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The Northern Mallee Pipeline Project: Exploring community perceptions of its impact

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Foreword

Water is a scarce resource. Less than one percent of the world's water is usable fresh water. The value of water is becoming increasingly important, especially in the Wimmera Mallee where continued drought years, and climate change and variability have placed greater pressure on the availability of water for its various uses. In this region, substantial change is underway to the current stock and domestic channel system, with construction of the Wimmera Mallee pipeline which will replace 16,000 km of highly inefficient earthen channels responsible for the loss of up to 85% of water through seepage and evaporation. Although the pipeline will provide a reliable, quality water supply and save up to 103 000ML of water per year, the actual amount of water available will depend on climate.

The Water in Drylands Collaborative Research Program (WIDCORP) is a group of peak organisations from the Wimmera Mallee and University of Ballarat working collaboratively to study the social, economical and environmental impact of this water infrastructure change on the community. Using the Wimmera Mallee Pipeline as a case study, this research focuses on identifying water uses and water values in a dryland region; how communities balance the competing demands for water and; how communities can best maximise opportunities from the additional water as a result of a piped system. Research is undertaken concurrently with the construction of the pipeline and forms the basis for an on-going research program at the Horsham Campus of the University of Ballarat. The research frameworks and outcomes are expected to be of significance to dryland communities elsewhere in Australia and globally.

This report provides valuable insight in to the perceptions of the Northern Mallee community regarding the economic, environmental and social impacts of the pipeline on the community and farming.



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1. Background

1.1 Introduction

Stock and domestic water delivery across the dryland Wimmera Mallee region of Victoria historically was via open earthen channels to storage dams located across the region (van Veldhuisen, 2001). Whilst this water supply system was critical for the development of agriculture and communities in this region, wastage of water through evaporation and seepage was increasingly of concern. This was particularly highlighted during drought events where the Grampians headwaters were under stress to supply this system.

In response to this situation, in the early 1990s the Northern Mallee Pipeline Project (NMPP) was initiated. This was a major infrastructure project that replaced an open channel delivery of water from the Grampian catchments to the Northern Mallee farms and towns with a pipeline supply from the Murray River. This project spanned ten years and was completed in 2002.

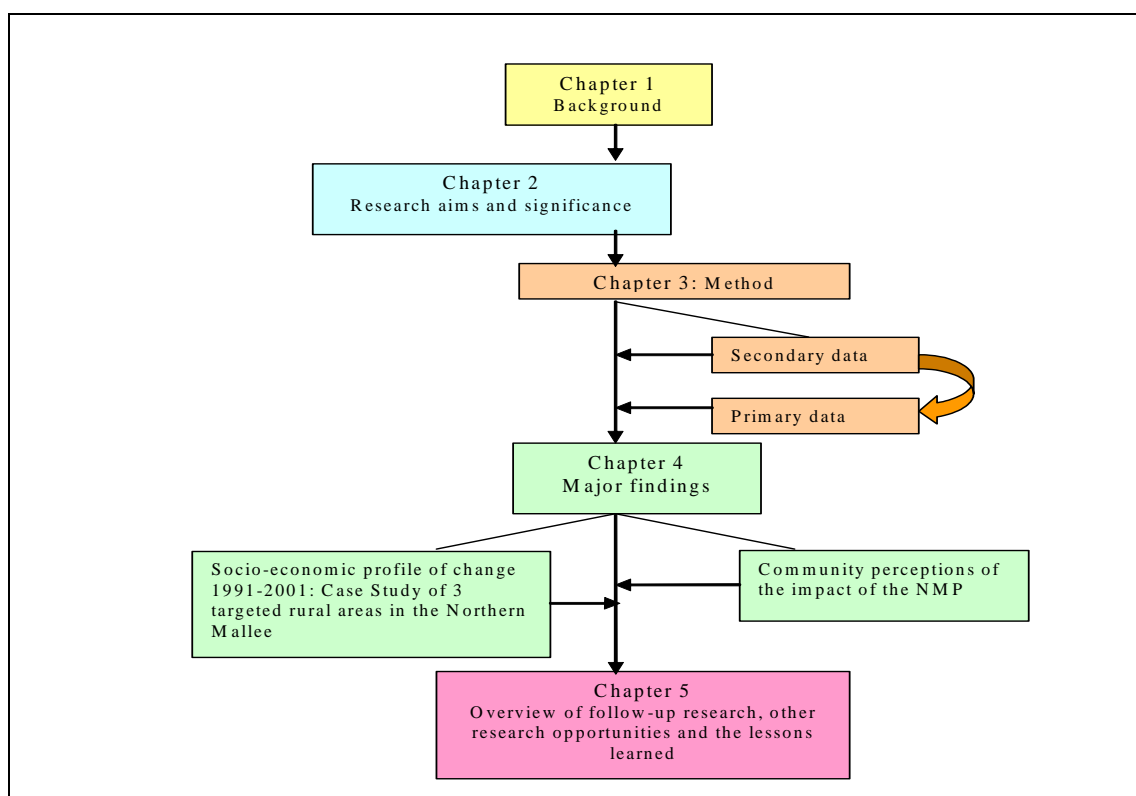
Capturing the implications of this major change in water delivery on the regions communities and agriculture provides an opportunity to understand its regional significance. Documenting the lessons learnt from this project provides valuable information for subsequent projects of this nature in the remainder of the Wimmera Mallee and in other dryland regions of Australia where similar projects are planned or underway.

The study reported here draws upon primary and secondary data to gain an understanding of the NMPP before, during and after construction of the pipeline. It seeks to understand how this major infrastructure change has impacted on the Northern Mallee community by documenting the issues, benefits and costs encountered during the 10 years of this project. This study explores the perceived economic, environmental and social impacts of the replacement of the channel /dam system with a piped water supply.

Section One of this report introduces the characteristics of the Northern Mallee region followed by a brief description of the NMPP. It provides a review of reports and evaluations of the NMPP including major government initiatives to assist farmers in maximising benefits from this new water supply system. This review highlights some gaps in knowledge about the longer term implications or changes in the regions agriculture and social wellbeing subsequent to the construction the pipeline.

Cognisant of these gaps, Section Two of this report provides the aims and objectives of this study; Section Three outlines the methodology; Section Four provides the results of the study findings and Section Five draws together the data and provides an overview of follow-up research, other research opportunities and the lessons learnt to date from the Northern Mallee experience. The report concludes how these might be of relevance to other similar infrastructure projects, in particular the pipeline soon to be constructed across the remainder of the Wimmera Mallee region. The structure of this report is diagrammatically represented below (Figure 1).

Figure 1
Structure of Report



1.2 The Northern Mallee Region

The Northern Mallee region covers an extensive area of North West Victoria of close to 43,000 square kilometres (Figure 2). The regional population is estimated to be 61,095 people, with the major urban centre being Mildura and the smaller townships of Ouyen, Red Cliffs, Merbein, Irymple, Murrayville, Hopetoun, Rainbow, Birchip, Sea Lake, Robinvale and Nyah.¹

Agriculture is the principal activity and primary source of income in this semi-arid region, utilising 62% of the land. The southern area of the Mallee is dominated by dryland broadacre farming including cereal, wool and prime lamb production. In the northern area nearer the Murray River and Mildura intensive irrigation contributes to the vast array of irrigated horticulture (grapes and citrus) for both the domestic and export markets.²

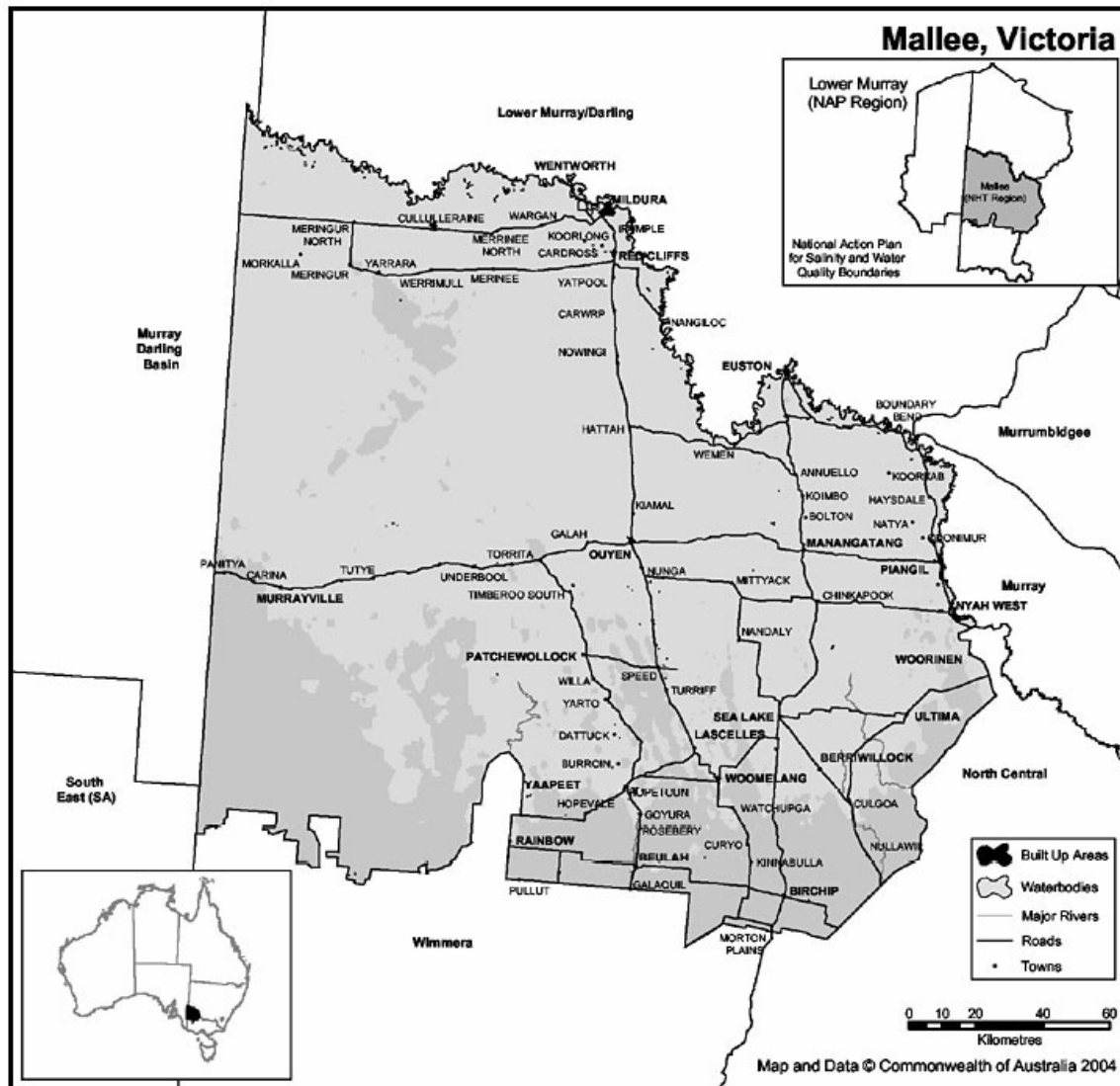
The Murray River and Mallee outback region encourages many tourists to the area. Close to 40% of this region is public land, many of which are state and national parks (Murray-Sunset National Park, Wyperfeld National Park, Hattah-Kulkyne National Park and Murray-Kulkyne Park). These parks provide opportunities for a range of

¹ Sourced from the Mallee Catchment Management authority website www.malleecma.vic.gov.au. Retrieved 5 May 2006.

² Ibid.

leisure activities. There are 913 wetlands in the Mallee including 14 classified as "high value". There are 500 small conservation reserves scattered through the agricultural area and large tracts of riverine and dryland State Forest.³

Figure 2
The Northern Mallee Region, Victoria



1.3 The Northern Mallee Pipeline Project

The Wimmera Mallee Water Supply System (WMWSS, Figure 3), is responsible for the water supply to the Wimmera and Mallee regions (GWM Water). Since the completion of the Northern Mallee Pipeline in 2002 water for the Northern Mallee is mostly sourced from the Murray River and distributed through pipes to towns and farms. Whilst some remaining parts of the Northern Mallee are still supplied through open earthen channels from water storages in the Wimmera and Grampians,

³ Sourced from Mallee CMA website www.malleecma.vic.gov.au. Retrieved 5 May 2006.

planning is underway to pipe this final Northern Mallee region sourcing water from the Murray River.⁴ This is being undertaken as part of the Wimmera Mallee Pipeline Project and includes a trunk line adjacent to the NMP from the Murray River to Swan Hill. This will provide piped water to six rural districts and the townships of Berriwollock, Culgoa and Nullawill.⁵

Figure 3
Wimmera Mallee Water Supply System

GRAMPIANS WIMMERA MALLEE WATER



⁴ GWM Water (2006). "Next stage of pipeline project announced". Media release sourced from GWM Water website, www.gwmwater.org.au. Retrieved 20 October 2006.

⁵ GWM Water (2006). "Next stage of pipeline project announced". Media release sourced from GWM Water website, www.gwmwater.org.au. Retrieved 20 October 2006.

1.3.1 The Wimmera-Mallee Water Supply System

The earthen channel Wimmera Mallee Water Supply System (WMWSS) is almost 100 years old and is a complex network of 16 000km of open earthen channels covering almost three million hectares. It extends from the Grampians in the southern Wimmera to Ouyen and Manangatang in the Northern Mallee (Figure 3). With highly saline groundwater and limited surface water due to sandy soils, topography and low rainfall, the channel system was built out of a necessity to transport water from the Grampians catchments to this vast dryland region. This channel system has provided a biannual or annual (in dry periods) dam fill to 13,500 farms and 51 towns for stock and domestic purposes. The water is mainly harvested from the Wimmera and Glenelg River catchments. In recent times of extended low rainfall, the system is unable to fulfil its role. In 2006 only a partial channel to run towns is possible due to low water levels in the supply reservoirs.

This system was largely built in the era of horse and buggy and although a pioneering masterpiece allowing the establishment of farming and settlements within the region, the high water loss through seepage and evaporation has long been recognised as unsustainable. Average losses exceeding 40 000 ML of water per year across the main system and efficiency as low as 30% in the Northern Mallee region (Rural Water Commission of Victoria (RWC), 1991) is well documented. Other recognised limitations of the system include reduced in-stream flow; serious over-commitment of water limiting “spare” water available for new users; declining water quality particularly increased salinity and nutrients; and the high cost of channel maintenance (RWC, 1991).

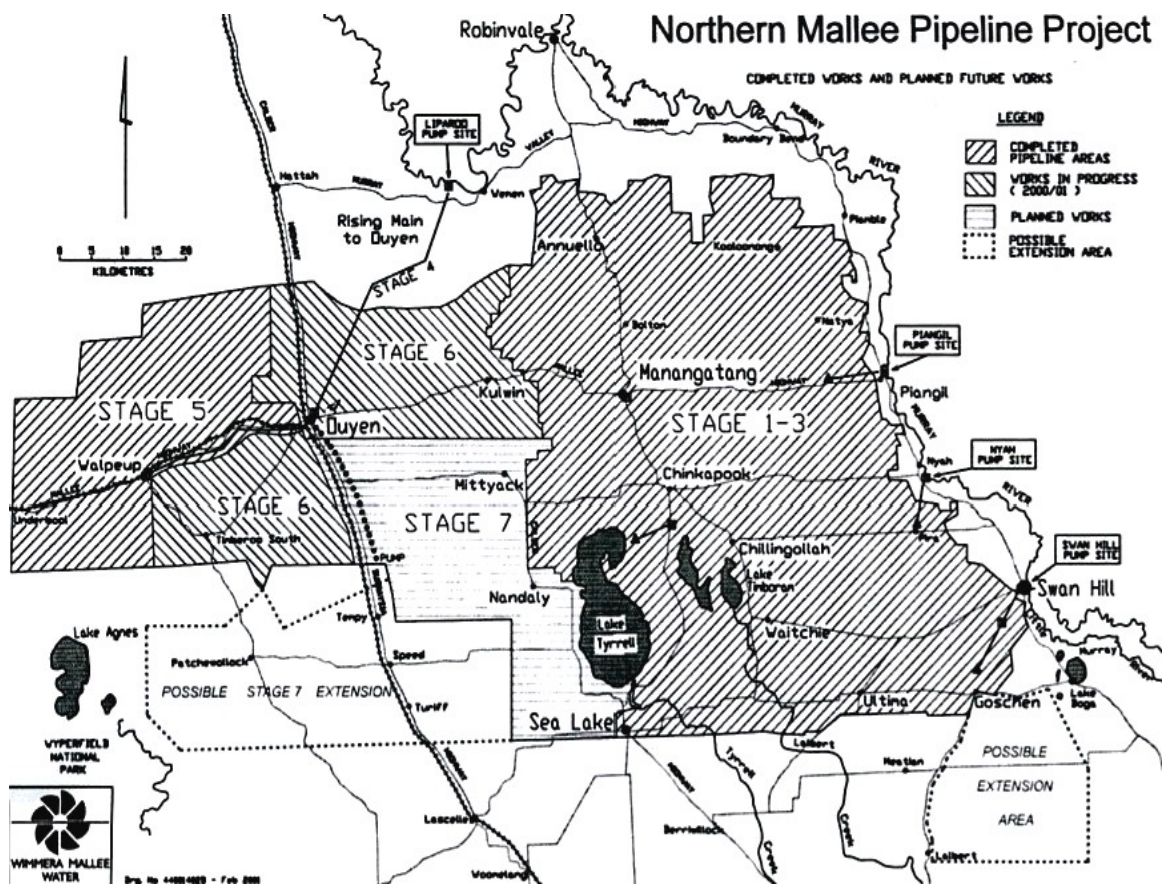
The Wimmera Mallee System Study completed in 1991 (RWC, 1991) used a “whole of catchment approach” to review the security of the system and its ability to meet future water demands. Aiming to develop a strategy for the future management and operation of this water supply system, numerous technical investigations were undertaken which highlighted the seriousness of the deficiencies in the Wimmera Mallee system. A number of practical initiatives and solutions were identified to address these issues including, increasing the storage capacity of urban stores and introducing demand management strategies such as tariff reform and consumer education to encourage water conservation. The most ambitious suggestion however was to replace the Grampians supplied channels in the Northern Mallee region with pipelines supplied from the Murray River. It was proposed that this scheme could potentially save 50,000ML of water which could then be used for environmental flows, security of supply and new users and supply high quality water to the region. Although first proposed 50 years earlier and supported by a feasibility study published in 1985, the Wimmera Mallee System Study (RWC, 1991) rallied communities together to impress upon the Government the importance of this pipeline project. The Federal and State Governments committed funding to Stage 1 of the project in 1992.

1.3.2 The Northern Mallee Pipeline Project (1992-2002)

The Northern Mallee Pipeline Project (NMPP) officially commenced in September 1992 to replace 50 000 ML per year of channel flows from storages in the Grampians with 5000 ML per year of piped water supplies from the Murray River. The 7 stage project spanned 10 years and included the building of four pump stations, six re-lift

pumps, four elevated tanks, 3 balancing storages and 2500km of pipes. Stage 7 was completed in August 2002 and water was flowing to 65000 hectares of farmland including 1700 farms and 12 towns in the areas boarded by Ultima, Sea Lake, Underbool, Wemen, Kooloonong and the Murray River (Figure 4). The project reportedly finished on time and on budget, reaching its targeted water saving of 49 500 ML per year at a total cost of \$50 million. The Federal and State governments each contributed \$19 million; Wimmera Mallee Water (WMW) a further \$2.3 million and landholders paid \$9.5 million for on-farm works.

Figure 4
The Northern Mallee Pipeline Project area, Stages 1-7 (1992-2002)



Despite the projects timely finish, it did experience several problems including; funding delays, most notably delaying the commencement of Stage 2 for two years⁶; initial apprehension from landowners^{7,8} and technical difficulties including the collapse of the newly constructed Goschen water tower⁹ and trencher breakdowns¹⁰.

Upon completion John Konings¹¹, the then Wimmera Mallee Water General Manager announced: [the Northern Mallee pipeline] “now stands as a model of community/government partnerships and for combining economic, environmental and social benefits which will last for generations to come”. Its success was further acknowledged by winning the Victorian Savewater Award and the Australian National Committee on Irrigation and Drainage Award in 2002¹² in recognition of the project’s excellence and promotion of best practice in water conservation.

A timeline of the NMPP illustrating the progress of the project over its 10 year time span is attached as Appendix A. This provides a useful reference point to NMPP milestones discussed throughout this report.

1.4 Evaluation of the Northern Mallee pipeline project and WARMPlan

Two independent audits have been undertaken assessing the impacts of the Northern Mallee pipeline.

- Wimmera Mallee Water commissioned independent consultants Kinhill Engineering Pty Ltd (Kinhill) of Adelaide to undertake a review of Stage 1 of the pipeline (Kinhill Engineers Pty Ltd, 1995) in November 1994
- Department of Agriculture, Fisheries and Forestry (AFFA) commissioned Melbourne based consultants Snowy Mountains Engineering Corporation Pty Ltd (SMEC) to assess the benefits of Stages 1-3 of the NMPP (Snowy Mountains Engineering Corporation Pty Ltd, 1999) in 1999.

The Northern Mallee pipeline was also seen to created opportunities for farmers to improve their natural resource management practices and improve farm profitability and viability. The Water and Resources Management and Planning program (WARMPlan)¹³ was developed to assist farmers to make the most of these opportunities and an evaluation of this program was undertaken in 2001. This program, a key initiative in the Northern Mallee during the time of the pipeline, is reviewed in the following section providing some measurable outcomes to assess the impact of the NMP.

⁶ “Feds retreat from piping”. The Wimmera Mail Times, 3 September, 1993.

⁷ “Nonsense talk on river run (editorial)”. The Wimmera Mail Times, 31 July 1991.

⁸ “Letters to the Editor”. The Wimmera Mail Times, 6 January, 1993.

⁹ “Tower is back in action”. The Swan Hill Guardian, 13 February, 1998.

¹⁰ “Northern Mallee Pipeline Project Stage 6 pushes ahead”. The North West Express, 29 March, 2001.

¹¹ This information was contained in John Konings speech notes at the completion ceremony of the Northern Mallee pipeline Project, 19 November, 2002. Sourced from GWM Water archives.

¹² “Mallee pipeline job wins national award”. The Wimmera Mail Times, 6 September, 2002.

¹³ Sourced from WARMPlan information contained in GWM Water archives.

1.4.1 Kinhill Northern Mallee Pipeline Review –Stage 1

Kinhill (1995) conducted an independent review of Stage 1 of the Northern Mallee Pipeline Project (NMPP) using both primary and secondary data to;

- assess customer's water supply expectations
- review the design and construction processes
- assess whether project aims and benefits have been met, and
- suggest improvements.

This study included a Water Supply Questionnaire (Kinhill, 1995) sent to all landholders in Stage 1A area (Piangil to Manangatang) of the NMPP (response rate 60%). The questionnaire found that, despite some concerns regarding water rates, flow pressure and loss of dams, the customers appeared accepting of the new system and acknowledged that the pipeline now provided them with opportunities for new water uses including feedlots, trees and piggeries. Details of this study are summarised below.

This questionnaire provides valuable, but brief, insight into the community perceptions of a change in water infrastructure on the Northern Mallee community. Although, this questionnaire provides opportunities for landholders to express their opinions with regards to the new water supply, it does not encompass the impacts of this new water supply on the community or farming practices. There now is a need to assess these changes retrospectively.

The major findings of this study are based on information acquired from site inspections, interviews, customer survey and documents provided by the then Wimmera Mallee Water (WMW). The findings of this review are summarised in Table 1.

Table 1
Major findings of the Kinhill (1995) Northern Mallee Pipeline Review

Parameter	Outcome	Recommendation
water flow and availability	Satisfactory	None
location of meter		
information provided to WMW customers		
Pipeline and pump station operation	Satisfactory - some small breaks, leaks and minor faults reported - considered consistent with other projects	Customers should be made aware that system is not 100% reliable and that problems take time to fix
water pressure	Needs to be reviewed	Improvements in design philosophy would enhance economic and supply benefits
pipeline cleaning		
operation procedures	Needs to be reviewed	Develop an operation and procedural manual to increase timely reactions to malfunctions and non-standard problems
record keeping		
water quality	Some improvement, with an evident decrease in salinity Not of potable quality	Detailed assessment and requirement needed before definitive statement can be made
water savings	Reported as "obviously high and significant" Identified that this could not be accurately defined	
water usage	Water consumption greater than expected – may be due to customers inexperience with pressurised water system	Develop a customer education program in the use of a piped water system and encourage them to use more automatic and efficient watering systems
Return on investment	Benefit-cost ration is between 1.14 – 2.5. This was considered acceptable.	

1.4.2 SMEC Audit, Northern Mallee Pipeline Project Report

An audit of the benefits of Stages 1-3 was undertaken in 1999. A number of assessments were conducted utilising various methodologies. These methods and major findings are reported in the following table.

Table 2
Major findings of the SMEC (1999) Audit of the Northern Mallee Pipeline Project

Aim	Method	Findings	Recommendations
To assess impact of NMP on natural resource management	searched relevant databases consultation with stakeholders – four workshops and two discussion groups	<ul style="list-style-type: none"> - increased flows to Wimmera & Glenelg Rivers - improved in-stream habitat - improved in-stream water quality - reduced weed dispersion 	
To assess impact of NMP on farm management	two focus groups – a total of 14 people	<ul style="list-style-type: none"> - improved water security for domestic, garden & stock - improved farm productivity - reduced farm operating costs & time saving - enhanced chemical efficiency - improved livestock health - no new livestock enterprises - reduced weed and animal pest control - improved flexibility in farm planning - greater confidence for future development of NM region - high value irrigated cropping systems are unrealistic due to cost 	<ul style="list-style-type: none"> - continuous monitoring of benefits so they can be identified & quantified - an annual survey of landholders sent with the water account - the social benefits strongly expressed by the community should be seriously considered as National, State and Regional gains

From these findings, the Northern Mallee pipeline appears to have a number of significant environmental and farm management benefits. This audit also reported that the high priority given by the stakeholders to using water for household and garden purposes indicated that the social benefits arising from the pipeline were also important to the community. Although an assessment of the social benefits was

outside the scope of this audit, it was reported that a number of other benefits had been identified during the workshops and focus groups including:

- Improved quality of life
- Increased tourism
- Increased community confidence and positive community attitude towards remaining in and developing the region

One key recommendation of this audit was the need to monitor benefits annually so benefits can be identified and quantified over time. To date, no regular surveys have been conducted to assess these longer term benefits of the pipeline. Consequently, data reporting benefits and how they might change research must rely on secondary data and recollection by individuals.

1.4.3 Water and Resources Management and Planning for the Northern Mallee (WARMPan)

The Water and Resources Management and Planning (WARMPan) Project aimed to assist Northern Mallee farmers to make the most of the opportunities available to them as a result of the secure supply of high quality piped water.¹⁴ These opportunities included introducing farmers to a number of sustainable and productive farm management opportunities. In addition, the WARMPan promoted and conducted a range of activities aimed at improving drought preparedness, profitability and viability for dryland farms in the Northern Mallee.¹⁵

The sustainable and productive farm management opportunities available to farmers as a result of the pipeline.¹⁶

- High quality pressurised year round water supply
- Levelling channels and reclaiming land in channel easements
- Directing water to any point on their property
- Fencing or working land according to soil type
- Diversifying to new industries
- Improved stocking rates and stock condition
- Reduced seepage and salinity
- Reduce plant and animal pest problems

The WARMPan was implemented in 1997 and funded by the Commonwealth Department of Agriculture, Fisheries and Forestry (DAFF) and the Victorian Department of Natural Resources and Environment (DRNE). The activities were guided by a Commonwealth-State Agreement and an Implementation Plan which included a list of Initiatives and Measures. These formed the basis of the WARMPan programs and implementation was directed by a locally based Steering Committee.¹⁷ An additional list of Complementary Measures with matched funding from the State

¹⁴ WARMPan brochure developed for the Northern Mallee community. Sourced from GWM Water archives.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Brain Garrett & Associates (2001). "Evaluation Report of WARMPan 2001 (1997-2001): For the WARMPan Committee".

Government guided the implementation of projects. These Complementary Measures were under the management of the DNRE.¹⁸

Prior to the commencement of the WARMPlan, a number of problems were reported¹⁹ including;

- delayed approval of the program by 15 months due to a change in government
- difficulty in the financial management of the program
- problems with the Partnership Agreement
- lack of initial enthusiasm
- restricted finances of the landholders, due to drought conditions, limited their ability to afford upgraded water supply systems
- project “downtime” and project management issues due to the highly dispersed community and seasonal workload
- problems establishing community structures, relationships and recognition took up at least one year of the program

Summaries of the major programs of the WARMPlan undertaken during 1997-2001 are listed in Table 3. The table also includes WARMPlan outcomes as identified in the Evaluation Report²⁰ commissioned by the Steering Committee as part of the inbuilt monitoring and evaluation process of the project.

The evaluation of the WARMPlan was largely based on participant numbers. However, the total farmer participation numbers were reportedly hard to estimate given that some farmers participated in numerous activities. Further to this, there was no evidence gathered that would indicate if participation did mean farmers had adopted more productive and sustainable farming practices.

The Evaluation Report²¹ reports the project as successful, despite the findings that there was some “natural resistance” and a slower than anticipated uptake of WARMPlan activities. Its success was largely seen as; engaging the community in identifying the needs of the Northern Mallee; the interest and enthusiasm of the participants; and the persistence of the project manager. An acknowledged weakness of the evaluation was its inability to provide quantitative monitoring of the programs. It is therefore difficult to ascertain an accurate measure of success of the WARMPlan programs and the level of adoption of such initiatives by Northern Mallee farmers. Understanding the impact of the WARMPlan is now reliant on retrospectively gathering data to evaluate this initiative over the longer term .

¹⁸ Further details on the Partnership Agreement, Implementation Plan and Steering Committee can be found in Brain Garrett & Associates (2001).

¹⁹ Brain Garrett & Associates (2001).

²⁰ Brain Garrett & Associates (2001).

²¹ Brain Garrett & Associates (2001).

Table 3
Summaries of the major programs of the WARMPan and their outcomes

Program	Description²²	Outcomes/Evaluation²³
Whole Farm Planning	- workshops encouraging farmers to consider all aspects of farm management, emphasising budgeting & planning for a piped water system	courses run at 6 Mallee towns 82 farms developed whole farm plans
Farm Water System Design Consultancy	- offered farmers access to qualified consultants to prepare designs for their on-farm water systems - Manual ²⁴ developed to assist farmers who did not have access to this program	delays in funding prevented this program running in conjunction with Stage 3 of NMPP implemented the program in Stages 5-6 77 participants in total
Drought Preparedness & Risk Management	- half-day workshop aimed to help farmers plan for impact of drought and other risk factors - workshop based on training module ²⁵ which was also published - booklet ²⁶ including a self-assessment checklist for drought preparedness was published	121 farmers from 7 Northern Mallee regions participated in these workshops Booklet was distributed to 3200 farmers in Northern Mallee region
Assessing Farm Business Position and Potential	- facilitated farmers involvement in a TopCrop BizCheck group to analyse the current potential of their farms against benchmarks developed for farms across the Mallee	original facilitator changed direction, therefore, local accountants and consultants ran the course under WARMPan direction groups were run in two Mallee towns

²² WARMPan brochure developed for the Northern Mallee community describing the WARMPan programs. Sourced from GWM Water archives.

²³ Brain Garrett & Associates (2001).

²⁴ Hayden, O. (2001). Mallee farm water supply manual.

²⁵ "Strategies for Managing Drought Risk – Dryland Mallee Region". Sourced from GWM Water archives.

²⁶ "Managing Drought Risk in the Mallee". Sourced from GWM Water archives.

Best Practice	- provided activities to improve farmers knowledge on more productive and sustainable farming practices - presentations by visiting experts - production of "best practice videos" ²⁷	exposed over 500 farmers to best practice
Diversifying Farm Income	- produced a series of brochures on 14 alternative industries	field inspections held at trial sites - aquaculture, jojoba plots 300 enquiries received
Leadership	- The Mallee Leaders Course designed to help farmers develop their skills and capacities as leaders	12 enrolments Bursaries provided to 2 applicants for other leadership activities

1.5 Summary of NMPP evaluations

The above evaluations of the NMPP suggest that the Northern Mallee pipeline has been successful in:

- increasing the supply of high quality water over an increased area,
- increasing flows in to the Glenelg and Wimmera Rivers and the subsequent improvement in the in-stream environment of these rivers
- aesthetic improvements of gardens and landscapes
- improved water recreation
- increased cropping on reclaimed land

However, a number of knowledge gaps have been identified and include:

- No regular assessment has been conducted to identify how this change in water infrastructure has impacted on the Northern Mallee community
- Little information exists about the community's perception of the success of the pipeline and how it has impacted on them economically, environmentally and socially.
- Limited information is available on farmers perceptions of how the pipeline has effected farming practices and quality of life on the farm
- It is unclear as to how successful the WARMPlan program was in assisting farmers, in terms of, the number of farmers who have adopted new practices

A heightened understanding of the objective and subjective impacts of the pipeline will provide an opportunity to more fully learn about the longer term impact of the NMPP across the region. In addition, a longitudinal study of the impacts of the

²⁷ Best practice videos on Tillage, Cropping Sequences and Salinity. Sourced from GWM Water archives

pipeline on the region would be of significant research value in the future, particularly as an unrestricted water supply is now less certain.

This study of community perceptions of the Northern Mallee pipeline contributes to gaining this knowledge and aims to provide a basis for further longitudinal research into the impacts of the Northern Mallee and Wimmera Mallee pipeline projects. The next Section discusses the specific objectives of this study.

2. Study Objectives

2.1 Study context

Identified in the previous Section, a number of benefits have been associated with the construction of the Northern Mallee pipeline (NMP). However, the evaluations and audits of various aspects and stages of the NMP indicate that little information exists about the community perceptions of the impact of the pipeline. In the absence of this information and given these impacts may change over time, understanding past and present community perceptions are important. It is also important to include objective assessments of impacts of the pipeline as total reliance on retrospective studies based on individuals recollection are susceptible to recall inaccuracy and bias²⁸. A heightened understanding of the objective and subjective impacts of the pipeline provide an opportunity to learn about the longer term impact of the NMPP across the region.

Further to this, the evaluations have not provided any assessment of the impact of the pipeline on the Northern Mallee farming community and hence there is a limited understanding of how a secure supply of high quality water has impacted on farming and natural resource management practices. The previous section discussed the Water and Resources Management and Planning (WARMP) program identifying limited knowledge on uptake of the program and how successful this program was in assisting farmers in adopting new practices. Identifying the above knowledge gaps informed the aims and approach of this study.

2.2 Overall study objective and significance

This study undertaken as part of The Water in Drylands Collaborative Research Program (WIDCORP) seeks to address these knowledge gaps. The study will explore the impact of the pipeline on the Northern Mallee community to gain an understanding of how a change in water infrastructure has impacted on the community and more specifically on farming and natural resource management practices.

Furthermore, the study will contribute to:

- (a) a generic understanding of the economic, environmental and social impacts of the pipeline on the Northern Mallee community;
- (b) an understanding of the changes in farming and natural resource management practices as a result of the pipeline
- (c) an understanding of the community perceptions of these impacts

The outcomes of the study will begin to inform WIDCORP of the impact of piped water on a rural community. The findings will identify follow-up research in the

²⁸ "Data sources for social research in Scotland: Results from a scoping study on longitudinal research". Retrieved from www.scotland.gov.uk, 18 October 2006.

Northern Mallee and other research opportunities that will provide valuable insight into similar water infrastructure projects elsewhere.

2.3 Study aims

The specific aims of this study are:

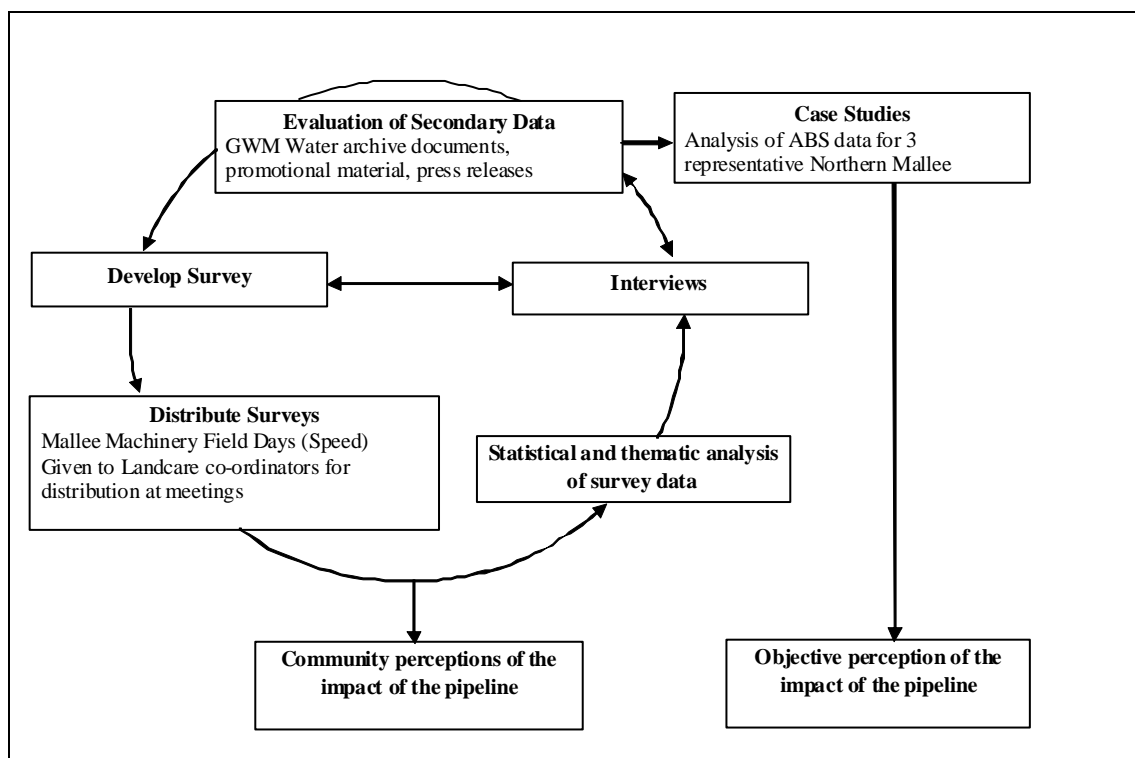
- 1.** to investigate whether the major social and economic structure of the Northern Mallee region has changed due to the introduction of the pipeline
- 2.** to understand the community perceptions of the economic, environmental and social impacts of the Northern Mallee pipeline on the community and farming
- 3.** to provide a basis for further longitudinal research into the impacts of the Northern Mallee and Wimmera Mallee pipeline projects

3. Method

3.1 Overview of the study methodology

This Section reviews the methodological approach to this study. Figure 5 represents the study approach.

Figure 5
The Study approach: Triangulation



Method triangulation was the approach chosen to assess the community perceptions of the impacts of the pipeline. Simply defined this approach is “the use of multiple methods to study a single problem, such as, interviews, observations, questionnaires or written secondary sources”.²⁹ The rationale for this approach was based on a review of the key concepts and tools available to undertake sound impact assessment, which concluded that one of the critical factors necessary for good project evaluation was the use of both qualitative and quantitative approaches.³⁰ It was highlighted that these two approaches strongly complement each other and the systematic evaluation of data from various sources often ensures data validity and reliability.³¹ The qualitative and quantitative methods applied in this project are described below .

²⁹ Ezemenari, K., Rudqvist, A., & Subbarao, K. (1999). “Impact evaluation: A note on concepts and methods”. This note forms part of a position. Quote taken from page 16.

³⁰ Ibid.

³¹ Information sourced from www.chronicpoverty.org. Retrieved 13 October 2006.

3.1.1 Qualitative Methods

A number of qualitative strategies were used to develop an understanding of the impacts of the Northern Mallee pipeline.

3.1.1.1 Written secondary sources

Numerous written secondary sources were accessed through the GWM Water archives. These archives were dated 1991-2002 and included:

- Wimmera Mallee Water pre and post-pipeline construction studies
- newspaper articles relating to all aspects of the NMPP
- NMPP promotional material
- WARMPlan documents
- funding applications
- Letters, Memos

Over 150 newspaper articles dated between 1992-2002 were sourced from :
The North West Express; Wimmera Mail Times; The Buloke Times; Herald Sun; The Donald-Birchip Times; The Swan Hill Guardian; The Wedderburn and Inglewood Express; North Central News; Warracknabeal Herald; The Mail-Times; The Hopetoun Courier

The views and opinions contained in these documents were used in the identification of the community perceptions of the impacts of the pipeline. They also contributed to the development of survey questions and interview themes.

3.1.1.2 Informal, conversational interviews

Informal conversations were held with local Northern Mallee community members and farmers during survey distribution at the Mallee Machinery Field Days (Speed, August 2-3, 2006). An estimated 150 people whose properties were connected to the pipeline contributed their views. The use of open-ended questions during survey distribution was an invaluable part of not only survey completion, but of learning in detail the individuals' thoughts and feelings regarding the impacts of the pipeline during various stages³². The nature of the conversations were casual, which allowed for the interviewer to respond quickly to individual differences and explore issues that were pertinent to single individuals rather than the community as a whole³³. These views were documented and used to build an understanding of community attitudes regarding the NMPP.

3.1.1.3 Open-ended interviews

In-depth open-ended interviews were held with:

- Local Farmer (8 August, 2006)
- Project Engineer, Northern Mallee Pipeline Project (11 September, 2006)
- WARMPlan Board Member (14 September, 2006)

³² Information sourced from www.chronicpoverty.org. Retrieved 13 October 2006.

³³ Ibid.

- Project Manager, WARMPlan (19 September, 2006)

Phone interviews were conducted with these individuals at pre-arranged times. Pre-determined open-ended questions were developed based on the secondary data and the conversations held with individuals at the MMFD. The use of open-ended questions in this study enabled issues to be explored in greater detail, while still allowing flexibility for the individuals to tell their stories³⁴. The views expressed in these interviews were compiled and contributed to the understanding of the community perception. The participants were selected based on their direct involvement with the NMPP and through referrals. A number of other people were identified but were either no longer contactable or unable to participate.

3.1.2 Quantitative Methods

Two quantitative methods were used in this study to complement the results of the qualitative approaches and enhance the validity and reliability of the data. First, a case study approach was utilised to capture any social-economic changes that may have occurred as the result of the pipeline. This method focused on objective data collected largely from the Australian Bureau of Statistics (ABS). Secondly, a Northern Mallee Community Attitudes survey was developed to assess the community perceptions of the impact of the pipeline. These methods are discussed in the following sections.

3.1.2.1 Case studies

A comparative case study approach was used to assess the objective changes in the community's social and economic characteristics as a result of the pipeline. This method involved the selection of three Northern Mallee study areas and the collection of social-economic data relevant to each area pre and post-pipeline construction. The following sub-sections summarise the selection process used to identify the three towns and the data used in the compilation of the social-economic profiles.

Selection of study areas

Three selection criteria were used to determine the study areas to be used including:

Discrete Postcodes

ABS-defined postal areas were used to define study areas to ensure that no overlap occurred between the case study towns.

Availability of data

ABS census dates influenced the timeframe over which data could be collected. The years in which census data was collected pre and post-pipeline construction were 1991 and 2001 respectively. As the completion dates for the latter stages of the pipeline (parts of Stage 6 and Stage 7) are not included in this timeframe, they were excluded from the selection process.

Relation to pipeline Stage

Towns were selected to represent the 10 year time frame of the NMPP to allow for examination of short, medium and longer-term impacts of the pipeline pre and post-

³⁴ Information sourced from www.chronicpoverty.org. Retrieved 13 October 2006.

construction. As the towns were restricted to those which were connected to the pipeline during Stages 1-5, the final towns chosen represented Stages 1, 3 and 4.

Targeted Rural Study Areas³⁵

Manangatang and surrounds

Part of Stage 1 (Piangil – Manangatang) of NMPP. Construction commenced in October 1992 and was completed in May 1993. The postal area of Manangatang also includes the neighbouring small towns and rural areas of Bolton, Chinkapook, Cocamba, Turoar and Winnambool.

Ultima and surrounds

Part of Stage 3 (Swan Hill – Ultima) of NMPP. Construction commenced in December 1995 and was completed in May 1997. The postal area of Ultima also includes the neighbouring towns and rural areas of Waitchie and Gowanford.

Ouyen and surrounds

Part of Stages 4 & 5 of NMPP (Wemen to Ouyen; Ouyen to Walpeup). Construction commenced in November 1997 and was completed in July 1999.

Data collection

The social-economic profiles were largely collated from Australian Bureau of Statistics social and economic data. However, information from local economic development boards, local councils, tourism bodies, and the local water authorities was also sourced.

Key ABS data fields

social statistics = demographics, education and training and socio-economic indexes

economic statistics = employment

3.1.2.2 The Northern Mallee Community Attitudes Survey

A survey research technique was used to gain an understanding of the community attitudes and perceptions of the impact of the pipeline. This method involved the development of a questionnaire to survey the perceptions of the Northern Mallee community members and farmers connected to the pipeline. The rationale and questionnaire development are described in the following sub-sections.

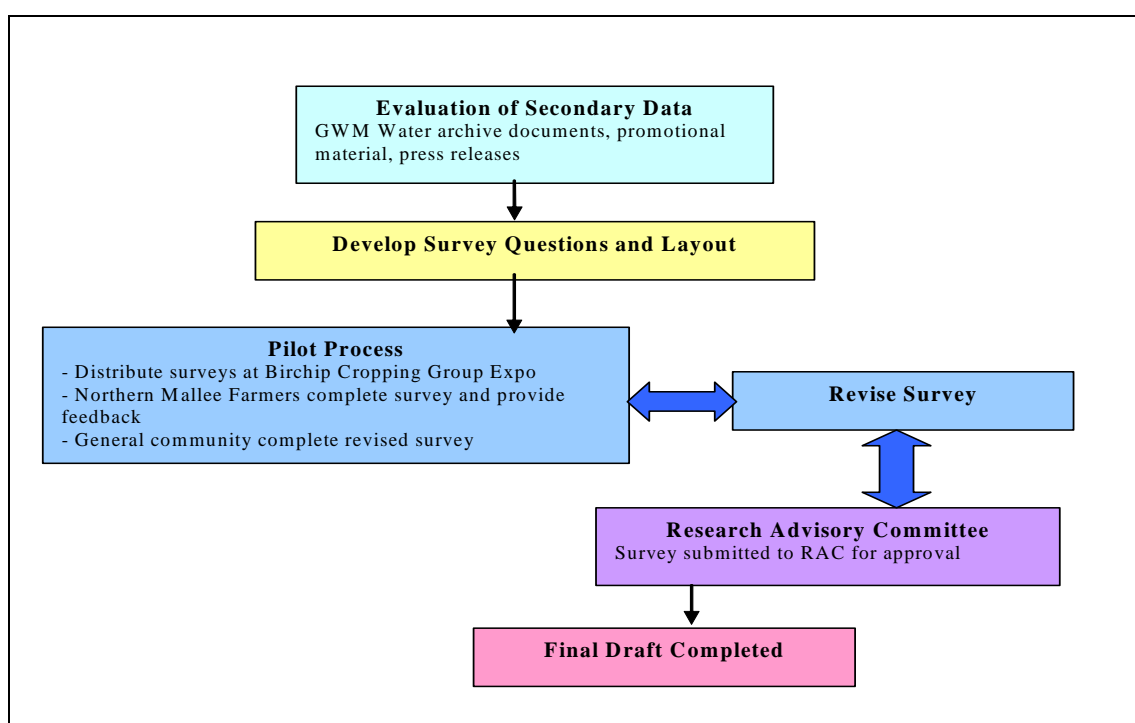
Questionnaire development

The Northern Mallee Community Attitudes Survey was designed as a self-administered questionnaire, comprising largely of closed questions, with some opportunities for open-ended responses. It was organised in to five sections to provide an orderly and structured approach to data gathering.

³⁵ Profiles of these towns are contained in the detailed report (Appendix B).

The contents of the questions were based on a compilation of reported benefits of the pipeline from numerous sources including the Wimmera Mallee Study System Draft (RWC, 1991); SMEC Audit (1999); Kinhill Report (1994); media releases; newspaper articles; WARMPlan Evaluation Report (2001); and conversations with key people involved in the Northern Mallee Pipeline Project. A recent survey of attitudes and aspirations of the Hindmarsh Shire Community³⁶ also provided some areas and types of questions to provide opportunities of some later comparative data analysis. The development of the survey is summarised in the following diagram.

Figure 6
Development of the Northern Mallee Community Attitudes Survey



The final version of the questionnaire (Appendix B) consisted of 52 questions arranged in to the following five sections:

- a) perceived benefits and disadvantages of the pipeline to the community after construction;
- b) perceived benefits and disadvantages of the pipeline to the community before construction;
- c) demographics;
- d) perceived benefits and disadvantages of the pipeline to primary production
- e) the impact of the WARMPlan.

Northern Mallee community members were asked to complete Sections A to C, whereas farmers were asked to complete all five sections. Completion of all five sections took approximately 20 minutes.

³⁶ The Centre for Regional Innovation and Competitiveness (CRIC) & WIDCORP (2006). "Hindmarsh Shire community attitudes and aspirations: Perceptions of the Wimmera Mallee Pipeline".

Target population

The target population for the survey was all persons aged 18 years or over residing in the area boarded by the Northern Mallee pipeline and had property that was connected to the pipeline. This included those individuals living in towns and rural areas. Individuals were approached by researchers at the Mallee Machinery Field Days (Speed, August 2-3, 2006) and asked if they lived in the Northern Mallee region and had piped water. If they responded “yes”, then they were asked to complete a questionnaire.

Data collection

The questionnaires and self-addressed envelopes were distributed to residents of the Northern Mallee at the Mallee Machinery Field Days (MMFD) located at Speed on August 2-3, 2006. Two methods of survey distribution were used; (1) a single questionnaire was handed to an individual; (2) multiple questionnaires were handed to individuals for distribution at field day sites and at meetings. Close to 400 questionnaires were distributed via these methods across the two days. However, one limitation of the second method is the uncertainty regarding how many individuals received a questionnaire, therefore, limiting the accuracy of response rate.

In order to maximise the response rate of the survey, a further 85 questionnaires were sent to the Landcare Co-ordinators of Sea Lake, Ouyen and Manangatang and another 50 were sent for distribution among Northern Mallee Top Crop Groups. These questionnaires were to be distributed at workshops and Landcare meetings held in late August and early September 2006. Following an ABC Radio Interview another two questionnaires were posted to interested participants and 16 were sent to interested persons after informal conversations. A total of 553 questionnaires were distributed over a two week period. However, it is unclear how many individuals actually received a questionnaire.

Two ABC Radio interviews (August 7 and August 18 2006) and newspaper media releases were used to prompt individuals to return the questionnaires. September 15 2006 was used as the final date for receipt of questionnaires.

Response rate

The response rate (10%) was lower than expected with only 54 surveys completed and returned. Despite this small sample, eleven postcodes in the NMP area were represented (Table 4).

Table 4
Northern Mallee pipeline areas represented in the survey sample

Postcode	Area	Stage of pipeline	Number of survey respondents
3542	Lalbert	3	1
3546	Manangatang/Chinkapook	1	9
3585	Chillingollah	2	3
3597	Piangil/Natya	1	1
	Total respondents Stages 1-3		14
3488	Speed	7	3
3489	Tempy	7	6
3490	Ouyen	5	6
3491	Patchewollock	7	8
3507	Walpeup	5	2
3509	Underbool	5	3
3533	Nandaly	7	7
	Total respondents Stages 4-7		35
Missing data		5	5

Survey sample and demographics

The majority of respondents were male (82.4%) between the ages of 35-64 years (70.6%). This reflects the general trend across both Mallee regions and rural Victoria of an ageing population. In particular, there has been an increase in people aged 35 years and over in Mallee towns³⁷

The survey was distributed to both people living in town and in rural areas. However, the majority of respondents lived in rural areas (76.9%) rather than in town. They were generally married (88.5%) with half the respondents having children living at home (54.9%). Nearly all respondents had lived in the Northern Mallee for more than 10 years (94.2%).

The respondents generally ran their own businesses (80.8%), predominantly farms. Household annual income varied between \$20,000 and \$100,000, with 76.9% of respondents falling within this bracket. Only 7 individuals reported an annual income of more than \$100,000 and no respondents indicated that they had an income under \$20,000. This indicates that the sample was not overrepresented by the highest or lowest income brackets.

³⁷ ABS Census Data 2001

3.2 Data Analysis

3.2.1 ABS data

ABS sources were compared across the three study areas prior to and following the construction of the pipeline. In most cases, the ABS data was converted to percentages, so comparison could be made between the study areas and Victorian state statistics.

3.2.2 Written secondary sources and interviews

Thematic analysis was used to assess the themes in the secondary data. Data was broadly organised according to its relevance to economic, environmental and social impacts pre and post-pipeline construction. Within each theme was a set of sub-themes which were identified from the survey questions. Relevant secondary data was then organised according to these sub-themes and formed the basis for interpretation.

3.2.3 The Northern Mallee Community Attitudes Survey

The Statistical Package for the Social Sciences (SPSS) was used to analyse the survey data.

Assessment of perceived pipeline benefits and importance

The SPSS Frequencies and Explore procedures were used to obtain the percentage of responses, means and standard deviations of perceived benefits and importance of those benefits. The standard deviations indicated that little variability existed within responses, with 98% of total respondents indicating a positive or very positive attitude towards the impact of the pipeline. Further to this, very few “don’t know” responses were recorded. This pattern of responses indicates that although the sample was small there was a high level of awareness and understanding of the impacts of the pipeline.

Following the identification of overall preferences, a quadrant analysis was undertaken to identify the perceived strengths and weaknesses of the pipeline. This process involved an assessment of respondent perception of the benefits of the pipeline, in relation to their perceived importance of these elements. The vertical axis of the quadrant represents the level of importance associated with each proposed benefit of the pipeline. The horizontal axis indicates respondents’ perception that the pipeline has delivered that benefit. A comparison of the average importance of the benefit relative to the perceived benefit enables the various benefits to be classified into four quadrants (Table 5); strengths, weaknesses, adequate and maintain.

Table 5
Quadrant Classifications

Quadrant	Importance Rating	Benefit Rating
Strengths	Above average	Above average
Weakness	Above average	Below average
Adequate	Below average	Below average
Maintain	Below average	Above average

This information allowed for the determination of the community perceptions of the environmental, social and economic impacts of the pipeline. The data was also analysed to ascertain the impact of the pipeline on farming practices and attitudes and also in relation to the WARMPlan.

Assessment of perceived impacts over the Stages of the Pipeline

Stages 1, 2, 3, 5 and 7 were represented by the survey sample. However, small numbers in each group precluded the comparison of each individual stage. Therefore, the data was recoded and collapsed into two groups; Stages 1-3 (N=14) and Stages 4-7 (N= 35). Assumptions of normality were assessed for each group. However, due to severe violations parametric tests comparing the groups for differences in their perception of the pipeline was not possible. Therefore non-parametric tests were used. The Mann-Whitney U test was used to test for differences between the two Stage groupings of the pipeline allowing for assessment of perceived impacts of the pipeline over time. However, given the small sample sizes in the groups, these results were only used to explain possible variations in responses rather than to identify conclusive differences between the stages of the pipeline.

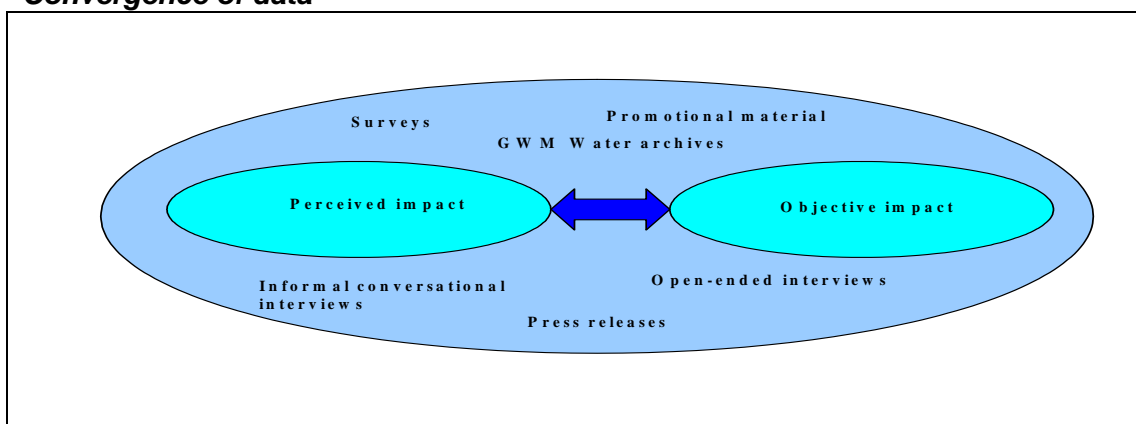
Effects of gender and age on perceived impact

The data was unable to be analysed for differences between perceptions of the pipeline based on gender or age groups due to small sample sizes in each of the groups. Collapsing the data was unable to create groups with sufficient numbers for analyses.

3.2.4 Convergence of data

This study recognises that the sample size was too small to generalise the results based on the survey data alone. Therefore the data from both the qualitative and quantitative methods were converged (Figure 7) to enhance the validity and reliability of data and to identify common themes in relation to the economic, environmental and social impacts of the Northern Mallee on the community and farming.

Figure 7
Convergence of data



3.3 Research reflections

This study has compiled a large range of secondary and primary data from multiple sources to determine the economic, environmental and social impacts of the Northern Mallee pipeline on the community and farming. The triangulation method used in this study enhances the validity and reliability of the data collected and contributes to the degree of confidence with which the conclusions regarding the impact of the pipeline are drawn. However, a number of limitations associated with the individual methods used limit the reliability and generalisability of these findings and therefore only trends in the data are highlighted rather than conclusive statements about the impacts of the pipeline. The limitations are discussed in the following sub-sections.

3.3.1 Case studies

One major limitation in the case study approach was the limited availability of data from the Australian Bureau of Statistics (ABS) at the scale required for this study. ABS postal areas were used to gather data for the three towns and their surrounds. However, the Ultima postal area only extends as far as the boundaries of the township and therefore do not capture changes in the rural regions of this study area. Additionally, since the 1996 Census changes have been made to the Australia Post postcodes and therefore those used in the POA listing for the 2001 Census may not necessarily match those used for and prior to the 1996 Census³⁸. As such there may be inconsistencies within a dataset for a particular study area. The ABS website does not specify whether the Australia Post postcode boundaries have changed for the study areas between 1991 and 2001.

Limitations also exist in determining the relationship between pipeline construction and changes in the Northern Mallee rural communities based on this data. This secondary data was limited in availability and generalisability. With only a broad picture of the general trends in the Mallee regions it is difficult to ascertain the impact of the pipeline on the specific study areas from this type of data.

3.3.2 Privacy

Privacy laws prevent accessing names and contact details of individuals. Without these names, no follow up reminders could be sent to individuals. This study addressed this limitation by promoting the return of the surveys on the radio.

3.3.3 Recall bias

The majority of the survey and interviews in this study are based on current perceptions of individuals and can therefore be considered an accurate measure of their attitudes. However, the nature of part of this study is retrospective as it requires participants to provide information (attitudes regarding the pipeline pre-construction) based on recollection. This method is associated with a number of limitations, namely that recall of information depends entirely on memory which can often be imperfect and therefore unreliable (Hassan, 2006). It is reported that the reconstruction of events, motives and feelings are highly susceptible to recall inaccuracy and bias. Further to this, recent events may cloud the interpretation of

³⁸ Information sourced from ABS website, www.abs.gov.au.

previous events³⁹. To counter this limitation other sources of data identifying community perceptions at the time of pre-pipeline construction were sourced from secondary data.

Convergence of both primary and secondary data sources is a research method that acknowledges these limitations and increases the validity and reliability of the data. The identified impacts of the Northern Mallee pipeline on the community in this study are based on compiled data rather than on only one source of data. Emerging from this data are some common themes in relation to the perceived economic, environmental and social impacts of the pipeline on the Northern Mallee community and farming. The major objective and subjective findings of this study are presented and discussed in the next Section.

³⁹ "Data sources for social research in Scotland: Results from a scoping study on longitudinal research". Retrieved from www.scotland.gov.uk, 18 October, 2006.

4. Major findings

4.1 Introduction

The major findings of the study, which are a compilation of both primary and secondary data are described in this Section. Representing the findings in this way provides a holistic understanding of both the objective and subjective impact of the Northern Mallee pipeline some 10 years after its inception. The findings are discussed in two parts; a social-economic profile and community perceptions of the impact of the pipeline.

The first part summarises the key findings of the analysis of the social-economic data of three specific areas in the Northern Mallee which gained access to the pipeline in 1993, 1997 and 1999; Manangatang, Ultima and Ouyen respectively. For a more detailed report of these findings refer to Appendix C.

The second part provides an account of the community perceptions of the impact of the pipeline and how these may have changed over the 10 year period of the NMPP by reporting primary and secondary data findings in the context of before, during and after pipeline construction. A number of common themes in relation to the perceived (or subjective) economic, environmental and social impacts of the pipeline on the Northern Mallee community and farming were identified. These themes are described below.

Definitions of economic, environment and social themes used in this study

Economic refers to cost of piped water; attracting new industries and business to the region and improving the appeal of the region as a tourist destination.

Environment relates to water quality and security; the availability of water for parks, Rivers and wildlife; and the amount of water wasted throughout the region.

Social refers to both participation in recreational activities and social attitudes relevant to the community and individual's well-being including quality of life, financial security, availability of employment and health services, level of stress and anxiety and attitude towards the future.

Key lessons from all stages of the pipeline are highlighted and these may be of relevance to the Wimmera Mallee pipeline and other such projects in dryland Australia.

4.2 A social-economic profile of change, 1991-2001: Case study of three targeted rural areas in the Northern Mallee

Social-economic trends across rural Australia over the past decade provide a basis from which to assess notable changes across the NMP region that may show some correlation with the construction and use of the pipeline. This study analysed the demographic and social-economic trends and indexes that have occurred in Manangatang, Ultima, Ouyen and regional Victoria in 1991 and 2001.

In general, the analysis of the available social-economic data indicates that some demographic and employment changes were observed in the three study areas post-pipeline construction compared to pre-pipeline. These changes appear consistent for all three towns, indicating impacts of the pipeline over time are unclear.

Analysis of these data sources did not detect any changes in these regions demography or economy that could be related to the pipeline. Trends in these regions population, age and economy were reflective of trends across other rural regions of Victoria.

This highlights a number of important factors that are worthy of consideration in understanding the impact of the NMP on the regions' social-economic situation:

- Secondary data is limited in availability and generalisability. It only gives a broad picture of the general trends in the Mallee regions making it difficult to ascertain the impact of the pipeline.
- There is a need to develop a set of objective indicators and a primary data collection method of these indicators which is relevant to changes associated with the pipeline

Follow-up research focusing on the social-economic profiles of Northern Mallee towns pre- and post pipeline construction using more specific data will help clarify the objective impact of the pipeline.

4.3 Community perceptions of the impact of the Northern Mallee pipeline

4.3.1 Introduction

Common themes in relation to the environmental, social and economic impacts of the pipeline on the Northern Mallee community and farming were identified throughout this study. The major findings are summarised according to these themes in the following sections.

4.3.2 Perceived economic impacts of the Northern Mallee pipeline

“There will be new processing or specialist industries attracted to the area because of its environment and water availability”⁴⁰

4.3.2.1 Pre-construction

The Wimmera Mallee System Study Draft Summary Report (Rural Water Commission, 1991) identified a number of economic benefits resulting from the

⁴⁰ Wimmera Mallee Water (1997) “A pipeline to change”: Briefing note. Sourced from GWM Water archives. This quote is taken from a passage in this briefing note which reflects on what the Mallee pipeline area may look like in 10 years time. Given that it was written 9 years ago, it appears fitting to include this to reflect on what WMW thought the impacts of the pipeline would be now.

Northern Mallee pipeline prior to its construction. In general, it was proposed that with an increased supply of quality water there would be:

- water sales to new industries
- savings in operation and maintenance costs of channel system
- reduced capital expenditure on redundant channel system
- return of land to productive use

An increase in water based tourism, employment opportunities and development of new industries were also identified as economic benefits of the pipeline^{41,42}

The Northern Mallee community attitudes survey asked respondents to think back to before the pipeline was built. The majority of respondents when asked to recall their expectation that the pipeline would improve the region's economy identified that it was important, with 66.1% agreeing that the pipeline would also deliver this benefit.

Secondary data revealed that the community^{43,44}, Shires and Federal MP's⁴⁵ were all concerned about the capital costs to farmers prior to construction.

Federal MP John Forrest reported in The Swan Hill Guardian Newspaper, 22 September 1993:

“that some farmers had complained to him about having to pay \$25,000 and \$30,000 for on-farm infrastructure, at a time of low commodity prices...Despite low interest rate assistance by Rural Finance, financial burden was still too great”.

Initial concerns regarding the application of the user-pay system to environmental flows were also voiced in local newspapers with strong opposition to the public having to pay for environmental flows⁴⁶.

Excerpt from the Editorial (1999, July 31). *The Wimmera Mail Times*.

“We disagree vehemently with an outrageous assertion that the public purse should pay for environmental flows in line with the Rural Water Commission's user-pays principle”.

The survey responses and the many conversations held with farmers over the two days at the Mallee Machinery Field Days (Speed, August 2-3, 2006) support this concern for the initial on-farm cost and ongoing annual costs. The majority of the respondents (87.7%) when asked to recall their concerns prior to the pipeline agreed that they were concerned about the possible increase in the cost of water. Specifically, the additional costs associated with gaining access to piped water

⁴¹ Wimmera Mallee Water. (1996). *Northern Mallee Pipeline Project: A model infrastructure project of major significance to the nation, state and local communities*. Horsham, Victoria: Wimmera Mallee Water.

⁴² Wimmera Development Association (no date). “Strategic importance of Wimmera-Mallee pipelining”. A community information sheet sourced from GWM Water archives.

⁴³ Letters to the Editor. (1993, January 6). *The Wimmera Mail Times*.

⁴⁴ Bound together by water. (1999, March 2). *The Buloke Times*.

⁴⁵ MP optimistic on pipeline works. (1993, September 22). *The Swan Hill Guardian*.

⁴⁶ Piping, the lifesaver for a river –at a cost. (1991, July 31). *The Wimmera Mail Times*; Nonsense talk on river run (Editorial). (1991, July 31). *The Wimmera Mail Times*.

(79.6%) was of greater concern than having their water metered (46%). Open-ended survey responses also reflected this concern.

Examples of open-ended survey responses when asked about their concerns prior to construction of the pipeline

- “Cost, getting water all the time”
- “The cost of on-farm infrastructure”
- “Cost of tanks and piping”

4.3.2.2 During construction

During construction, one of the main impacts of the pipeline was reported to be enhancement of the regions’ economy during construction through increased employment opportunities and the influx of workers into the regional towns. A Pipeline Facts⁴⁷ sheet proposed that “at least 2000 jobs over the life of the project will be created in various positions, ranging from labourers, to farmers and consultants”.

The Donald-Birchip Times (1992, 19 May) reported that:

The Rural Water Commission “believed 50 on-site jobs would be created...with up to 100 more from flow on effects in the initial stages”

“Mr Crabb identified that pipeline employment will give a much needed boost to the economies of local towns in the Mallee region from the considerable flow-on effects”.

There is limited data available to determine the full impacts of the pipeline during construction on the economy of the Northern Mallee pipeline regions. However, secondary data and interviews with one of the NMPP Project Engineers⁴⁸, and a local farmer⁴⁹ indicate that the impact of this project on the regions’ economies has been minimal.

Notably the major tenders went to interstate companies as the regional contractors were not large enough to support the project nor did they have the specialised training required. Smaller contracts such as fencing and some sub-contracts were let to local people. It was estimated that approximately 20 local people were employed at each stage of the pipeline.⁵⁰

⁴⁷ Rural Water Commission (no date). “Wimmera Mallee Water Supply System- Pipeline Facts”. Community information sheet sourced from GWM Water archives.

⁴⁸ NMPP Project Engineer (personal communication, September 11, 2006)

⁴⁹ Tempy farmer (personal communication, August 8, 2006)

⁵⁰ NMPP Project Engineer.

The construction of the pipeline involved three main tenders; one for the supply of pipes; the second for installation and the third for service connections. The pipe supply went to two main National suppliers, mainly located in Melbourne, NSW and Queensland and a range of contractors were appointed for installation, including one from South Australia^{51,52}.

The outside contractors, in general, had their own sub-contractors and workers. They arranged accommodation deals with local motels, hotels and caravan parks and used the local shopping and eating facilities. Whilst they did bring business into the regional communities, it appears that only a small economic impact would have resulted from the construction of the pipeline at the time, due to the small influx of workers (approximately 30) for a short period of time (approximately 4-5 months)⁵³. A local farmer supported this minimal impact, summarising the economic impact of the pipeline as “outside contractors came in with specialised equipment and we sold them pies and beer”.⁵⁴

Whilst specific information is not available to estimate the number of jobs created from such a large infrastructure project, there is some evidence that the Northern Mallee pipeline project created several opportunities for employment both regionally and in the cities. However, it appears that the majority of these opportunities lay outside that of the Northern Mallee region.

4.3.2.3 Post construction

Key economic impacts identified by the Rural Water Commission (1991) and Wimmera Mallee Water (1995) included savings in operation, maintenance and capital expenditure of the channel system; water sales to new industries; return of land to productive use; increased tourism and development of new industries. This study further identified the impact of the pipeline on cost as an important economic impact to consider. The following assessment of these impacts post pipeline construction is made based on the secondary data and the results of the Northern Mallee community attitudes survey, interviews and conversations with stakeholders and community members. Refer to Appendix D for details of the survey results relating to the economic impacts of the pipeline.

Savings in operation, maintenance and capital expenditure of channel system

The Rural Water Commission (1991) identified that a piped water supply in the Northern Mallee would considerably reduce the annual operating and maintenance costs of the channel system. Further to this, it was expected that the pipeline would also reduce the capital expenditure on the redundant channel system.

Limited data was available on the impacts of the pipeline on the costs of the channel system for all stages post-pipeline construction. However, Wimmera Mallee Water

⁵¹ Ibid.

⁵² Speech notes from the Opening of Stage 4-5. Sourced from GWM Water archives.

⁵³ NMPP Project Engineer.

⁵⁴ Personal communication with Tempy farmer, 8 August 2006

(2002) assessed these benefits for Stages 1-3 of the pipeline. The final report⁵⁵ indicated that the Net operation and maintenance savings due to pipelining was \$116,000 per year, with further annual capital savings of between \$110,000 - \$130,000. This data was not available for the latter stages of the pipeline.

Attracting new business and tourism to the region

Water sales to new users and attracting new business and tourism to the Northern Mallee were identified as benefits of the pipeline pre-construction. Wimmera Mallee Water (1995) reported that a wide range of industries were examining establishment within the region, however, they faced significant cost penalties without a secured water supply. It was identified that with a secure supply of quality water, these new industries would be attracted to the region. Tourism was also expected to increase with a piped water supply. It was predicted that with piped water there would be less fluctuation in the Grampians storages, which in-turn would lead to an increase in water-based tourism.

The secondary data available indicates that of the annual water saved as a result of the pipeline (49,509ML), 7469ML was allocated to new users⁵⁶. However, evidence indicates that none of this allocated water has been sold to new users⁵⁷ suggesting that perhaps the development of new business and industries is yet to occur.

The survey data supports this suggestion with only 21.5% of respondents agreeing that the pipeline created new industries and attracted new investment to the region and 36.9% agreeing that the pipeline had created opportunities to increase household income. However, earlier stages of the pipeline (Stages 1-3) were seen by many respondents (72.8%) to have created opportunities to increase household income, compared with the latter stages (22.6%, Stages 4-7). Furthermore, more respondents (45.5%) perceived earlier stages of the pipeline to have a positive impact on attracting new business and creating new industries, compared to latter stages (15.6%). This may indicate that these economic benefits of the pipeline may not be realised for sometime after construction.

The survey responses indicated that few respondents (18%) agreed that the pipeline attracted tourism to the region, with very few (6.5%) believing that the pipeline has had a positive impact on attracting tourism.

Return of land to productive use

The impact of the pipeline on the productivity of reclaimed channels is discussed in Section 4.3.4.3 in the broader context of farming.

⁵⁵ Wimmera Mallee Water (2002). "Capital investment assessment Northern Mallee pipeline project". Sourced from GWM Water archives.

⁵⁶ Wimmera Mallee Water (2002) "Northern Mallee pipeline project construction stages – Final: Funding and allocation of saved water". Sourced from GWM Water archives.

⁵⁷ Wimmera Mallee Water (2002). "Northern Mallee pipeline project: Sale of Savings Water". This report documents the water sold from the annual water savings of the pipeline. While some of this water was sold (1709ML), it was not to new users. Sourced from GWM archives.

Cost

The community perceptions of the impact of the pipeline on cost are mixed. Secondary data indicated that farmers were disappointed with the costs associated with the pipeline, with on-farm set up costs being viewed as high; “had to pay for piped water when water rates were already uneconomically high” were reported in the newspapers⁵⁸. It was noted that farmers thought it unfair that rate payers had to bear all costs to convert to the pipe with no major financial gains and with 90% of saved water going to environmental flows outside the region. Anger was expressed in relation to Walpeup Lake, with farmers arguing that they were paying large costs to give 20,000 ML of their entitled water back to the water authorities and that they couldn’t get a “mere 350ML” to fill Walpeup Lake and maintain “a minimum quality of life in this district”⁵⁹.

On the contrary, The Guardian newspaper (19 October, 1998) reported that those initially critical of the pipeline because of farmers facing the prospect of off-farm costs became supporters once this cost was picked up by governments. Furthermore the North West Express (12 November, 1998) interviewed several farmers connected to the pipeline and found a positive perception of the impact of the pipeline on cost.

Examples of comments from the interviews in the North West Express (1998, November 12).

“piped water is very expensive but that it is the way to go both economically and ecologically” – *Manangatang farmer*

“one-off farm cost of piping was a small price for the unquestioned benefits...piping adds to the capital value of your property and improved water quality alone makes it worthwhile“ and “...the extra production from land now taken by channels will certainly help compensate” – *Walpeup farmer*

“the capital cost of piping was nowhere near what we thought it would be...put together the facts on piping leave you miles in front” – *Ultima farmer*

The survey responses also indicate a mixed perception, with 51% of respondents agreeing that the pipeline has led to excessive water costs. Open-ended survey comments also indicated that some farmers were concerned about cost and having their water metered.

Examples of open-ended responses reflecting concern of rising water costs.

“ [we are] very fearful that when everyone is on meters price(s) will go through the roof”;

“Prices and meter reading fees just keep going up and up”

“ [I] fear that the fact of meters being available will be used as an excuse to push up the cost of water as it is so easy to increase costs by a few cents per mega litre more often and so ever increasing the cost by stealth”.

⁵⁸ Letters to the Editor. (1998, July 31). *The North West Express*.

⁵⁹ (1998, July 31). *The North West Express*.

Examples of open-ended responses expressing concern.

“the biggest worry to all pipeline users is the increasing cost of the water”

“too highly priced for no good reason”

“Costs are so high. If water was always regular, maybe worth it”

“The cost per KL of water is very high. Hence, it’s a high price to pay for a nice garden”

“Mallee (is) not fully compensated for huge savings in water from the Grampians – but still paying for infrastructure in reservoirs”

“Water that is saved should not be provided cheap to new users after the current users have paid the high costs of installation”

Follow-up research focusing on quantifying the economic costs and benefits of the pipeline and the impact of the new water tariff structure on farm income will help clarify the impact of the pipeline on the Northern Mallee regions economy.

4.3.3 Summary of impact of pipeline on the economy

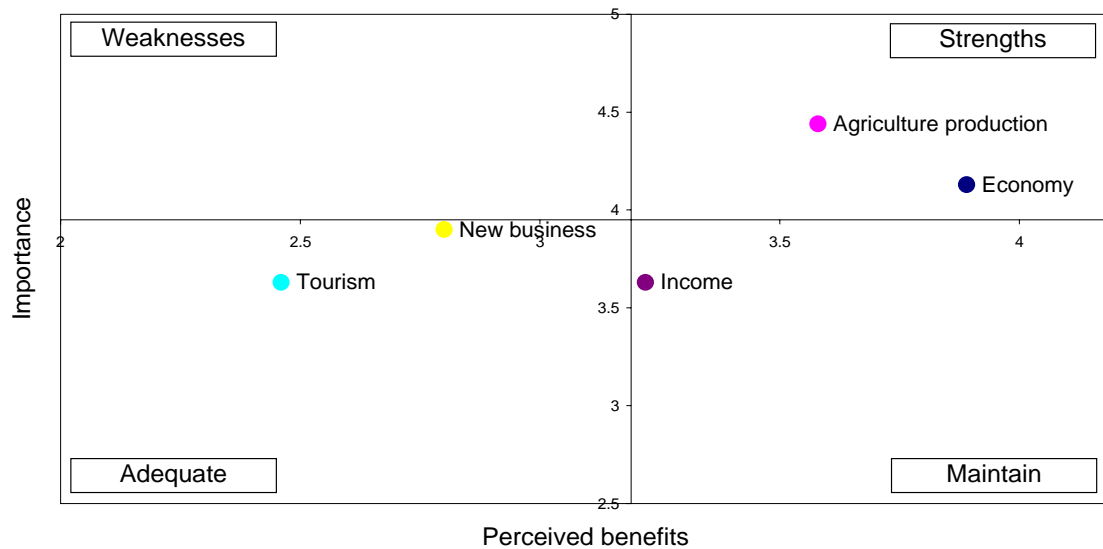
The economic base of the Northern Mallee is largely based on broad-acre cropping and prime lamb in the southern areas and intensive irrigation in the northern areas. A large part of this region is national park which attracts many tourists annually. With the introduction of the pipeline it was anticipated that a secure supply of high quality water would boost the economics of the region by encouraging the development of new businesses and an influx of tourists (RWC, 1991). This study explored whether the community believed that the pipeline enhanced these economic aspects of the region.

Summary of study findings on the economic impacts of the pipeline:

- Many survey respondents (66.1%) believe that the pipeline has improved the region’s economy.
- Secondary data indicated that some farmers were disappointed with the costs associated with the pipeline, with on-farm set-up costs being viewed as high.
- 51% of survey respondents agreed that the pipeline has led to excessive water costs.
- 37% of open-ended survey responses expressed concern regarding cost of piped water.

A quadrant analysis of survey responses (Figure 8) compared the relative average importance of the proposed economic impacts with the community’s belief that the pipeline has delivered that benefit.

Figure 8
Perceived economic benefits and important pipeline attributes



This is a summary of the community perceptions of the economic impacts of the pipeline based on the convergence of multiple data analyses.

Benefits

- Improved economy
- Increased agriculture production

Limitations

- Limited attraction of tourism & new business to the region

Concerns

- Excessive water costs

4.3.4 Farming impacts

“Many farm holdings will have reasonably significant new small enterprises ranging from herbs and high return vegetables and flowers through to quality piggeries and bird farms of different types⁶⁰”

4.3.4.1 Pre- construction

Prior to construction of the pipeline the major farming benefit proposed by the Rural Water Commission (1991) in the Wimmera Mallee System Study Draft Report was the return of land to productive use. However, Wimmera Mallee Water^{61,62, 63} later identified a number of other farm management benefits including:

- Reduced channel seepage
- Improved livestock condition
- Reduced pest plants and animals
- More flexible on-farm water system layouts
- Opportunities to develop alternative farming enterprises

The Northern Mallee community attitudes survey asked respondents to think back to before the pipeline was built. Many respondents (68.5%) when asked to recall their expectation that the pipeline would improve the region’s farming opportunities identified that it was important, with fewer (59.1%) agreeing that it would actually deliver this benefit.

Community members when asked to recall their concerns regarding the pipeline before construction expressed a variety of issues in their open-ended survey responses. These concerns are reflected in the following comments.

Examples of open-ended survey responses about concerns prior to construction.

- The availability of quality materials for infrastructure
- Clear rules regarding what had to be purchased
- Farm installation of equipment
- Back filling of channels
- Location and cost of tanks

Water security for stock, water pressure and adjustment to a completely new system were also raised as issues in the survey, with one farmer stating that the pipeline is “a totally new concept to come to terms with. It was a positive attitude that wastage

⁶⁰ Wimmera Mallee Water (1997) “A pipeline to change”: Briefing note. Sourced from GWM Water archives. This quote is taken from a passage in this briefing note which reflects on what the Mallee pipeline area may look like in 10 years time. Given that it was written 9 years ago, it appears fitting to include this to reflect on what WMW thought the impacts of the pipeline would be now.

⁶¹ Wimmera Mallee Water (1997). “A Pipeline to change – A briefing note”. Sourced from GWM Water archives.

⁶² Wimmera Mallee Water. (1996). *Northern Mallee Pipeline Project: A model infrastructure project of major significance to the nation, state and local communities*. Horsham, Victoria: Wimmera Mallee Water.

⁶³ WARMPlan brochure developed for the Northern Mallee community. Sourced from the GWM Water archives.

through the channel system could be eliminated. No on-farm storage for fire fighting or other emergency needs; particularly for stock, should system break down was and is an ongoing concern”

4.3.4.2 During construction

The main impact of the pipeline on farming during construction is the consultation process between Wimmera Mallee Water and local farmers with respect to the location of the pipeline and backfilling channels. However, limited data is available from this study to determine the full impacts of the pipeline during the construction phase.

The primary data indicates that, in general, farmers appeared to be satisfied with the community consultation process during the planning and construction stages of the pipeline. The survey responses indicated that many of those consulted (65.2%), were positive about this experience. Although the Project Engineer of the NMPP reported that some farmers were “against the pipeline” and that they didn’t want consultation as “they didn’t want change”⁶⁴, no negative comments were heard about this process during the many conversations with farmers at the Mallee Machinery Field Days (Speed, 2-3August, 2006) or through open-ended responses in the survey.

Example of the consultation process with local farmers⁶⁵.

One Tempy farmer described the consultation process as “excellent”, stating that he had three meetings on a one on one basis with pipeline management. He reported that he met the engineers about the layout of the pipe on his farming property and said that he had some input “to a degree”. He reported that they discussed many topics including his future production expectations and the amount of water he thought he needed; tapping points and vegetation, erosion and soil types. He reported a positive outcome stating that they have “tapping where they want” and that the impact on his property during construction was minimal.

The secondary data identified that the backfilling of redundant channels caused some concern for landholders particularly within Stages 2-3 of the NMP.⁶⁶ In general, landowners were responsible to backfill redundant channels and incorporate reclaimed land into their farm layout.⁶⁷ However, this process was considered inequitable as some farmers had small channels or no channels, whereas others had large main channels that traversed their properties for 20km.⁶⁸ For these farmers backfilling was not only difficult and expensive, but dangerous.⁶⁹ In 1997 WMW adopted a policy in consultation with the Consultative Committee of assisting with the

⁶⁴ NMPP Project Engineer.

⁶⁵ Tempy farmer.

⁶⁶ Letter dated 12 June 2002. Sourced from GWM Water archives.

⁶⁷ Memo dated 12 May 2000. Sourced from GWM Water archives.

⁶⁸ Wimmera Mallee Water (1997). “Northern Mallee Pipeline Project channel backfilling – Submission for Board decision”. Sourced from GWM Water archives.

⁶⁹ GWM Water (2002). “Backfilling of channels after piping”. Presentation slides sourced from GWM Water archives.

backfilling of certain main channels in the NMPP area.⁷⁰ It was decided that WMW would undertake partial backfilling of the larger channels (within Stages 1-3) to a stage that could then be safely managed by the landowner. This policy continued throughout the latter stages (Stages 5-7) of the NMPP⁷¹.

WARMPPlan

The WARMPPlan was established during the construction of the pipeline (1997-2002) to assist farmers to achieve the opportunities offered by the pipeline and to promote and conduct other activities aimed at improving drought preparedness, profitability and viability for dryland farms in the Northern Mallee.⁷² This study evaluated the success of the WARMPPlan programs during pipeline construction using the Northern Mallee community attitudes survey and interviews with key people involved in the WARMPPlan. However, the available data from the survey was limited. As a result this study's evaluation of the success of the WARMPPlan was largely based on the results of interviews with the WARMPPlan Program Manager⁷³ and Board Member⁷⁴ and conversations with community members at the Mallee Machinery Field Days (Speed, 2-3 August, 2006). The outcomes of this evaluation are summarised below. For a more detailed report of this evaluation refer to Appendix E.

In general, the WARMPPlan appears to have had some success in raising awareness and educating farmers. It was reported that although most people would have made changes to the farm due to the pipeline regardless of the WARMPPlan, "it wasn't about getting farmers to do it", rather about getting them to consider all the facts and doing it well. It was considered a program to help farmers implement change, but it wasn't the driver of those changes. The Program Manager identified that farmers who were not committed made changes to their on-farm water systems, however, those farmers who were involved and borrowed money designed better on-farm water systems and developed whole farm approaches to farm management. The Board Member believes that the WARMPPlan led "to better outcomes than if it had not been there".

4.3.4.3 Post- construction

Key farm management benefits identified pre-pipeline construction included increased cropping production on reclaimed land; reduced channel seepage; improved livestock condition; reduced pest plants and animals; more flexible on-farm water system layouts; and opportunities to develop alternative farming enterprises (RWC, 1991; WMW, 1995). The following assessment of these impacts post pipeline construction is made based on the secondary data and the results of the Northern Mallee community attitudes survey, interviews and conversations with stakeholders and community members. Refer to Appendix F for details of the survey results relating to impacts of the pipeline on farming.

⁷⁰ Ibid.

⁷¹ Memo dated 24 September 2003. Sourced from GWM Water archives.

⁷² WARMPPlan brochure developed for the Northern Mallee community. Sourced from GWM Water archives.

⁷³ WARMPPlan Program Manager (personal communication, September 19, 2006).

⁷⁴ WARMPPlan Board Member (personal communication, September 14, 2006).

Improvements in broad acre farming

Prior to construction of the pipeline a number of improvements to broad-acre farming were identified. Replacing open channels with underground pipes allows for channels to be backfilled and levelled which in turn enables paddocks to be cropped in once piece and reduces channel seepage. This increases the productivity of the land and the efficiency of farming techniques and equipment.

Secondary data supports these benefits, with interviews^{75,76} with farmers indicating a positive attitude towards reduction in channel seepage and increased production on reclaimed land.

Comments reported in newspaper articles

- “sick of channels, the lost production, the noxious weeds brought in by the main channel, the seepage and local salting”⁷⁷
- “channel seepage has put sizeable areas out of production”⁷⁸
- “the quality of land once traversed by channels (had) already improved as a direct result of piping”⁷⁹

These comments are supported by the survey responses, with 61.4% agreeing that the pipeline had improved agriculture production. Further to this, most respondents (95.1%) reported that they had filled in channels and cropped reclaimed land (87.8%). Open-ended survey responses further reflected this positive impact on broad acre farming. One farmer reported that 10% of his land was previously useless due to seepage from channels. He now reports that with the channels filled in the efficiency of his farm has improved as has the economy.⁸⁰

Examples of open-ended responses

- “don’t have to go around channels. Can work paddock in one piece;
- “due to filling in channels we are able to work paddocks in a square land or as we wish”;
- “no channel across paddocks”;
- “Making all of the paddock more useable (no channels)” and “...the removal of the old channels that squares up paddocks, no seepage areas & reduces areas of weeds”.

A number of conversations with farmers at the Mallee Machinery Field Days (Speed, 2-3 August, 2006) also highlighted increased effectiveness of pesticides and spray units as a benefit of the pipeline, with one farmer commenting that his chemical efficiency (especially round-up) had increased and his boom spray maintenance had

⁷⁵ Wide farmer support for \$52M piping plan. (1998, November 12). *The North West Express*.

⁷⁶ Pipe delight. (2000, August 9). *The Swan Hill Guardian*.

⁷⁷ (1998, November 12). *The North West Express*.

⁷⁸ Ibid.

⁷⁹ (2000, August 9). *The Swan Hill Guardian*.

⁸⁰ Tempy farmer.

decreased by up to 80% (personal communication). Survey responses support this benefit with the majority of respondents (86.4%) agreeing that effectiveness of pesticides and spray units had improved with, 77.3% of surveyed farmers reporting an increase in the effectiveness of their pesticides and spray units. Open-ended responses and conversations with farmers⁸¹ indicate that this improvement in effectiveness largely appears to come from improved water quality; “clear filtered water, most suitable for use in sprayers for crop spraying”; “Two big positives is the access to good water for spraying and easier flying of boom sprays”.

The reduced need to use rainwater for pesticides and herbicides was also perceived as a benefit of the pipeline, with 70.4% of farmers agreeing, and 66.7% reporting a reduction in use of rainwater for these purposes on their farms. Working land according to soil type was not perceived as a benefit of the pipeline, rather farmers did this out of common sense⁸².

Reduced pest plants and animals

One of the proposed benefits of the removal of open channels was better control of pest plants and animals, which can act as a haven for rabbits and help spread noxious weeds. In general, the majority of survey respondents (69.8%) agreed that the pipeline reduced pest plants and animals. However, this reduction appears more related to reduced weeds, with 63.4% of surveyed farmers reporting reductions on their own properties compared with only 53.7% reporting reductions in animal problems.

Flexible on-farm water systems

Increased flexibility of on-farm water systems was proposed as a benefit of the pipeline⁸³. With the introduction of a piped system, the issue of water availability no longer constrains stock and farm management decisions as tapping points and troughs can be located anywhere on the property allowing new land to be serviced and maximising the benefits for livestock. The survey responses support this benefit, with the majority of respondents agreeing (92.7%) that the pipeline has increased the flexibility, and 90.5% reporting that they have implemented on-farm water systems.

Improvements in Livestock

Wimmera Mallee Water⁸⁴ identified that with a secure supply of quality water and flexible on-farm water systems, troughs could be located to minimise stock walking distances and maximise the use of shade. This in turn would lead to improvements in stock condition due to energy conservation and less trampling of pasture.

⁸¹ Mallee Machinery Field days, Speed, August 2-3 2006.

⁸² Open-ended survey responses

⁸³ Wimmera Mallee Water. (1996). *Northern Mallee Pipeline Project: A model infrastructure project of major significance to the nation, state and local communities*. Horsham, Victoria: Wimmera Mallee Water.

⁸⁴ Ibid.

During the many conversations held with farmers at the Mallee Machinery Field Days (Speed, 2-3 August, 2006) it appears that the improvements in livestock were mainly in relation to security of water for stock, with most farmers identifying that if it wasn't for the pipeline, there would be no stock in the Mallee. One farmer identified that without the pipeline he would no longer have a livestock business, which in turn would reduce his business by half, hence decreasing his quality of life⁸⁵. Several open-ended survey responses also reflected this theme.

Examples of open-ended survey responses:

- "Only for having this pipeline we would not be running sheep in this area"
- "Due to the drought we wouldn't be able to run stock without the pipeline"
- "Now that dam fills are restricted further South we would have been stuffed in years like this – there would be no stock in the Mallee at all".

Many survey respondents (59.1%) agreed that the pipeline has improved livestock condition in general, with fewer (53.7%) reports of livestock improvement on their own farms. However, most farmers (72.7%) connected to the pipeline for longer (Stages 1-3) saw improvements in their livestock compared to those farmers connected during the later stages (50%). This indicates that the benefits to livestock may emerge some time after pipeline connection.

Development of alternative farming enterprises

*"you can bring water to farmers, but you have to teach them to drink"*⁸⁶

The development of alternative farming enterprises was promoted as one benefit that would arise from the introduction of a secure supply of quality water⁸⁷. The secondary data identifies a number of emerging alternative farming enterprises in the Northern Mallee; "there is a gradual realisation that fresh approaches to farming can be tried, that a new economy can arise, and that maybe these effects will revive small communities"⁸⁸. Several farmers spoke of their new enterprises at Wimmera Mallee Water's annual water seminar⁸⁹ including game processing for export, pheasants, pistachio nut and cherry farming. Rabbit breeding, dryland fishing, jojoba plots and exporting goats were also identified as new business ventures starting in the region⁹⁰.

⁸⁵ Interview with a Tempy farmer, 8 August 2006.

⁸⁶ WARMPlan 2001 Feature – Water adds value to the Mallee. (2001, July 19). *The Mallee Ag. News, The North West Express*.

⁸⁷ WARMPlan brochure developed for the Northern Mallee community. Sourced from GWM Water WARMPlan archives.

⁸⁸ (2001, July 19). *The Mallee Ag. News, The North West Express*.

⁸⁹ "Thumbs up all round for piped water". Information from a Water Seminar held by GWM Water at Warracknabeal Community Centre (no date). Sourced from GWM Water archives.

⁹⁰ (2001, July 19). *The Mallee Ag. News, The North West Express*.

Example of impact of the pipeline on the intensive livestock industry.⁹¹

In an interview with a Tempy farmer he identified that with the drought, Victoria has been losing its cattle to Queensland. However, he reported that Victoria is more suitable than Queensland for intensive livestock due to the low humidity. Therefore, with a more secure supply of water in the Mallee intensive livestock is now possible.

The pipeline was also thought to have a positive impact on the intensive livestock industry (or feedlots).⁹² However, in a response to farmers in the Northern Mallee raising concerns that the size of piping was inadequate to meet the needs of current and future feedlots⁹³ it was reported that the pipeline system was not designed to supply the requirements of large scale feedlot development e.g. 20,000-40,000 head.⁹⁴

The survey responses also do not support the development of alternative enterprises in the Northern Mallee, with less than half the respondents (41.9%) agreeing that the pipeline allowed for the development of alternative farming practices, and only 22.5% agreeing that the pipeline had provided opportunities to move into new business areas. Furthermore, the survey responses indicated that nearly all farmers (95%) had not taken up these opportunities. This lack of response by the farmers to broaden their farming enterprises may be due to the economic viability of the suggested alternative businesses. It was reported that the relative economics of these initiatives may make them unavailable for rural users located too far from major cities as transport costs to market would be too high. As such, they may not be considered high value return alternatives to crop and sheep⁹⁵.

Whilst the evidence is inconclusive, there may be some suggestion that the Northern Mallee farmers do not see the development of alternative farming enterprises as a benefit of the pipeline and that more research is needed into the economic viability of these enterprises in the Wimmera Mallee region.

Farming attitudes

There was limited data available to assess the impact of the pipeline on the farmer's attitudes towards their farm's security and the quality of life on the farm. However, based on the survey results some farmers believed that the pipeline had a positive impact on their attitudes towards the farm (65.8%), their perception of their farm's financial security (63.2%) and their quality of life on the farm (60.6%). There was also a tendency for farmers to have a more positive outlook towards their future as a farmer, with 57.9% indicating that the pipeline has had a positive impact on their attitude. This highlights the need to better understand the impact of the pipeline on farmer's attitudes towards their farm and their future security on the farm.

⁹¹ Tempy farmer.

⁹² Ibid.

⁹³ Letter dated 15 June 1995. Sourced from GWM Water archives.

⁹⁴ Letter dated 23 June 1995. Sourced from GWM Water archives.

⁹⁵ WARMPlan Project Manager.

4.3.5 Summary of impact of the pipeline on farming

*“What is the overall farmer reaction to piping? I would describe it as a huge plus”
– Piangil farmer⁹⁶*

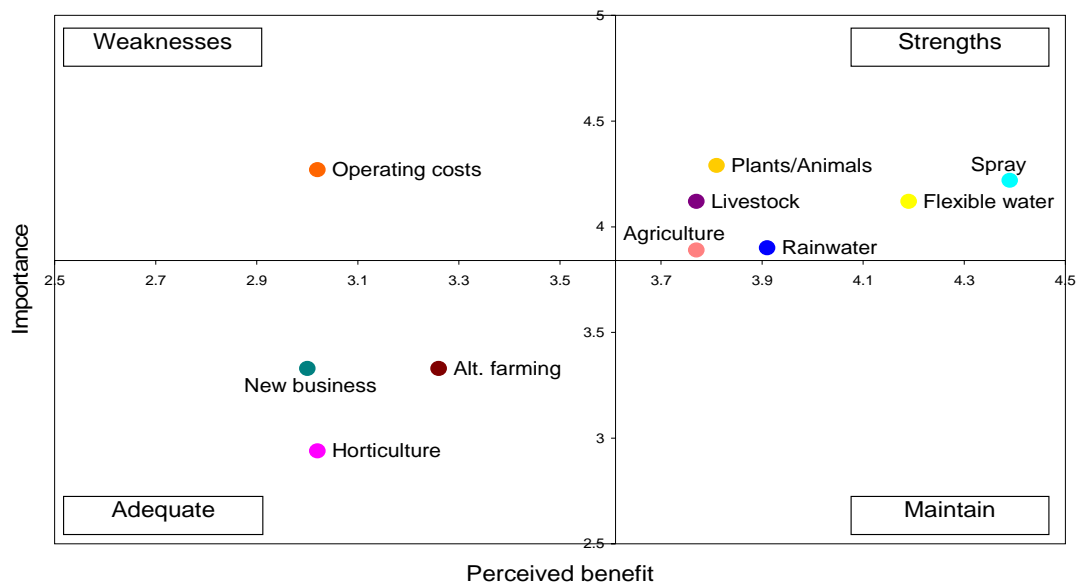
Broad-acre farming including stock is the predominant source of income for most Northern Mallee families. Prior to the introduction of the pipeline it was becoming increasingly difficult to maintain stock in this region due to limited water availability and poor water quality. It was anticipated that the pipeline would secure a high quality water supply which would not only enable farmers to keep stock but improve livestock condition.

Summary of study findings on the farming impacts of the pipeline:

- Overall the pipeline has had a positive impact on farming.
- Security of water supply for stock and increased effectiveness of spray units are considered the main benefits.
- Farmers have made some changes to their broad acre farming practices.
- Very few new agricultural enterprises have been developed.
- Farmers generally have a more positive outlook towards their financial security and their quality of life on the farm.

Two quadrant analyses (Figures 9 & 10) compared the relative average importance of the proposed farming impacts with the community's belief that the pipeline had delivered that benefit. These identified the perceived strengths and weaknesses of the pipeline.

Figure 9
Perceived farming benefits and important pipeline attributes



⁹⁶ “Pipe delight”. (2000, August 9). *The Swan Hill Guardian*.

Figure 10
Perceived farming impacts and important pipeline attributes



This is a summary of the community perceptions of the farming impacts of the pipeline based on the convergence of multiple data analyses.

Benefits

- Increased flexibility of water systems
- Effectiveness of pesticides & spray units
- Improved livestock
- Reduced use of rainwater

- Reduced pests & weeds
- Increased financial security
- Improved quality of farm life

Limitations

- Farm operating costs
- Limited opportunities for new business

Concerns

- On-farm set up costs

4.3.6 Perceived environmental impacts of the Northern Mallee pipeline

“All Mallee farm houses will be very desirable places to live with automated water systems supporting picturesque gardens, trees, shrubs and fresh vegetables. The landscape will be improved with small woodlots or shade and wind break plantings”⁹⁷

4.3.6.1 Pre-construction

The Wimmera Mallee System Study Draft Summary Report (Rural Water Commission, 1991) identified a number of environmental benefits resulting from the Northern Mallee pipeline prior to its construction. Primarily the project was to achieve significant water savings by replacing approximately 50,000ML of channel water per annum with 5,000ML of a piped supply. Additionally, the project was expected to:

- Improve security of supply
- Increase water for environmental flows in rivers and wetlands in the Wimmera and Glenelg River systems
- Improve water quality particularly by reducing salinity
- Reduce water wastage through a reduction in channel seepage and evaporation

The Northern Mallee community attitudes survey asked respondents to think back to before the pipeline was built. Many respondents (60%) when asked to recall their expectation that the pipeline would improve the region’s environment indicated it was important, however less than half (43.5%) agreed that it would actually deliver this benefit. A number of survey respondents also indicated in their open-ended responses that they were concerned for wildlife and the effect of the pipeline on the health of the Murray River System.

Prior to the pipeline, some respondents (56%) were concerned about changes to the channel and dam system with fewer (28.5%) concerned over changes to the region’s landscapes. The ability of the pipeline to deliver sufficient water and the amount of time that would be needed to fill in channels and check troughs in summer were also reported as concerns⁹⁸.

Whilst this evidence is inconclusive, there may be some suggestion that the community may have been somewhat uncertain as to the environmental benefits that would be delivered by the pipeline.

4.3.6.2 During construction

WMW and the then Department of Conservation and Natural Resources (DCNR) developed on-ground procedures for addressing environmental impacts of the pipeline area since Stage 1⁹⁹.

⁹⁷ Wimmera Mallee Water (1997) “A pipeline to change”: Briefing note. Sourced from GWM Water archives. This quote is taken from a passage in this briefing note which reflects on what the Mallee pipeline area may look like in 10 years time. Given that it was written 9 years ago, it appears fitting to include this to reflect on what WMW thought the impacts of the pipeline would be now.

⁹⁸ “Funds in the pipeline for water course”. The Weekly Times, Wednesday, 23 April 1997.

⁹⁹ WMW and DCNR (1995) “Process for environmental assessment and clearance”. Sourced from GWM Water archives.

Environmental assessments and archaeological surveys were conducted prior to each stage of the pipeline to determine the potential impact on native vegetation and habitat values, to offer guidelines to minimise impact of the proposed construction and to ensure compliance with legislation relating to the protection of aboriginal archaeological sites. The recommendations from these assessments guided works approvals, planning permits and environmental requirements during the construction process of the pipeline (personal communication). The main changes resulting from these reports included:

- Pipe route - selection of a less damaging route
- Construction method – use of a small excavator rather than a large digger
- Reinstatement method – spread bush brush over excavated areas to promote regrowth

An example demonstrating environmental sensitivity during construction

In the original plans the pipeline crossed the north-west corner of the Eureka State Forest. DCNR highlighted that the Eureka Reserve is a significant Mallee reserve supporting a native grassland community which are one of the most threatened and least represented communities on Reserves in the State. WMW re-route the new Eureka rising main through private land adjoining Eureka Reserve¹⁰⁰.

Environmental audits of the ecological impacts associated with the construction and operation of the Northern Mallee pipeline were undertaken approximately a year after the completion of Stages 4, 5, 6, and 7. It was reported that most of the pipes were laid in cultivated paddocks and that very few trees were removed. The main impact was reported to be on the understory which was removed at road reserve crossings. However, measures were taken to minimise this impact through route selection and reducing the width of the excavation zone (personal communication).

Environmental Audit: Stage 7 Findings

The findings for Stage 7 indicated that approximately 1.25 habitat-hectares of native vegetation were adversely affected by the construction of the pipeline and that conservation offsets for this loss of vegetation was required by WMW (Delaney & Sluiter, 2003).

4.3.6.3 Post construction

Key environmental impacts identified in the Wimmera Mallee System Study Draft Report (1991) included increased environmental flows, water conservation, security of supply and improved water quality. This study further identified impacts of the pipeline on improved visual environment and flora and fauna. The following assessment of these impacts post pipeline construction is made based on the secondary data and the results of the Northern Mallee community attitudes survey,

¹⁰⁰ Information noted in Letters dated 7 September 1995, 16 October, 1995 and 23 October 1995. Sourced from GWM Water archives.

interviews and conversations with stakeholders and community members. Refer to Appendix G for details of the survey results relating to the environmental impacts of the pipeline.

Increased environmental flows

Environmental flows are water releases that are provided to meet the environmental water requirements of rivers and streams (Dyer, Carter, & Robson, 2005). The Rural Water Commission (1991) identified that one of the major environmental benefits of pipelining the Northern Mallee was making water available for environmental releases in the Wimmera River and other wetlands in the region. The annual environmental flow recommendations for the Wimmera catchment is between 59,500ML and 73,000ML of water¹⁰¹.

Water savings from the Northern Mallee pipeline were allocated to the environment at the completion of each stage (Dyer et al, 2005). At the completion of Stage 7, the Wimmera and Glenelg rivers received a total volume of 32,240ML of regulated entitlements. This entitlement was further increased to 40,563ML after the completion of the Stage 7 Extension (Speed/Patchewollock) and Cannie Ridge. A further 3,227ML of unregulated entitlements is available in the form of extra spills from storages¹⁰². Although the Wimmera and Glenelg Rivers are legally entitled to these water savings, the amount released for annual flows varies depending on the water available in the GWM Water storages (Dyer et al, 2005). As a result the environment has yet to be allocated the full entitlement in any year¹⁰³.

Environmental flow releases in the Wimmera Catchment

5,357ML of water was received by the Wimmera Catchment for the 2004/2005 season. This is less than 10% of the annual volume of water recommended for environmental flows (Dyer et al, 2005).

Environmental benefit of the pipeline in that water savings have been made available for environmental flows as a result of the Northern Mallee pipeline. However, low water storages have prevented the full entitlement being released into the rivers.

Water conservation - reduced amount of water wasted

Based on Grampians Wimmera Mallee Water figures ¹⁰⁴ the Northern Mallee pipeline project reached this projected target, saving a total of 49,509ML of water. The amount of water saved at each stage is listed in Table 6.

¹⁰¹ This recommendation was identified in the Stressed Rivers Report (Sinclair, Knight, Merz, 2002). Cited in Dyer, F., Carter, R., & Robson, T. (2005).

¹⁰² Personal communication with the Environmental Water Reserve Officer, WCMA – October 6, 2006.

¹⁰³ Ibid.

¹⁰⁴ "Northern Mallee Pipeline Project Construction Stages – Final: Funding and allocation of saved water (2003). Sourced from GWM Water archives.

Table 6
Amount of water saved at each stage of the Northern Mallee pipeline

Stage of pipeline	Years of construction	Water savings (ML)
1	1991-1993	9,800
2	1994-1995	5,500
3	1995-1997	8,789
Stages 1-3		24,089
4	1997-1998	-
5	1998-1999	10,750
6	1999-2000	7,750
7	2001-2002	6,920
Stages 4-7		25,420
Total NMPP Stages 1-7		49,509
Stage 7 Extension		9930 ¹⁰⁵
Cannie Ridge		2666 ¹⁰⁶

Both secondary and primary data indicated that the community generally perceived that the pipeline had reduced the amount of water wasted throughout the region, with 96.2% of survey respondents agreeing that this was the case. When clarifying how the community believed water was saved, conversations with community members clearly identified reduction in water wasted as the result of a reduction in channel seepage and evaporation, rather than individuals saving water. Although the survey did highlight that many respondents (73.9%) agreed that the pipeline had created opportunities to install water saving technology, they were not asked whether they had actually installed this technology. Therefore, it remains unclear as to whether Northern Mallee residents have taken up opportunities to implement water saving technology. This highlights the need to better understand the impact of the pipeline on the uptake of water saving technology by the Northern Mallee community.

Security of supply

The Wimmera Mallee supply system was shown to be overcommitted by 20,000ML per year (RWC, 1991) and securing the supply of water to users under the channel system was threatened in the Northern Mallee not only in drought conditions, but also in dry periods¹⁰⁷. The introduction of the pipeline was expected to alleviate this pressure on the channel system and securing the supply of water to existing users in the Northern Mallee community was identified as a benefit of the pipeline (RWC, 1991). Both the secondary and primary data from this study support this benefit, indicating a very positive response to the impact of the pipeline on water security.

¹⁰⁵ Memo from Water Resources Officer (2004) "Update to Speed/Patchewollock pipeline savings figures". Sourced from GWM Water archives.

¹⁰⁶ "Northern Mallee Pipeline Project Construction Stages – Final: Funding and allocation of saved water (2003).

¹⁰⁷ Rural Water Commission (no date), "Wimmera-Mallee water supply system: Pipeline Facts". This is a customer information sheet sourced from GWM Water archives.

Comments reported in newspaper articles:

- "...security of supply is the big advantage of piping"¹⁰⁸
- "...security of supply the year round"
- "It's just like living in town. We have water for the garden and chooks as well as the sheep"¹⁰⁹

These comments are supported by the survey responses, with 98.1% of survey respondents agreeing or strongly agreeing that the pipeline provided a more reliable supply of quality water. Responses to open ended questions in the survey also reflected this; "guaranteed supply has been the biggest plus"; "reliable water source"; and "...we are grateful for the convenience of a piped supply and (so far) the reliability"

Specifically, the increased availability of water for domestic purposes and for gardens were identified as key benefits of the system in both the survey and in a series of interviews with local Northern Mallee farmers reported in the newspaper. Most of those surveyed (82.7%) agreed that the pipeline increased availability of water for domestic purposes and gardens.

The Swan Hill Guardian (2000, August 9) reported the following comments:

- "farming aside, I now have a lovely garden with vegies, flowers, fruit trees and lawns"
- "it's a far cry from when...garden was restricted to a few geraniums in pots around the door...now we have an automatic watering system with a timer nurturing roses, a big lawn and trees"
- "We used to steer clear of white clothing because it was impossible to keep it white. With piping all that has changed"

Improved water quality

The pipeline water supply is for domestic and stock use and untreated is not a potable water supply. However, the quality of this supply, when compared to the open channel supply, is significantly improved. A water quality study was commissioned by WMW in 1999 to critically assess the filters located at the pump stations along the river and an assessment of water quality risks (suspended solids and turbidity, algae and microbiological) to WMW customers. The study indicates that although pipeline water is not of potable quality, 90% of the particles are removed by the filters indicating an improvement in water quality. This study is summarised below.

¹⁰⁸ Pipe Delight. (2000, August, 9). *The Swan Hill Guardian*.

¹⁰⁹ Piped water quenches Mallee. (1998, October 19). *The Buloke Times*.

Northern Mallee Pipeline Project Water Quality Study

This study (Gutteridge Haskins & Davey Pty Ltd, 1999) tested water quality at the Nyah, Piangil and Pental Island pump stations. The treatment of the water entering the pipeline involves river water being pumped through filters to remove some of the river silt, suspended solids, turbidity and algae. This reduces pipeline maintenance costs and improves the aesthetic quality of the water delivered to customers accessing the water directly from the pipeline.

The study found

- raw quality water varied over time with respect to suspended solids, turbidity, apparent colour and algae
- filtered water quality varied, possibly as a result of variation in the raw water quality and filter efficiency;
- approximately 90% of particles were removed by filters - a high concentration of particles remained in the filtered water and
- water is not of potable quality and is not intended as a potable water supply

The following comments regarding water quality reflect opinions of those connected to the pipeline.

- "...Improved water quality alone makes it [the pipeline] worthwhile" – *Walpeup farmer*¹¹⁰,
- "the water quality is so clear and good that you could drink out of it" – *Tempy farmer*¹¹¹

Almost all survey respondents (98.1%) agreed or strongly agreed that the pipeline provided a more reliable supply of quality water. Open ended questions further supported this: "(water) Quality greatly improved"; "water quality is better"; "no more muddy and smelly showers..."; "...much cleaner"; and "generally water quality has improved over channel water.

Though there appears from the discussion to date that water quality has improved this appears not the case for all those now connected to the pipeline. Comments made by some farmers at the Mallee Machinery Field Days (Speed, August 2-3, 2006) identified water quality concerns indicating that water quality to their property had not improved with the pipeline, and was of inconsistent quality and often muddy. A number of open ended responses in the survey confirm there are some water quality issues associated with the Northern Mallee pipeline system.

¹¹⁰ (1998, November, 12). *The North West Express*.

¹¹¹ Tempy farmer.

Open ended responses from survey about water quality

- “the quality of water from the pipe line is often not of a good quality – cloudy, muddy. It should be of a higher standard as it is very expensive”
- “water quality (is) terrible”
- “Quality of water is varied. Clean, sometimes smelly, sometimes muddy...;”
- “...dirty water have been negatives”

This study’s findings appear to be consistent with the community perceptions of the impact of the pipeline on water quality, with some reports of improvement and others identifying muddy and inconsistent quality.

GWMW have identified certain water quality issues in some Northern Mallee Regions, specifically Manangatang and Underbool which under the “Country Towns Water Supply and Sewerage Program” have received funding to improve the water quality.¹¹² However, it appears that the issue of quality is not associated directly with pipeline water, but rather the water in the earthen town storages. For example, in the case of Underbool, water is piped from the Murray River to an earthen storage before it enters the town reticulation system. The water in the storage is left untreated and therefore results in muddy water sometimes being delivered to properties.¹¹³ The water quality issues raised by the Northern Mallee community members in this study may reflect the quality of the water in the town storages rather than the piped water.

Improved visual environment

Based on the survey data, many of the respondents remained neutral as to whether the pipeline had increased the availability of water for the Wimmera and Glenelg Rivers (69.4 %). Many were neutral as to whether it improved the aesthetic quality of the region (69.6%). Earlier stages of the pipeline (Stages 1-3) were seen by some survey respondents (54.6%) to have improved the aesthetics of the region compared to later stages (15.6 % in Stages 4-7). This may indicate that the aesthetic benefits of the pipeline may not be realised for some time after its construction.

Mixed responses were noted for the impact of the pipeline on the amount of water available for parks. Although 38% of survey respondents were neutral, 28% agreed that the pipeline had increased the water available whereas 34% disagreed that there had been an increase in availability of water for parks. Responses to open-ended survey questions indicated that some community members missed the aesthetics of open water and farm dams -‘seeing a dam of cool water on a hot day’.

Impact on flora and fauna

The conversations with community members and farmers at the Mallee Machinery Field Days (Speed, 2-3 August, 2006), indicated that most people believed that there had been a change in wildlife due to the introduction of the pipeline. However, the

¹¹² GWM Water (2006). “Water quality improvements planned for Manangatang (Media release)”.

¹¹³ Regional Development Officer, GWM Water (personal communication, October 5006)

impact of this change was perceived as positive by some and negative by others. Some Northern Mallee community members expressed their concerns of the effect of the pipeline on wildlife and mixed views have been expressed since its construction.

Examples of survey respondents concerns

- “I feel like we are living in the Mallee like it was meant to be– channels/dams were fun but artificial, brought in birds, animals and weeds that we didn’t have”¹¹⁴
- “more birds (parrots and pigeons) than ever”¹¹⁵
- “...wild ducks and plovers are now coming much closer to the house”¹¹⁶
- “I feel very strongly that the native animals and birds have been ...ignored...no provisions for their survival...expected demise is...visually evident”¹¹⁷

Survey respondents identified that they missed the dams for water birds as a result of the pipeline; “dams for wildlife”; “no water for birds and animals”; “the waterbirds on the dams”; “birds congregating at dusk and dawn”; “Loss of waterbirds”. Some community members also expressed concern for the wildlife in the survey and in newspapers. Plastic troughs were seen to be a hazard for birds as the rounded lip does not provide enough grip for birds.¹²¹

Comments reflecting the concerns on wildlife as a result of the pipeline

- “In some areas the loss of dams has had a detrimental effect on the wildlife”¹¹⁸
- “Loss of Lake Walpeup will severely effect wildlife and especially birdlife”¹¹⁹
- “In the searing heat and high temperatures – such as 2005/2006 Summer, many times I was told of the stress suffered by native birds/animals as dams or waterholes dried up. I saw it often for myself. One feels helpless to defend or help them”.¹²⁰

One recent study further highlights the impact of the pipeline on wildlife. Although it does not directly assess the impact of the Northern Mallee Pipeline on animals and birds, it does look at the biodiversity in closed (pipeline) versus open water systems (channels and dams).¹²² Although this study did not look at biodiversity in the Northern Mallee before the pipeline, it does indicate that the pipeline may have reduced the biodiversity in this region as a result of a now closed water system. This study is summarised below.

¹¹⁴ Open-ended survey response.

¹¹⁵ Tempy farmer.

¹¹⁶ (2000, August 9). *The Swan Hill Guardian*.

¹¹⁷ Open-ended response survey.

¹¹⁸ Open-ended survey response.

¹¹⁹ (1998, July 30). *The North West Express*.

¹²⁰ Open-ended survey response.

¹²¹ Tempy farmer.

¹²² Starks, J (2006) “Diversity in a piped system”. Presentation to the WIDCORP Research Advisory Committee, 21 September 2006.

Diversity in a piped system

This study assessed the abundance and diversity of birds, mammals, reptiles and frogs throughout the Wimmera and Mallee farming landscapes. Specifically, biodiversity in these regions was compared in stock troughs supplied by pipelines, wildlife troughs set in woodlands, woodlands without a water source and dams in open paddocks and channels. It appears that differences were observed in the number and diversity of birds in and around troughs in pipeline areas compared with dams and channels. The key findings from the study were:

- (1) that wildlife troughs in woodlands maintained biodiversity levels in farming landscapes comparable to that associated with farm dams and channels
- (2) no frogs were observed in areas serviced by the Northern Mallee pipeline
- (3) lower levels of biodiversity were recorded in areas serviced by the pipeline compared to that of dams and channels
- (4) strategic application of wildlife troughs may be a way to maintain biodiversity in the future.

4.3.7 Summary of perceived environmental impacts of the pipeline

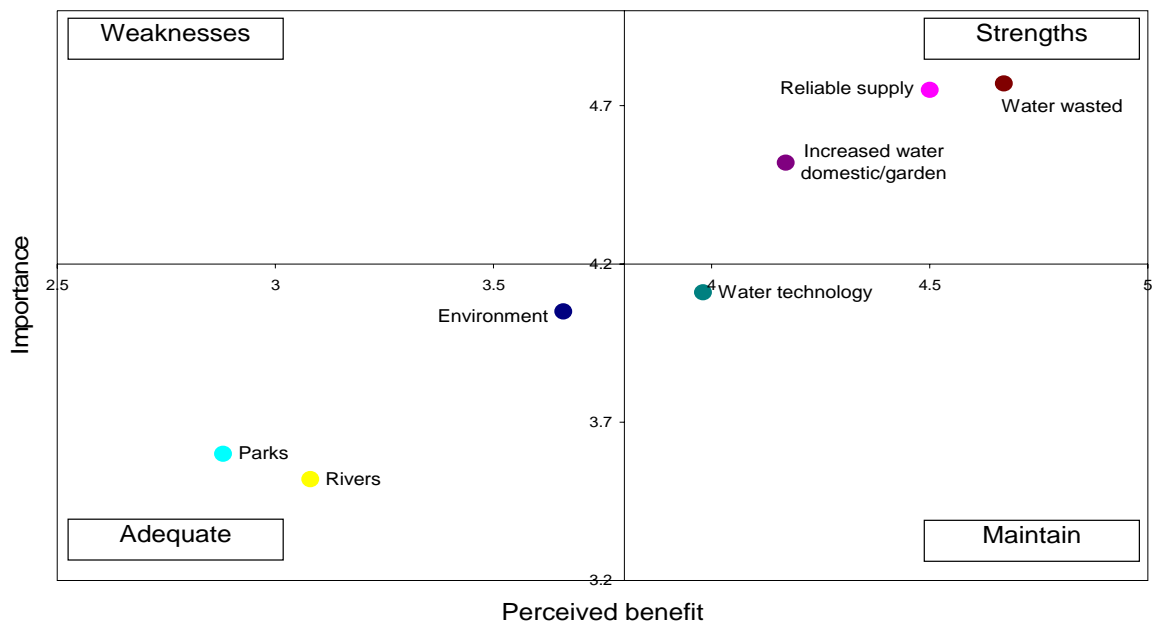
The prolonged dry period in the Northern Mallee region prior to the pipeline combined with the inefficiency of the channel water delivery system had a number of significant environmental consequences. Water wastage through seepage and evaporation, declining water quality and reduced in-stream flows into the Wimmera and Glenelg Rivers were long recognised as unsustainable. The introduction of the pipeline was expected to improve water security and quality with the aim of the project being to save 50,000ML of channel water per year. This study explored the community perceptions of the impact of the pipeline on the environment.

Summary of study findings on the environmental impacts of the pipeline:

- The community have a mixed reaction to the overall impact of the pipeline on the environment.
- Primary and secondary data indicate that the main benefits are improved water security for domestic and gardening purposes and reduced water wasted.
- The community misses the aesthetics of water in farm dams.
- Concern was expressed for the loss of wildlife.

A quadrant analysis (Figure 11) compared the relative average importance of the proposed farming impacts with the community's belief that the pipeline had delivered that benefit. Strengths of the pipeline are clearly identified based on this analysis.

Figure 11
Perceived environmental benefits and important pipeline attributes



This is a summary of the community perceptions of the environmental impacts of the pipeline based on the convergence of multiple data analyses.

Benefits

- Water security
- Increased water availability for domestic & garden purposes
- Reduced amount of water wasted

Limitations

- Limited increase in water available for parks and rivers

Concerns

- Loss of wildlife

4.3.8 Perceived social impacts of the Northern Mallee pipeline

“There will be a growing number of small holdings attracted by the improved lifestyle reliable water brings”¹²³

4.3.8.1 Pre-construction

The Wimmera Mallee System Study Draft Report (RWC, 1991) identified that an improvement to the social amenity of the Northern Mallee communities would be a benefit of the pipeline. This theme was also reiterated in a community fact sheet which reported that the pipeline may improve the quality of life of towns-people and farmers¹²⁴. It is also reflected in the above quote indicating that WMW expected some improvement in lifestyle associated with a more reliable supply of water. However, details of this “improved lifestyle” were not given and it was reported that the extent and likely timing of this benefit was unknown (RWC).

The Northern Mallee community attitudes survey asked respondents to think back to before the pipeline was built. Some respondents (56.3%) when asked to recall their expectation that the pipeline would improve the region’s social activities indicated that it was important, however close to half (43.8%) remained neutral as to their opinion that the pipeline would actually deliver this benefit.

Prior to the pipeline, many survey respondents (71.4%) expressed concern about changes to on-farm recreational water use, particularly the loss of swimming and yabbing in dams. Although inconclusive, this may indicate that the community were somewhat negative towards to the social impact of the pipeline.

4.3.8.2 During construction

One example of the impact of the pipeline on the social aspects of the community during construction is demonstrated through the story of the community’s rally to save Walpeup Lake. This issue received a lot of press and the following story is a collation of the information found in the newspaper articles and GWM Water files.

¹²³ Wimmera Mallee Water (1997) “A pipeline to change”: Briefing note. Sourced from GWM Water archives. This quote is taken from a passage in this briefing note which reflects on what the Mallee pipeline area may look like in 10 years time. Given that it was written 9 years ago, it appears fitting to include this to reflect on what WMW thought the impacts of the pipeline would be now.

¹²⁴ Wimmera Development Association (no date). “Strategic Importance of Wimmera-Mallee Pipelining”. This is a community information sheet sourced from GWM Water archives.

Walpeup Lake

Walpeup (or Timberoo) Lake is a natural 13 Ha depression on the edge of a large timber reserve which originally filled with natural rainfall runoff and soakage from sand hills. In the recent past (before the pipeline) the lake received channel runoff water after high rainfall, some outfall water from normal channel runs and a “recreation supply volume” purchased by the council. Although during the summer months the lake dried due to evaporation and seepage, the community believed this Lake to be integral to their recreational activities and social lifestyle¹²⁵.

It was proposed by WMW that under a piped supply, the pipeline infrastructure, capital cost and annual costs were too high to justify a large volume supply to the lake from a piped supply system. Therefore, a pipe supply to Walpeup Lake was considered uneconomical. Alternatively, WMW suggested that 15km of redundant channels leading to the lake be kept and that any water could be sourced from runoff water after high rainfall or from outfall from the upstream channel run. However, the resultant water quantity in the Lake would be small¹²⁶.

Several members of the local community were opposed to the idea of water based recreational activities no longer being available at the Lake and conflict arose between the objectives of the NMPP and community members who wished to retain the lake¹²⁷.

Comments made by a community member in a Letter to the Editor about the negative impacts of closing Walpeup Lake¹²⁸.

- “the importance of saving this lake is paramount to the value of this community’s standard of living”
- “there will be no recreation water within a 100km radius of the lake”
- “fishing, yabbying and boating are popular pastimes for this district...if the lake disappears water recreation will go with it”
- “the Walpeup Lake is a magnificent asset to this community”

In response to these objections WMW commissioned Australian Water Technologies Pty Ltd to undertake a study of the environmental and social effects of a changed water supply to Walpeup Lake¹²⁹. This study is summarised below.

¹²⁵ AWT (1999). “Investigation into the social and environmental effects of a changed water supply at Walpeup Lake”. Melbourne, Australia: WATERECOscience

¹²⁶ Letter dated 22 June 1998. Sourced from GWM Water archives.

¹²⁷ Letter dated 17 June 1998. Sourced from GWM Water archives.

¹²⁸ (1998, July 30). *The North West Express*..

¹²⁹ AWT (1999). “Investigation into the social and environmental effects of a changed water supply at Walpeup Lake”. Melbourne, Australia: WATERECOscience

Investigation into the social and environmental effects of a changed water supply.

The aim of this study was to examine the environmental and social effects of a changed water supply to Walpeup Lake and to minimise any adverse effects.

The major findings of the study identified that:

- (a) continuity of supply could only be based on the importance of the lake as a community resource rather than on environmental grounds (despite the existence of some locally significant flora and fauna at the lake);
- (b) the lake was found to be a popular local recreation resource, although given the recent trend to a decline in usage the consultants questioned the continued use of the lake by the locals;
- (c) the lake was found to be used by some tourists, although it appears limited in its ability to attract more tourists due to the nature of the lake and its relative remoteness.

It was concluded with a recommendation that due to the Lakes importance to the community, more time should be given to further assess this value and future management options.

WMW agreed in the interim period that the lake be supplied through the channel system during which time further community consultation and future management options could be examined.¹³⁰ After a public meeting¹³¹ and another study by AWT identifying pipeline requirements to supply Lake Walpeup¹³², WMW agreed to lay a 80mm pipe to Walpeup Lake's inlet and supply an annual 20ML water supply.¹³³ The Lake Committee applied for a \$50,000 grant to construct a basin within the lake area to receive and use the water supply for recreational purposes.¹³⁴ The grant was received and on July 22, 2002 the water was turned on. An official opening ceremony was held in November 2002.¹³⁵ However, WMW had difficulty supplying an adequate flow of water to fill the lake to a reasonable level.¹³⁶

The persistence and community spirit shown in this story indicates how important the community perceives recreational water to be in their social life and further supports the suggestion that the community were somewhat negative regarding the social impact of the pipeline before and during construction. However, this story highlights the flexibility of the NMPP and WMW's willingness to work with the community to reduce the potential negative social impact of the pipeline. It demonstrates that change in rural communities can be achieved and that successful large infrastructure

¹³⁰ Wimmera Mallee Water (1999) "Ministerial briefing note: Water supply to Walpeup Lake". Sourced from GWM Water archives.

¹³¹ "Pipeline", October 1999. Sourced from GWM Water archives.

¹³² AWT (2000) "Supply to Walpeup Lake from Northern Mallee pipeline system: Final report". Sourced from GWM Water archives.

¹³³ Eighty millimetre pipe for Walpeup Lake. (2000, December, 21). *The North West Express*.

¹³⁴ What's happening with Walpeup Lake?. (2001, November, 15). *The North West Express*.

¹³⁵ Walpeup Lake official opening party. (2002, November 14). *The North West Express*.

¹³⁶ Ibid.

projects can be flexible and work with rural communities to achieve this change minimising negative impacts.

4.3.8.3 Post- construction

Improved social amenity and lifestyle were identified as potential benefits of the pipeline pre-construction (RWC, 1991). However, the definition of “social amenity” was not specified. As such, this study defined “social” as not only participation in water-based recreational activities but also the community’s social attitudes relevant to the community and individual’s well-being including quality of life, financial security, availability of employment and health services, level of stress and anxiety and attitude towards the future. The following assessment of these impacts post pipeline construction is made based on the secondary data and the results of the Northern Mallee community attitudes survey, interviews with stakeholders and conversations with community members. Refer to Appendix H for details of the survey results relating to the social impacts of the pipeline.

Impact on recreational water use

Limited secondary data was available on the impact of the pipeline on recreational water use post-construction. However, the many conversations had with farmers at the Mallee Machinery Field Days (Speed, 2-3 August 2006) indicates a negative response to the impact of the pipeline on recreational water use. Specifically, the loss of yabbing, swimming and fishing in dams was particularly felt by the community. Thirty-five references were made to the loss of on-farm recreational water use in the open ended responses in the survey, in particular the negative effect the loss of dams has had on family activities.

Examples of open-ended survey responses.

- “Yabbing and swimming etc in family dams – social and family gatherings”
- “It has ruined water recreation activities (inland lakes)”
- “Swimming and taking kids yabbing”
- “Loss of locally dependent lake for recreation in the driest area of the state”
- “New Years Day – big yabby catching day! Social event that was tradition for many many years”

These comments are supported by the closed survey responses, 79.2% agreeing that on-farm recreational water use had decreased and 50% reporting the pipeline to have a negative impact on recreation and entertainment in the region. Conversely only 24.4% of respondents agreed that the pipeline had improved the region’s social activities; 13% agreed that there was increased water for recreational use. Furthermore, later stages of the pipeline (Stages 4-7) were seen by many survey respondents (65.6%) to have a negative impact on the region’s recreation and entertainment, compared to the earlier stages (Stages 1-3, 18.2%). This may indicate that over time the community may adapt to changes in social activities and find other ways to compensate for this loss. Alternatively, the individuals in Stages 1-3 live closer to the Murray River and therefore the loss of farm dams may not be as great as those living more inland in Stages 4-7 with no access to the River. Follow-

up research focusing on understanding how the Northern Mallee community has adapted to this loss of recreational water will enable a more in-depth understanding of the social impacts of the pipeline.

Contrary to the negative impact of the loss of farm dams, some individuals reported that the loss of dams was a positive and it had increased social opportunities; “we miss the dams but we see others at the pool (more social)”¹³⁷.

Example of a positive attitude towards the social impact of the pipeline.

In an interview with a farmer he identified that with the reduction in farm dams, the number of children drowning on farms may decrease. He also reported that they now have a swimming pool and this has enhanced his quality of life¹³⁸.

Improvement in social attitudes

The secondary data on the impact of the pipeline on social attitudes was limited. Uncertainty surrounding the impact of the pipeline is reflected in the community’s mixed perception of the impact of the pipeline on their social attitudes. The survey responses indicate that many respondents believed that the pipeline had a positive impact on their quality of life (68.1%); financial security (59.6%); standard of living (59.6%); their attitude towards both the community’s future (58.7%) and their own futures (59.5%); the level of stress in the region (60.9%); and individual levels of stress and anxiety (51.1%). On the other hand, community respondents remained neutral as to their perception of the impact on employment opportunities (73.9%), demand for health services (91.3%), access to education facilities (82.6%, N=46), quality of housing (69.6%) and their employment security (60.9%, N=46, M=3.35). Future research aimed at understanding the role water security plays in the quality of life of regional communities will enable a better understanding of these pipeline impacts.

4.3.9 Summary of social impacts of pipeline

Recreational water in the form of on-farm dams and off-farm Lakes has played a large role in the social lives of many Northern Mallee community members. Yabbying, swimming, fishing and water skiing has been a feature of many family traditions and holidays. With the water shortage prior to the pipeline many of the lakes had dried, leaving a hole in the social activities of these families and increasing the importance of on-farm dams.

Summary of study findings on the perceived social impacts of the pipeline:

- The community perceptions of the social impacts of the pipeline are mixed.
- Improved community spirit and quality of life and reduced levels of stress and anxiety are considered the main social benefits.
- There was a negative response to the impact of the pipeline on recreational water use, with 64.8% of survey respondents making comments regarding the loss of yabbying, swimming and fishing in dams.

¹³⁷ Open-ended survey response.

¹³⁸ Tempy farmer.

- Latter stages of the pipeline (Stages 4-7) were seen by most survey respondents (65.6%) to have a negative impact on the region's recreation and entertainment , compared to the earlier stages (Stages 1-3, 18.2%).
- The community did not believe that the pipeline had an impact on the aesthetic quality of the region.

Two quadrant analyses (Figures 12 & 13) compared the relative average importance of the proposed social impacts with the community's belief that the pipeline had delivered that benefit. Strengths of pipeline are identified in this analysis.

Figure 12
Perceived social benefits and importance of pipeline attributes for the Northern Mallee community

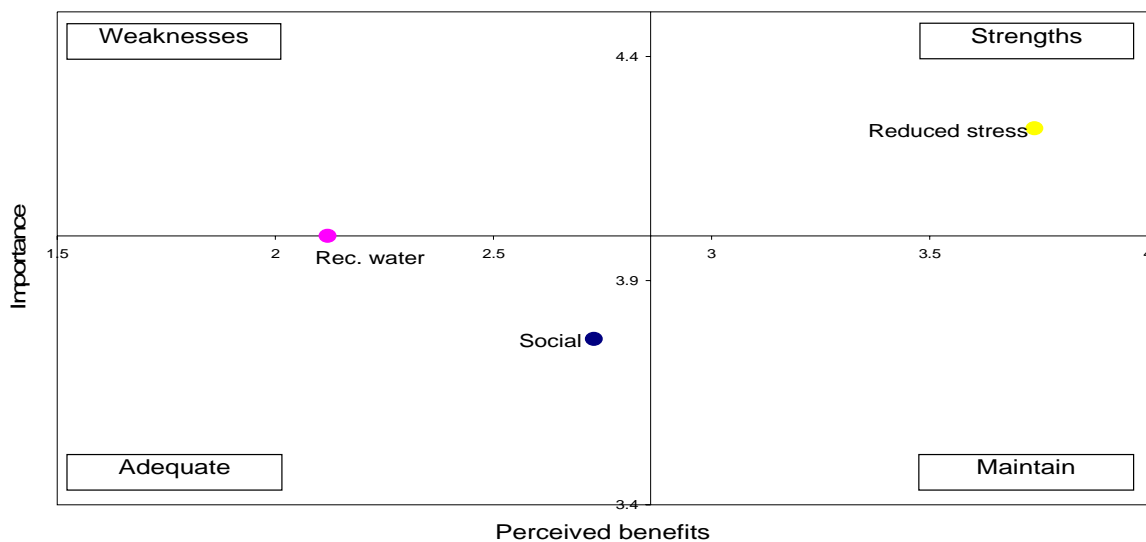
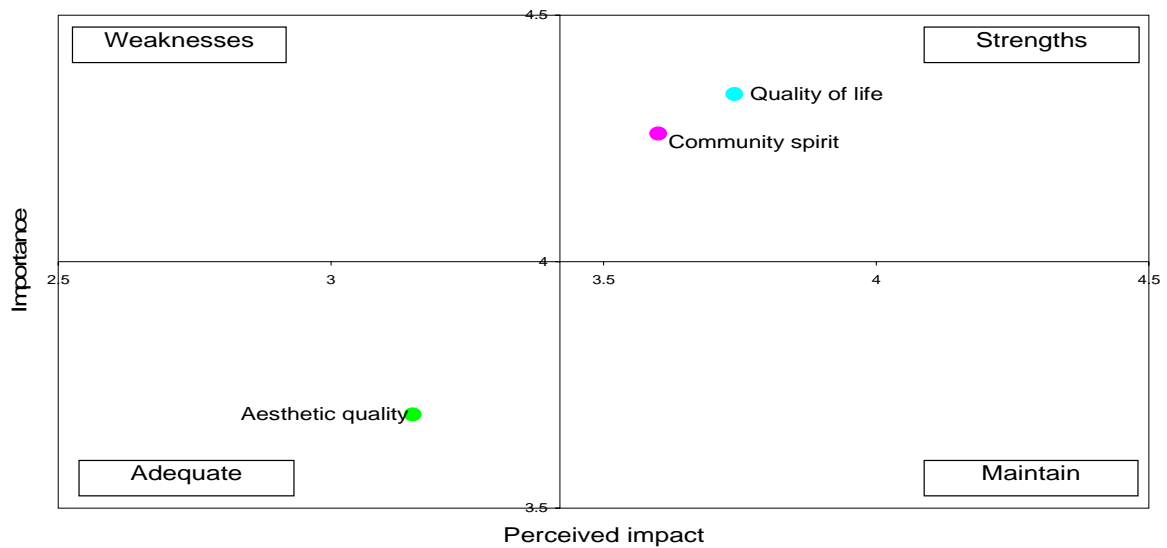


Figure 13
Perceived social impacts and important pipeline attributes



This is a summary of the community perceptions of the social impacts of the pipeline based on the convergence of multiple data analyses.

Benefits

- Improved quality of life
- Reduced level of stress & anxiety
- Improved community spirit

Limitations

- Loss of recreational water
- Limited improvement to aesthetic quality of the region

Concerns

- Loss of on-farm recreational activities; yabbing and swimming
- Loss of water in Lakes for skiing and swimming

5. Conclusions and research opportunities

This study has compiled considerable secondary and primary data from multiple sources to gain an understanding of the economic, environmental and social impacts of the Northern Mallee pipeline on the community and farming. The triangulation method used in this study enhances the validity and reliability of the data collected which contributes to the degree of confidence with which the conclusions regarding the impact of the pipeline are drawn. However, a number of limitations associated with the individual methods used limit the reliability and generalisability of these findings and therefore only trends in the data have been highlighted rather than conclusive statements about the impacts of the pipeline. This section summarises the conclusions of the study and discusses future research opportunities.

5.1 Conclusions

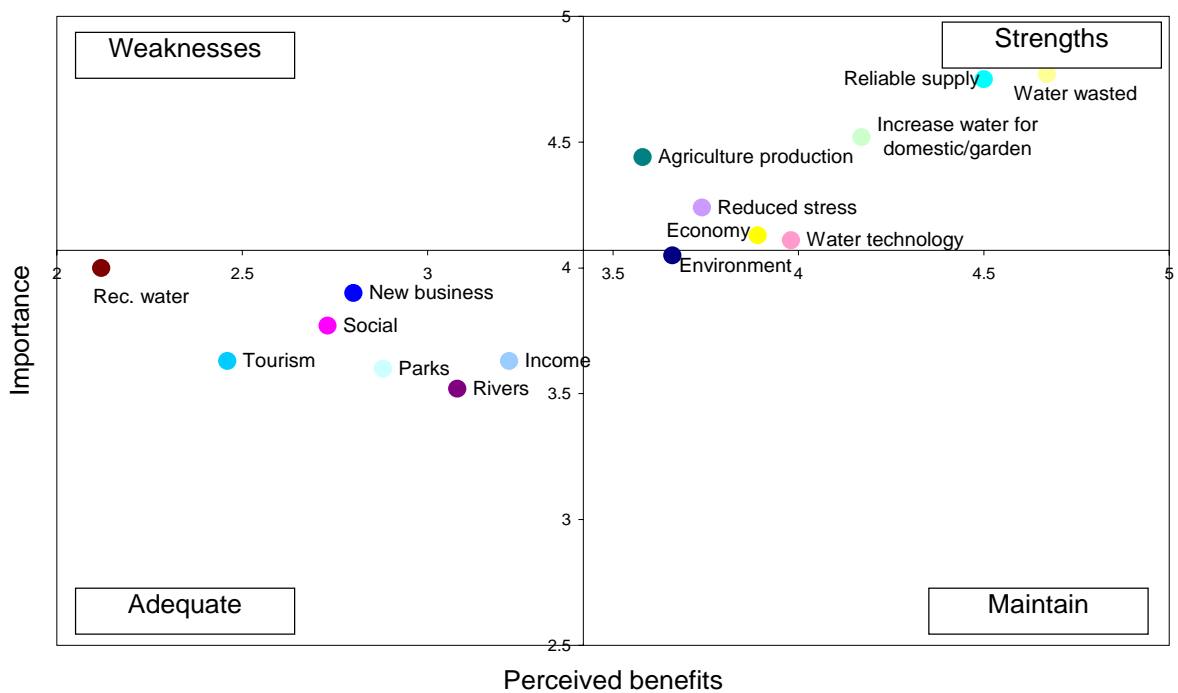
The findings summarised in this report are reflective of trends in the data rather than conclusive statements regarding the impacts of the pipeline. They are a guide to the community perceptions of the impact of the pipeline on the community and farming and provide a basis for further longitudinal research.

The main findings of this study on the impacts of the pipeline are:

- The community perceptions changed over time from somewhat sceptical to very positive.
- Economic, environmental and social impacts perceived as important by the community were achieved.
- The negative response to the loss of recreational water use hasn't had a negative impact on the overall perception of the pipeline.
- Reliability of water supply for domestic & stock purposes is more important to the community than recreational water.
- Perceived quality of life has improved.

A quadrant analysis (Figures 14) compared the relative average importance of the proposed pipeline impacts with the community's belief that the pipeline had delivered those benefits. This analysis demonstrates that having a more reliable supply of quality water for domestic and stock use and reducing waste water is more important than losing recreational water activities. These results indicate that water security for domestic, stock and agricultural purposes may play an important role in the perceived quality of life of rural communities.

Figure 14
Perceived benefits and importance of pipeline attributes for the Northern Mallee community



This is a summary of the community perceptions of the impacts of the pipeline based on the convergence of multiple data analyses.

Benefits

- Increased agriculture production
- Security of supply
- Increased water availability for domestic & garden purposes
- Reduced amount of water wasted

Limitations

- Limited attraction of tourism and new business to the region
- Limited increase in water available for parks and rivers
- Limited improvement in social activities
- Limited increase in water for recreational use

Concerns

- Cost
- Loss of recreational water use
- Loss of wildlife

5.2 Research opportunities

A number of lessons and research opportunities have been identified from this study. They fall into three categories; data collection methods; follow-up research in the Northern Mallee; and other research opportunities.

5.2.1 Data collection methods

A number of important factors that are worthy of consideration in understanding the impact of the NMP and future water infrastructure projects were highlighted during this study:

- Social-economic secondary data is limited in availability and generalisability. It only gives a broad picture of the general trends in the regions making it difficult to ascertain the impact of the pipeline.
- There is a need to develop a set of objective indicators and a primary data collection method of these indicators which is relevant to changes associated with the pipeline
- Reconstruction of events, motives and feelings are highly susceptible to recall inaccuracy and bias. Therefore, data collection at the time of the pipeline project is important.
- Longitudinal impact studies are required to further assess the development of impacts over time
- Building rapport with farmers face-to-face is essential for effective communication

5.2.2 Follow-up research

The community perceptions of the impact of the pipeline provide a basis for more detailed research into the actual economic, environmental and social impacts of the pipeline. The main aims of the follow-up research will focus on quantifying some of the economic costs and benefits of the pipeline and the social and environmental implications. These include:

- To quantify the economic costs and benefits of the pipeline.
- To quantify the impact of the new water tariff structure on farm income.
- To identify the social-economic profile of Northern Mallee towns and farms pre and post pipeline construction using more specific data.
- To understand how the Northern Mallee community has adapted to the loss of recreational water.
- To identify whether farmers have proactively created biodiversity opportunities for wildlife as a result of the loss of some farm dams.

5.2.3 Other research opportunities

This study highlighted a number of other research opportunities that would enhance the understanding of the impact of the pipeline in the Northern Mallee and provide valuable insight into similar water infrastructure projects elsewhere. These include:

- Longitudinal research to assess the impacts of changes in water infrastructure communities over time
- Understanding the value of water and its uses and how this might change under different supply and demand conditions
- The role water security plays in the quality of life of rural communities and the uptake of new farming and agricultural businesses.

References

- Delaney, R., & Sluiter, I. (2003). *Wimmera Mallee Water: Report for Stage 7 (Gypsum) Environmental Audit Project*. Brunswick, Victoria: EnviroSense.
- Dyer, F., Carter, R., & Robson, T. (2005). *Environmental flows: Report on 2004/2005 releases in the Wimmera and MacKenzie Rivers*. Horsham, Victoria: Wimmera Catchment Management Authority.
- Gutteridge Haskins & Davey Pty Ltd. (1999). *Northern Mallee Pipeline Project: Water quality study*. Melbourne, Victoria: Gutteridge Haskins & Davey Pty Ltd.
- Hassan, E. (2006). Recall bias can be a threat to retrospective and prospective research designs. *The Internet Journal of Epidemiology*, 3(2).
- Kinhill Engineers Pty Ltd. (1995). *Northern Mallee Pipeline Review*. Parkside, South Australia: Kinhill Engineers Pty Ltd,.
- Rural Water Commission of Victoria (RWC). (1991). *Wimmera Mallee Study System: Draft summary report*. Kerang, Victoria: Rural Water Commission of Victoria.
- Snowy Mountains Engineering Corporation Pty Ltd. (1999). *Northern Mallee Pipeline Project Report*. Melbourne, Vicotria: Snowy Mountains Engineering Corporation Pty Ltd.
- van Veldhuisen, R. (2001). *Pipedreams: A history of water supply in the Wimmera-Mallee*. Horsham, Victoria: Wimmera-Mallee Rural Water Authority