairs and Forestry (attendance facilitated by NAIF) • 9 other experts from USA, Canada, NZ and Australia • Land and Water Australia • CSIRO • WA Dept of Water • Various other state and private sector organisations
Meeting CRC IF Research Mark II	29-30 March	8	• CRC IF • NPSI • CSU • UNE • CSIRO

Seminars Meetings Workshops	Date	#	Organisations Represented
Workshop National Water Commission on WSA program – northern Australia session facilitated by NAIF	29-30 March	≈ 20	• National Water Commission • Dept of Agriculture, Forestry and Fisheries • Land and Water Australia • Ord Irrigation Cooperative • Gascoyne Water Cooperative • WA Department of Environment • WA Office of Water Strategy • Centre for Aboriginal Horticulture • NT Agricultural Association • Plantation Management Services • South Burdekin Water Board • North Burdekin Water Board • Burdekin Shire Council • Department of Natural Resources, Mines & Water • Meatant Consultancy • Sunwater • ANCID
Meeting, Office of Water Strategy, Perth	21 March	4	• WA Office of Water Strategy • WA Dept of Water
Meeting, CSIRO Perth	27 February	1	• WA Dept. of Agriculture
Meeting, QLD DNRMW	23 February	1	• QLD Dept Natural Resources, Mining and Water
Meeting, James Cook University	22 February	1	• James Cook University
Meeting, James Cook University	21 February	2	• Australian Centre for Tropical Freshwater Research
NAIF Steering Committee tour of the Burdekin	15 February	20	• QLD Dept. Natural Resources, Mines and Water • National Program for Sustainable Irrigation • Dept of Agriculture, Forestry and Fisheries • Sunwater • Ord Irrigation Cooperative • NT Dept. Environment, Natural Resources and Arts • Land and Water Australia • CRC IF • University of New England

Seminars Meetings Workshops	Date	#	Organisations Represented
QLD Stakeholder Meeting, CSIRO Townsville	14 February	40	• NAIF Stakeholder Reference Group • Local canegrowers • North Burdekin Water Board • South Burdekin Water Board • Burdekin Shire Council • QLD EPA • Great Barrier Reef Marine Park Authority • James Cook University • Australian Centre for Tropical Freshwater Research • QLD Dept. of Natural Resources, Mines & Water • Sunwater • BSES • Mulgowie Farming Operations • CSIRO • Dept. of Agriculture, Forestry & Fisheries • Ord Irrigation Cooperative • NT Dept. Environment, Natural Resources and Arts • Land and Water Australia • National Program for Sustainable Irrigation
Meeting, Office of Water Strategy, Perth	9 February	1	• Office of Water Strategy
Nth Aust Cross Project Collaboration tele-meeting	2 February	4	• NT Dept Natural Resources, Environment & Arts • Environmental Research Institute of the Supervising Scientist (by email) • Charles Darwin University (by email)
2005			
Meeting, Office of Water Strategy, Perth	7 December	3	• Office of Water Strategy • Dept of Water • Dept of Agriculture

Seminars Meetings Workshops	Date	#	Organisations Represented
Meeting, Water Smart Australia, Canberra	2 December	≈ 30	• National Water Commission • National Farmers Federation • Victorian Farmers Federation • Cotton Australia • Twynam Agricultural Group • Ricegrowers Association of Australia • Irrigation Association of Australia • NSW Irrigators Council • South Australian Murray Irrigators • SunWater • CRC for Irrigation Futures • National Program for Sustainable Irrigation • SA Murray Darling NRM Board • NT Agricultural Association • Pratt Water • Aust. National Committee on Irrigation & Drainage • Cth Dept of Agriculture, Forestry & Fisheries • Southern Rural Water • CSIRO (Jeff Camkin)
Meeting, CSIRO, Perth	2 December	3	• Dept of Water
Meeting, Office of Water Strategy, Perth	1 December	10	• Office of Water Strategy • WA Irrigation Review Steering Committee • Dept of Water (formerly Dept of Environment) • Dept of Agriculture • Water Corporation
Nth Aust Cross Project Collaboration tele-meeting	1 December	2	• NT Dept Natural Resources, Environment & the Arts • Environmental Research Institute of the Supervising Scientist
Meeting, CSIRO, Perth	1 December	1	• Dept of Industry Resources
Meetings, Darwin	23-24 November	10	• NT Dept Natural Resources Environment & the Arts • NT Dept of Primary Industries, Fisheries and Mining • Amateur Fishing Association of NT • NT Horticultural Association • Charles Darwin University • Environmental Research Institute of the Supervising Scientist • CSIRO Sustainable Ecosystems • Aust. National Committee on Irrigation & Drainage

Seminars Meetings Workshops	Date	#	Organisations Represented
Meetings organised by ANCID, Darwin	21-22 November	12	• Aust. National Committee on Irrigation & Drainage • NT Dept Natural Resources, Environment & the Arts • Ord Irrigation Cooperative • NT Dept of Primary Industries, Fisheries and Mining • Charles Darwin University • Environmental Research Institute of the Supervising Scientist
Nth Aust Cross Project Collaboration tele-meeting	31 October	4	• NT Dept Natural Resources, Environment & the Arts • Environmental Research Institute of the Supervising Scientist • Charles Darwin University
Meeting, Environmental Research Institute of the Supervising Scientist (ERISS), Darwin	7 October	12	• SSD • Environmental Research Institute of the Supervising Scientist • NT Dept Natural Resources, Environment & the Arts • NT Dept of Primary Industry, Fisheries and Mining • Cth Department of Environment and Heritage • WWF • CSIRO
Meeting, Northern Australia Groundwater Systems, NRETA, Darwin	3-5 October	6	• NT Dept Natural Resources, Environment & the Arts • QLD Dept of Natural Resources and Mines • CSIRO
CRC IF Annual Research Forum, Mildura	19-21 September	>80	• CRC Irrigation Futures • CSIRO Land and Water • QLD Dept Natural Resources, Mines and Energy • National Program for Sustainable Irrigation • Land and Water Australia • VIC Dept of Primary Industries • University of Melbourne • University of Southern Queensland • University of South Australia • University of Western Sydney • Charles Sturt University • NSW Agriculture • South Australian Research and Development Institute

Seminars Meetings Workshops	Date	#	Organisations Represented
Meeting, Sustainability Challenge, North Burdekin Water Board Case Study, Ayr	27 July	14	• North Burdekin Water Board • South Burdekin Water Board • CSR • QLD Dept of Natural Resources and Mines • Burdekin Shire Council • Canegrowers • CSIRO • University of New England • BSES
Meeting, Sustainability Challenge, North Burdekin Water Board Case Study, Ayr	30 June	6	• North Burdekin Water Board • CSIRO • University of New England • BSES
Workshop, Lower Burdekin Knowledge Platform, Ayr	17 June	≈ 30	• North Burdekin Water Board • South Burdekin Water Board • Sunwater • Burdekin Dry Tropics Board • Burdekin Shire Council • Canegrowers • QLD Dept of Natural Resources and Mines • BBIFMAC • QLD Dept of Primary Industry and Fisheries • BSES • James Cook University ACTFR
ERA workshop, Ecological Risk Assessment for the Wetlands of the Lower Burdekin	1 June	25	• North Burdekin Water Board • South Burdekin Water Board • Burdekin Dry Tropics Board • Townsville City Council • Canegrowers • Dept of Natural Resources and Mines • BBIFMAC • Dept of Primary Industry and Fisheries • EPA • ACTFR • University of Melbourne • University of Western Australia • Great Barrier Reef Marine Park Authority • Australian Sweet Forage Pty Ltd • Earth Environmental Consulting • Haughton Catchment Committee • Creek to Coral Waterwatch • CRC for Irrigation Futures • Burdekin Productivity Services Ltd • Monash University • CSIRO Land and Water

Seminars Meetings Workshops	Date	#	Organisations Represented
NT Stakeholder Meeting, Darwin	30 May	≈ 26	• NAIF Steering Committee • NT Dept Infrastructure Planning and Environment • NT Dept Business Industry & Resource Development • CSIRO • Environmental Research Institute of the Supervising Scientist • Land & Water Australia • NT Agricultural Association • NT Cattleman's Association
Workshop: Groundwater surface water interaction in the tropics, Darwin	26-27 May	≈ 40	• SKM • QLD University of Technology • QLD Dept Natural Resources & Mines • Charles Darwin University • CSIRO • NT Dept Infrastructure Planning and Environment • NT Dept Business Industry & Resource Development • EWL Sciences Pty Ltd • Australian National University • Ord Irrigation Cooperative
ERA Workshop: Irrigation in the Katherine-Daly region, Darwin	18 May	≈ 25	• NT Dept Infrastructure Planning and Environment • NT Dept Business Industry & Resource Development • Charles Darwin University • NT Horticultural Association • Environmental Research Institute of the Supervising Scientist • Cth Department of Environment and Heritage • CSIRO
Darwin meetings	17 May	7	• Sue Jackson, CSIRO • Peter Jacklyn, CRC Savanna's • Peter Jolly et al, NT DIPE
SunWater, Ayr	10 March	1	• Shaun Davidge – Project Manager: Water for Bowen
Sustainability Challenge Project Meeting, Charles Sturt University, Albury	25 February	≈ 20	• CRC Irrigation Futures • CSIRO Land and Water • QLD Natural Resources and Mines • South Australian Research and Development Institute • University of Western Sydney • Charles Sturt University • NSW Agriculture
Northern Australia Environment Alliance (NAEA), Brisbane	22 February	4	• Stuart Blanch – Manager Freshwater WWF Australia • Kerryn O'Connor - Wilderness Society • Henry Boer - Queensland Conservation Council • Matthew Durack – CRC IF

Seminars Meetings Workshops	Date	#	Organisations Represented
CRC IF Sustainability Challenge, Townsville, Ayr	15-17 February	≈ 10	• CRC IF Sustainability Challenge (Christen, Shepherd) • North Burdekin Water Board • BBIF MAC • SunWater
BBIFMAC, Ayr	14 February	10	• Burdekin Bowen Integrated Floodplain MAC
University of Melbourne – Confirmation Seminar, Melbourne	4 February	25	• University of Melbourne • CRC for Irrigation Futures • National Program for Sustainable Irrigation
Sunwater, Ayr	1 February	3	• SunWater
WA Water Task Force, Perth	27 January	≈ 15	• See minutes of meeting
2004			
CRC IF Sustainability Challenge Project Workshop, Sydney	17 November	23	• CRC Irrigation Futures • CSIRO Land and Water • SunWater • QLD Natural Resources and Mines • South Australian Research and Development Institute • University of Western Sydney • Charles Sturt University • NSW Agriculture
ERA Workshop Townsville	10 November	25	• CSIRO Land and Water • National Program for Sustainable Irrigation • Monash University • Australia Centre for Tropical Freshwater Research • NT Dept of Infrastructure, Planning and Environment • QLD Dep. of Primary Industries • QLD Dept of Natural Resources and Mines • Ord Land and Water • Burdekin Bowen Integrated Floodplain MAC • Burdekin Dry Tropics Board • CSR
Seminar – Kellett; CSIRO Davies Laboratory Townsville	15 October	25	• CSIRO Land and Water • CSIRO Sustainable Ecosystems • QLD Environmental Protection Agency • QLD Natural Resources and Mines • North Queensland Area Consultative Committee • Individual Farmers

Seminars Meetings Workshops	Date	#	Organisations Represented
CRC IF Annual Conference	20 September	100	• CRC Irrigation Futures • CSIRO Land and Water • QLD Dept Natural Resource Mines and Energy • National Program for Sustainable Irrigation • Land and Water Australia • Victoria Department of Primary Industries • University of Melbourne • University of Southern Queensland • University of South Australia • University of Western Sydney • Charles Sturt University • NSW Agriculture • South Australian Research and Development Institute
Brisbane Workshop	3 August	18	• QLD Dept of Primary Industries and Fisheries • QLD Environmental Protection Agency • QLD Dept Natural Resources Mines and Energy • QLD Dept State Development and Innovation • CSIRO Sustainable Ecosystems • CRC Irrigation Futures • Land and Water Australia
Darwin Workshop	26-27 May	20	• Cth Bureau of Rural Sciences • CSIRO Land and Water • National Program for Sustainable Irrigation • Cth Dept of Fisheries, Forestry & Agriculture • NT Dept of Business, Industry & Resource Development • CRC for Irrigation Futures • Land and Water Australia • Cth Dept of Environment and Heritage • Environmental Research Institute of the Supervising Scientist • QLD Dept of Natural Resources, Mines & Energy • NT Dept of Infrastructure, Planning & Environment • WA Dept of Environment • WA Dept of Agriculture
Kununurra Meeting 2	7 May	2	• WA Dept of Agriculture
Kununurra Meeting 1	7 May	1	• WA Dept of Environment
Kununurra Seminar	6 May	9	• WWF • Ord Cucurbit Growers • WA Dept of Agriculture • Ord Land and Water • Ord Irrigation • Ord Irrigation Coop • Kimberley Primary Industries Association

Seminars Meetings Workshops	Date	#	Organisations Represented
Broome Seminar	5 May	6	• Environs Kimberley • Kimberley Land Council • Gray's Organic Produce • Individual Farmers • Kimberley Area Consultative Committee • Kimberley Sustainable Regions Advisory Committee
Karratha Seminar	5 May	3	• WA Dept of Environment • WA Dept of Agriculture
Perth Seminar	4 May	10	• WA Farmers Federation • WA Dept of the Premier and Cabinet • Irrigation Association of Australia, WA Region • CSIRO Land & Water • WA Dept of Environment • WA Dept of Industry and Resources • Conservation Council of WA • Pastoralists and Graziers Association of WA

Appendix 8

NORTHERN AUSTRALIA IRRIGATION FUTURES

REPORT ON NAIF CASE STUDIES

DECEMBER 2007

Background

Of particular interest in the NAIF research is the similarities and differences between the various jurisdictions, the aim being to help develop a shared approach to understanding and managing irrigation in the north of Australia. The Stage 2 Work Plan emphasises the importance of case studies and, in accordance with the preferences of each jurisdiction, the lower Burdekin (QLD), Daly (NT) and Ord (WA) irrigation areas were chosen for the case studies. A work plan was then developed for each. This is a report on the case studies to inform the NPSI Final Report.

Case Study Objectives

The role of case studies is to inform the NAIF research and help ensure that activities and outputs are of practical value. The case studies were expected to:

- Allow the NAIF project to link closely with and draw from other activities taking place in the case study areas
- Help ensure that the sustainability framework can provide for the incorporation of ecological, social, economic and cultural values by those wishing to use it
- Help ensure that the risks and limitations of irrigation are clearly identified and
- Help ensure that the NAIF Stakeholder Reference Group has the opportunity to understand the direct relevance of decisions about irrigation in northern Australia to the future of those individuals and communities.

Case Study Activity Highlights

Key learning's from the case studies are picked up throughout the NAIF report series. Following are some of the activity highlights.

Lower Burdekin Case Study (QLD)

- An initial NAIF workshop was held in Brisbane in August 2004
- Information from the Lower Burdekin is included in a review of past and present irrigation in northern Australia, comparisons and lessons from the Burdekin, Daly and Ord irrigation systems and an overview of hydrology of the north
- NAIF convened a meeting of key organisations in the Lower Burdekin in June 2006 which resulted in the establishment of an ongoing Lower Burdekin Water Futures group, currently Chaired by Dr Keith Bristow
- The NAIF framework of an ESD Component Tree System, catchment based knowledge platforms, and science, policy and stakeholders operating in an integrated way, was demonstrated through a Lower Burdekin prototype, which has received strong support in the Lower Burdekin through the SC and at the NAIF Final Workshops
- A Bayesian network models stakeholder workshop was held in June 2006
- NAIF convened and chaired a Lower Burdekin Water Forum on 25/8/06 with 80 stakeholders

- Stakeholder interviews capturing personal views on lessons from the lower Burdekin were completed and analysed. Results form part of a CRC IF funded NAIF directed PhD thesis

- Final NAIF NPSI workshops were held in Ayr and Brisbane in September 2007.

Daly River Case Study (NT)

- An initial NAIF workshop was held in Darwin in June 2004

- NAIF chaired regular cross project meetings with CDU, ERISS and NRETA: http://www.clw.csiro.au/naif/crosslinks.html

- Information from the Daly is included in a review of past and present irrigation in northern Australia, comparisons and lessons from the Burdekin, Daly and Ord irrigation systems and an overview of hydrology of the north

- Stakeholder interviews capturing personal views on lessons from the Daly were completed and analysed. Results form part of a CRC IF funded NAIF directed PhD thesis

- A presentation on NAIF and the Sustainability Framework, and a public presentation by Dr Chaves were held in Darwin in August 2006

- NAIF was invited and had a strong presence at the North Australia Water Use Experts Summit in Darwin in December 2006

- A final NAIF NPSI workshop was held in Darwin in September 2007

- NAIF has been invited to brief the Daly River Management Advisory Committee on irrigation mosaics and the NAIF frameworks to support irrigation decision making in December 2007.

Ord Case Study (WA)

- Initial NAIF workshops were held in Perth, Karratha, Broome and Kununurra in May 2004

- A public presentation by Dr Chaves was hosted by NAIF in Kununurra and Perth in August 2006

- Information from the Ord is included in a review of past and present irrigation in northern Australia, comparisons and lessons from the Burdekin, Daly and Ord irrigation systems and an overview of hydrology of the north

- Stakeholder interviews capturing personal views on lessons from the Ord were completed and analysed. Results form part of a CRC IF funded NAIF directed PhD thesis

- Final NAIF NPSI workshops held in Kununurra and Perth in September 2007.

Achievement Criteria

An assessment of performance against the achievement criteria established in the case study work plans is attached (Attachment 1).

Assessment against Cast Study Objectives

Objective	Comment
Allow the NAIF project to link closely with and draw from other activities taking place in the case study areas	Case studies provided an important mechanism to link with the local community in each case study area. This was particular the case for the lower Burdekin following its identification as the preferred catchment for developing a prototype of the NAIF frameworks. As expected, this provided a sounding board to test ideas with local decision makers and land holders.
Help ensure that the sustainability framework can provide for the incorporation of ecological, social, economic and cultural values by those wishing to use it	Each case study area provided important inputs to the frameworks. Activity in each area (previous irrigation decisions, water plans, NRM plans etc) were used to identify the ecological, social, economic, cultural and external factors needing to be captured in the ESD component trees. The generic component trees were then applied to the lower Burdekin case study to develop a set of ESD component trees specific to the lower Burdekin.
Help ensure that the risks and limitations of irrigation are clearly identified	This is the purpose of the ESD component tree system. By developing a generic starting point through the component trees the process of determining which issues are relevant and which are not can be made more transparent.
Help ensure that the NAIF Stakeholder Reference Group has the opportunity to understand the direct relevance of decisions about irrigation in northern Australia to the future of those individuals and communities	The SRG has not operated as originally envisaged. As the project progressed, more emphasis was placed on direct connections between the NAIF project team and key stakeholders in the case study areas and northern Australia in general. Further details on this are provided in the NAIF NPSI Final Report.

Case Study Outcomes

The Lower Burdekin, Daly and Ord have provided important input to the research in relation to each of thee research areas. The NAIF project has been able to develop strong links with key stakeholders, including local and more remote officers in relevant governments, through each of these case studies. The case studies provided an opportunity to profile the NAIF project locally and test ideas against local circumstances. This was particularly the case for the lower Burdekin where the SC requested the project team work with the local community to develop a prototype of the NAIF frameworks to support irrigation decision making in northern Australia.

"It was a fundamental underpinning of the project to have the three key example areas across northern Australia (lower Burdekin, Katherine-Douglas-Daly and the Ord). The advantage of having concentrated effort in those three areas has been the involvement from the three communities and the stakeholders has been enormous". Kevin Devlin, SC member.

Attachment 1

COMMENTS AGAINST CASE STUDY ACHIEVEMENT CRITERIA

Achievement Criteria	Performance Indicator	Data Source	Comments
A comprehensive, practical and usable framework for supporting debate and decisions about irrigation in northern Australia	Acceptance of framework by key stakeholders	Documented feedback from case study stakeholders on framework	Feedback from NAIF NPSI Final Workshops suggests good support for NAIF frameworks. See Report on NAIF NPSI Final Workshops (October 2007) which is an appendix to the NAIF NPSI Final Report.
Wider knowledge of key biophysical features relevant to irrigation in northern Australia	Comprehensive collation and interpretation of key knowledge and understandings of northern Australian landscapes relevant to irrigated agriculture	Documented feedback from case study stakeholders on NAIF project questionnaires	Feedback from NAIF NPSI Final Workshops suggests NAIF has increased awareness of biophysical features relevant to irrigation in northern Australia. See Report on NAIF NPSI Final Workshops (October 2007) which is an appendix to the NAIF NPSI Final Report.
Successful project communications	Case study stakeholders are part of NAIF Stakeholder Network and receiving quarterly project updates	Project records on membership of Stakeholder Network	Of the more than 300 NAIF stakeholder members at 25/10/07: 19 out of 110 members in QLD are in the lower Burdekin 7 out of 72 members in NT in the Daly 28 out of 82 members in WA in the Ord. These figures don't accurately represent how many of the 300 network members have an interest in one or more of the case studies. For example, most government officers are based in capital cities outside case study areas.
Effective implementation and coordination	Project partners maintain investment for project duration	CSIRO/WA Govt Funding Agreement approved and maintained	All investments have been maintained.

Appendix 9

NORTHERN AUSTRALIA IRRIGATION FUTURES

STEERING COMMITTEE DRAFT COMMUNIQUÉ

DECEMBER 2007

Future of NAIF – Steering Committee Draft Communiqué

(October 2007)

This communiqué was prepared by the current NAIF sub-committee to generate discussion and ideas regarding the future of the NAIF project after the completion of the CDS23 component.

The goals of the NAIF project are to provide new knowledge, tools, and processes to facilitate assessment and decision making regarding irrigation in northern Australia with a specific view to long term sustainability. The project has already had a significant positive impact on inter-jurisdictional cooperation between the 3 governments in the North but also with community and industry stakeholders and other research programs. The sub-committee agrees that the continuation of this project model would contribute greatly to help to ensure that any expansion of irrigation in the north of Australia is done in a sustainable manner.

The NAIF project has so far focussed the research on three main areas associated with irrigation in Northern Australia with various levels of rigour. These included:

- Preliminary conceptual work on the use of mosaics as an alternative to broad acre irrigation.
- Tropical water systems including goods and services, Water quality, water quantity and ground water / surface water interactions; and
- A sustainability Framework which included a component systems approach to understanding complex social-ecological systems and the use of emerging tools and on-line technology

This work has been lauded by an extensive range of interested parties including the North Australian Task force, community groups, industry and academia. The challenge now is to ensure that the work is utilised and that the project concepts are extended into new areas or the development and implementation of existing research.

We believe that the component systems work could be further developed particularly once the concept has been trialled in some “real life” situations. There are plans to upgrade the Burdekin Knowledge platform and other research teams such as the Tropical Rivers and Coastal Knowledge Consortium are looking at knowledge sharing systems which may present opportunities to utilise some of the work so far developed as part of the Sustainability Framework project theme. Work on the concept of mosaics could be extended, once again with some ground truthing of concepts and utilising monitoring data to improve and prove up the concept. The use of mosaics is especially applicable to the Northern Territory where irrigable soils are naturally mosaiced across the landscape.

Other potential avenues of research could be in the area of:

- carbon sequestration/trading etc.
- Salt and nutrient planning and management
- Use of alternative or supplementary water sources such as overland flow and flood harvesting and aquifer recharge

Appendix 10

NORTHERN AUSTRALIA IRRIGATION FUTURES: SHARING THE LEARNING'S

NAIF WORKSHOPS (SEPTEMBER TO NOVEMBER 2007)

Keith L. Bristow[1,2], Jeff K. Camkin[1,2], Steve Marchant[2,3]
Lucy Reading[2,4] and Di Popham[1]

[1]CSIRO Land & Water and [2]CRC for Irrigation Futures
[3]University of New England and [4]University of Queensland

DECEMBER 2007

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The contents of this publication do not purport to represent the position of the Project Partners[1] in any way and are presented for the purpose of informing and stimulating discussion for improved decision making regarding irrigation in northern Australia.

[1] The Project Partners are: CSIRO, Land and Water Australia, National Program for Sustainable Irrigation, CRC for Irrigation Futures, and the Governments of Australia, Queensland, Northern Territory and Western Australia.

1 EXECUTIVE SUMMARY

A series of Northern Australia Irrigation Futures (NAIF) meetings and workshops where held across northern Australia in early 2004 to: (i) identify and introduce the NAIF project to a broad range of clients and stakeholders; (ii) identify data required and data sources; and (iii) determine the willingness of stakeholders to participate in NAIF project activities. Three reports[2] summarising the stakeholder engagement outcomes were posted on the NAIF project website at http://www.clw.csiro.au/naif/. The results of these initial meetings were used to focus the NAIF project efforts in a number of key areas or themes, including:

1. The history and context of irrigation in northern Australia
2. Understanding Tropical Water Systems
3. Understanding Irrigation Mosaics
4. Sustainability Frameworks
5. The process – involving stakeholders and key case study sites

The project has over the last few years, with the help and guidance of the Steering Committee (SC), adapted in response to research results, improved understanding of the external environment (particularly in relation to changes in the national water agenda), client needs and strategic opportunities.

NAIF held another series of workshops across northern Australia in September 2007 and in Canberra in November 2007 as part of the final reporting process for the Land and Water Australia National Program for Sustainable Irrigation (NPSI) component of NAIF. The aim was to engage with as many clients and stakeholders as possible, including those who took part in the initial workshops to: (i) share the NAIF project learning's and experiences over the last 4 years, and (ii) to seek their feedback on progress to date and views on future directions and priorities. This report provides a summary of these workshops, together with a consolidated version of the NAIF presentations used in the workshops.

There was good engagement with and participation in discussion by the participants at all the workshops, which demonstrated strong endorsement for NAIF. Improved recognition of the complexity of irrigation systems, the need to understand and manage associated groundwater systems, the need to manage drainage from the inception of irrigation, and the uncertainty and risks associated with irrigation decision making were highlighted at all workshops.

It was clear from the workshops that the knowledge platforms and ESD component trees were of particular interest to most of the participants, who saw them as being at the very least "useful" and more likely "absolutely critical" if improved irrigation outcomes are to be achieved. The question of ownership and maintenance of any working version of the knowledge platforms was the most common concern voiced in all the workshops.

There was also a view that the NAIF process had been extremely worthwhile and that a specific focus on irrigation in northern Australia needs to be continued, and perhaps expanded beyond irrigation and groundwater systems to cover other NRM related issues such as land and soils. Funding to continue the NAIF process and research was highlighted as a major concern.

[2] Report of Stakeholder Consultations in Western Australia (31 May 2004), Report of Darwin Workshop (22 June 2004) and Report on the Brisbane Workshop with Queensland Government Agencies (3 August 2004).

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3 PURPOSE OF THIS DOCUMENT

The purpose of this document is to provide a report on the Northern Australia Irrigation Futures (NAIF) workshops and meetings held across northern Australia during September 2007 and in Canberra in November 2007. These workshops formed part of the final reporting process for the initial Land and Water Australia National Program for Sustainable Irrigation (NPSI) component of NAIF. The aim of the workshops and meetings were to share the NAIF project learning's and experiences over the last 4 years with a broad range of key stakeholders across northern Australia, and to seek their feedback on progress to date and views on future directions and priorities.

4 INTRODUCTION

Northern Australia holds an iconic status for many Australians. The interplay between the landscapes, rivers and strongly monsoonal weather patterns has resulted in unique and diverse ecological systems that will need special care to retain their integrity. At the same time, with some 70 per cent of Australia's fresh water discharging from tropical rivers, the region faces significant environmental challenges associated with increasing pressure to develop water resources, catchments and coastal environments, as well as managing existing threats, including weeds, feral animals and fire.

There is a unique and historic opportunity to ensure that management of Australia's northern water resources takes place within a strategic, ecologically, culturally and economically sustainable framework. There is widespread awareness of the opportunity to learn from previous decisions that have resulted in irrigation systems that are degraded or degrading. There is also increasing recognition of the need to view and manage northern Australia through a 'northern lens', recognising that this needs to take place within a national and international context.

Deciding on whether to irrigate in northern Australia, and if so what irrigation should look like, where it should be located, and how it should be managed, requires improved understanding of river and catchment attributes and the risks and benefits associated with irrigation. The Northern Australia Irrigation Futures project (NAIF) (http://www.clw.csiro.au/naif/) was established in 2003 to address these issues. The NAIF goal is to provide new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia. NAIF has focussed its efforts in five key areas which are discussed in more detail below.

The National Plan for Water Security announced on the 25 January 2007 (http://www.environment.gov.au/water/action/npws.html) notes that while there are important water resources and environmental assets in the north that need to be maintained, there is also an opportunity for further development of northern Australia land and water resources and we must understand how to do that wisely. According to the Plan, "*Future and ongoing development of northern Australia's land and water resources must take place in a strategic framework that is ecologically, culturally and economically sustainable, which will ensure that schemes are consistent with the principles of the National Water Initiative*". The Northern Australia Land and Water Taskforce, which is part of the National Plan for Water Security, was set up to address this issue. The role of the Taskforce is to examine the potential for further land and water development in Northern Australia, with particular emphasis on the identification of the capacity of the north to play a role in agricultural development (http://www.environment.gov.au/water/action/development/index.html).

It is likely that the Northern Australia Land and Water Taskforce and ongoing drought in southern Australia will stimulate a lot more interest in northern Australia. It is timely therefore that various other studies are now also underway to improve understanding of northern catchments in an attempt to ensure that any decisions about the future of northern Australia are made with the best information available about the potential long term implications for northern Australia and Australia as a whole. Various studies are being carried out by governments (the Australian, WA, NT, and QLD governments in particular), universities, NRM regional bodies, private companies, research organisations, and others. A good example is the Tropical Rivers and Coastal Knowledge consortium (http://www.track.gov.au/).

NAIF is well connected with many of the above activities and other initiatives across northern Australia, and engages in ongoing discussions, debate, and collaborative activities that support the search for more resilient and sustainable approaches to the future of northern Australia.

This report summarises experiences and outcomes of the recent suite of workshops held across northern Australia and in Canberra. The aim of the workshops and meetings was to share the NAIF project learning's and experiences over the last 4 years with a broad range of stakeholders across Australia, and to seek their feedback on progress to date and views on future directions and priorities.

5 THE WORKSHOPS

The aim of the workshops and meetings were to share the NAIF project learning's and experiences over the last 4 years with a broad range of key stakeholders across northern Australia, and to seek their feedback on progress to date and views on future directions and priorities

The itinerary involved:
- Brisbane - 7th September 2007
- Ayr - 14th September 2007
- Darwin - 24th September 2007
- Kununurra - 25th September 2007
- Broome - 26th September 2007 (stakeholder meetings)
- Perth - 28th September 2007
- Canberra – 28th November 2007

The key water departments of each of the State and Territory governments took a lead role through their NAIF Steering Committee (SC) representative in organising, inviting participation, and hosting the workshops in their respective jurisdictions. This involved the Department of Natural Resources and Water (NRW) in Queensland, the Department of Natural Resources, Environment and The Arts in the Northern Territory, and the Department of Water in Western Australia. A number of key Federal Government Departments and other key organisations in Canberra were involved in inviting participants to the Canberra workshop.

Each workshop involved a presentation about NAIF and its activities by Keith Bristow and Jeff Camkin, during which they sought and encouraged active engagement and discussion with and between participants. The aim was to challenge the what, why and how things were being done, and to draw out the key learnings as the workshop progressed. Each workshop (which varied in length from around 2.5 to 3.5 hours) ended with participants being invited to share their final thoughts and/or take home message with the group.

The consolidated presentation used by Keith Bristow and Jeff Camkin across northern Australia is provided in APPENDIX 2. This includes an updated version of the NAIF frameworks section of the presentation used in the Canberra workshop.

5.1 Brisbane Workshop 7/9/07

The Brisbane workshop was held on the 7/9/07. The workshop as opened and chaired by Tom Crothers from NRW in Brisbane. Tom Crothers is also a member of the NAIF SC.

The list of attendees is included in the table below:

Name	Organisation	Email Contact
Tom Crothers (Chair)	Dept. of Natural Resources and Water (NRW) / NAIF SC Member	Tom.Crothers@nrw.qld.gov.au
Lucy Reading	NRW / CRC IF / UQ	l.reading@uq.edu.au
Diwakara Halanaik	NRW	Diwakara.Halanaik@nrw.ql.gov.au
Joan Meecham	NRW	Joan.Meecham@nrw.qld.gov.au
Lyall Hinrichsen	NRW	Lyall.Hinrichsen@nrw.qld.gov.au
Russell Holland	NRW	Russell.Holland@nrw.qld.gov.au
Lindsay Delzoppo	EPA	Lindsay.Delzoppo@epa.qld.gov.au
Joseph Evans	Canegrowers	Joseph_Evans@canegrowers.com.au
Les Robertson	Sugar Research & Development Corporation	lrobertson@srdc.gov.au
Ian Winter	Swancorp	Meggsie1972@yahoo.com
Kumar Thambar	Dept. of Premier and Cabinet	David.Thambar@premiers.qld.gov.au
Peter Elliot	Dept. of Primary Industry and Fisheries	Peter.Elliot@dpi.qld.gov.au
Matthew Durack	Private farmer	matthewd@stahmann.com.au
Ian Johnson	Queensland Farmers Federation	ianjcon@ozemail.com.au
Jane Muller	Growcom	jmuller@growcom.com.au
Mike Grundy	CSIRO	Mike.Grundy@csiro.au
Richard Cresswell	CSIRO	Richard.Cresswell@csiro.au
Freeman Cook	CSIRO / CRC IF	Freeman.Cook@csiro.au
Justin Story	CSIRO	Justin.Story@csiro.au
Keith Bristow	CSIRO / CRC IF	Keith.Bristow@csiro.au
Jeff Camkin	CSIRO / CRC IF	Jeff.Camkin@csiro.au
TOTAL = 22		

Key messages and points of discussion during the workshop

- Most biological processes are faster at higher temperature. Therefore, we need to be more cautious in northern Australia because mistakes can play out faster (Freeman Cook)

- Discussion on whether the Stakeholder Reference Group (SRG) was useful. The Darwin SRG/SC meeting was a valuable experience (Tom Crothers)

- Money to support the process that NAIF established is critical (KLB). Need to spend time digging into this issue and pick it up in the final report (Matthew Durack)

- There isn't a social framework in which these discussions (future of irrigation in northern Australia) can take place – this put too much responsibility on the NAIF project (Joan Meecham)

- NAIF means naïve, and we were (when establishing the original project). A lot of that naivety has been removed from the language NAIF now uses (Mathew Durack)

- NAIF has achieved some things by focussing on irrigation but now needs to become a northern Australia Futures project (Joan Meecham)

- Be vigilant in conveying the message that water flowing to the sea is not wasted (Keith Bristow)

- Collecting information is linked to collective trust. This is why historically farmers haven't voluntarily provided, for example, information on nitrogen and why there is, therefore, no overall nitrogen balance available (Mathew Durack)

- A big lesson from the failure of southern systems was the separation of science from people in the catchment. Not enough trust. Irrigation needs to up its level of professionalism and how it engages with science (Mathew Durack)

- There is a critical need for better information management systems at the catchment level (Jane Muller)

- Time scale is very important as well. Things take a long while to move through groundwater systems and there may need to be active management of some things (problems) we have already created (Freeman Cook)

- The rate determining step is understanding of ecology (Joan Meecham) - understanding the ecology and the ecology / hydrology links (Tom Crothers)

Final Thoughts from Participants (what are your thoughts on NAIF activities?)

- A really, really powerful system, potentially. How does it link to other similar processes? (Lyall Hinrichson)

- Amazing what can be done with technology (*reference to the Knowledge Platform*). Really cool but don't lose focus on real practical drivers and staff. Need some very simple feedback - eg if I do this what will happen – to meet the practical needs of farmers (Jane Muller)

- Relationship between use of tools and policy changes. There will be no change without economic drivers. There are opportunities to lever off other opportunities such as mining and electricity (Peter Elliot)

- The tools should recognise the difference in decision making at various scales (Joan Meecham)

- Good to see people are looking at these things and thinking about the future of the north so that we don't repeat mistakes. Good there are ways of farmers being able to look at information. Hope funding continues, if not there must be some way of getting industry investment (Ian Winter)

- Who are the groups being targeted for change? Good there are visual types of things being developed. Bit of practical realistic aspect to it (NAIF work) eg water use efficiency isn't everything. Mosaics is a new concept. Systems diagram shows collective need. Lots of good things happening (Joseph Evans)

- Limited capacity in NAIF – lots of chiefs, no Indians. NAIF is trying to do too much – need more focus on key aspects and getting other similar activity involved. Should NAIF just focus on water? (Richard Cresswell)

- Pleased to see how NAIF has matured over time. Only concern is short term funding and to ensure NAIF is supported well in the future (Lindsay Delzoppo)

5.2 Ayr Workshop 14/9/07

The Ayr workshop was held on the 14/9/07. The workshop as opened and chaired by Tom Crothers from NRW in Brisbane. Tom Crothers is also a member of the NAIF SC.

The list of attendees is included in the table below:

Name	Organisation	Email Contact
Tom Crothers (Chair)	Dept. of Natural Resources and Water (NRW) / NAIF SC Member	Tom.Crothers@nrw.qld.gov.au
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Lucy Reading	NRW / UQ / CRC IF	l.reading@uq.edu.au
John Power	Burdekin Shire Council	John.Power@burdekin.qld.gov.au
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Total = 24		

Key messages and points of discussion during the workshop

- Response times for systems (eg groundwater systems) can be decades (Vern Veitch)

- Maybe we need to think completely differently (eg wetting and drying cycles) when considering irrigation mosaics to get maximum benefit. Also, the way mosaics impact on things like weeds, 'ephemerality' are important (Peter Gilbey)

- Do we need to change our mindset about what crop we grow? (Peter Gilbey)

- It is easier to plan than to retrofit. Changing the lower Burdekin is a real challenge – ecosystems, infrastructure etc. We need to take lessons from the lower Burdekin to influence future decisions (George Lukacs)

- There are opportunities to use cane industry infrastructure (mills, rail etc) to move to other industries, eg timber (Vern Veitch)

- We can have such frameworks (NAIF SF) but who manages and funds it. Should we be taking our management to another level?

- What impact will National Water Initiative and especially water pricing have on the future of irrigation?

Final Thoughts from Participants (what are your thoughts on NAIF activities?)

- This (NAIF SF) is a very, very useful path that will deliver best practice environmental management (Michael Hoey)

- NAIF Knowledge Platform is a fascinating way to go. A particularly useful mechanism to get awareness of available knowledge (Gary Jensen). Yes, but need to find knowledge to change behaviour (Tom Crothers)

- Used right the Knowledge Platform can help develop trust (Andrew Kelly)

- There are lots of websites (*reference to Lower Burdekin Knowledge Platform*) but a key issue is who is the gatekeeper? (Reg Huston)

- In order to deliver trust in the knowledge platform need to remove the role of gatekeeper (Natalie Stoeckl)

5.3 Darwin Workshop 24/9/07

The Darwin workshop was held on the 24/9/07. The workshop as opened and chaired by Ian Lancaster from NRETA in Darwin. Ian Lancaster is also Chair of the NAIF SC.

The list of attendees is included in the table below:

Name	Organisation	Email Contact
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Tim West	NT Horticultural Assn	
Guy Robertson	Landcare/NT Horticultural Assn	Landcare@ntha.com.au
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Michael Douglas	TRaCK / Charles Darwin Uni	Michael.Doulas@cdu.edu.au
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Sue Jackson	CSIRO	Sue.Jackson@csiro.au
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Jeff Camkin	CSIRO / CRC IF	Jeff.Camkin@csiro.au
TOTAL = 21		

Key messages and points of discussion during the workshop

- The US has developed much more complex solutions to deal with complex systems

- Improving outcomes can be achieved if there are economic drivers. For example, improving nitrogen outcomes resulting from improved application of nitrogen through coded fertilisers that make nitrogen more available to plants with reduced wastage

- There is acceptance of the need to increase the sophistication of managing water systems. This is achievable for corporate farms and is considered part of due diligence. It is less achievable for family farming due to cost, but they are aware of the need for better management

- NAIF focus is on water but has ignored land management change. That needs to be integral part of water management as well, ie land/soil/water managed together

- One of your take home messages is that there must be export of salts out of irrigation areas. Until the Burdekin and Ord are fixed it will be difficult to get community support for large irrigation systems (Stuart Blanch)

- Is there more detailed working going to happen on irrigation mosaics (eg understanding pests)? (Peter Whitehead) (that needs to be done but is not part of the current NAIF work Keith Bristow)

- Need to think about how such a knowledge platform might disadvantage indigenous people (or others) who don't want to make their knowledge available (Stuart Blanch)

- Vague about who owns the LBKP (Lower Burdekin Knowledge Platform). Shouldn't it be seen as underpinning water planning and therefore isn't whoever is responsible for water planning also responsible for the LBKP? (Ian Smith)

- Great idea, but who owns it (the Knowledge Platform)?

- Challenge is who maintains it, not who establishes / builds it (the Knowledge Platform) (Bill Freeland)

- The ability of the layman to access information from multiple perspectives is a very positive attribute of the knowledge platforms

- Libraries are very expensive to run, one of these (Knowledge Platform's) is horrific. Maintenance is the issue (Bill Freeland) - NRETA Maps has at least halved the cost of providing bore data to the community (Ian Lancaster)

- There is an element of user pays to this (the Knowledge Platform). If it is about water could use water fees to pay for it (Stuart Blanch)

Final Thoughts from Participants (what are your thoughts on NAIF activities?)

- Potential useful links between the NAIF sustainability framework and the Daly River Management Advisory Committee, including scenario planning. Learnt a lot (Peter Whitehead)

- Very passionate about groups being able to access information relevant to them. Catchment approach is really powerful. Web info is a really important tool. Suggest we look at the Corangamite CMA web site (http://www.ccma.vic.gov.au/). Wish you well – a terrific aim that could be utilised by a range of organisations or opportunities (Ian Linley)

- Pretty good general outcomes. Would be good to look at the leaves of the component trees – at the detail (Russell Willing)

- From an industry perspective this provides insight into the future. Definite future for the sustainability framework – it is a viable option (Tim West)

- Very happy NAIF focus is not on new large scale irrigation as there is a need to improve existing irrigation. The make or break for the sustainability framework is how adequately non-biophysical criteria are addressed. How do the 300 factors link up? What are the policy tools that come with the NAIF recommendations about the future of irrigation?

Mosaics are a new approach but what about cumulative impacts? Key message is that one must export salts (and hence nutrients), so by implication there will be pollution. This is a key message, needs to be in black and white. Would like to see recommendations for what to do where irrigation is not part of the future (Stuart Blanch)

- Improving communication and engagement will help decrease any animosity. The knowledge platforms and regional focus are an absolutely positive step forward (Geraldine Lee)

- It is useful to have a group looking at the long term perspective. Not much focus on agriculture or how water could be better utilised, efficiency of water use. There won't be large scale irrigation like southern Australia. Mosaics concepts will develop in NT and WA. Knowledge base very useful and can be made to work in each area. For example, Camballin, where capturing anecdotal information is critical because people come and go in the north. Having a knowledge base is important for someone starting fresh, eg new to northern Australia. Also important for learning issues at catchment scale (Peter Harrison)

- Knowledge platform important and useful – will deliver beneficial outcomes (Guy Robertson)

- Forum was useful to me to generate thoughts. Knowledge management is a huge issue, including capturing existing knowledge. Fantastic direction being taken and good ideas. How much of the information on irrigation mosaics is from research versus thoughts. We need to talk more tomorrow about where to from here (Anne Withell)

- Learnt a lot. Need to process that information. Sustainability framework and component trees are really relevant to the Northern Australia Land and Water Futures Assessments. There has been some discussion on web based knowledge platforms with DEWR. Need knowledge exchange base for northern Australia. Going beyond the knife edge is not an option for northern Australia (Anya Lam)

- Including soil variability is an obvious way to go with the mosaics work. Soil patchiness is a reality of northern Australia. Of the 300 components, what are the important ones, what are the key questions to be answered and, therefore, what knowledge do we need? Where does the funding come from to build and implement these concepts? Is it time industry put funding in? Are the issues being addressed about sustainable irrigation, sustainable development or sustainable environments? (Richard Cresswell)

- The LBKP is absolutely critical and if rolled out in less developed regions business plans can be developed and adjudicated properly. Knowledge gaps need to be filled by funding. There is enormous knowledge but need to fill gaps. Enormous social outcomes possible around water but it must be sustainable. Mosaics is exactly what we have in mind for the centre (central Australia). People coming to the water so need to fill knowledge gaps to achieve good decisions (Vincent Lang)

- I hope that DRMAC will use the component trees to identify issues relevant to managing the Ooloo aquifer. Knowledge platforms are essential. Many people go to industry rather than government websites because they trust them more (Ian Lancaster)

5.4 Kununurra Workshop 25/9/07

The Kununurra workshop was held on the 25/9/07. The workshop as opened and chaired by John Ruprecht from DOW in Perth. John Ruprecht is also a member of the NAIF SC.

The list of attendees is included in the table below:

Name	Organisation	Email Contact
John Ruprecht (Chair)	Department of Water (DOW) / NAIF SC Member	John.Ruprecht@water.wa.gov.au
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TOTAL = 20		

Key messages and points of discussion during the workshop

- Efficiency of delivery systems
- Is salt such a big issue and are there good examples of salt management plans
- Complexity and systems approaches to irrigation
- The relevance of the Burdekin groundwater experiences to the Ord systems
- Discussion of common issues across state boundaries is the real benefit
- Value of the frameworks in capacity building

Final Thoughts from Participants (what are your thoughts on NAIF activities?)

- A really good systems approach that supports capacity building. See also the Goulburn Broken Catchment salt management plan (Ruth Duncan)

- Like the whole of systems approach. Learnt a lot. The questions build caution. A good approach (Suzi Silvester)

- Good to bring out physical side so we know what questions to ask (Phillip Hams)

- Appreciate NAIF acknowledge there are questions but also a need to move forward and make decisions (Matt Brann)

- Good that you recognise that efficiency is not the be all and end all (Tony Chafer)

- Personally interested in community decision making and the knowledge platform. Custodianship issues are fundamental – it is about people (Susie Williams)

- A balanced system of system inputs and outputs (Dave Munday)

- Irrigation is still reluctant to put forward solutions. There is a need to make decisions, not just seek more information (Duncan Palmer)

- Interested in the LBKP and knowledge management, has been on the catchment reference group agenda for the last 12 months. Agree with the opportunity to replicate the system across northern Australia (Liz Brown)

- No comments – had my say earlier (Elaine Gardiner)

- Recognise the need to make good decisions about irrigation (Anna Price)

- Managing the groundwaters and salt is critical (Richard Cresswell)

- There are interesting applications for the knowledge platforms. What stops knowledge platforms being politicised? (Malcolm Baker)

- Need active decisions about water in the system, wether its about allocation or reallocation (Anya Lam)

- Component trees idea is good. Clear steps to show why decision was made - transparent management of the number of issues considered (Ann Withell)

- Further feedback from Dave Munday on 26/9/07:

  Workshop went really well, particularly as it was an evening session which are invariably difficult for people after a long day at work. People remained interested. Rated it 8/10. Now much more comfortable with where NAIF is at. Fantastic. Actually understand where KLB is coming from on groundwater/water issues, understand the knowledge platform and could now explain these things to others. At least one person had heard enough about the Burdekin but Dave and Liz thought the approach was good.

5.5 Perth Workshop 28/9/07

The Perth workshop was held on the 28/9/07. The workshop was opened and chaired by John Ruprecht from DOW in Perth.

The list of attendees is included in the table below:

Name	Organisation	Email Contact
John Ruprecht (Chair)	Department of Water (DOW) / NAIF SC Member	John.Ruprecht@water.wa.gov.au
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Jeff Camkin	CSIRO / CRC IF	Jeff.Camkin@csiro.au
TOTAL = 19		

Key messages and points of discussion during the workshop

- Are you suggesting that drainage and salt management is a key benchmark for all irrigation systems? (Tom Busher) - Yes, and must be considered from the beginning (KLB)

- Not only do we need policies for event driven systems but also need governance systems. Is NAIF considering governance systems? (Doug Hall)

- What financial incentive is there for upstream landowners to improve the quality of water coming off their property? Who owns the water upstream? If upstream farmers did there would be an economic incentive (Doug Hall)

- How much of the take home messages are driven by QLD rather than WA situations? A lot of the messages apply really well, but interested in how much NAIF has focussed on WA rivers as opposed to QLD. They seem to stack up really well, but suggest that WA take a small group process to review the take home messages from a WA perspective to make sure that they stand up (Roy Stone) - This could be linked to the NPSI final reporting process.

- Is it fair to say that this is leading to some sort of best practice approach to decision making on irrigation proposals? (Doug Hall) - Need to capture the key messages into the NAIF sustainability framework (KLB)

- While each of the take home messages are important, it is important not to lose the connectivity between them. Probably the biggest take home message is the complexity of the system and the need to manage that complexity (Doug Hall)

- There appeared to be reasonable support for new thinking on irrigation, such as linking irrigation and irrigation lifetime to mine lifetime

- Supportive of the conclusion about the need to use modern "control systems" approach to irrigation. Challenge is getting growers onside, measuring, sharing data. This needs the right governance systems to create long-term security to encourage sharing and a joint approach (Doug Hall)

- Greenfields sites represent a unique opportunity to set the bar higher and this can also help show the benefits of doing so to existing areas (Doug Hall)

- Is NAIF looking at non-traditional crops (eg gubinge, trees etc) (Roy Stone)

- The approach involves other (more) people in decision making – if they are more aware of the processes and challenges they are more likely to accept the outcome (Doug Hall)

- Different people have different views and values and how are these dealt with? Can't resole different views / values. Improved access to information doesn't fully resolve the fundamental tensions of different perceptions – not convinced that any system of knowledge management will resolve all such conflicts (Ian Loh)

- The visual tools (navihedron) are incredibly powerful. This is the start of a journey - knowledge management is still embryonic and we should be prepared to make some mistakes. At the moment it is superficial – the first step is education about the complexity. The knowledge platform has extraordinary potential to aid decision making (Doug Hall)

- Knowledge lies with individuals – there is a difference between knowledge and information. Beware the danger of casting past decisions in a poor light (Tony Smith)

- Original industry expected that NAIF would deliver a template for irrigation decisions that governments would use to replace existing processes. When will it get to that? (Tom Busher). We are working closely with governments of WA, NT and QLD to deliver tools that they may use - It may not replace other processes immediately but should be complementary to existing processes (JC). If the tools help control the shifting sands of decision making it will be very useful (Tom Busher)

- How would you ensure that knowledge platform is kept up to date (Hazel Kural). The ultimate issue is ownership of it (Doug Hall)

Final Thoughts from Participants (what are your thoughts on NAIF activities?)

- Do we have more information on demand scenarios that could assist my work on understanding future demands. Perhaps there is a link between the knowledge platform and that demand projection work (Hazli Koomberi)

- Very excited by what I have seen. Clearly using the latest technology and concepts. Greatest challenge is understanding complex systems, not many people can do that, and any tool to help is a good thing (Doug Hall)

- Good to see consolidation of some issues for northern Australia (Leith Bowyer)

- Seen growth of NAIF project for a while and find it exciting. How can we tap into the differences / conflicts which is part of the complexity. Consistently found this exciting and the Rottnest Island example helps ground the thinking (Peta Dzidic)

- Governance structures come out in various discussions. Further irrigation in northern Australia will need to come to grips with existing decision making processes within the jurisdictions (Ian Loh)

- Previously involved in Ord planning and construction. Good overview compared to dry land and it is heartening to see focus on trying to understand the complexity before implementing new irrigation systems (Don Crawford)

- Really enjoyed the workshop. Gave context to the groundwater work being done in the Ord. A lot of evidence of dedicated effort (Tony Smith)

- Understanding how it operates (the biophysical functioning) is scientific; understanding values and understanding decision making comes down to governance. May need to separate work on scientific understanding from governance and decision making (Chris Rose)

- If decision making tool for government then need uniformity of information provision and simplification of information. Learnt a lot (Hazel Kural)

- There is potential for the knowledge platform to be applied across a lot of things, eg climate change. One observation – Burdekin focus of presentation was difficult to get my head around (Andy McMillan)

- Opportunity now to make the transition from research and development to decision making support by rolling out the sustainability framework across trial catchments, which will be important. Setting groundwater targets as a benchmark is a key message that applies everywhere. Understanding and managing the salt is critical (Tom Busher)

- Feedback been covered by previous points. A good introduction to NAIF (Ben Thunder)

- Because there are different viewpoints it is important that these are synthesised. Is there a risk of inflexibility due failure to review synthesised info. If it is a decision making tool how to keep it current? (Eugene Carew)

- Really enjoyed the workshop. Framework is like a big model for the catchment and would help identify knowledge gaps. No matter how good info is, some bad decisions are still likely. Might be useful to develop a flow chart of how the sustainability framework could be used (Geoff Strickland)

- Interaction between the states through NAIF has been extremely useful and a real benefit. Workshops in the north over the past week have been really useful and overall NAIF has been very successful, especially in building partnerships (John Ruprecht)

5.6 Canberra Workshop 28/11/07

The Canberra workshop was held on the 28/11/07. The workshop was opened and chaired by Anwen Lovett from Land & Water Australia in Canberra. Anwen Lovett is a member of the NAIF SC.

The list of attendees is included in the table below:

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Name	Organisation	Email Contact
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Jin Wang	Dept of Environment & Water Resources (IT)	
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John Williams	John Williams Scientific Pty Ltd	jdrwilliams@ozemail.com.au
Anne Withell	Dept of Environment & Water Resources	Anne.Withell@environment.gov.au
Total = 35		

Anwen Lovett opened the workshop and welcomed participants, asking each participant to introduce themselves to the group.

Anwen Lovett stated that a key strength of the NAIF Project has been the working relationship between the three state governments. The NAIF Project was set up in 2003 to ask questions about irrigation in northern Australia: Is there potential for irrigation? If not, why not? If so, how should it look? From Land and Water Australia's perspective, one of the terrific things about the NAIF Project is that it is recording and delivering its findings at a time when the community is discussing these issues.

Key messages and points of discussion during the workshop

Keith Bristow commenced the workshop presentation, seeking interactive participation from workshop attendees. Following Keith's presentation on Water Systems, the following comments were taken from participants:

- NAIF has highlighted the importance of having a long term view when considering irrigation across northern Australia. The long term research focus is extremely important and balances short term research being done through other projects (Ian Lancaster)

- NAIF has encouraged a shift in policy thinking, for example the restriction on groundwater pumping which has come out of the Water Act (Tom Crothers)

- Is the culture in the north different to the south in regard to the management of salt? (Glen Walker)

- Salt management planning would be beneficial for all regions (Keith Bristow)

- WA experienced dryland salinity more than irrigated salinity, but with issues of rising water tables WA will be considering the irrigation salinity issue more closely (John Ruprecht)

- Interesting in that this is about people and systems. Irrigators need to understand how what they do affects the system as a whole and not just their farm and if they understand this then they can begin to understand how policy needs to address management of the system (Sarah Leonardi)

- I'm looking at best management practice in the north and whether an adaptive management approach would be more appropriate and whether this would create difficulties (Michael Martin)

- Farmers prefer certainty and security. Adopting an adaptive management (AM) approach would take away some of that certainty. Adoption of AM by farmers would be dependent on an individual farmer's situation and economic situation (Keith Bristow)

- Best management practice (BMP) was a constraining mindset (Jeff Camkin)

- A BMP was fixed in time, although it should include a review (Ian Atkinson)

- BMPs imply having an end point while adaptive management practice is ongoing (Keith Bristow)

- Karen Cody (National Land and Water Resources Audit) drew attention to the concept model in the presentation that illustrated the complexity of the biophysical system and sought how this linked into social and other systems. Keith Bristow confirmed that this would be covered in Jeff Camkin's part of the presentation

Keith Bristow went on to present the Mosaics work, with the following comments noted:

- It can take 30 to 50 years before issues arise from the impact of irrigation and salts on a natural system, therefore it is important to get decisions right to prevent these long term issues (Ian Lancaster)

Jeff Camkin presented on the framework and provided a live demonstration of the lower Burdekin knowledge platform. General discussion then followed:

- I found the real time presentation interesting. Has any thought been given to building in and demonstrating the economics of the system (eg. cost of a hectare of cane, cost of providing water) (Geoff Dyne)

- Reflecting on the life of the project; had the project got to the point originally thought, or had key things changed, for example, had the sustainability framework developed into what was initially thought? (Jim Donaldson).

- There were extremely ambitious views of what could be achieved at the start of NAIF. Resourcing was a major issue throughout the project. The Steering Committee were adaptive and made appropriate changes as learnings were made. Biophysical aspects moved on to be more inclusive of all parts of the system. The journey has been more productive and useful by adapting as we learned (Keith Bristow)

- The original vision sought to identify a tool that would assist someone who wanted to develop a greenfield site. This grew into: what information is already known; what can people access; how can we assist them to make their decisions. Knowledge sharing for specific sites is being achieved; the next step is to transfer information to a site that hasn't been covered yet (Kevin Devlin)

- There was a requirement for capacity building in a fully transparent and engaged way because irrigation is quite new to the NT. There is a need to have good and simple knowledge platforms to attract all stakeholders and provide answers to questions. I support the direction that NAIF has taken in order to get decisions made in a collaborative fashion (Ian Lancaster)

- Initial impressions of the project may have been that we should develop irrigation in northern Australia. The development of component trees was a good step to identify

issues within regions and ease the concerns of stakeholders, showing that adaptive management is beneficial (Tom Crothers)

- The break down of the component trees is useful to assess the impacts at a national level through to a regional scale. How were the component trees developed? On different local scales some issues may not be identified (Karen Cody)

- The process undertaken included analysis of decisions, flushing out issues, `placing these into the structure, continually re-iterating and making changes as required, workshopping with sub-committee members to refine and extract all issues for consideration. MindMapper software was used to assist in drawing the issues together (without having to address all the complexity at once). The next step was consideration of the relevance of each issue (Jeff Camkin)

- The process also highlights knowledge gaps and the integrity of data collected. The demonstration of the system used by fisheries was very beneficial to the process (Tom Crothers)

- What was the stakeholder reaction to the concept of irrigation systems being disposable (Andrew Dickson)

- Stakeholders were receptive to the idea and that planning for the shut down of irrigation schemes should be considered the same as they do in the mining industry (Keith Bristow)

- There are concerns regarding the lag in time between the development of an irrigation scheme and the downstream effects and, if irrigation schemes were disposable these would no longer be present to make the repairs to the ecosystem. It was also noted that small mosaic style schemes could also cause potential downstream issues (Andrew Dickson)

- Large schemes and mosaic schemes should have salt management plans incorporating positive and negative impacts and how these should be handled when shut down occurs (Keith Bristow)

- Has this project taken decision making on irrigation substantially forward? Is the product that different to others or is it just useful? (Christine Schweizer)

- There are a lot of databases available, but not a system that brings the information together spatially. In current systems knowledge is lost, or information is not accessible and information that is available is often not relevant. This (LBKP) is a step forward because it brings the relevant information together at a catchment level and provides a better linking of catchments (Jeff Camkin)

- The NAIF work has been exposed internationally with very positive feedback received from catchments that are keen to have similar accessibility to knowledge in their region (Keith Bristow)

- This research will help defend the process of planning and take the pressure off local and federal staff who are under pressure to make decisions (Tom Crothers)

- The capacity of the framework to provide a tool for review (eg of planning) is important to me. Will the framework allow for a formal review of decisions that have been made? (Bronwyn Ray)

- The systematic application of the component trees provided a process to look back and review decisions. Other factors, such as political issues and climate change, may alter priorities into the future – and these changes can be made more transparent (Jeff Camkin)

- The framework can help document the journey. Through benchmarking and then reviewing, one can see how things have changed (Keith Bristow)

- What is the driver for stakeholders to use the framework? There is also a Water Act in place which is not utilized to the full potential. There was a situation in a southern irrigation area when major flooding occurred causing the system to almost collapse. This became the driver to bring the community together to plan for the future – and resulted in a legislative framework for the community to work within (John Williams)

- If water levels rising as per the graph in the presentation, should the Burdekin Dam be emptied? (Andrew Dickson)

- The problem was not generated by the level of water in the Burdekin Dam, but from the system not being managed properly in the lower Burdekin. If you irrigate you must manage your drainage (Keith Bristow)

Anwen Lovett wound up question time and sought final comments from around the room.

Final Thoughts from Participants (what are your thoughts on NAIF activities?)

- Very informative, but also lots of questions which I will follow up with Keith and Jeff including “where to from here?” (Glen Walker)

- Very informative and good discussion. Lots of questions and will follow up with more. Biggest thing that strikes me is that we have started to develop something but the project is ended. How do we go forward? This is a big issue. Needs to go forward (Chris Smith)

- We’re struggling with these issues in the Burdekin community. What we have seen looks very useful. We have to try to find a policy framework to use and this may be an opportunity to do this; to put it into gear. I am worried we have gone into too much detail too quickly. You need to come to a basic understanding of the system you are working on at the highest level to ensure the community understands that irrigation is about putting more water into the landscape and the landscape cannot take that. The bottom line is sustainability. We can make a choice, but the environmental system will limit those choices. The community needs to know the important issues first and bringing the information together is ok, provided we have a system analysis that is fairly simple in the first instance. Very few people in the Burdekin understand that you cannot irrigate unless you extract the excess. You need a structure at a higher level with a policy framework to drive it (John Williams)

- Very informative, particularly in the planning sectors. Idea of centralised control centre and access to information in real time would be beneficial (Mark Lettfuss)

- Useful tool to inform broader political decisions but need political drivers in place (Chris Parker)

- Concerned about usefulness of decision making. Trade-off cost vs term (David Lambert)

- Interested in mosaics – social and economic impacts as well (Jane Jervis)

- Interesting in that this is about people and systems. Irrigators need to understand how what they do affects the system as a whole and not just their farm and if they understand this then they can begin to understand how policy needs to address management of the system (Sarah Leonardi)

- More exposure that a lot of problems in south are emerging in the Burdekin. Originally believed that north Australia was different but I am starting to think differently now. Interested in irrigation mosaics (Craig Watson)

- Think about how to ensure governments will continue to access this information; is it about the Steering Committee thinking about what is the next step for NAIF? DEWR has a program that wants to build on this (Andrew Dickson)

- Very informative. Need to move to a more robust pricing model for water. More sophisticated short vs long term (Geoff Dyne)

- Useful to include TRACK and riverine end of catchment research. Need to keep exploring sustainability framework component trees and how to bring together to guide knowledge platform. Kept and shared information is beneficial instead of piece meal approach. How does it measure with others? How does it intersect with other NRM governance systems? (Jim Donaldson)

- I've attended four workshops to date and this was a more polished presentation. ESD process quite complex, can it be used in a more constructive way, instead of going through the whole process, to identify the key issues? What stops mosaics from becoming larger systems into the future? (Richard Cresswell)

- Liked the presentation and the informal and different ways of learning. Who are the stakeholders and how is the decision made? How does the SF help if they do not acknowledge this information? Governance arrangements on how it is used are really important (Michael Martin)

- Some processes are missing in decision support. Impacts of final decision (Jin Wang)

- The capacity of the framework to provide a tool for review (eg of planning) is important to me (Bronwyn Ray)

- How to bring indigenous information into this? Will this work extend beyond Burdekin, Daly and Ord (Murray Radcliffe)

- Looking how to take it forward, not just in northern Australia. Bringing knowledge and understanding together and increasing transparency and rigour in decision making and planning (John Ruprecht)

- Want to know more about underground water storage (Gianni D'Addario)

- Excellent extension and collaboration over last three years. Strategic 50 year outlook is good. Huge workload with not much resourcing. Next phase needs to be scoped well before initiating. How far can you take the knowledge platform eg can a planner or irrigator use it to understand "if I do this, this happens"? What are the impacts of change? Can it be maintained? (Anne Withell)

- I agree with Bronwyn's view regarding monitoring and evaluation tool for water planners being incorporated. QLD, WA and NT (NAIF SC members) need to think about that (Tom Crothers)

- First exposure to NAIF, very useful and good learning to take away. Australian government on a mission to modernize irrigation in Australia. Endorse the comments re the need for the right institutional frameworks for this to work. Collaboration is important. Can see potential (Mark Rounds)

- NAIF is not dead. 2.6 people will continue research under CRC IF until 2010. Only the LWA NPSI project is coming to conclusion. We should not assume that because we believe the tool is good and useful that someone will use it. There must be a demand to use it. It needs to be marketed and put in front of other agencies including southern Australia (Ian Atkinson)

- Very interesting. Great to put all information together in one platform (Scott Macauley)

- Very informative. Would like to continue the conversation with DEWR/CSIRO re further support (Sarah Spackman)

- Need to continue long term thinking. ESD needs to be rolled out. After DRMAC meeting would like to roll it out in the Daly. Capacity building – take the Water Advisory Committee through the process. Issues differ geographically and demographically (Ian Lancaster)

- This forms a useful platform for this afternoon's discussion (NAIF Steering Committee Meeting) on where to go to next. Reflections on what others said: good knowledge can lead to bad decisions; need to have legislative framework to govern. Break down is in the governance and management of messages provided and decisions made regardless. This may provide better than previously and need mechanism to make sure decisions are made with full benefit of this knowledge (Kevin Devlin)

Anwen Lovett thanked participants for their feedback and stated that the workshop had been a very useful process. Feedback will be used in the NAIF SC discussions this afternoon.

6 COMMON THEMES IN WORKSHOP PARTICIPANT RESPONSES

The six final NAIF workshops were conducted at widely different locations from small townships (Ayr, Kununurra) to state and federal capital cities (Brisbane, Darwin, Perth and Canberra). Participants in the workshops came from a broad and diverse range of interest groups which included individual landholders, corporate and government sectors, environmental groups, Indigenous Australians and researchers from the biophysical and social sciences. Despite these various differences, almost all the comments, questions and concerns recorded during the workshops can be grouped within seven 'common themes':

(i) Systems, complexity and water management
(ii) Groundwater systems and salt/salinity issues
(iii) Irrigation mosaics
(iv) NAIF Knowledge Platform (KP)
(v) NAIF Sustainability Frameworks (SF)
(vi) 'Red tape' and decisions about irrigation
(vii) Continuing the NAIF process

Thematicising the various responses in this way has drawn out some of the key 'learnings' to be taken from the workshops as a whole. Where they arise, these stronger messages are summarised at the end of each 'theme'.

(i) Systems, complexity and water management

Brisbane

- Need active decisions about water in the system, whether its about allocation or reallocation (Anya Lam)
- Most biological processes are faster at higher temperature. Therefore, we need to be more cautious in northern Australia because mistakes can play out faster (Freeman Cook)
- The rate determining step is understanding of ecology (Joan Meecham)
- Understanding the ecology and the ecology / hydrology links (Tom Crothers)
- Be vigilant in conveying the message that water flowing to the sea is not wasted (Keith Bristow)

Darwin

- The US has developed much more complex solutions to deal with complex systems
- There is acceptance of the need to increase the sophistication of managing water systems. This is achievable for corporate farms and is considered part of due diligence. It is less achievable for family farming due to cost, but they are aware of the need for better management

Perth

- While each of the take home messages is important, it is important not to lose the connectivity between them. Probably the biggest take home message is the complexity of the system and the need to manage that complexity (Doug Hall)
- Previously involved in Ord planning and construction. Good overview compared to dry land and it is heartening to see focus on trying to understand the complexity before implementing new irrigation systems (Don Crawford)
- Seen growth of NAIF project for a while and find it exciting. How can we tap into the differences / conflicts which is part of the complexity (Peta Dzidic)

- Very excited by what I have seen. Clearly using the latest technology and concepts. Greatest challenge is understanding complex systems, not many people can do that, and any tool to help is a good thing (Doug Hall)

Canberra

- Interesting in that this is about people and systems. Irrigators need to understand how what they do affects the system as a whole and not just their farm and if they understand this then they can begin to understand how policy needs to address management of the system (Sarah Leonardi)
- I'm looking at best management practice in the north and whether an adaptive management approach would be more appropriate and whether this would create difficulties (Michael Martin)
- Farmers prefer certainty and security. Adopting an adaptive management (AM) approach would take away some of that certainty. Adoption of AM by farmers would be dependent on an individual farmer's situation and economic situation (Keith Bristow)
- Best management practice (BMP) was a constraining mindset (Jeff Camkin)
- A BMP was fixed in time, although it should include a review (Ian Atkinson (CRC IF)
- BMPs imply having an end point while adaptive management practice is ongoing (Keith Bristow)

Summary of 'Systems, complexity and water management' theme

Understanding the complexity of ecological/hydrological/social systems is the key to better decision making and management of current and future irrigation.

(ii) Groundwater systems and salt/salinity issues

Brisbane

- Time scale is very important. Things take a long while to move through groundwater systems and there may need to be active management of some things (problems) we have already created (Freeman Cook)

Ayr

- Response times for systems (eg groundwater systems) can be decades (Vern Veitch)

Darwin

- One of your take home messages is that there must be export of salts out of irrigation areas. Until the Burdekin and Ord are fixed it will be difficult to get community support for large irrigation systems (Stuart Blanch)

Kununurra

- Fantastic. Actually understand where Keith is coming from on groundwater/water issues, (Dave Munday)
- Managing the groundwaters and salt is critical (Richard Cresswell)

Perth

- Really enjoyed the workshop. Gave context to the groundwater work being done in the Ord. A lot of evidence of dedicated effort (Tony Smith)
- Are you suggesting that drainage and salt management is a key benchmark for all irrigation systems? (Tom Busher)

- Yes, and must be considered from the beginning (Keith Bristow)
- What financial incentive is there for upstream landowners to improve the quality of water coming off their property? Who owns the water upstream? If upstream farmers did there would be an economic incentive (Doug Hall)

Canberra
- It can take 30 to 50 years before issues arise from the impact of irrigation and salts on a natural system, therefore it is important to get decisions right to prevent these long term issues (Ian Lancaster)
- Is the culture in the north different to the south in regard to the management of salt? (Glen Walker)
- Salt management planning would be beneficial for all regions (Keith Bristow)
- WA experienced dryland salinity more than irrigated salinity, but with issues of rising water tables WA will be considering the irrigation salinity issue more closely (John Ruprecht)
- If water levels rising as per the graph in the presentation, should the Burdekin Dam be emptied? (Andrew Dickson)
- The problem was not coming from the level of water in the Burdekin Dam, but from the system not being managed properly in the lower Burdekin. If you irrigate you must manage your drainage (Keith Bristow)

(iii) Irrigation Mosaics

Ayr
- Maybe we need to think completely differently (eg wetting and drying cycles) when considering irrigation mosaics to get maximum benefit. Also, the way mosaics impact on things like weeds, 'ephemerality' are important (Peter Gilbey)
- It is easier to plan than to retrofit. Changing the lower Burdekin is a real challenge – ecosystems, infrastructure etc. We need to take lessons from the lower Burdekin to influence future decisions (George Lukacs)
- Do we need to change our mindset about what crop we grow? (Peter Gilbey)
- There are opportunities to use cane industry infrastructure (mills, rail etc) to move to other industries, eg timber (Vern Veitch)

Darwin
- Is there more detailed working going to happen on irrigation mosaics (eg understanding pests)? (Peter Whitehead)
- Mosaics are a new approach but what about cumulative impacts? Key message is that one must export salts (and hence nutrients), so by implication there will be pollution. This is a key message, needs to be in black and white. Would like to see recommendations for what to do where irrigation is not part of the future (Stuart Blanch)
- Including soil variability is an obvious way to go with the mosaics work. Soil patchiness is a reality of northern Australia (Richard Cresswell)
- Fantastic direction being taken and good ideas. How much of the information on irrigation mosaics is from research versus thoughts. We need to talk more tomorrow about where to from here (Anne Withell)
- Mosaics concepts will develop in NT and WA (Peter Harrison)
- Mosaics is exactly what we have in mind for the centre (central Australia) (Vincent Lang)

Perth
- Is NAIF looking at non-traditional crops (eg gubinge, trees etc) (Roy Stone)

- Green field sites represent a unique opportunity to set the bar higher and this can also help show the benefits of doing so to existing areas (Doug Hall)
- There appeared to be reasonable support for new thinking on irrigation, such as linking irrigation and irrigation lifetime to mine lifetime

Canberra

- There are concerns regarding the lag in time between the development of an irrigation scheme and the downstream effects and, if irrigation schemes were disposable these would no longer be present to make the repairs to the ecosystem. It was also noted that small mosaic style schemes could also cause potential downstream issues (Andrew Dickson)
- What stops mosaics from becoming larger systems into the future? (Richard Cresswell)
- Large schemes and mosaic schemes should have salt management plans incorporating positive and negative impacts and how these should be handled when shut down occurs (Keith Bristow)
- Interested in mosaics – social and economic impacts as well (Jane Jervis)
- More exposure that a lot of problems in south are emerging in the Burdekin. Originally believed that north Australia was different but I am starting to think differently now. Interested in irrigation mosaics (Craig Watson)
- What was the stakeholder reaction to the concept of irrigation systems being disposable (Andrew Dickson)
- Stakeholders were receptive to the idea and that planning for the shut down of irrigation schemes should be considered the same as they do in the mining industry (Keith Bristow)

Summary of 'Irrigation Mosaics' theme

The mosaics concept is accepted as a possible future irrigation option in northern Australia, particularly in relation to patchiness of soil quality/types and developing irrigation mosaics to be linked to a nearby mine in terms of project 'lifetime'. Issues that need to be addressed are mainly to do with boundary concerns (e.g. pests), existing infrastructure, and understanding and managing potential cumulative impacts.

(iv) NAIF Knowledge Platform (KP)

Brisbane

- There is a critical need for better information management systems at the catchment level (Jane Muller)
- Collecting information is linked to collective trust. This is why historically farmers haven't voluntarily provided, for example, information on nitrogen and why there is, therefore, no overall nitrogen balance available (Mathew Durack)
- A big lesson from the failure of southern systems was the separation of science from people in the catchment. Not enough trust. Irrigation needs to up its level of professionalism and how it engages with science (Mathew Durack)

Ayr

- NAIF Knowledge Platform is a fascinating way to go. A particularly useful mechanism to get awareness of available knowledge (Gary Jensen).
- Yes, and need to find knowledge to change behaviour (Tom Crothers)
- Used right the Knowledge Platform can help develop trust (Andrew Kelly)
- There are lots of websites but a key issue is who is the gatekeeper? (Reg Huston)

- In order to deliver trust in the knowledge platform need to remove the role of gatekeeper (Natalie Stoeckl)

Darwin

- Forum was useful to me to generate thoughts. Knowledge management is a huge issue, including capturing existing knowledge (Anne Whithell)
- Need to think about how such a knowledge platform might disadvantage indigenous people (or others) who don't want to make their knowledge available (Stuart Blanch)
- Vague about *who owns the LBKP*. Shouldn't it be seen as underpinning water planning and therefore isn't whoever is responsible for water planning also responsible for the LBKP? (Ian Smith)
- Great idea, but *who owns it (the Knowledge Platform)*?
- The ability of the layman to access information from multiple perspectives is a very positive attribute of the knowledge platforms
- Libraries are very expensive to run, one of these (Knowledge Platform's) is horrific. Maintenance is the issue (Bill Freeland)
- NRETA Maps has at least halved the cost of providing bore data to the community (Ian Lancaster)
- There is an element of *user pays to this (the Knowledge Platform)*. If it is about water could use water fees to pay for it (Stuart Blanch)
- Challenge is *who maintains it*, not who establishes / builds it (the Knowledge Platform) (Bill Freeland)
- Very passionate about groups being able to access information relevant to them. Catchment approach is really powerful. Web info is a really important tool. Suggest we look at the Corangamite CMA web site (http://www.ccma.vic.gov.au/). Wish you well – a terrific aim that could be utilised by a range of organisations or opportunities (Ian Linley)
- Knowledge platform important and useful – will deliver beneficial outcomes (Guy Robertson)
- Knowledge base very useful and can be made to work in each area. For example, Camballin, where capturing anecdotal information is critical because people come and go in the north. Having a knowledge base is important for someone starting fresh, eg new to northern Australia. Also important for learning issues at catchment scale (Peter Harrison)
- Improving communication and engagement will help decrease any animosity. The knowledge platforms and regional focus are an absolutely positive step forward (Geraldine Lee)
- There has been some discussion on web based knowledge platforms with DEWR. Need knowledge exchange base for northern Australia. Going beyond the knife edge is not an option for northern Australia (Anya Lam)
- The LBKP is absolutely critical and if rolled out in less developed regions business plans can be developed and adjudicated properly. Knowledge gaps need to be filled by funding. There is enormous knowledge but need to fill gaps.(Vincent Lang)
- People (are) coming to the water so need to fill knowledge gaps to achieve good decisions (Vincent Lang)

Kununurra

- Personally interested in community decision making and the knowledge platform. Custodianship issues are fundamental – it is about people (Susie Williams)
- Interested in the LBKP and knowledge management; has been on the catchment reference group agenda for the last 12 months. Agree with the opportunity to replicate the system across northern Australia (Liz Brown)
- There are interesting applications for the knowledge platforms. What stops knowledge platforms being politicised? (Malcolm Baker)

- …understand the knowledge platform and could now explain these things to others. At least one person had heard enough about the Burdekin but Dave and Liz thought the approach was good (Dave Munday - on 26/9)

Perth

- Different people have different views and values and how are these dealt with? Can't resole different views / values. Improved access to information doesn't fully resolve the fundamental tensions of different perceptions – not convinced that any system of knowledge management will resolve all such conflicts (Ian Loh)
- Knowledge lies with individuals – there is a difference between knowledge and information. Beware the danger of casting past decisions in a poor light (Tony Smith)
- There is potential for the knowledge platform to be applied across a lot of things, eg climate change. One observation – Burdekin focus of presentation was difficult to get my head around (Andy McMillan)
- Supportive of the conclusion about the need to use modern "control systems" approach to irrigation. Challenge is getting growers onside, measuring and sharing data. This needs the right governance systems to create long-term security to encourage sharing and a joint approach (Doug Hall)
- The visual tools (navihedron) are incredibly powerful. This is the start of a journey - knowledge management is still embryonic and we should be prepared to make some mistakes. At the moment it is superficial – the first step is education about the complexity. The knowledge platform has extraordinary potential to aid decision making (Doug Hall)
- How would you ensure that knowledge platform is kept up to date (Hazel Kural).
- The ultimate issue is *ownership* of it (Doug Hall)
- Consistently found this exciting and the Rottnest Island example helps ground the thinking (Peta Dzidic)

Canberra

- I found the real time presentation interesting. Has any thought been given to building in and demonstrating the economics of the system (eg. cost of a hectare of cane, cost of providing water) (Geoff Dyne)
- If data or information was available in regard to this, it could be connected to the knowledge platform (Jeff Camkin)
- Has this project taken decision making on irrigation substantially forward? Is the product that different to others or is it just useful? (Christine Schweizer)
- There are a lot of databases available, but not a system that brings the information together spatially. In current systems knowledge is lost, or information is not accessible and information that is available is often not relevant. This (LBKP) is a step forward because it brings the relevant information together at a catchment level and provides a better linking of catchments (Jeff Camkin)
- The NAIF work has been exposed internationally with very positive feedback received from catchments that are keen to have similar accessibility to knowledge in their region (Keith Bristow)
- Excellent extension and collaboration over last three years. Strategic 50 year outlook is good. Huge workload with not much resourcing. Next phase needs to be scoped well before initiating. How far can you take the knowledge platform, e.g. can a planner or irrigator use it to understand "if I do this, this happens"? What are the impacts of change? Can it be maintained? (Anne Withell)
- Very interesting. Great to put all information together in one platform (Scott Macauley)
- Very informative, particularly in the planning sectors. Idea of centralised control centre and access to information in real time would be beneficial (Mark Lettfuss)

- There was a requirement for capacity building in a fully transparent and engaged way. Irrigation is quite new to the NT. There is a need to have good and simple knowledge platforms to attract all stakeholders and provide answers to questions. I support the direction NAIF has taken in moving towards getting decisions made in a collaborative fashion (Ian Lancaster)

Summary of 'NAIF Knowledge Platform' theme

It is quite apparent from the number of responses made during the workshops that the Knowledge Platform held the most interest for the participants, who saw it as being at the very least, "useful" and more likely "absolutely critical" if improved irrigation outcomes are to be achieved. As indicated by several of the comments above, the question of ownership of any working model of the Knowledge Platform was the most common concern voiced in all the workshops.

(v) NAIF Sustainability Frameworks (SF)

Darwin

- Pretty good general outcomes. Would be good to look at the leaves of the component trees – at the detail (Russell Willing)
- From an industry perspective this provides insight into the future. Definite future for the sustainability framework. It is a viable option (Tim West)
- I hope that Dr Mac will use the component trees to identify issues relevant to managing the Ooloo aquifer. Knowledge platforms are essential. Many people go to industry rather than government websites because they trust them more (Ian Lancaster)
- The make or break for the sustainability framework is how adequately non-biophysical criteria are addressed. How do the 300 factors link up? What are the policy tools that come with the NAIF recommendations about the future of irrigation? (Stuart Blanch)
- Of the 300 components, what are the important ones, what are the key questions to be answered and, therefore, what knowledge do we need? (Richard Cresswell)
- Learnt a lot. Need to process that information. Sustainability framework and component trees are really relevant to the Northern Australia Land and Water Futures Assessments (Anya Lam)
- Enormous social outcomes possible around water but it must be sustainable (Vincent Lang)
- Are the issues being addressed about sustainable irrigation, sustainable development or sustainable environments? (Richard Cresswell)

Kununurra

- Component trees idea is good. Clear steps to show why decision was made; transparent management of the number of issues considered (Ann Withell)
- Good to bring out physical side so we know what questions to ask (Phillip Hams)

Perth

- Really enjoyed the workshop. Framework is like a big model for the catchment and would help identify knowledge gaps. No matter how good info is, some bad decisions are still likely. Might be useful to develop a flow chart of how the sustainability framework could be used (Geoff Strickland)
- Understanding how it operates (the biophysical functioning) is scientific; understanding values and understanding decision making comes down to

governance. May need to separate work on scientific understanding from governance and decision making (Chris Rose)

- If decision making tool for government then need uniformity of information provision and simplification of information. Learnt a lot (Hazel Kural)
- Governance structures come out in various discussions. Further irrigation in northern Australia will need to come to grips with existing decision making processes within the jurisdictions (Ian Loh)

Canberra

- Liked the presentation and the informal and different ways of learning. Who are the stakeholders and how is the decision made? How does the SF help if they do not acknowledge this information? Governance arrangements on how it is used are really important (Michael Martin)
- What is the driver for stakeholders to use the framework? There is also a Water Act in place which is not utilized to the full potential. There was a situation in a southern irrigation area when major flooding occurred causing the system to almost collapse. This became the driver to bring the community together to plan for the future and resulted in a legislative framework for the community to exercise (John Williams)
- We're struggling with these issues in the Burdekin community. What we have seen looks very useful. We have to try to find a policy framework to use and this may be an opportunity to do this; to put it into gear. I am worried we have gone into too much detail too quickly. You need to come to a basic understanding of the system you are working on at the highest level to ensure the community understands that irrigation is about putting more water into the landscape and the landscape cannot take that. The bottom line is sustainability. We can make a choice, but the environmental system will limit those choices. The community needs to know the important issues first and bringing the information together is ok, provided we have a system analysis that is fairly simple in the first instance. Very few people in the Burdekin understand that you cannot irrigate unless you extract the excess. You need a structure at a higher level with a policy framework to drive it (John Williams)
- ESD process quite complex, can it be used in a more constructive way, instead of going through the whole process, to identify the key issues? (Richard Cresswell)
- The break down of the component trees is useful to assess the impacts at a national level through to a regional scale. How were the component trees developed? On different local scales some issues may not be identified (Karen Cody)
- The process undertaken included analysis of decisions, flushing out issues, `placing these into the structure, continually re-iterating and making changes as required, workshopping with sub-committee members to refine and extract all issues for consideration. MindMapper software was used to assist in drawing the issues together (without having to address all the complexity at once). The next step was consideration of the relevance of each issue (Jeff Camkin)
- The process also highlights knowledge gaps and the integrity of data collected. The demonstration of the system used by fisheries was very beneficial to the process (Tom Crothers)
- Some processes are missing in decision support. Impacts of final decision (Jin Wang)
- Concerned about usefulness of decision making. Trade-off cost vs term (David Lambert)
- This research will help defend the process of planning and take the pressure off local and federal staff who are under pressure to make decisions (Tom Crothers)
- The capacity of the framework to provide a tool for review (eg of planning) is important to me. Will the framework allow for a formal review of decisions that have been made? (Bronwyn Ray)

- The systematic application of the component trees provided a process to look back and review decisions. Other factors, such as political issues and climate change, may alter priorities into the future – and these changes can be made more transparent (Jeff Camkin)
- The framework can help document the journey. Through benchmarking and then reviewing, one can see how things have changed (Keith Bristow)
- I agree with Bronwyn's view regarding monitoring and evaluation tool for water planners being incorporated. QLD, WA and NT (NAIF SC members) need to think about that (Tom Crothers)
- First exposure to NAIF, very useful and good learning to take away. Australian government on a mission to modernize irrigation in Australia. Endorse the comments re the need for the right institutional frameworks for this to work. Collaboration is important. Can see potential (Mark Rounds)
- How to bring indigenous information into this? Will this work extend beyond Burdekin, Daly and Ord ? (Murray Radcliffe)
- Looking how to take it forward, not just in northern Australia. Bringing knowledge and understanding together and increasing transparency and rigour in decision making and planning (John Ruprecht)
- Need to continue long term thinking. ESD needs to be rolled out. After DRMAC meeting would like to roll it out in the Daly. Capacity building – take the Water Advisory Committee through the process. Issues differ geographically and demographically (Ian Lancaster)

Summary of 'NAIF Sustainability Frameworks' theme

The general consensus in the workshops was that the SF component trees approach would assist decision-makers by expanding and strengthening the knowledge base utilised in making decisions and would benefit stakeholders by ensuring that the processes of decision making are transparent.

(vi) 'Red tape' and decisions about irrigation

Ayr

- What impact will National Water Initiative and especially water pricing have on the future of irrigation?

Kununurra

- Good to see consolidation of some issues for northern Australia (Leith Bowyer)
- Appreciate NAIF acknowledge there are questions but also a need to move forward and make decisions (Matt Brann)
- Irrigation is still reluctant to put forward solutions. There is a need to make decisions, not just seek more information (Duncan Palmer)
- Recognise the need to make good decisions about irrigation (Anna Price)
- Opportunity now to make the transition from research and development to decision making support by rolling out the sustainability framework across trial catchments, which will be important (Tom Busher)
- Original industry expected that NAIF would deliver a template for irrigation decisions that governments would use to replace existing processes. When will it get to that? (Tom Busher)
  - We are working closely with governments of WA, NT and QLD to deliver a tool that they may use. It may not replace other processes immediately but should be complementary to existing processes (JC)

- If the tool helps control the shifting sands of decision making it will be very useful (Tom Busher)

- Because there are different viewpoints it is important that these are synthesised. Is there a risk of inflexibility due failure to review synthesised info. If it is a decision making tool how to keep it current? (Eugene Carew)

Perth

- Is it fair to say that this is leading to some sort of best practice approach to decision making on irrigation proposals? (Doug Hall)
  - Need to capture the key messages into the NAIF sustainability framework (Keith Bristow)
- The approach involves other (more) people in decision making. If they are more aware of the processes and challenges they are more likely to accept the outcome (Doug Hall)

Canberra

- Useful tool to inform broader political decisions but need political drivers in place (Chris Parker)
- Very informative. Need to move to a more robust pricing model for water. More sophisticated short vs long term (Geoff Dyne)

Summary of 'red tape and decisions' theme

The idea of 'cutting red tape' obviously resonates well with decision makers e.g. industry and government agencies, as indicated by comments such as "Original industry expected that NAIF would deliver a template for irrigation decisions that governments would use to replace existing processes" and; "Is it fair to say that this is leading to some sort of best practice approach to decision making on irrigation proposals?"

(vii) Continuing the NAIF process

Brisbane

- NAIF means naïve, and we were (when establishing the original project). A lot of that naivety has been removed from the language NAIF now uses (Mathew Durack)
- NAIF has achieved some things by focussing on irrigation, but now needs to become a northern Australia Futures project (Joan Meecham)
- A really, really powerful systems, potentially. How does it link to other similar processes? (Lyall Hinrichson)
- Limited capacity in NAIF. Lots of chiefs, no Indians. NAIF is trying to do too much; need more focus on key aspects and getting other similar activity involved. Should NAIF just focus on water? (Richard Cresswell)
- Amazing what can be done with technology. Really cool but don't lose focus on real practical drivers and staff. Need some very simple feedback, (e.g. if I do this what will happen?) to meet the practical needs of farmers (Jane Muller)
- Relationship between use of tools and policy changes. There will be no change without economic drivers. Opportunities to lever off other opportunities such as mining and electricity (Peter Elliot)
- The tools should recognise the difference in decision making at various scales (Joan Meecham)
- Who are the groups being targeted for change? Good there are visual types of things being developed. Bit of practical realistic aspect to it (NAIF work) e.g. water use efficiency isn't everything. Mosaics are a new concept. Systems diagram shows collective need. Lots of good things happening (Joseph Evans)

- Good to see people are looking at these things and thinking about the future of the north so that we don't repeat mistakes. Good there is ways of farmers being able to look at information. Hope funding continues, if not there must be some way of getting industry investment (Ian Winter)
- Pleased to see how NAIF has matured over time. Only concern is short term funding and to ensure NAIF is supported well in the future (Lindsay Delzoppo)
- Money to support the process that NAIF established is critical (Keith Bristow).
- Need to spend time digging into this issue (of continuing support) and pick it up in the final report (Matthew Durack)

Ayr

- This (NAIF SF) is a very, very useful path that will deliver best practice environmental management (Michael Hoey)
- We can have such frameworks (NAIF SF) but who manages and funds it. Should we be taking our management to another level?

Darwin

- Improving outcomes can be achieved if there are economic drivers. For example, improving nitrogen outcomes resulting from improved application of nitrogen through coded fertilisers that make nitrogen more available to plants with reduced wastage
- Very happy NAIF focus is not on new large scale irrigation as there is a need to improve existing irrigation (Stuart Blanch)
- It is useful to have a group looking at the long term perspective. Not much focus on agriculture or how water could be better utilised, efficiency of water use. There won't be large scale irrigation like southern Australia (Peter Harrison)
- Potential useful links between the NAIF sustainability framework and the Daly River Management Advisory Committee, including scenario planning. Learnt a lot (Peter Whitehead)
- NAIF focus is on water but has ignored land management change. That needs to be integral part of water management as well, i.e. land/soil/water managed together
- Where does the funding come from to build and implement these concepts? Is it time industry put funding in? (Richard Cresswell)

Kununurra

- A really good systems approach that supports capacity building. See also the Goulburn Broken Catchment salt management plan (Ruth Duncan)

Perth

- Do we have more information on demand scenarios that could assist my work on understanding future demands? Perhaps there is a link between the knowledge platform and that demand projection work (Hazli Koomberi)
- Not only do we need policies for event driven systems but also need governance systems. Is NAIF considering governance systems? (Doug Hall)
- How much of the take home messages are driven by QLD rather than WA situations? A lot of the messages apply really well, but interested in how much NAIF has focussed on WA rivers as opposed to QLD. They seem to stack up really well, but suggest that WA take a small group process to review the take home messages from a WA perspective to make sure that they stand up (Roy Stone). This could be linked to the NPSI final reporting process

Canberra

- Reflecting on the life of the project; had the project got to the point originally thought, or had key things changed, for example, had the sustainability framework had developed into what was initially thought? (Jim Donaldson)

- Initial impressions of the project may have been that we should develop irrigation in northern Australia. The development of component trees was a good step to identify issues within regions and ease the concerns of stakeholders, showing that adaptive management is beneficial (Tom Crothers)
- The original vision sought to identify a tool that would assist someone who wanted to develop a greenfield site. This grew into: what information is already known; what can people access; how can we assist them to make their decisions. Knowledge sharing for specific sites is being achieved; the next step is to transfer information to a site that hasn't been covered yet (Kev Devlin)
- There were extremely ambitious views of what could be achieved at the start of NAIF. Resourcing was a major issue throughout the project. The Steering Committee were adaptive and made appropriate changes as learnings were made. Biophysical aspects moved on to be more inclusive of all parts of the system. The journey has been more productive and useful by adapting as we learned (Keith Bristow)
- Useful to include TRACK and riverine end of catchment research. Need to keep exploring sustainability framework component trees and how to bring together to guide knowledge platform. Kept and shared information is beneficial instead of piece meal approach. How does it measure with others? How does it intersect with other NRM governance systems? (Jim Donaldson)
- NAIF has encouraged a shift in policy thinking, for example the restriction on groundwater pumping which has come out of the Water Act (Tom Crothers)
- Very informative, but also lots of questions which I will follow up with Keith and Jeff including "where to from here?" (Glen Walker)
- Very informative and good discussion. Lots of questions and will follow up with more. Biggest thing that strikes me is that we have started to develop something but the project is ended. How do we go forward? This is a big issue. Needs to go forward (Chris Smith)
- Think about how to ensure governments will continue to access this information; is it about the Steering Committee thinking about what is the next step for NAIF? DEWR has a program that wants to build on this (Andrew Dickson)
- Very informative. Would like to continue the conversation with DEWR/CSIRO re further support (Sarah Spackman)
- NAIF is not dead. 2.6 people will continue research under CRC IF until 2010. Only the LWA project is coming to conclusion. We should not assume that because we believe the tool is good and useful that someone will use it. There must be a demand to use it. It needs to be marketed and put in front of other agencies including southern Australia (Ian Atkinson)
- NAIF has highlighted the importance of having a long term view when considering irrigation across northern Australia. The long term research focus is extremely important and balances short term research being done through other projects (Ian Lancaster)

Summary of 'Continuing the NAIF process' theme

A number of linkages between NAIF and other regions/projects have been noted, particularly with respect to improving understanding and management of the complexity of irrigation and groundwater systems, and application of the LBKP and sustainability frameworks. Collaboration between the three state governments through the NAIF process is a major stepping stone towards a coordinated approach to understanding and managing irrigation in northern Australia, as stated in the following comment: "*Interaction between the states through NAIF has been extremely useful and a real benefit. Workshops in the north over the past week have been really useful and overall NAIF has been very successful, especially in building partnerships*" (John Ruprecht – DOW and NAIF SC member).

The NAIF process to date is seen to be very worthwhile and it is generally felt that a specific North Australian focus on irrigation needs to be continued, and perhaps even expanded beyond irrigation to cover other NRM related issues such as land and soils. Accessing the necessary funding to continue the NAIF process is seen as a major concern.

7 AN ANALYSIS OF THE NAIF WORKSHOP HELD IN AYR: 14/9/07

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Workshop Participation: Capturing Key Messages and Data

In general the participants maintained a high level of attentiveness throughout the workshop and most, if not all, were able to add to the discussions on the various points that were raised. The participants' level of attentiveness and engagement indicates that the language and concepts used and the structure and timing of the presentations were well received and therefore quite appropriate.

Indeed, participants' engagement in several key topic areas was such that, at the end of the workshop, the Chairman (Tom Crothers) commented that "an extra hour of discussion would have been beneficial". A major issue with running these workshops longer than 3 or 4 hours is trying to accommodate the busy schedules of many of the participants. One way of overcoming this problem, without making the workshop last longer, would be to ask each of the participants to provide feedback via a questionnaire structured around the key topics covered in the workshop. As well as capturing some of the thoughts that weren't expressed on the day, 'ex-poste' feedback of this type could provide some valuable insights, because, besides their own immediate views on the issues raised, participants would have had a chance to digest and synthesize the questions, comments and thoughts expressed by the other participants in the workshop.

There are also some difficulties involved in ensuring that *all* the key messages provided by participants during workshops are captured. The NAIF Project Team members who attended this particular workshop discussed this issue afterwards and agreed unanimously that video taping the entire workshop would provide the most benefit in terms of the ability to retrieve all useable data. Video clips can also be used to reinforce a point and to stimulate discussion in future forums. For example, a short video clip of the interaction around a particular topic in a prior workshop could be played in subsequent workshops, as well as at conference presentations, meetings and at fora such as the Northern Australia Task Force briefings etc.

Key messages and points of discussion during the workshop
(Discussion points are listed under the presentation *topics* as delivered during the workshop)

NAIF Overview

- Salinity, particularly in the redistribution of salt and salinity issues in BHWSS

- Nitrogen build-up, understanding the 'fate' of nitrogen 'lost' in the system

- Understanding hydrology, particularly in relation to the 'unseasonality' of river flows due to regular releases of water from the Burdekin Dam
  - Gary Everson: "Has the seasonality of river flows been considered for surface water/groundwater interactions? (River levels are not kept at the same level all year.)
  - Also, the groundwaters of the floodplain and the Delta are being kept 'topped up' and this may have more impact on surface-water groundwater interaction than the unseasonal river flows

- The issue of 'lag' times, for example "it takes two decades to see any changes (e.g. water table salinity problems), but a lot longer to address the problems" that are causing the observed changes

- Ground Water
  - Water table targets
  - What data was assessed to determine the overall trend in EC and why is the result different to the salinity contour maps from NRW?

- Variations in water table characteristics
  - John Power: "Nothing is uniform in our groundwaters (yields etc) so there can't be uniform flushing"

- Is the NAIF Project only concerned with the Burdekin, Ord and Daly case study sites? (Yes, but research data and outcomes will relate to catchments across northern Australia.)

- What are the specific outcomes benefiting the Burdekin from the NAIF Project? (One concrete benefit is LBWF.)

- Are the CRCIF supported PhD students the only ones involved in the NAIF project work (No, there are a wide range of stand alone and collaborative research efforts e.g. JCU, BDT etc.)

Mosaics

Potential Problems with Mosaics
- Increased exposure to invasive species
  - "Every irrigation system in the world has an invasive species problem and there is a lack of funding for this problem."

- Mosaics may 'hide' negative impacts longer and thus increase the 'lag' in response to them"

- Mosaics are easier to plan for future than retrofit existing developments
  - "It is a real challenge to make changes to the Lower Burdekin due to constraints including infrastructure"

- Sugar mills require a minimum tonnage of cane to maintain profits, which means enough land must be set aside to supply the required amount of cane. Can the existing infrastructure be used in another viable way? For example, using sugar cane for bio fuel and using mills for other purposes besides, or as well as, producing sugar

Potential Benefits of Mosaics
- Managing salt

- Increasing the diversification of agricultural production
  - Question of crop types and planting/conserving native vegetation to manage our irrigation systems

- 'New ways of thinking about agriculture, such as linking irrigation mosaics to mining
  - Peter Gilbey: "If we can change everything in a irrigation system (particularly deep drainage and wetting and drying) then irrigation mosaics may work and not just lead to a lag in response."

- Peter Gilbey: “But there is also a question of scale, cost and viability of mosaics.”

- Protection of Surface Water Systems
  - “SW systems – we need to look at the way in which we’ve impacted on the surface water systems, we need to consider the protection of wetlands and the conservation of the ephemeral nature of the rivers.”

Development/background of the Sustainability Framework

- Decision-makers today face uncertainty, risk and increasing ‘red tape’ when making decisions on irrigation development
  - We are making decisions before we need to in order to appease/cater for media, political, interest group pressures that may, *or may not,* come to bear. Setting a benchmark for environmental flow objectives for all the rivers in the state could be an example of decisions already made on a broad scale that may not be necessarily relevant in particular circumstances
  - “In the modern context: in recent times policies (e.g. Wild Rivers) have come up and decision making is going on ahead of the game.” - Peter Gilbey

- As problems in Southern Australia receive more and more media attention, the Irrigation Industry as a whole is perceived in an increasingly negative light by the public at large
  - With respect to environmental problems, the Mining Industry once had a bad image, but, through good PR, it has been able to persuade the public that it can now manage its adverse impacts. Irrigation needs to take the same approach
- “Cities view irrigators as environmental vandals – we need projects like this to present the real picture of irrigation.” (Tom Crothers)

- “Irrigation is intrinsically locked into the landscape” (George). In other words, landscape shapes irrigation and irrigation shapes landscape. This comment follows on from the one above above, and relates to the suggestion that positive impacts of irrigation are not widely publicised
  - “Politicians are naïve about irrigation.”
  - “The Irrigation Industry is largely judged on the bad performers.”
  - “Ecological triggers are not considered”. Triggers set by agencies are brushed aside by media driven public perceptions of environmental ‘vandalism’.” An example of this is the bad publicity that has surrounded Cubby Station, which has only taken 60GL in last 10 years (Tom)

- With its overarching ‘vision’ of a sustainable irrigation future, the NAIF Project looks to identify the positive contributions, as well as assess the negative impacts, of irrigation in northern Australia. The NAIF Project can therefore help ‘balance’ some of the overly negative perceptions of irrigation and raise the profile of irrigators in the public view

Dealing with complexity/uncertainty

- Resource decisions are ultimately made on the basis of the *available* information and also under difficult time constraints.
  - “Lobby groups are affective” in attaining their goals largely because of the time and availability of information constraints on decision-makers
  - George Lukacs: “We will never have the full and accurate picture of e.g. this is how the Lower Burdekin operates. Uncertainty and risk is at the science level and at the policy level. As scientists we may not be expressing the uncertainty very well
  - “Trying to have the full picture may be the wrong approach.”

- John Quiggin and Bruce Chapman: “Further research into decision making is required when there is risk involved.”
- “Science can do better to provide the best guess.”
- “Probability based tools are improving e.g. Bayesian Networks.”
- “We are moving the right direction with Bayesian networks and decision making tools”

- “Issues are emotive, and often driven by people 800 kms away. This makes it too easy for decision-makers to say no” (Evan Shannon)

- “There are also risks attached to no decisions”
  - Vern: “The risk of saying no can be higher than the risk of saying yes but including constraints”.

- There is a lack of capability to make decisions
  - “EPA etc haven’t got enough highly qualified staff to make decisions” (within existing time frame requirements)
  - “Agencies have lost experienced staff, and while ‘on-ground’ crews are generally better educated (all have degrees now), they have little practical experience or knowledge of their locality (compared to staff that had been there for, in many cases, decades). “We struggle without (that) experience” (Gary).
  - “If there is a lack of staff can’t the government just ask for the information from mining companies and consultancies to make the decisions?”

- “We need independent ecological assessments” (Vern)
  - Should development proponents appoint their own consultants to do EIAs etc?
  - A mining company proposal to remove 16kms of vegetation along a river bank was shown by their assessments to be environmentally friendly!” (Tom)
  - “There needs to be more emphasis on the proponent providing information”

** Apart from the influence of the public, media and interest groups on decision making, there are three major issues arising from the above discussion
  (i) The ability of science to provide the best guess. The conclusion from the workshop discussion was that this comes down as much to allowing science to do so (accepting a ‘best guess’) as it does to science’s ability to do so. One of the key contributions that the NAIF SF can make in relation to this issue is to provide transparency in decision making, whether the decisions themselves are made with all the available knowledge or with the best guess that could be expected
  (ii) The question of who should provide the ecological assessment (independent body or proponent). This is also a question of the availability of a transparent decision-making framework that can be used by all/anyone
  (iii) The loss of experienced staff throughout the public services, and their replacement by younger, better educated, career oriented and thus more mobile staff. This is an issue that is driven by national and international forces e.g. a booming resources sector and record low unemployment rates. Subsequently there is keen competition for qualified staff, many of whom are lured into mining with the promise of high financial rewards. Such forces are beyond the control of localities, regions and even states. Under these circumstances, the importance of readily accessible information and ‘standardised’ decision-making frameworks, particularly in relation to cross-jurisdictional issues should be blatantly obvious. Furthermore, when we take the above issues and look at the direction that KT Studios’ work on the SF is heading in, the future may see e.g. proposals for a development in Qld worked on by Qld, WA and NT agency staff?!

Component Trees

- All forms of knowledge are not currently being utilised in decision making
  - George: "I don't agree. – data is static and knowledge is evolving, how you interpret the data now depends on contemporary science, the data needs to be constantly reviewed and re-assessed and new information needs to keep being added. We don't have all of the information now, it is an ongoing process
  - While scientific data is probably always going to be incomplete, there is a lot of relevant local/ indigenous knowledge that is not even being canvassed, let alone utilised at present

- "It's a scary fact that we believe we can fix the problems we create" (Vern).
  - It is easy to overlook this particular comment, which goes to the root of many of our NRM problems. We can still tend to use science and technology to separate ourselves from nature and the services it provides for us in our attempts to solve difficult problems. Coming to grips with new ways to re-engage with natural systems (via irrigation mosaics for example) is aimed at providing a more sustainable result from our application of science and technology to these problems
  - Natalie - Gathering of historic knowledge is really important because the pendulum often swings in government and we can learn from decisions in the past and particularly from the context of previous decisions. Historical data helps to build context"
  - This proposal is an interesting one, particularly in relation to a previous comment which implicitly suggests that knowledge is always growing. While this is true in terms of the overall quantity of knowledge being generated, it neglects the fact that some knowledge, much of it important and useful, has been, and is being, lost. For example, long time local residents' and Indigenous Peoples' knowledge may only be found in one or two people's heads and is lost forever when they leave the area or pass on

Lower Burdekin Knowledge Platform

Moving from the difficulties due to uncertainty and lack of knowledge to ways of improving knowledge gaps.

- Daniel Ellis – "Who would fund the LBKP? Who decides when the information gets updated on the knowledge platform? It could become irrelevant where if it is not updated. There have been three reports accessed by the NBWB, but they all disagree."

- "Who manages the KP?" (Catchment should own it – Keith)

- "I agree with a Wikepedia-type model and I would like to see all groups involved."
  - George - The platform should include different inputs and views on a given issue
  - Peter – until this region gets fair dinkum about collaborating, instruments like the knowledge platform won't happen because the information is held by different groups (govt, business etc)

- "I think it's a great place to go, but the community doesn't have the capacity to fund the associated costs at present. Someone needs to pay for it." (Daniel Ellis)
  - "The time is right; do we have the institutional formatting to make it work?" (Daniel Ellis)
  - Keith: "It'll be good when someone from the catchment is standing up and taking it forward."

** The potential of the KP is recognised, but at the moment there is no 'champion' prepared to take it to the next level and beyond. Funding is a major issue, as is ownership and operation and maintenance of the hardware and software. There is wide range of stakeholders that would benefit directly and indirectly from an operational LBKP; SunWater, BDTNRM, GBRMPA, CSR, JCU and CSIRO as well as the obvious local beneficiaries such as the NBWB and SBWB, Burdekin Shire Council, Sunfish, Nth Qld Conservation Council and several hundred farmers.

Looking into the future, possibly the most influential thing that could happen in relation to the development and uptake of the KP is the amalgamation of the North and South Burdekin Water Boards and the BHWSS. Such a body could perhaps gather sufficient resources and political backing to engage in such an undertaking.

KT Studios DVD

- A web based tool linking science, technology and stakeholders across time and space
  - The next stage for the KP

Wrap Up and Feedback

- "How has the NWI push for one water price across Australia impacted on northern Australia?" (Natalie)
  - "Surely the value of water is different in each area?" (This relates to the above question)
  - "Has the resource management charge been dropped or deferred?" (Daniel Ellis)
  - Tom Crothers: "Queensland has been attempting to get clarification on water pricing and a resource management charge. The impacts of water trading need to be considered – it increases the value of the allocation

- "Are full costs associated with water supply being paid by end users?" (Vern)
  - Should the community be taxed to help cover the costs?

- In relation to the LBKP and KT Studios Web-based Tool
  - From the Water boards perspective the information is vital, because we need this information to make better informed decisions. We also need to know exactly what, out of all the information that is available, is relevant and whether we are considering everything that we need to (Andrew Kelly)
  - Gary: "NRW looks at the bigger picture but the knowledge of other smaller projects also needs to be captured."

- "This is the sort of mechanism that we can use to get the knowledge across. A lot of the problem (with decision-making) is fear of the unknown." (Gary)

- "This KP, if it's used right will help develop that trust" (Andrew Kelly talking about transparency and overcoming the 'fear of the unknown' and trust issues that can go along with it.)

- "A lot of websites are used for PR. Who will be the gatekeeper for the LBKP? How open is it to dissenting views? (Reg Huston talking about keeping vested interests from using KP as an advertising vehicle.)
  - "For the KP to be trusted we'll have to remove the ability of the gatekeeper to select the information that goes on it"

Final Comments

While some questions about aspects of irrigation mosaics and the ownership of the LBKP are yet to be resolved, there seems to be a broad acceptance shown by the participants in this workshop that there is a need to think differently about irrigation if we are to work towards a sustainable future for agriculture in the Burdekin region in particular and in northern Australia in general.

Throughout the discussions on the various topic areas, the NAIF Project received very strong support from the majority of workshop participants, whose backgrounds spanned industry, government, conservation, scientific and private sectors. The Water Boards and the local council in particular are very keen to see the LBKP 'up and running' and there are some obvious concerns that there will be no further progress towards this outcome if the NAIF Project is 'wound up' in 2007. All in all, the outcomes of the NAIF Project as presented at this workshop appear to be highly valued by a broad cross section of stakeholders.

8 ACKNOWLEDGEMENTS

A large number of people have contributed to the success of the NAIF project over the last four years and we thank them all for their various contributions. We would like to thank in particular:

1. All workshop participants for their active involvement in and contributions to the workshop discussions and debate

2. Current steering committee members, including Ian Atkinson, Tom Crothers, Kevin Devlin, Andrew Kelly, Ian Lancaster (Chair), Anwen Lovett, John Ruprecht and Christine Schweizer

3. Past steering committee members, including Tom Aldred, Fiona Bartlett, Murray Chapman, Greg Claydon, Allan Dale, Ross Dalton, Mathew Durack, John Loney, Jos Mensink, Wayne Meyer, Ian Prosser, Grant Sadler and Ian Smith

4. Current and past stakeholder reference group members, including Gianni D'Addario, Robert Boshammer, John Etty, Dan Halloran, Patricia Julien, Barry Louvel, Geoff Strickland, Vern Veitch, Graham Webb and Marc Wohling

5. Project team contributors, including Keith Bristow, Jeff Camkin, Di Popham, Cuan Petheram, Freeman Cook, Zahra Paydar, Emmanuel Xevi, Philip Charlesworth, Patrick Hegarty, Justin Story, Katrina Annan and our PhD students Bart Kellett, Peta Dzidic, Steve Marchant and Lucy Reading

6. Other key contributors to the NAIF concept and project, including Peter Cullen, Peter Gilbey, Andy McCrea, Ivan McLeod, Wayne Mollah, Lois Hunt, Gareth Evans, Glen Starkey, Matt Darcey, Pushpa Onta, Tanya Vernes, John Williams and John Logan

7. The core collaborating partners, including the WA, NT, QLD and Australian Governments, Land and Water Australia and the National Program for Sustainable Irrigation, CRC for Irrigation Futures, and CSIRO

9 APPENDIX 1: A SUMMARY OF THE NAIF PROJECT

The NAIF project is a collaborative arrangement between the Australian, QLD, NT and WA governments, the Cooperative Research Centre for Irrigation Futures, Land and Water Australia and the National Program for Sustainable Irrigation, and CSIRO. NAIF is overseen by a representative and skills based Steering Committee (SC), which provides strategic advice and guidance to the project to ensure robustness of the technical and scientific quality of the project.

The current NAIF SC includes members from the WA, NT, QLD and Australian Governments, Land and Water Australia (LWA), the LWA National Program for Sustainable Irrigation (NPSI), CRC for Irrigation Futures (CRC IF), SunWater and the North Burdekin Water Board (NBWB).

The geographic focus for the NAIF project is tropical Australia, north of the tropic of Capricorn. NAIF is carrying out targeted research focussing on improving understanding of the links between irrigation and the quantity and quality of downstream water systems (particularly groundwater systems), and the relationship between irrigation and the ecological, economic and social systems within which irrigation takes place.

The key project themes to date have involved:

1. The history and context of irrigation in northern Australia

   This work has focussed on (i) documenting the policy, legislation and institutional arrangements relevant to water and irrigation management in northern Australia to identify the 'control structures' that influence irrigation decisions; (ii) reviewing past and present irrigation in northern Australia, focussing on key bio-physical information (eg groundwater flow system characteristics) and sustainability issues; and (iii) analysing the Lower Burdekin, Ord and Katherine-Douglas-Daly irrigation schemes to identify the implications to future design and management of tropical irrigation. This work will help identify key knowledge gaps, improve understanding of the risks and limitations of irrigation in northern Australia, and help governments and communities learn from past mistakes and successes.

2. Understanding Tropical Water Systems

   This work has focussed on (i) providing an overview of the current understanding of the hydrological constraints and opportunities for irrigation in northern Australia, which will help address community perceptions and misconceptions about what role irrigation may or may not play in northern Australia; and (ii) an assessment and recommendations on the practicality of developing a groundwater flow classification system for northern Australia.

3. Understanding Irrigation Mosaics

   This work has focussed on (i) reviewing research into mosaics relating to ecology, forestry, meteorology and saline basins to aid understanding of the concept of irrigation mosaics, or patchworks of irrigation, and whether they may be an appropriate style of irrigation for northern Australia; and (ii) reviewing and applying existing and new modelling and analysis tools to explore potential advantages and disadvantages of irrigation mosaics in northern Australia.

4. Sustainability Frameworks

   This work has focussed on the development of frameworks that, through their involvement, are embraced by policy makers, regulators, investors and managers, to help ensure any irrigation is managed in a consistent, ecologically sustainable manner in northern Australia. The Lower Burdekin, Daly and Ord case studies are supporting and informing the development and testing of frameworks which will contribute tools and knowledge to support considered debate, decision-making and long term strategic planning for northern Australia and Australia as a whole. The NAIF Steering Committee endorsed a conceptual framework and a prototype is now being developed for the lower Burdekin. This work includes the application of approaches used in fisheries management to address complexity and uncertainty through the development of ecologically sustainable development (ESD) component trees. This work also includes examining how emerging technological environments and understanding of how, when and why individuals share and search for knowledge could support the resolution of complex decisions.

5. The process – involving stakeholders and key case study sites

   Engaging with clients and stakeholders through a project which spans northern Australia has been challenging but, guided by a SC endorsed Stakeholder Engagement and Communication (SE&C) Strategy this has proved a highly successful feature of the NAIF project in which learning's and experiences are shared directly with those involved in policy development and management of water resources and irrigation across northern Australia. Since its inception NAIF has participated in and/or presented at more than 155 significant meetings, workshops, seminars and conferences, for a combined audience of over 3,000 participants.

   Another key aspect of the process has been the identification and use of key case study sites including the Lower Burdekin, Daly and Ord, which have provided important input to the research in relation to each of the research areas. Importantly, the NAIF project has been able to develop strong links with key stakeholders in each of these catchments. This is particularly the case for the lower Burdekin where the SC has requested the project team to develop a prototype knowledge platform to help better capture and utilise the existing knowledge about irrigation in that catchment.

The key elements of the NAIF project are summarised in Figure 1.

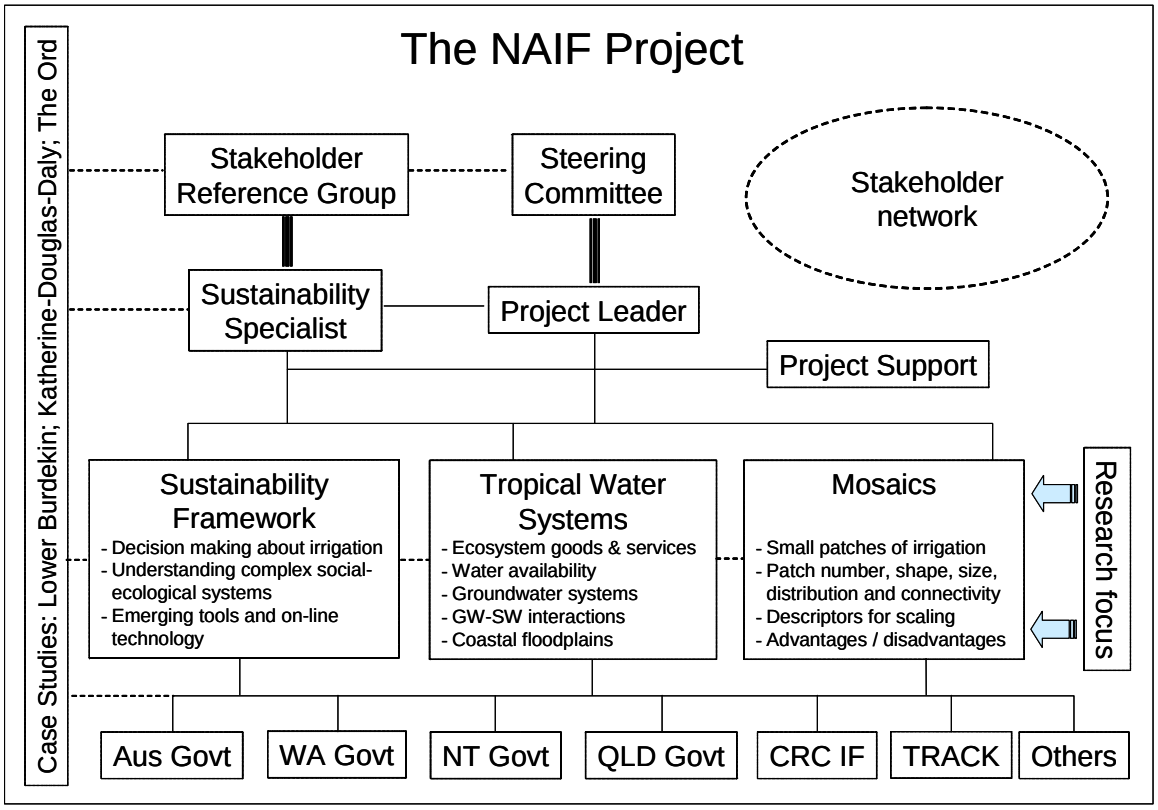


Figure 1: Schematic showing key elements and interconnections of the NAIF project

10 APPENDIX 2: THE CONSOLIDATED NAIF PRESENTATION

This appendix includes the consolidated presentation used in the workshops across northern Australia, as well as an updated version of the frameworks section of the presentation used in the Canberra workshop.

Northern Australia Irrigation Futures (NAIF)

Keith L. Bristow and Jeff K. Camkin - CSIRO and CRC for Irrigation Futures

www.clw.csiro.au/naif/

Northern Australia Irrigation Futures

- NAIF project launched August 2003
  - ANCID Conference in Shepparton – Minister Truss
- Not a traditional 3 year project
  - Long term strategic focus; 50+ years
  - Focus on northern catchments, governments, decision makers, irrigation systems, land and water managers …
  - Evolve and add/drop activities over time
- NAIF is a journey; process and products/outputs important

Aim today is to share learning's and experiences and seek input on future directions

Northern Australia Irrigation Futures

GOAL:

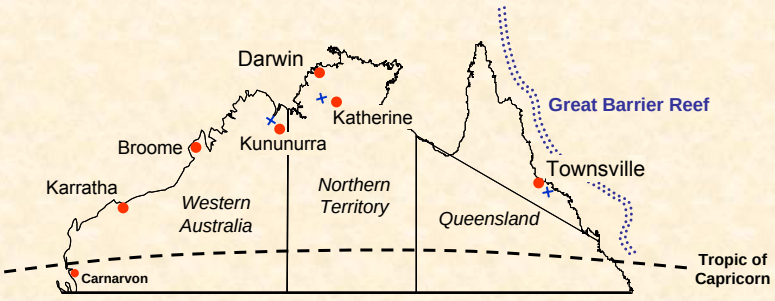
To provide new knowledge, tools and processes to support debate and decision making regarding irrigation in northern Australia

NAIF is a collaboration involving the following core partners:

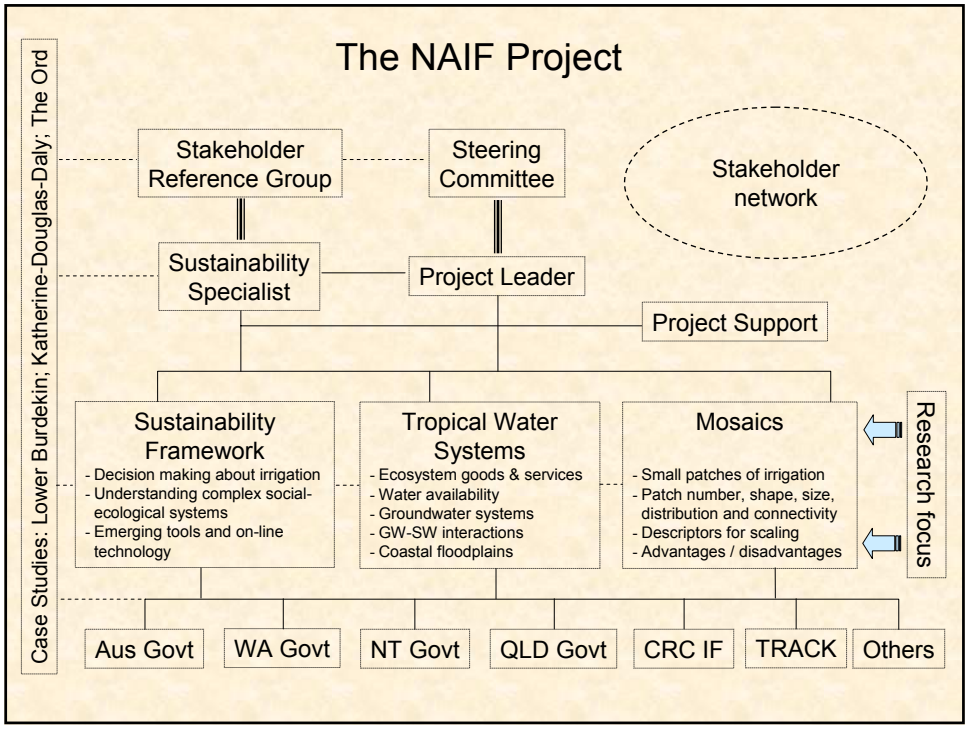
Government of Western Australia · Northern Territory Government · Queensland Government Natural Resources and Water · Australian Government Department of Agriculture, Fisheries and Forestry · Australian Government Land & Water Australia · Sustainable Irrigation · Irrigation Futures · CSIRO

Northern Australia

Unique features, opportunities, challenges



- Increasing focus on northern Australia
  - Stimulated by the Northern Australia Taskforce
- Polarised views about the potential role of irrigation
  - Pro-protection versus pro-development, but we find strong commonalities – A better future for northern Australia



Water Systems and Irrigation

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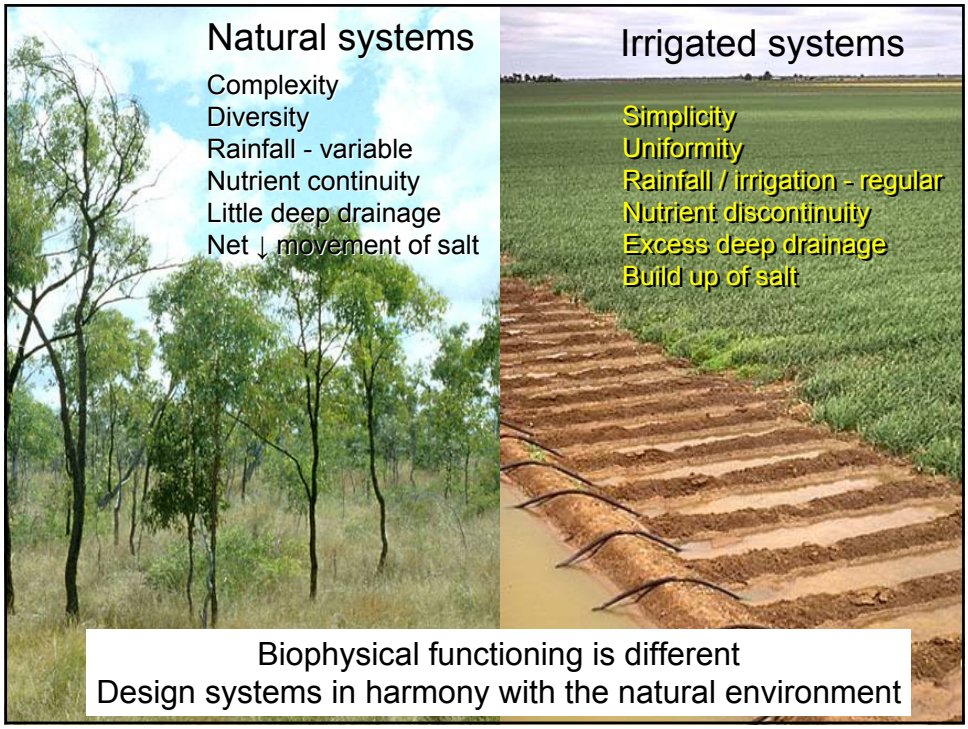
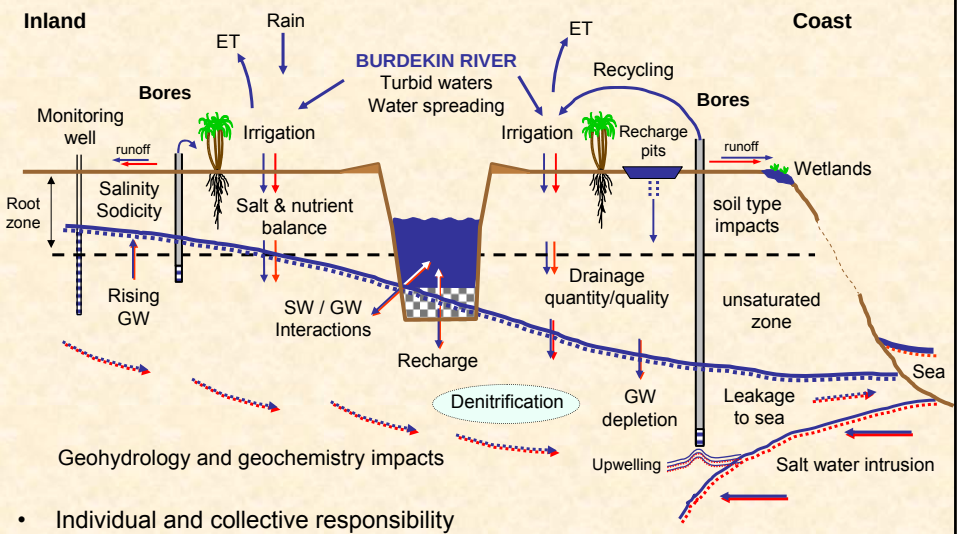


Key hydrological features of NA

- Generally old, flat landscapes with low hydraulic gradients
- Climate varies across the north
  - Wet tropics, wet-dry tropics, semi-arid/arid tropics
- Rainfall more seasonal than that of southern Australia
- Unusually large variability for the mean annual rainfall
- Some of the highest daily rainfall intensities in the world
- Very high evaporation rates
- Rivers – intermittent, seasonal, ephemeral (GW dependent)

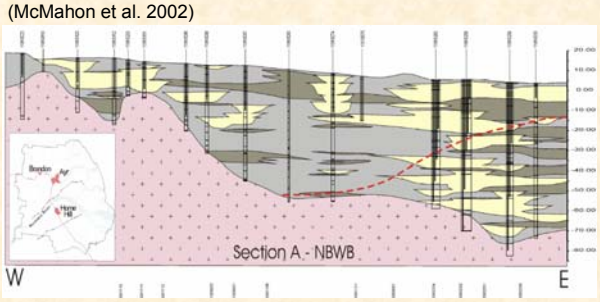
Irrigated systems are complex systems



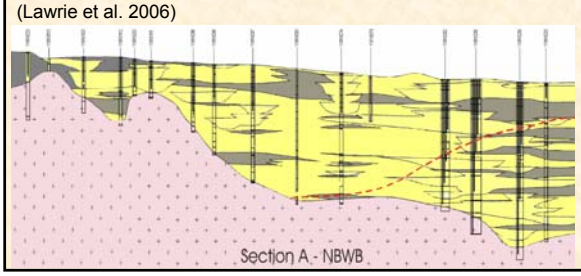
- Individual and collective responsibility
- Need a systems approach to manage the inter-connectedness
- Set and meet water table targets (quantity and quality)
- Incorporate variability in a system where farmers want certainty - how ?

Understanding the hydrogeology is critical

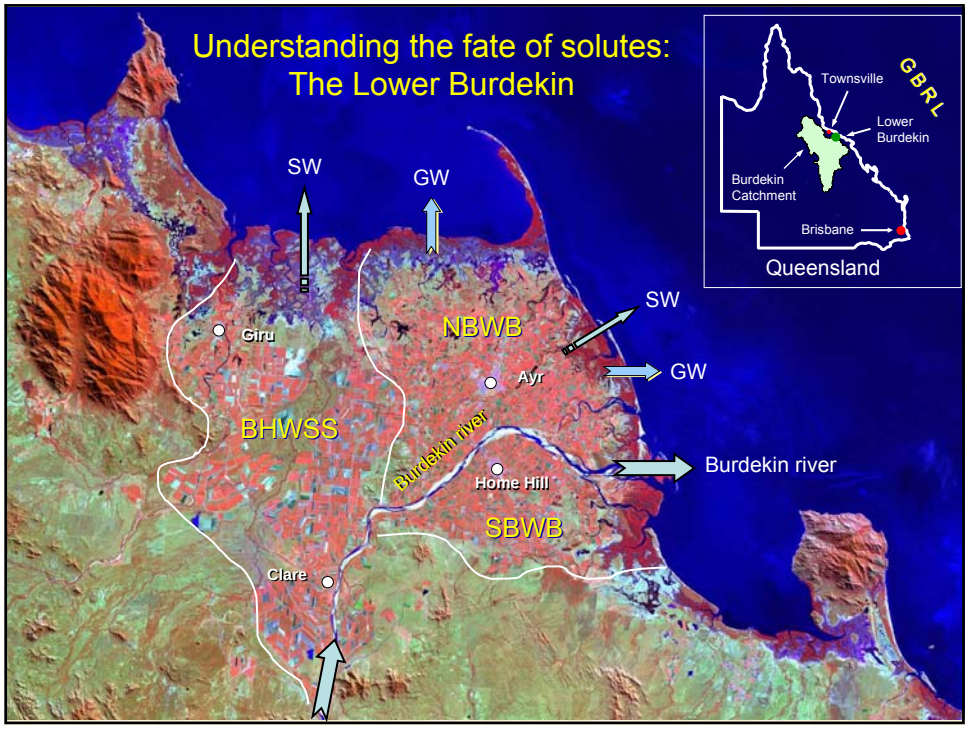
(McMahon et al. 2002)



(Lawrie et al. 2006)

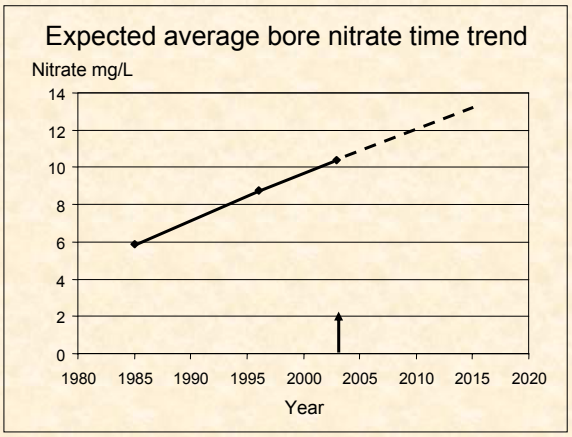


- Burdekin delta a large, low gradient, shallow-water fan delta (?)
- Interpreting the presence / absence of gravel a key issue
- High levels of vertical connectivity
- Uncertainty about lateral connectivity and implications of ‘faulting’
- Down hole and airborne geophysics (CRC LEME)



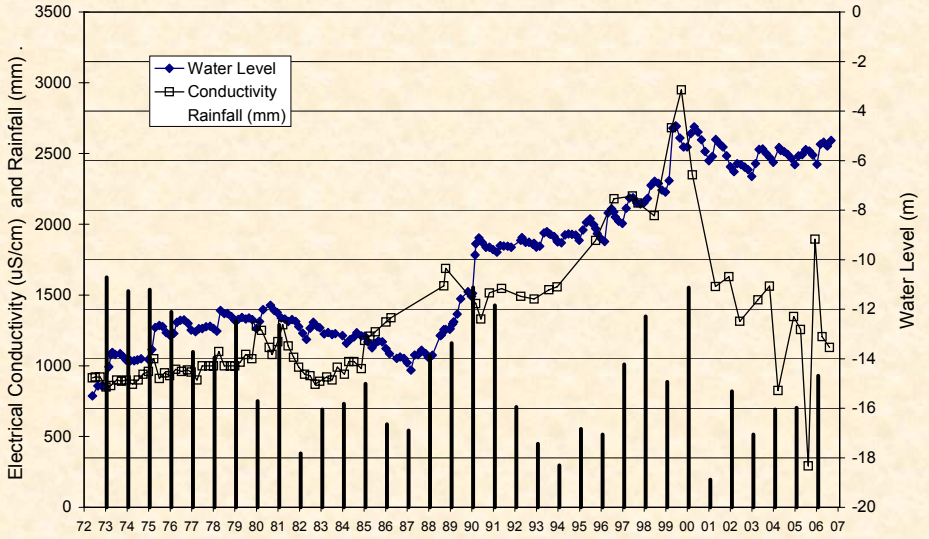
Nitrogen build up in the LB groundwater systems

- 13% of bores with elevated nitrate levels (>20 mg/L)
- 21% of bores with statistically significant rising nitrate levels
- Total estimated to be ≈ 30,000 t N in the groundwater
- High uncertainty - data suggest an increase with time



(Mary Barnes, 2005)

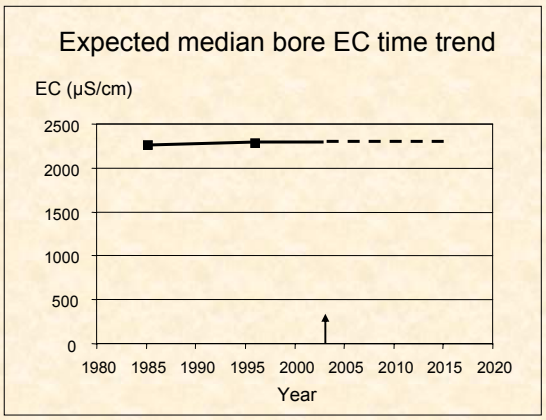
Understanding groundwater salinity – BHWSS example



(Ayr DPI Research Station Silo Rainfall Data)

Salinity build up in the LB groundwater systems

- High EC values (44% of bores >3000 µS/cm)
- EC in 43% of bores increasing
- In general overall EC time trend is close to flat
- Rainfall varied from ≈300 to ≈1700 mm/yr (1985-2003)



(Mary Barnes, 2005)

The basics of irrigation

"Irrigation without groundwater control ultimately causes water logging and salinity problems . . . .

. . . . Irrigation can only be sustainable if salts and drainage water are adequately removed from the underground environment and managed for minimal environmental damage."

(Herman Bouwer, 2000)

Key take home messages

- Water in the north is already being used
  - Volumes, quality and timing
  - Decisions are about reallocating water to different uses
- Water availability and storage needs in event driven systems are poorly understood
  - Sustainable yields ?
  - Storage – large dams; distributed on and off-stream storages; groundwaters; various combinations ?
- Groundwaters are critical to base flow and maintenance of ecological features
- Water quality is as important as quantity; especially in meeting ecological needs

Key take home messages

- Efficiency is not the answer to everything
  - Need to meet multiple objectives; water, salt, nutrient …
- Need a salt management plan; groundwater systems don't 'flush' as easily as first thought
- Must set and meet water table targets (both quantity and quality) and adjust management practices to meet targets
- Water management is an individual and collective responsibility
- Need policies that make sense for event driven systems

Irrigation mosaics

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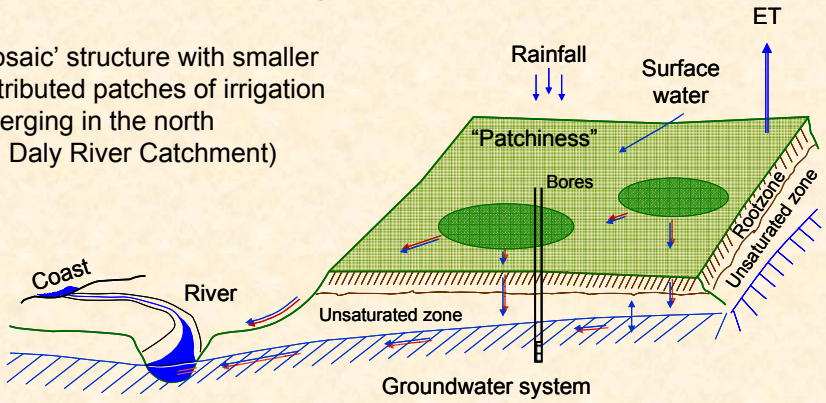
Irrigation mosaics

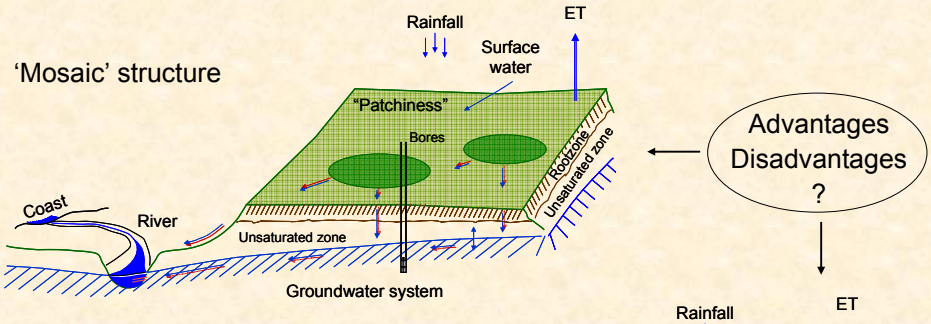
'Mosaic' structure with smaller distributed patches of irrigation emerging in the north (eg Daly River Catchment)



- Irrigation-groundwaters-rivers-wetlands-estuaries-ocean
- Must understand end of catchment needs
- Base flows (quantity and quality) dependent on groundwaters
  - Understand the space and time lags associated with solute transport

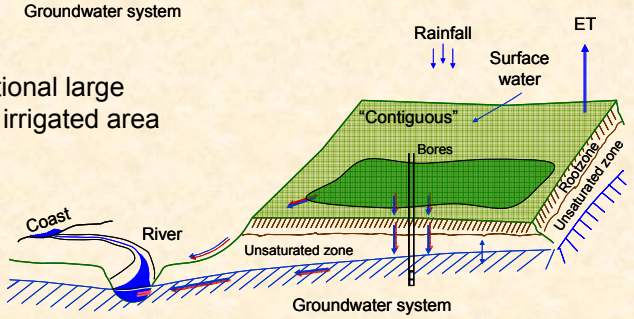
Irrigation mosaics

'Mosaic' structure



Advantages
Disadvantages
?

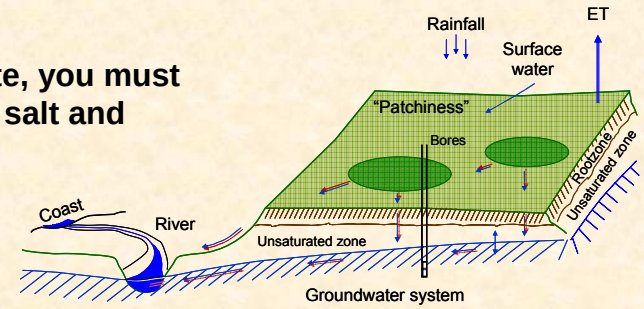
Traditional large scale irrigated area



New approaches to irrigation in northern Australia ?

- Links to mining and remote indigenous communities
- Potential for “fly in – fly out” to large remote schemes
- New sophisticated / high tech systems
- Centralized “control centers” as in big industry

If you irrigate, you must manage the salt and drainage



Key take home messages

- Mosaics could result in reduced water-table height, water-table spread and solute spread (Advantage)
- Actual benefit will depend on size of the individual patches; spacing between patches; assimilative capacity of surrounding areas
- Increased evapotranspiration likely because of increased advection (Disadvantage)

Key take home messages

- Environmental benefits may be short lived if space and time lags just delay any unwanted consequences of irrigation
- Now have some tools for further analysis to obtain insights into various designs of mosaic systems
- The social, economic and ecological advantages and disadvantages still need to be addressed

Frameworks to support irrigation decision making

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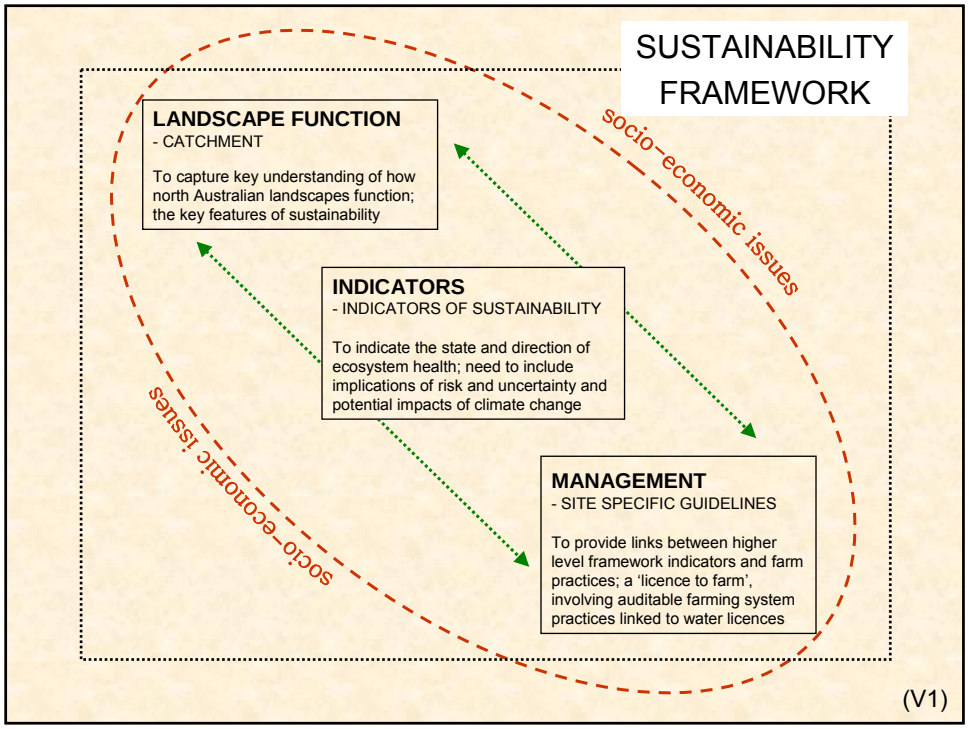
The NAIF sustainability framework objectives

1. To develop a framework to help ensure any irrigation is managed in a consistent, ecologically sustainable manner

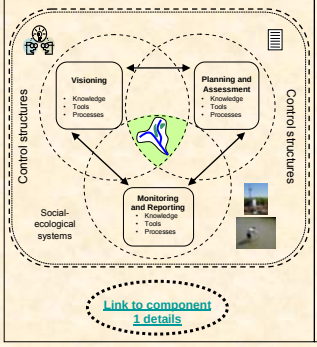
2. To use linked case studies & stakeholder input to support and inform development and testing of the framework

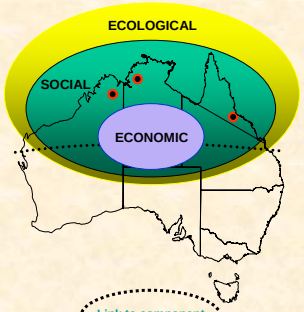
3. Through the framework, contribute tools & knowledge to support debate, decision making & strategic planning

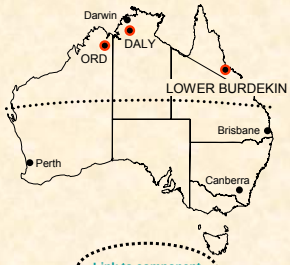


Sustainability Framework (October 2006)

Component 1	Component 2	Component 3
Knowledge tools & processes to support **integrated decision making and management**	Knowledge, tools & processes to support **understanding of complex social-ecological systems**	**Warehouse** for project activities and outputs







Link to component 1 details | Link to component 2 details | Link to component 3 details

What might it be, what wont it be

- Provide a synthesis of knowledge
- Suite of tools, knowledge and processes to choose from
- Not a calculator
- Aspirational
- Long term strategic view (50+ years)
- Thinking on the framework will continue to evolve
- Ongoing refinement through application and testing in partnership with governments and other stakeholders

NAIF Sub-Committee communiqué

"The NAIF Sub-Committee, consisting of representatives from WA, NT & QLD, see substantial benefits in the sustainability framework concept."

"The sustainability framework would be a powerful tool to support the roll out of water allocation planning in northern Australia"

The need for strategic frameworks

"Future and ongoing development of northern Australia's land and water resources must take place in a strategic framework that is ecologically, culturally and economically **sustainable***…"*

National Plan for Water Security, January 2007

The link between knowledge and confidence

David Trebeck, National Water Commissioner, 2006

"…the three jurisdictions of the north – QLD, NT & WA – are facing increasing pressures to free up water for development, but the risk is that they ***lack sufficient knowledge*** *of their rivers & groundwater systems* ***to respond with confidence****."*

What impacts on confidence?

Decisions about irrigation development are very complex
+
Lots of uncertainty
+
High risks & consequences
+
Higher community expectations and capable 'watchdogs'
+
Increasing development pressure
+
Governments will need to continue to make decisions
=
Often risk averse

Wouldn't you be?

Some things to ponder on

Must dealing with complexity result in more ‘red tape’?

Does every uncertainty carry a high risk?

How well are we using what is already known?

Dealing with complexity and uncertainty

ESD Component Trees

“A key question is not whether an industry is sustainable, which can be divisive and unhelpful, but rather, what that industry contributes to sustainable development.”

(Signposts for Australian Agriculture, 2005)

Knowledge Platforms

“Resource decisions are often made with whatever information is readily at hand, regardless of whether it represents a full & accurate picture.”

(Oregon Coastal Atlas, 2005)

Demonstrated benefits of ESD component systems

Comprehensiveness
- Comprehensive starting point to identify relevant factors for specific locations / proposals
- Reduced chance of factors 'falling through the cracks'
- Reduced likelihood of bias

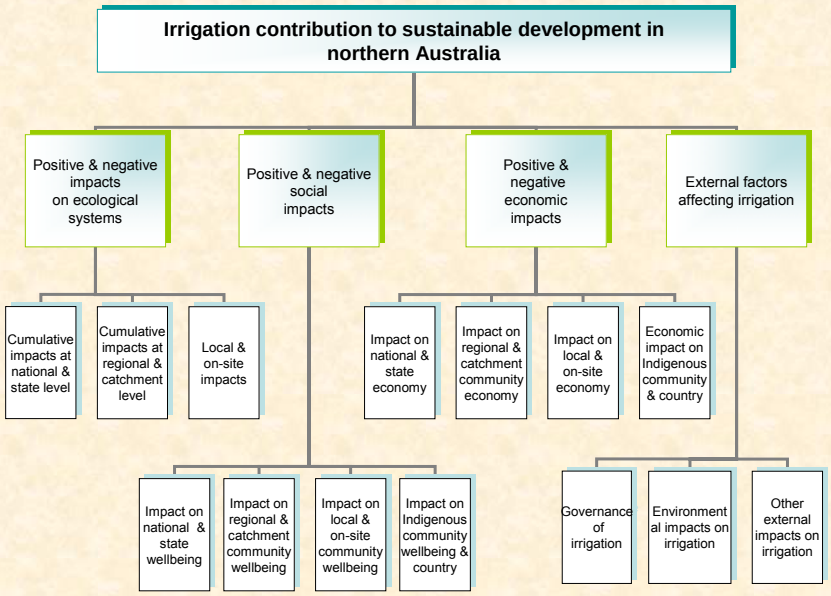
Transparency
- Documentation of which factors are not relevant and why

Consistency
- Same starting point helps consistency between locations and proposals, where appropriate

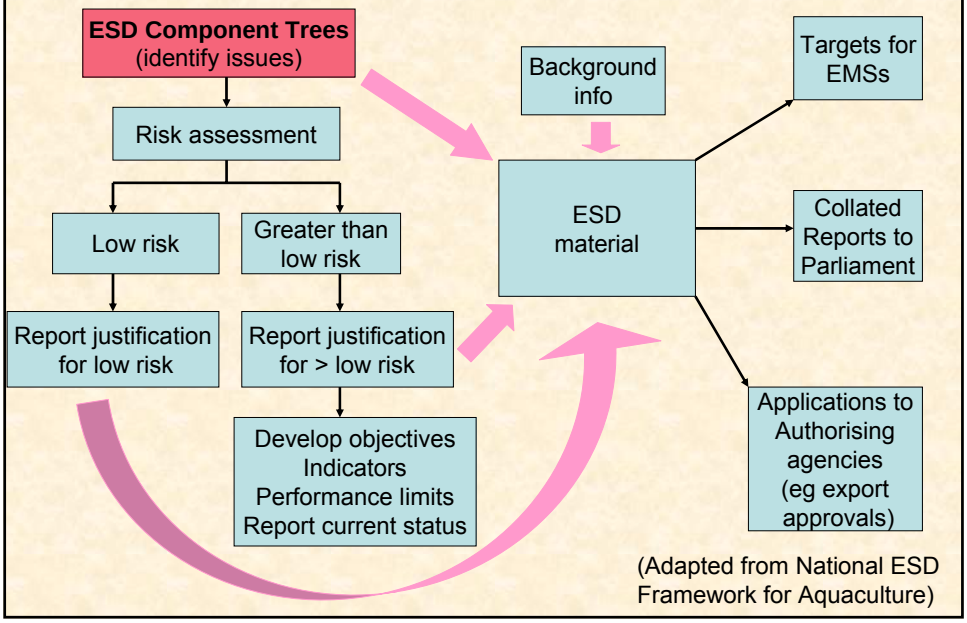
Helps understand difference between uncertainty & risk

Developing an ESD component system for irrigation in northern Australia

High-level NAIF generic component system



Applying ESD component trees



(Adapted from National ESD Framework for Aquaculture)

Potential uses of an ESD component system for irrigation in northern Australia

- Support TBL, ESD or sustainability reporting
- Catchment visioning and planning
- Developing irrigation proposals
- Assessing irrigation proposals
- Improving existing irrigation
- Identifying and managing knowledge gaps
- Others?

How well are we utilizing what is already known?

*"While **a mass of information and data is available** on various aspects of irrigation and irrigation management, it is often scattered across industries or locations or websites and is difficult to access…*

*Critically, this **lack of accessible, centralised information leads to inappropriate management practices or duplication of research and resources."***

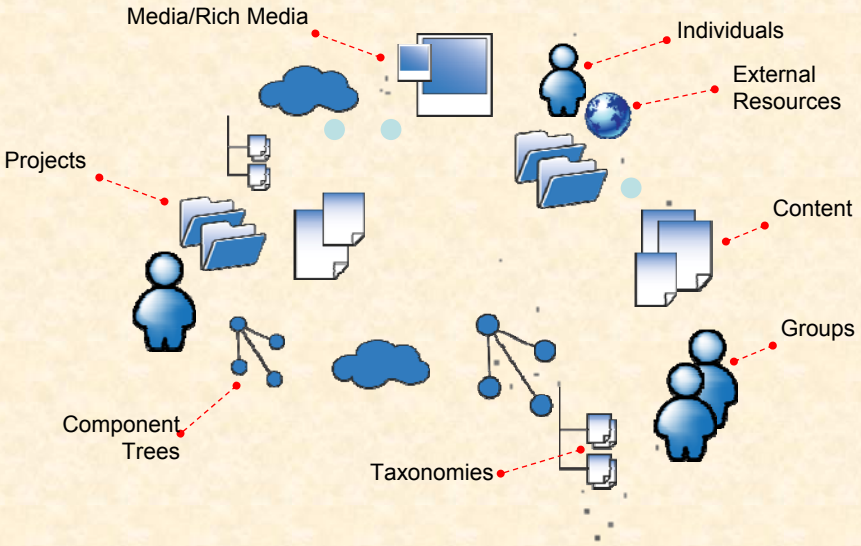
(Australian National Committee on Irrigation and Drainage, July 2007)

Knowledge platforms have emerged to help address this.

Utilising local knowledge

(Phillip Jauncey, SBS Insight Program: Running the River, 2007)

Utilising all forms of available knowledge



What we have heard (1)

- There is a widespread commitment to “doing better” in northern Australia
- Trade-offs will happen, either planned or unplanned. Surely its better to have some control of the process
- Embracing and dealing with complexity and uncertainty is a shared responsibility

What we have heard (2)

- We can do better at using ALL available knowledge, tools and processes
- We need to do better at bringing knowledge together at the catchment scale
- The use of new and emerging technology has a place in dealing with complexity and uncertainty
- Above all else, it’s about people and relationships

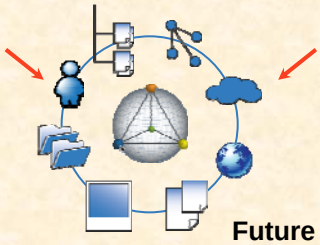
We need more sophisticated systems

"If we are to avoid the mistakes of agricultural systems in the past we need a much more sophisticated approach"

(Neil McKenzie, Chief CSIRO Land and Water, July 2007)

The lower Burdekin prototype framework

Lower Burdekin ESD Component System



Capacity Building & Knowledge Transfer (people)

Lower Burdekin Knowledge Platform

Future 'knowledge space'

The lower Burdekin prototype framework

- Demonstration of the current Lower Burdekin Knowledge Platform (LBKP)
- KT Studios video
  - New web based technologies
  - Leverage of knowledge
  - Sharing of experiences
  - New learning models
  - LBKP Version 2
  - Technologies that support people

The northern challenge

- Generating localised short term benefits are ‘easy’; delivering catchment scale long term sustainability is the challenge
- Achieving long term sustainability will require a much more sophisticated approach

General discussion

NAIF activities, findings and future directions

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Acknowledgements

Would like to thank a large number of people, but too many to mention all individually

Thank in particular:

- The NAIF project team, including students
- Past and current members of the NAIF SC:

  Murray Chapman, Grant Sadler, Ian Prosser, Kevin Devlin, Ian Smith, Ross Dalton, Jos Mensink, Allan Dale, Andrew Kelly, Matthew Durack, Greg Claydon, Tom Aldred, Wayne Meyer, John Loney, Fiona Bartlett, Anwen Lovett, Ian Lancaster, John Ruprecht, Tom Crothers, Ian Atkinson, Christine Schweizer

- The core collaborating partners

  The WA, NT, QLD and Australian Governments, Land and Water Australia National Program for Sustainable Irrigation, CRC for Irrigation Futures, CSIRO

Updated version of the NAIF Frameworks section used in the Canberra Workshop

Frameworks to support irrigation decision making

NAIF
Northern Australia Irrigation Futures

www.clw.csiro.au/naif/

Presentation overview

Background and objectives

Context for frameworks to support decision making

Briefly describe the evolution of thinking

Demonstrate a Lower Burdekin prototype framework

Discuss future directions

The NAIF framework objectives

1. To develop a framework to help ensure any irrigation is managed in a consistent, ecologically sustainable manner

2. To use linked case studies & stakeholder input to support and inform development and testing of the framework

3. Through the framework, contribute tools & knowledge to support debate, decision making & strategic planning

The need for strategic frameworks

*"Future and ongoing development of northern Australia's land and water resources must take place in **a strategic framework** that is ecologically, culturally and economically* **sustainable***…"*

National Plan for Water Security, January 2007

The link between knowledge, risk and confidence

David Trebeck, National Water Commissioner, 2006

*"…the three jurisdictions of the north – QLD, NT & WA – are facing increasing pressures to free up water for development, but the **risk** is that they lack sufficient **knowledge** of their rivers & groundwater systems to respond with **confidence**."*

What impacts on confidence?

Decisions about irrigation development are very complex
+
Lots of uncertainty
+
High risks & consequences
+
High community expectations and capable ‘watchdogs’
+
Increasing development pressure
+
Governments will need to continue to make decisions
=
Often risk averse

Wouldn’t you be?

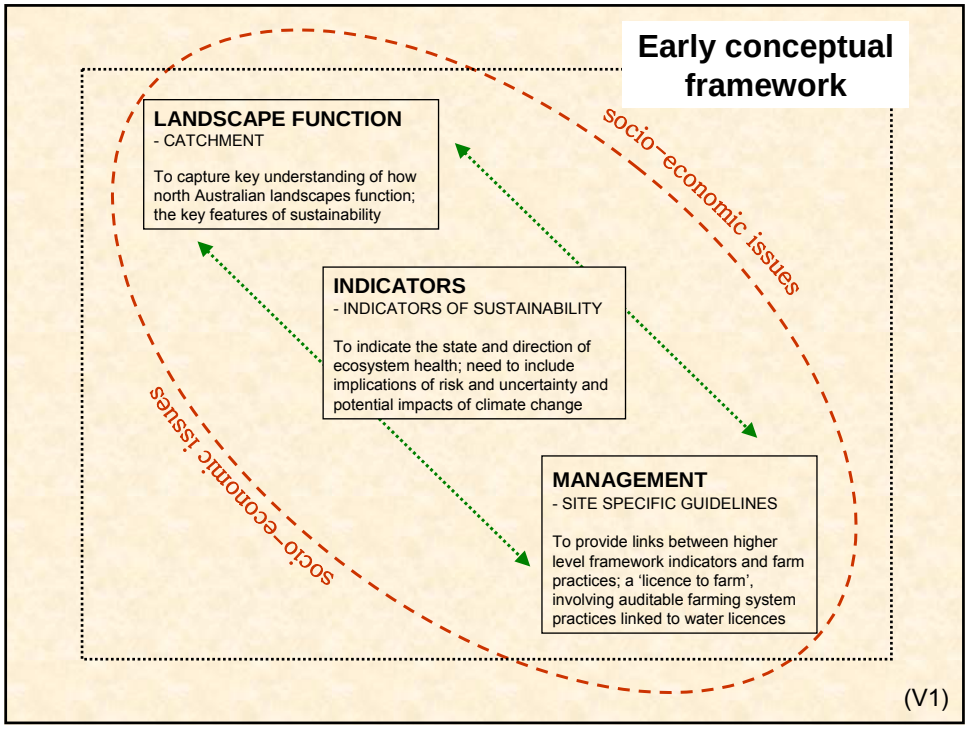
Some things to ponder on

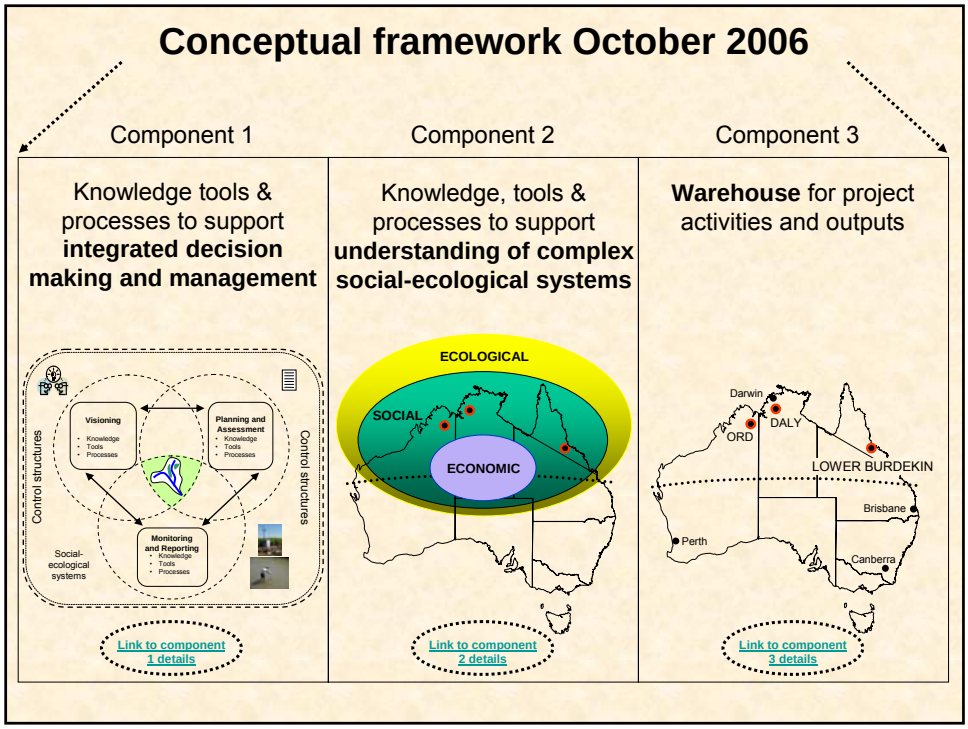
Must dealing with complexity result in more ‘red tape’?

Does every uncertainty carry a high risk?

How cautious is too cautious?

How well are we using what is already known?


Early conceptual framework
LANDSCAPE FUNCTION
- CATCHMENT
To capture key understanding of how north Australian landscapes function; the key features of sustainability
INDICATORS
- INDICATORS OF SUSTAINABILITY
To indicate the state and direction of ecosystem health; need to include implications of risk and uncertainty and potential impacts of climate change
MANAGEMENT
- SITE SPECIFIC GUIDELINES
To provide links between higher level framework indicators and farm practices; a 'licence to farm', involving auditable farming system practices linked to water licences
socio-economic issues
socio-economic issues
(V1)

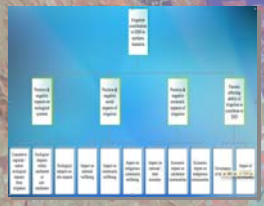

Conceptual framework October 2006
Component 1
Component 2
Component 3
Knowledge tools & processes to support integrated decision making and management
Knowledge, tools & processes to support understanding of complex social-ecological systems
Warehouse for project activities and outputs
Visioning
Planning and Assessment
Monitoring and Reporting
Control structures
Control structures
Social-ecological systems
ECOLOGICAL
SOCIAL
ECONOMIC
Darwin
DALY
ORD
LOWER BURDEKIN
Brisbane
Perth
Canberra
Link to component 1 details
Link to component 2 details
Link to component 3 details

What is sustainability?

"Sustainability, is better seen as a measure of the relationship between the community as learners and their environment, rather than an externally designed goal to be achieved"

(Sriskandarajah et al, 1991)

A lower Burdekin prototype framework



Lower Burdekin ESD Component System

Capacity Building & Knowledge Transfer (People)

Lower Burdekin Knowledge Platform

Lower Burdekin Water Futures Group

Established in 2006 and chaired by NAIF

Involves water and irrigation managers, scientists, water users, stakeholders and policy makers

Integrating local knowledge and scientific expertise to solve complex catchment challenges

Integrating Hydrology, Environment, Life & Policy

Priorities identified by the LBWF

Airborne geophysical survey of lower Burdekin

Strategic groundwater monitoring system

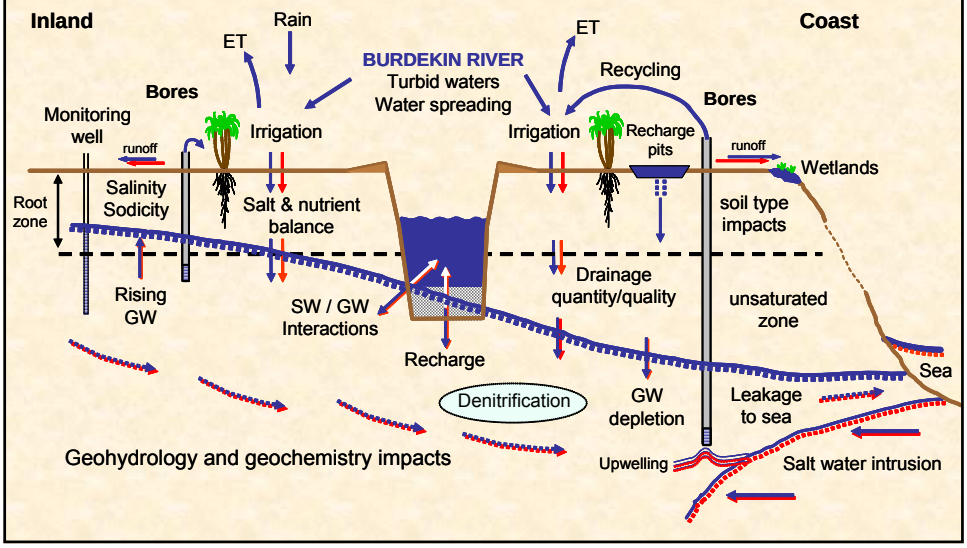
Groundwater model

Groundwater hydrology skills

Community capacity building

Lower Burdekin Information System

Understanding the complex lower Burdekin water and irrigation system



A lower Burdekin prototype framework

Lower Burdekin ESD Component System

Capacity Building & Knowledge Transfer (People)

Dealing with complexity, uncertainty & risk

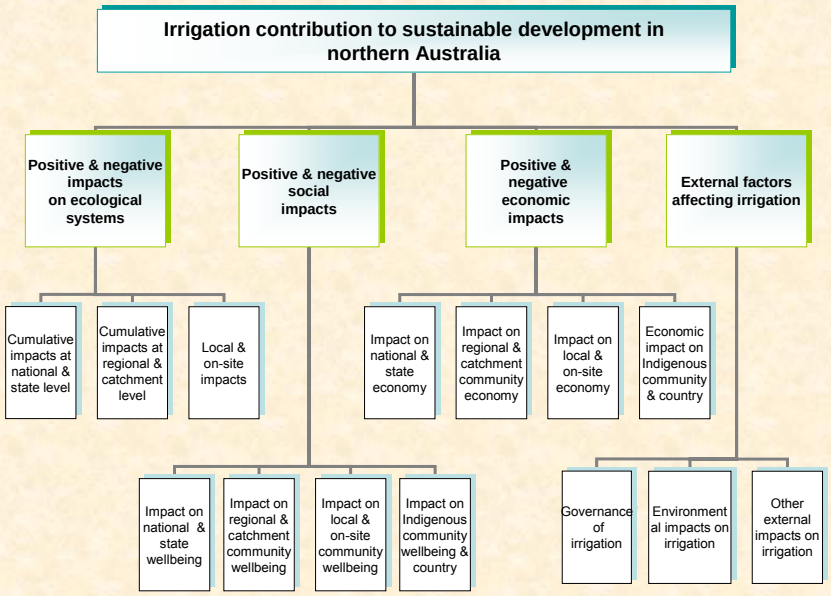
"A key question is not whether an industry is sustainable, which can be divisive and unhelpful, but rather, what that industry contributes to sustainable development."

(Signposts for Australian Agriculture, 2005)

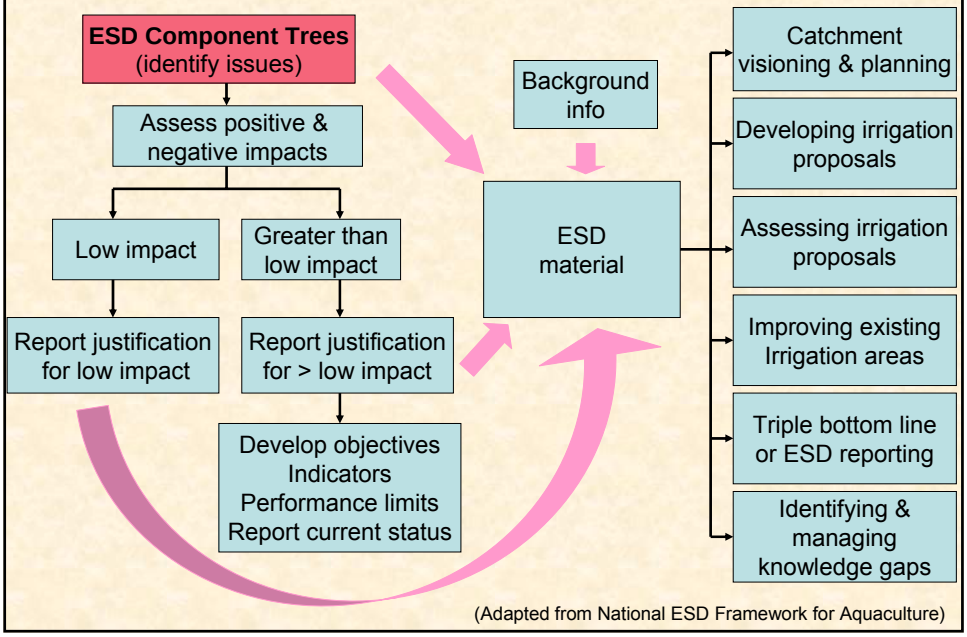
→ **ESD Component Tree Systems**

Developing an ESD Component Tree system for irrigation in northern Australia

High-level NAIF ESD Component Trees



Using an ESD Component Tree system



(Adapted from National ESD Framework for Aquaculture)

Benefits of ESD Component Tree systems

Comprehensiveness

- A starting point for identifying relevant factors
- Reduced chance of factors 'falling through the cracks'
- Reduced likelihood of bias

Transparency

- Specifying why some factors are not relevant increases transparency

Consistency

- Same starting point helps consistency between locations and proposals, where appropriate

Helps understand the difference between uncertainty & risk

A lower Burdekin prototype framework

Lower Burdekin ESD Component System

Capacity Building & Knowledge Transfer (People)

Lower Burdekin Knowledge Platform

How well do we use what is already known?

*"While **a mass of information and data is available** on various aspects of irrigation and irrigation management, it is often scattered across industries or locations or websites and is difficult to access…*

*Critically, this **lack of accessible, centralised information leads to inappropriate management practices or duplication of research and resources."***

(Australian National Committee on Irrigation and Drainage, 2007)

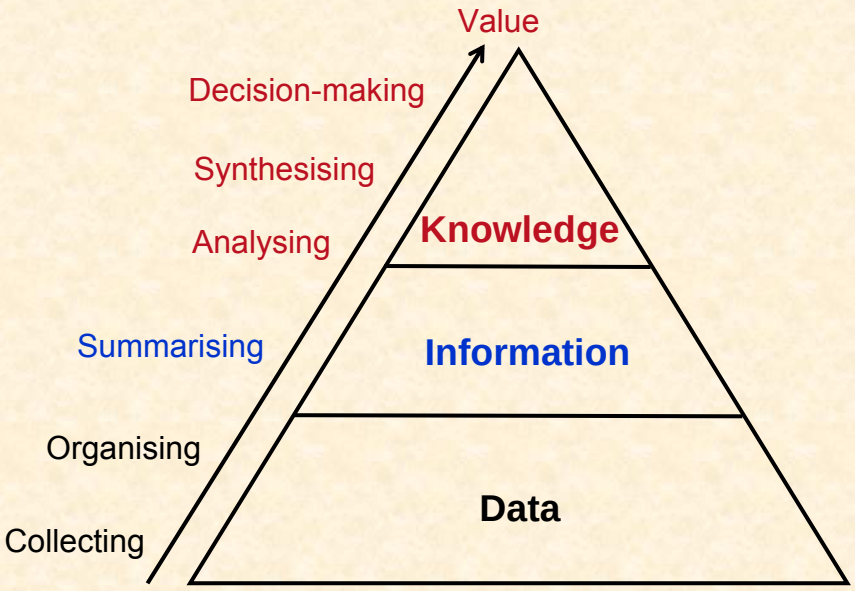
What happens if it is not accessible?

"Resource decisions are often made with whatever information is readily at hand, regardless of whether it represents a full & accurate picture."

(Oregon Coastal Atlas, 2005)

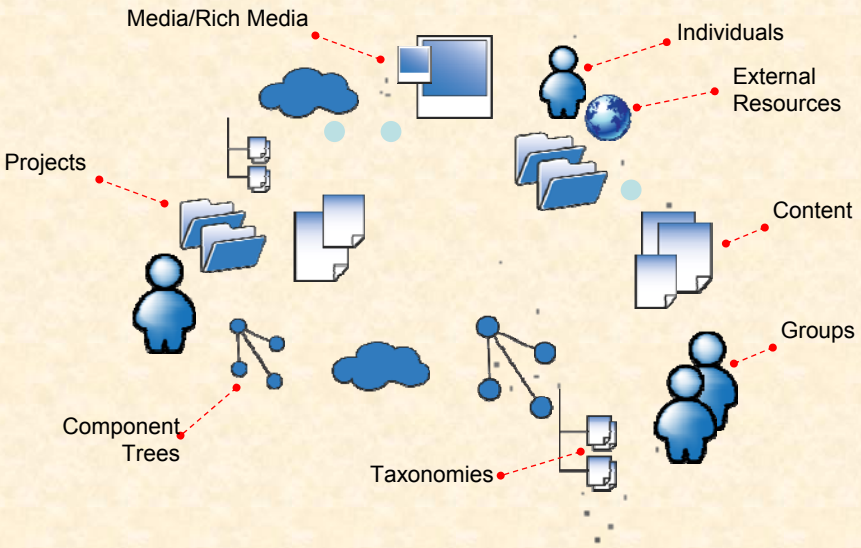
Knowledge Platforms

Data, information and knowledge

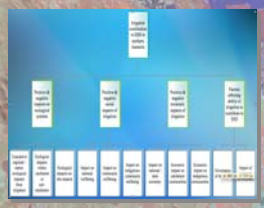


From www.Learningforsustainability.net

How well do we use all forms of available knowledge?



A lower Burdekin prototype framework

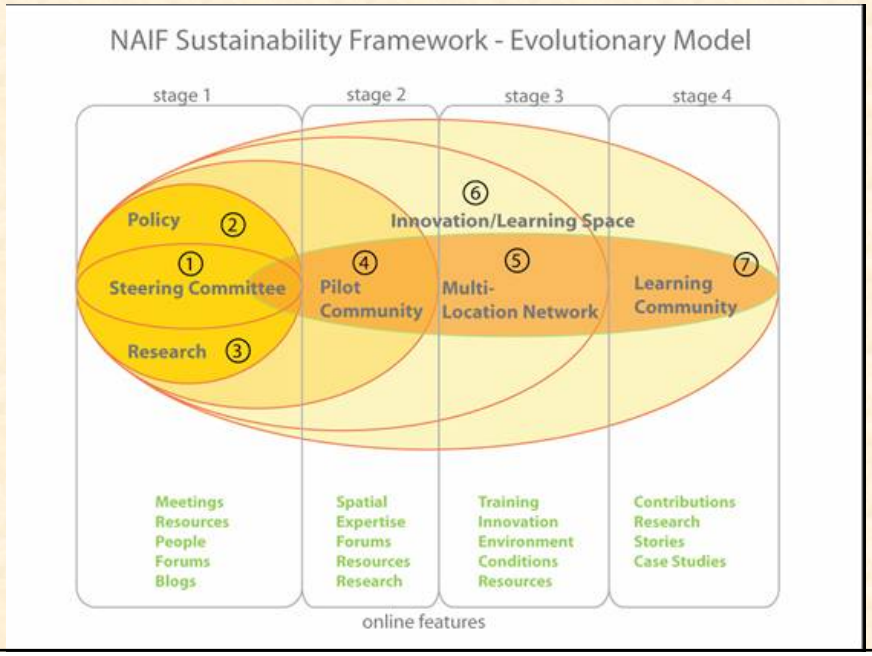


Lower Burdekin ESD Component System

Capacity Building & Knowledge Transfer (People)

Lower Burdekin Knowledge Platform

Future Directions



What is the NAIF sustainability framework?

Demonstrated through the lower Burdekin, the NAIF sustainability framework is suite of initiatives, and an approach, that supports development of the relationship between the community and its natural and built environment.

Appendix 11

NORTHERN AUSTRALIA IRRIGATION FUTURES

DELIVERING ON NORTHERN AUSTRALIA'S NEEDS: SYNERGIES BETWEEN TRaCK AND NAIF

DECEMBER 2007

Delivering on Northern Australia's needs: Synergies between TRaCK and NAIF

(Draft with TRaCK for finalisation/approval)

Australia's tropical rivers and coasts are widely recognised for their outstanding natural and cultural values, and the region has an iconic status for many Australians. The interplay between the landscapes, rivers and strongly monsoonal weather patterns has resulted in unique and diverse ecological systems that will need special care to retain their integrity. At the same time, with some 70 per cent of Australia's fresh water discharging from tropical rivers, the region faces significant environmental challenges associated with increasing pressure to develop water resources, catchments and coastal environments, as well as managing existing threats, including weeds, feral animals and fire.

The National Plan for Water Security (25 January 2007) notes that while there are important water resources and environmental assets in the north that need to be maintained, there is also an opportunity for further development of northern Australia land and water resources and we must understand how to do that wisely. According to the Plan, *"Future and ongoing development of northern Australia's land and water resources must take place in a strategic framework that is ecologically, culturally and economically sustainable, which will ensure that schemes are consistent with the principles of the National Water Initiative".*

The Tropical Rivers and Coastal Knowledge (TRaCK) research hub brings together Australia's leading tropical river and coastal scientists and managers to: (i) identify important natural assets and ecosystem services and how they are maintained or delivered: (ii) assess the social, economic and environmental impact and viability of proposed developments in the region; and (iii) identify opportunities to develop genuinely sustainable enterprises. TRaCK consists of seven interconnected themes and is designed to generate and share the knowledge needed by regional NRM bodies, governments, Indigenous communities and industry to underpin the sustainable management of tropical rivers and coastal environments. TRaCK focuses on the rivers and coasts between the tip of Cape York Peninsular (QLD) and Broome (WA).

The Northern Australia Irrigation Futures project (NAIF) is carrying out targeted research focussing on improving understanding of the links between irrigation and the quantity and quality of downstream water systems (particularly groundwater systems), and the relationship between irrigation and the ecological, economic and social systems within which irrigation takes place. NAIF is also developing a Sustainability Framework to support strategic thinking and decision-making about irrigation in northern Australia. The Sustainability Framework will help build community capacity to understand and engage in complex decisions and help inform those whose responsibility it is to make such decisions. The Sustainability Framework draws from the National ESD Framework for Wild Fisheries and for Aquaculture. It involves: (i) the development of a generic set of component systems which identify the ESD factors relevant to irrigation in northern Australia; (ii) the use of those systems to support catchment, water and irrigation planning, assessment of irrigation proposals, triple bottom line reporting and knowledge gap analysis; and (iii) the development and use of technological environments at the catchment and sub-catchment level to establish knowledge platforms that improve awareness of and access to relevant knowledge, tools and processes to support decision making and the transfer of knowledge within and between catchments across northern Australia (north of the Tropic of Capricorn).

Many of the outputs from the TRaCK research (and other research) will feed into the NAIF Sustainability Framework and the framework will provide an important mechanism for transferring knowledge, tools and processes, including TRaCK and other research findings, across northern Australia.

NAIF activities and TRaCK themes are provided in Attachment 1 and key complementarities are shown in Attachment 2.

NAIF ACTIVITIES

The NAIF project is developing new knowledge, tools and processes to support debate and decision making about irrigation in northern Australia. NAIF activity focuses in four key activity areas:

Activity 1 (Irrigation Context Setting) is (i) documenting the policy, legislation and institutional arrangements relevant to water and irrigation management in northern Australia to identify the 'control structures' that influence irrigation decisions; (ii) reviewing past and present irrigation in northern Australia, focussing on key bio-physical information (eg groundwater flow system characteristics) and sustainability issues; and (iii) analysing the Lower Burdekin, Ord and Katherine-Douglas-Daly irrigation schemes to identify the implications to future design and management of tropical irrigation. This work will to help identify key knowledge gaps, improve understanding of the risks and limitations of irrigation in northern Australia, and help governments and communities to learn from past mistakes and successes.

Activity 2 (Understanding Tropical Water Systems) is (i) synthesising existing geological, geomorphological and hydrogeological studies of northern Australia to provide an overview of the current understanding of the hydrological constraints and opportunities for irrigation in northern Australia, which will help address community perceptions and misconceptions; and (ii) an assessment and recommendations on the practicality of developing a groundwater flow classification system for northern Australia.

Activity 3 (Understanding Irrigation Mosaics) involves (i) reviewing research into mosaics relating to ecology, forestry, meteorology and saline basins to aid understanding of the concept of irrigation mosaics, or patchworks of irrigation, and whether they may be an appropriate style of irrigation for northern Australia; and (ii) reviewing and applying existing and new modelling and analysis tools to explore potential advantages and disadvantages of irrigation mosaics in northern Australia.

Activity 4 (Sustainability Framework) is the development of a Sustainability Framework that, through their involvement, is embraced by policy makers, regulators, investors and managers, to help ensure any irrigation is managed in a consistent, ecologically sustainable manner in northern Australia. The Lower Burdekin, Daly and Ord case studies are supporting and informing the development and testing of the framework, which will contribute tools and knowledge to support considered debate, decision making and long term strategic planning for northern Australia and Australia as a whole. The NAIF Steering Committee has endorsed the development of the Sustainability Framework prototype for testing in the Lower Burdekin.

TRaCK THEMES

Theme 1 (Scenario Evaluation) encompasses the ultimate objective of the research program. Using information from all other themes, ecosystem-based, multiple-use scenarios will be explored and used as the basis of risk analyses. Scenario-building tools will be used across a spectrum of society, from those living in local communities, to those developing and implementing government policy.

Theme 2 (Values & Assets) focuses on assets of environmental, cultural, economic and social value. It will explore values placed on tropical coasts and rivers from local, national and international perspectives. It will also document the types of research and management issues that local communities consider necessary to maintain these values and will explore the significance of the ecological goods and services provided by systems in their present state and importantly to maintain or enhance that state.

Theme 3 (Riverscape & Coastal Settings) *includes research that will (i) develop a physical classification system based on hydrological regime and geomorphology to characterise riverscapes (including estuaries) and understand their formation and evolution; and (ii) understand the demographic and social character of the human populations within these settings.*

Theme 4 (Material Budgets) focuses on material budgets to tropical rivers and estuaries and will: (i) identify and quantify major sources of water, sediment, nutrients and carbon: (ii) estimate current and historic rates of sediment and nutrient loading in relation to land-use, and (iii) develop models to predict the effects of land-use change on hydrology, carbon, sediment and nutrient sources and loads, (iv) and develop appropriate indicators for monitoring and assessment of water quality and quantity.

Theme 5 (Food Webs & Biodiversity) will: (i) identify the sources of organic carbon "driving" aquatic food webs and the factors that have greatest influence on both the production and supply of these sources: (ii) identify the particular species' interactions that have a strong influence on carbon and nutrient flow to higher trophic levels; (iii) identify indices and patterns of aquatic biodiversity: (iv) determine the relationship between riverscape setting and patterns of biodiversity: (v) develop models to predict the effects of landuse change on food webs and aquatic biodiversity; and (vi) develop appropriate indicators for monitoring and assessment of biodiversity and ecological condition.

Theme 6 (Sustainable Enterprises) will (i) identify ecological sustainable and culturally appropriate use of coastal and riverine resources that are presently un or under-developed, but which offer opportunities to create innovative development options for remote and regional communities; (ii) develop culturally appropriate business strategies and models that are well matched to the needs and aspirations of the resident population whilst maintaining ecological integrity; (iii) apply scientific and Indigenous knowledge to design management and governance systems in order to apply lessons learnt and foster innovation; (iv) critically examine projects by developing thorough monitoring and evaluation frameworks that consider important information gained from other themes, in particular theme 2. This them will include, but is not limited to, testing appropriate indicators (developed in Themes 4 and 5) to assess the condition of environmental assets and monitor the ecological sustainability of developments.

Theme 7 (Communication and Integration) is a cross-cutting theme focussing on communication, adoption and integration. This includes co-ordination and integration of the research activities across themes, and the knowledge management and communication among researchers and with/between stakeholders and landowners, particularly regional NRM bodies and those who speak English as a second or third language. The theme will also coordinate training and capacity building by partner institutions.

MAJOR COMPLEMENTARITIES BETWEEN TRaCK AND NAIF

	NAIF Activity 1: Irrigation Context Setting	NAIF Activity 2: Understanding Tropical Water Systems	NAIF Activity 3: Understanding Irrigation Mosaics / Alternative Irrigation Systems	NAIF Activity 4: Sustainability Framework (SF)
TRACK Theme 1: Scenario Evaluation	Learning's from comparison of existing irrigation is input to scenario evaluation		Alternative irrigation systems as input for scenario evaluation	SF component system provides a framework to identify key factors for input to scenario evaluation
TRACK Theme 2: Values & Assets			Identification of values & assets to help determine alternative irrigation systems for NA	Understanding values and assets contributes to SF catchment knowledge bases
TRACK Theme 3: Riverscapes & Coastal Settings		Improved understanding of the hydrogeology and water systems of NA		Understanding riverscapes & coastal settings contributes to SF catchment knowledge bases
TRACK Theme 4: Material Budgets		Improved understanding of GW systems, GW-SW interactions, water quality and water availability	Improved understanding of the geochemistry of GW systems, fate of solutes, water quality, and implications to catchment material budgets	Understanding material budgets contributes to SF catchment knowledge bases
TRACK Theme 5: Food Webs & Biodiversity			Improved understanding of water sources, dynamics and fate of irrigation solutes contributes to understanding of food webs & biodiversity	Understanding food webs & biodiversity contributes to SF catchment knowledge bases
TRACK Theme 6: Sustainable Enterprises	Comparison of existing irrigation aids understanding options for ESD			SF component system provides a framework to support identification of sustainable enterprises
TRACK Theme 7: Communication & Integration	New knowledge and learning's feed into communication strategies	New knowledge and learning's feed into communication strategies	New knowledge and learning's feed into communication strategies	SF knowledge platforms support collation & knowledge distribution

Appendix 12

NORTHERN AUSTRALIA IRRIGATION FUTURES

FUTURE RESEARCH DIRECTIONS

DECEMBER 2007

FUTURE RESEARCH DIRECTIONS

This appendix provides further detail on the research needs identified through NAIF and the major opportunities for NAIF to contribute further.

RESEARCH NEEDS

Supporting the development of long-term visions for northern Australia

Capturing the emerging similarity between stakeholder group visions for northern Australia will demonstrate that there are major areas of overlap and minor areas of dispute. Documenting and profiling this will provide a stronger base for long-term strategic thinking. NAIF will revisit a proposal for this that was first submitted to the LWA Innovation Call in 2006.

Understanding northern Australia water systems

"…the three jurisdictions of the north – QLD, NT & WA – are facing increasing pressures to free up water for development, but the risk is that they lack sufficient knowledge of their rivers & groundwater systems to respond with confidence." David Trebeck, National Water Commissioner, Northern Water Use Experts Summit, Darwin, December 2006.

Future research should focus on:

- Developing catchment and irrigation system scale water budgets
- Improved understanding of the links between irrigation and environmental water needs (in collaboration with TRaCK)
- Understanding what 'water availability' and 'sustainable yield' means in northern Australia's highly event-driven systems and options for water storage (this will need to include understanding of groundwater/surface water interactions)
- Impacts of irrigation on groundwater quality and quantity
- The link between on-ground irrigation practice, groundwater systems and downstream ecosystems. This will address the likely pathways and potential fate of solutes and their impacts on the quality of receiving waters

Understanding irrigation mosaics and their potential to contribute to ecologically sustainable development

"There won't be large scale irrigation like southern Australia. Mosaics concepts will develop in NT and WA". Peter Harrison, Above Capricorn Tech

The longer-term environmental impacts of irrigation mosaics, especially in tropical environments, in space and time, are still largely unknown. Further studies into the biophysical, ecological, social and economic performance of irrigation mosaics, and into the governance frameworks required for them are needed to improve understanding of their benefits and costs. Such studies could not only help inform the potential role for irrigation mosaics but also help determine how existing irrigation systems could be reconfigured for improved harmonisation with natural systems.

Catchment scale salt and nutrient planning and management in northern irrigation systems

Development of multi-scale (farm, irrigation system, catchment) salt and nutrient management plans is emerging as a priority internationally and should precede any irrigation development. Planning for and managing salts and nutrients in irrigated systems is critical to protecting groundwater quality and downstream ecosystem function.

"To control the negative effects of drainage water disposal, state and federal agencies in several countries now are placing regulations on the discharge of saline drainage water into rivers ……. We propose that the responsibility for salt management be combined with the irrigation rights of farmers. This approach will enhance awareness of the salt management issue and motivate water delivery agencies and farmers to seek efficient methods for reducing the amount of salt needing disposal and to determine methods of disposing salt in ways that are environmentally acceptable." Oster, Kaffka and Wichelns, ICID paper 2008.

Developing frameworks to support irrigation decision making

"The Taskforce noted that for much of the northern Gulf and Cape York Peninsula regions, detailed on-the-ground and in-stream information are often sparse, and that previously collected information is often not readily accessible. A system focussed on the north, which captures this information, and makes it accessible to those who need it, is essential to support informed decision making". Northern Australia Land and Water Taskforce Communiqué, 28 September 2007.

Potential for sustainable development linking mine water and irrigation in remote communities

Mines needing to dewater and/or dispose of excess water open opportunities for using that water for irrigation instead of or as part of the disposal process. If designed carefully this could provide a range of social and economic opportunities (employment, fresh produce etc) for remote communities situated nearby the mines. Understanding the mine water quality and its suitability for irrigation will need particular attention.

Water storage needs and the use of alternative or supplementary water sources (overland flow, flood harvesting, aquifer recharge etc) to support sustainable development in northern Australia

Water availability, storage needs, and opportunities for storing water through the dry season are still poorly understood in the strongly event driven systems of northern Australia. There is a need to develop understanding of the potential for using overland flow, flood harvesting and/or aquifer storage and recovery or some combination of these to meet dry season water needs to avoid having to rely on large dams.

Carbon Sequestration and Carbon Trading in Irrigation Systems

Irrigation mosaics, which provide an alternative approach to traditional large scale irrigation, provide opportunities to design patches of irrigation distributed in space that are surrounded by natural systems. This would allow the trees and grasses to reduce soil erosion and nutrient runoff into waterways and retain their role in carbon storage through sequestration. There is also opportunity to incorporate learning's from work on mosaics into existing irrigation systems by reconfiguring them to incorporate more trees and other natural vegetation together with emerging conservation farming practices, which would again improve carbon storage through enhanced soil sequestration.

PRIORITIES FOR NAIF

There is support for NAIF as a research model to progress some of the above priorities, in collaboration with the northern jurisdictions and other key stakeholders.

"The project (NAIF) has already had a significant positive impact on inter-jurisdictional cooperation between the 3 governments in the North but also with community and industry stakeholders and other research programs. The sub-committee agrees that the continuation of this project model would contribute greatly to help to ensure that any expansion of irrigation in the north of Australia is done in a sustainable manner." Draft sub-committee communiqué (October 2007).

Focus areas for NAIF could be:

Supporting implementation of the National Water Initiative

NAIF could contribute to implementation of the NWI by:

Cross-jurisdictional integration, knowledge transfer and capacity building in water management

A significant feature of irrigation and water resource management in northern Australia is there are few players. This creates an opportunity for collaboration that is much easier than in southern Australia that has a very large number of players. NAIF provides an ongoing avenue to support cross-jurisdictional networks across northern Australia that can accommodate commonalities and differences.

"Making networks, especially interstate, which provide opportunity for discussion of issues, forming relationships and the verbal communication between stakeholders have all been an extremely beneficial outcome of the NAIF project. The inter-state networks are very valuable and are helping with day to day management. This project will facilitate better relationships between NRW and CSIRO and with the Burdekin stakeholders, and this is the catalyst of what this project has driven." Tom Crothers, QLD Department of Natural Resources and Water and NAIF SC member.

Delivering on the National Groundwater Action Plan

Developing improved understanding of the link between on-ground irrigation practice and downstream water systems will deliver on three key aspects of the Groundwater Action Plan, namely:

- develop understanding of the link between on-ground irrigation practice, groundwater systems and downstream ecosystems. This will address the likely pathways and potential fate of solutes and their impacts on the quality of receiving waters, and contribute to development of multi-scale (farm, irrigation system, catchment) salt and nutrient management plans
- develop understanding of the functional relationships between groundwater discharge and important ecosystems
- improve our knowledge of Australia's northern groundwater systems
- developing understanding of groundwater surface water connectivity

Supporting sophisticated, transparent and comprehensive water planning

Roll out of the NAIF ESD Component Tree System can support improved water planning by through processes that building confidence that that all relevant ESD factors are identified and priority issues addressed in planning.

"Mr Lancaster says one of the aims of the (NAIF) *project was to establish a sustainability framework or tree chart of the Daly to show where all the knowledge gaps are. It looks at asking the questions so answers can be given, from all points from social, cultural, environmental and economic perspectives...what we need to do now though is get a lot of this conceptual research down onto the ground. I'd like to get the sustainability framework worked out with some of my advisory committees and look at whole of catchment scale, right down to farm scale."* Ian Lancaster, Director Resource Management, NT Department of Natural Resources, Environment and the Arts, ABC Country Hour, 25 September 2007.

Improving knowledge management and building community capacity

Roll out of the NAIF catchment knowledge platforms can build community support and understanding of water, irrigation and catchment management by improving accessibility and utilisation of all forms of available information and knowledge.

"I have had further thought on the knowledge platform concept and believe that this will be 'the' most valuable resource for knowledge dissemination for future Agriculture in the NT. Primarily due to the separation (tyranny of distance) of production areas, and the fact that the vast majority of our producers are on-line and computer literate it is logical to utilise this system to engage them and facilitate knowledge brokering." Tim West, Environmental development Officer, NT Horticultural Association / NT Agricultural Association.

Supporting implementation of the National Plan for Water Security

Developing long-term visions for northern Australia

Capturing the emerging similarity between stakeholder group visions for northern Australia will demonstrate that there are major areas of overlap and minor areas of dispute. Documenting and profiling this will provide a stronger base for long-term strategic thinking about the future of northern Australia. NAIF will revisit a proposal for this that was first submitted to the LWA Innovation Call in 2006.

Providing strategic frameworks to support sustainable development

"Future and ongoing development of northern Australia's land and water resources must take place in a strategic framework that is ecologically, culturally and economically sustainable*…"* Prime Minister of Australia, National Plan for Water Security, January 2007.

The NAIF work to date provides tools to support the work of the Northern Australia Land and Water Taskforce and the Land and Water Futures Assessments.

Understanding the potential role of irrigation mosaics in northern Australia

"A recurring theme in discussions was the opportunities available for mosaic-style smaller scale developments, reflecting the limited availability of good quality land. This will also allow maintenance of the interconnectedness of the tropical savannah". NA Task Force Communiqué, September 2007.

NAIF has collated current understanding and developed some preliminary tools to support thinking about irrigation mosaics. This work needs to be extended to develop a more complete understanding of the ecological, social and economic benefits and costs of this mosaic form of development.

"Work on the concept of mosaics could be extended, once again with some ground truthing of concepts and utilising monitoring data to improve and prove up the concept. The use of mosaics is especially applicable to the Northern Territory where irrigable soils are naturally mosaiced across the landscape." Draft NAIF sub-committee communiqué (October 2007).

Encouraging and supporting systems approaches to managing northern catchments
"…the Taskforce noted that planners and developers need a good understanding of how the landscape works, especially the interconnectivity of ground and surface water systems, across northern Australia. Such knowledge requires good science, supported by sound measurement and monitoring practice, and most importantly, a system focused on the north, to capture the information, and make it accessible to those who need it." Northern Australia Land and Water Taskforce communiqué, 31 August 2007.

The important role NAIF is playing in delivering messages about the need to take a systems approach to managing catchments in northern Australia, and providing tools to support that approach, can continue to support northern governments and stakeholders.

"While each of the take home messages are important, it is important not to lose the connectivity between them. Probably the biggest take home message is the complexity of the system and the need to manage that complexity". "I am very excited by what I have seen. You are clearly using the latest technology and concepts. The greatest challenge is understanding complex systems, not many people can do that, and any tool to help is a good thing." Doug Hall, WA Industry Development Officer, Irrigation Australia.

Appendix 13

NORTHERN AUSTRALIA IRRIGATION FUTURES

PUBLICATIONS LIST

DECEMBER 2007

NPSI Final Reports

1. Northern Australia Irrigation Futures. National Program for Sustainable Irrigation (CDS23) – Final Report.

2. Northern Australia Irrigation Futures. National Program for Sustainable Irrigation (CDS23) – Final Technical Report.

Irrigation in Northern Australia Context Reports

3. Petheram, C., Tickell, S., O'Gara, F., Smith, A., Bristow, K.L. and P. Jolly. 2007. Analysis of the Lower Burdekin, Ord and Katherine-Douglas-Daly Irrigation Areas: Implications to future design and management of tropical irrigation. CSIRO Land and Water Science Report No. ??/07, CRC for Irrigation Futures Technical Report No. 04/07 xx pp. *(Waiting approval).*

4. Hegarty et al. 2007. A guide to institutional, legislative and policy frameworks relevant to irrigation and water management in northern Australia. CSIRO Land and Water Science Report No. ??/07, CRC for Irrigation Futures Technical Report No. 05/07 xx pp. *(Report under external review through Sub-Committee).*

5. Hegarty et al. 2007. A hotlink directory to northern Australia's irrigation and water management institutional, legislative and policy frameworks. CSIRO Land and Water Science Report No. ??/07, CRC for Irrigation Futures Technical Report No. 06/07 xx pp. *(Report under external review through Sub-Committee).*

6. An overview of irrigation in northern Australia
   This report is now the responsibility of the WA, QLD and NT governments for their completion. The NAIF project team has completed what it can and provided a template to the governments for their use.

Hydrology Reports

7. Petheram, C., Charlesworth, P.B. and K.L. Bristow. 2006. Managing on-farm and regional water and salt balances in Mona Park. CSIRO Land and Water Technical Report No. 23/06, July 2006. 50 pp.

8. Petheram, C. and K.L. Bristow. 2007. Towards an understanding of the hydrological factors, constraints and opportunities for irrigation in northern Australia: A review. CSIRO Land and Water Science Report No. ??/07, CRC for Irrigation Futures Technical Report No. 07/07 xx pp. *(In review).*

9. Bristow, K.L. and C. Petheram. 2007. Assessment of the practicality and benefits of developing a groundwater flow classification system for irrigation in northern Australia. *(Internal report to the NAIF Steering Committee).*

Irrigation Mosaics Reports

10. Paydar, Z., Cook, F.J., Xevei, E. and K.L. Bristow. 2007 Review of the current understanding of irrigation mosaics. CSIRO Land and Water Science Report No. 40/07, CRC for Irrigation Futures Technical Report No. 08/07. 31 pp.

11. Cook, F.J., Xevi, E., Knight, J.H., Paydar, Z. and K.L. Bristow. 2007. Analysis of biophysical processes with regard to advantages and disadvantages of irrigation

mosaics. CSIRO Land and Water Science Report No. ??/07, CRC for Irrigation Futures Technical Report No. 09/07 61 pp. *(Approved).*

Sustainability Framework Reports and Papers

12. Kellett, B., Bristow, K.L. and P.B. Charlesworth. 2005. Indicator Frameworks for Assessing Irrigation Sustainability. CSIRO Land and Water Technical Report No. 01/05. 52 pp.

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END OF REPORT