THE SOCIAL IMPACT OF CHANGING WATER REGIMES

FRAMEWORK AND ECHUCA CASE STUDY

A Report by the National Academies Forum

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Preface

In 2000 and 2001 the Business Council of Australia entered into discussions with Australia's four learned academies about societal change. The academies – Australian Academy of Science (AAS), Australian Academy of Technological Sciences and Engineering (ATSE), Academy of Social Sciences in Australia (ASSA), and Australian Academy of Humanities (AHA) – saw the need for a joint approach and agreed to work together to study selected aspects of this fascinating topic.

Uppermost in the mind of the Business Council was the social impact of changing water regimes. The supply of water for business, agriculture and domestic use was already a matter of concern and has become even an more prominent issue as much of our country experienced a serious drought, and climate change assessments raised the possibility that such climatic extremes would become more common in future. Such questions had been addressed, from technical and business perspectives, in the report *Water for Ever*, published by the Academy of Technological Sciences following their study of the availability and use of water in Australia. More recently, there has been the distraction of proposals to 'drought proof' Australia, and Governments have shown increased interest in restoring river flows in the Murray-Darling system.

The outcome of the discussions between the Business Council and the Academies was a submission to the Australian Research Council (ARC) for support from the Council's Learned Academies fund for a study of the social impact of changing water regimes in rural and regional Australia. Seed funding of $10,000 was provided by the Business Council of Australia. The submission to ARC was made by the National Academies Forum (NAF), the vehicle for cooperative action by the learned academies, which also provided $10,000 to support the study. The upshot was a grant of $92,000 for a study to be conducted in 2002. Because the study was slow to progress, and was not completed in calendar 2002, the ARC allowed the NAF to continue to draw on the grant through 2003 to the completion of the study.

The *2000 Review of the Australian Learned Academies* noted "the emergence of national questions and problems … which call for expertise and research from a wide span of intellectual disciplines" and recommended that the Academies should "speak with one voice in advising governments and stimulating public debate". The study proposal submitted to the ARC offered an opportunity for the Academies to respond to that advice by working together to explore the social aspects of water degradation. This study calls for the broadest possible spread of expertise in the study group. The diverse expertise of the Fellowships of the four academies and the networks to which their Fellows belong, coupled with their independence from political parties and lobby groups, ensures that they can give independent advice to government agencies and the community.

In this study the impact of changed water management regimes on community was examined in a region highly dependent on water and irrigation for its livelihood and future. The site chosen for the case study was the city of Echuca and its immediate surrounds in Campaspe Shire, some 150 km north of Melbourne on the banks of the Murray River. It is intended that the pilot study would examine the social impacts caused by changing water regimes. Every region has its distinctive features, , and accordingly the impact of changing water management regimes differs from region to region. Accordingly, the study in Echuca and its environs serves as a test of the approach and methodology, not as a basis for regional or national water policy.

A more ambitious objective, would be to examine the social impact of changes in water policy and management in several regions so as to more clearly identify the most important general responses and differentiate them from local or region-specific responses.

Each of the four Academies nominated representatives who formed the steering committee for the study. The members were Dr Peter Crawford (ATSE), Mr Keith Daniel (ATSE), Professor Graeme Hugo (ASSA), Professor John Lovering (AAS), Professor Leon Mann (ASSA), Professor Janet McCalman (AHA), Mr Steven Munchenberg (BCA) and Dr Lawrence Warner (AHA). Professor Ian D. Rae (ATSE Technical Director) was convener for the committee and he and Professor Mann oversaw the contributions to the study.

A major contribution to the study was made by Quentin Farmar-Bowers, who examined the way in which different groups acknowledged and responded to changing water regimes, and included interviews with people in the Echuca district. His research report, held by the National Academies Forum, was the basis for Chapter 1. Chapters 2-7 consist of contributions by experts on various aspects of the study – demography (Graeme Hugo), hydrology (Teri Etchells), public participation in policy making (Ron Johnston) – while local resident Selina Handley produced a pen-picture of life in Echuca.

About the Contributors:

Teri Etchells completed her PhD in the Department of Civil and Environmental Engineering at the University of Melbourne, as part of the Co-operative Research Centre for Catchment Hydrology. Previously, she had graduated from Monash University in 1997 with degrees in Engineering (first class Honours) and Commerce. Teri first developed an interest in the water industry through a cadetship with Melbourne Water and then moved into strategy consulting with The Boston Consulting Group before starting her PhD.

Quentin Farmar-Bowers completed his PhD degree in Civil and Environmental Engineering at the University of Melbourne, following a BSc in Agriculture and an MA in Business Studies. He was a member of the Victorian Public Service for nineteen years, where his career culminated in a two-year period as Director of Research for a Parliamentary Committee. He has been a consultant, working with Government departments and other agencies on projects concerned with sustainability, such as those involving land clearing, flora and fauna management, and biodiversity maintenance.

Selina Handley is an Arts graduate with Diplomas in Education and Agribusiness. She has taught in Alice Springs and Echuca and worked extensively with Victorian Government agencies in Community Engagement and Social programs. With her husband, she runs a dairy farm and lives just south of Echuca, but maintains sporting, social and cultural activities in the town.

Graham Hugo FSSA is a Professor of the Discipline of Geographical and Environmental Studies and Director of the National Centre for Social Applications of Geographical Information Systems at the University of Adelaide. Australia's leading demographer, he is the author of over two hundred books, articles in scholarly journals and chapters in books, as well as a large number of conference papers and reports. In 2002 he secured a $1.125 million ARC Federation Fellowship over five years for his research project, "The new paradigm of international migration to and from Australia: dimensions, causes and implications".

Leon Mann FSSA is Professorial Fellow and Director of the Centre for Research and Development leadership in the Faculty of Medicine, Dentistry and Health Sciences in the University of Melbourne. From 1991 to 2003, he held the Pratt Family Chair of Leadership at the Melbourne Business School. Professor Mann was President (2001-2003) of the Academy of Social Sciences in Australia, and chairs the Academy's research committee.

Ian D. Rae FTSE is Technical Director of the Academy of Technological Sciences and Engineering. An organic chemist by training, he has had extensive experience in policy development and serves as an adviser to Australian Governments and the United National Environment Programme. He is President Elect of the Royal Australian Chemical Institute.

Ron Johnston FTSE is Executive Director of the Australian Centre for Innovation Ltd at the University of Sydney, and one of Australia's leading analysts of change. Over the past fifteen years he has mapped and publicised the forces of change emerging from new technologies, changing patterns of international competitiveness and trade, new organisational structures, and shifts in social values. His work has included issues as diverse as water supply and management, technology-assisted learning, irrigation, university research, sea transport, global warming, nuclear fuel management, the IT industry, biotechnology, laws of the sea, opportunities for youth, sustainability and knowledge management.

Chapter 1 Introduction

Ian D. Rae and Leon Mann

1.1 The centrality of water

The supply of water for business, agriculture and domestic use was already a matter of concern and has become even a more prominent issue as much of our country experienced a serious drought, and climate change assessments raised the possibility that such climatic extremes would become more common in future. Such questions had been addressed, from technical and business perspectives, in the report Water for Ever, published by the Academy of Technological Sciences following their study of the availability and use of water in Australia. More recently, there has been the distraction of proposals to 'drought proof' Australia, and Governments have shown increased interest in restoring river flows in the Murray-Darling system.

1.2 A study of the social impact of changing water regimes in rural and regional Australia

While water planning and management in Australia has often focused on technical considerations of quantity and quality, the social impact of management strategies and contemporary water reforms, has been much less analysed. Consequently the social impacts have not been taken into consideration in any systematic way in public and private decision making. The social consequences of water resource degradation and changes in water allocation and availability associated with actions to restore river health and water quality are widespread. Rural towns and communities, farmers, and major rural industries all feel the brunt of economic, technological, environmental and government-directed change. There are further changes ahead, likely to be brought on by such things as caps on water availability, allocation of water to environmental flows and major programs to deal, in part, with the crippling impacts of salinity. These changes will have not only major economic but equally major social and equity implications.

Some changes are driven by natural imperatives - insufficiency of water supply, salinisation, and climate change, for example - and others will be driven by actions taken to limit or eliminate unwanted effects. In aggregate these changes are expected to increase economic activity and improve water quality. However, at local and regional level they can also be expected to cause considerable social disruption and some hardship. It seems obvious to us that the effects will be felt most keenly in those parts of rural and regional Australia where there is least capacity for change. Many organisations have contributed in an uncoordinated way to literature on the kinds of problems that the academies set out to study. These include government departments, welfare agencies, economists, and technology-based groups such as the four Cooperative Research Centres that have 'water' themes. The 'social water' study supports stated Government policies concerning remediation of environmental damage, sustainable development, and the impact of technological change on rural and regional Australia. Social and technological issues are too often studied in

isolation, but superior outcomes can be achieved by a multi-disciplinary approach. Such an approach would involve all of the stakeholders examining and evaluating social impacts and formulating a perspective to address problems of dislocation, hardship, inequity, non-sustainability. The stakeholders include state governments; shire and city councils; tourist and recreation authorities; planning, sewage and water supply bodies; primary producers; and rural residents. The perspective would be the basis for advice at the national level on the alleviation of social impacts caused by changing water regimes.

1.3 The Location of the Study: Echuca and the Campaspe region

The impact of changed water management regimes on community was examined in a region highly dependent on water and irrigation for its livelihood and future. The site chosen for the case study was the city of Echuca and its immediate surrounds in Campaspe Shire, some 150 km north of Melbourne on the banks of the Murray River. It is intended that the pilot study would examine the social impacts caused by changing water regimes. Every region has its distinctive features, and accordingly the impact of changing water management regimes differs from region to region. Accordingly, the study in Echuca and its environs serves as a test of the approach and methodology, not as a basis for regional or national water policy. A more ambitious objective would be to examine the social impact of changes in water policy and management in several regions so as to more clearly identify the most important general responses and differentiate them from local or region-specific responses.

1.4 A framework for linking water issues and social response

The study developed a broad framework for mapping the social and environmental impacts of changing water regimes. The key elements in the framework are:

- catchments and river management policies and regimes;
- technological infrastructure which supports water management policies and practice, such as channels, dams, gates, flows, diversion, re-use;
- economic policy and instruments underpinning water supply and allocation, rights, transfer, pricing, rationing;
- social-attitudes and habits influencing consumer behavior, attitudes and practices;
- environmental impacts, often seen in terms of sustainability, growth and recovery *versus* degradation including salinity etc; and
- social impacts.

The social impacts are observed firstly in the local community and region, with farmers, townspeople, suppliers, customers, and families being affected. There may be changes in employment and life prospects. Secondly, there are impacts on the wider community and region - upstream (where change may be required) and down stream as problems migrate. Thus it is seen that solutions which may be directed locally can impact more widely and necessitate the development of more general policy to deal with what will inevitably be a dynamic system.

The impacts are evident and may be detected in behaviours such as change of occupation and industry, learning and adoption of new and perhaps more efficient and productive practices, and possibly cooperation with others. More negatively, we may encounter despair, resentment or even exit from the region.

A feature of the framework is that it shows a dynamic system. Technical and economic tools can be applied to water management. They sit together with social behaviors and attitudes because it is not enough to have available new water usage practices - they must be adopted if there is to be change or if people are toad pat to change being forced on them. Together all three elements produce environmental impacts and social impacts, which are themselves linked in a dynamic relationship. It is easy to see that the system may be in balance or equilibrium, but also that there could be dissonance if technology, economics and social are out of balance.

The present study was able to explore only some of the social impacts of changing water regimes. Indeed, one may take the position that a dynamic situation is likely to produce unforeseen impacts and so premature attempts at closure might fail through failure to consider these. At this stage, however, we can say that the community consists of people with different needs, interests, strata, occupations, attachment to the area, mobility, commitments other attributes. We have sought out evidence of this diversity, asking 'what are the social impacts?', 'who is most impacted?', 'what can we draw from the study to explain how the social and the technological aspects interact in a community?' and 'what lessons can be learned?'

1.5 Introduction to the Chapters

The contributors to this volume cover some of the key elements in the framework. Teri Etchells (Chapter 3) describes the water management and water resource issues in the Campaspe region, providing an assessment of the changes in the environment and technological measures and interventions introduced to alleviate if not solve the water problems. Her discussion of water resources in the 4500 square kilometres Shire of Campaspe shows how the present system for application of surface and ground water developed. The Campaspe region, Etchells points out is an excellent site for a case study on the social and environmental impacts of changing water regimes. There are major salinity problems in the area, especially with the Water of the Campaspe River, much of the flow of which is captured by Lake Eppalock. Careful attention is paid to the environment and the arguments for increased environmental flows in the Murray River are described, with attention to riparian areas and wetlands. Environmental pressures combined with water scarcity in recent years, require changes in a regime that has until recently provided adequate water supplies but paid insufficient attention to ecology. Change is needed; Etchells argues at both local and catchment scales to achieve sustainability. A conceptual framework developed by Quentin Farmar-Bowers is used to examine the social impacts on community in the region, in particular the dairy farmers, growers and others who depend on water for their living. The conceptual framework has two principal elements.

Firstly, the practitioners who live on and make their livelihoods from the land and depend on water will have different perspectives on water allocation and usage from those of the professional specialists and experts who provide advice and make policy about water allocation and regimes. The different perspectives in turn have an impact on the morale, optimism, acceptance of new water regimes by practitioners and perhaps even the willingness to participate in or resign from community debate and consensus on the issues.

Secondly, that the attitudes of both practitioners and professionals toward sustainability in general (and water and land use in particular) are founded on basic human needs, such as the need for subsistence, protection, freedom, and participation, a list promulgated by Manfred Max-Neef in the late 1980s. These needs in turn, and whether they are fulfilled or frustrated by actual and impending changes in water-land management policy and practice, help determine the responses of individuals, groups and communities.

Dr Farmar-Bowers contrasts the views of specialists, who frequently live outside the affected town or region, and practitioners who live and work there and come from very different educational and cultural traditions. The views of the specialists are gathered from recent literature and analysed for evidence of a common position which often gives more weight to regional and national than to local affairs. The position of the practitioners is studied across nine human needs – subsistence, protection, affection, understanding, participation, leisure, creation, identity and freedom, described by Chilean economist Max-Neef. The framework of the nine human needs was used in detailed interviews with fourteen farming families. This qualitative research enabled the views of the practitioners to be ascertained. The final section of the study consisted of a comparison and reconciliation of the perspectives of the experts and the practitioners.

Selina Handley, a resident of Echuca, provides a personal and historical perspective on the changes brought to a river town reliant on water for a diversity of industries and lifestyles. A pen picture of Echuca, reaching back fifty years and moving rapidly to a description of the present situation, a range of agricultural activities – dairying, beef, viticulture and horticulture – underpin the prosperity of Echuca and the Campaspe Shire. However, the number of farming businesses is decreasing and there is increasing need for off-farm income to maintain the viability of those that remain. The cost of irrigation water is critical for the farmers. Businesses in Echuca benefit as services contract in nearby centres, and tourism – centred on the river – makes substantial contributions to the prosperity of the area.

Graeme Hugo analysed the social demographic changes occurring in Echuca and the Campaspe region, and in many other country towns. These demographic changes relate to movement to and from country towns by peoples in different age groups. Their implication for community attitudes and responses to changes in industry due to water regimes and availability is not spelled out but implied, being that country towns like Echuca are resilient. Despite the pressure on farming groups and others who depend on them, the attachment to the broader region is strong.

This broad conclusion is supported by the detailed demographics presented by Graeme Hugo. He observed that Echuca is growing at a faster rate than the rural population of Victoria but at a somewhat slower rate than population is growing in Melbourne. Nonetheless, Echuca is part of belt of substantial population growth across central Victoria, mainly from internal rather than international migration, and its fertility rate is comparatively high. Despite this positive factor, however, changing age structure in Echuca could mean that selective inward and outward migration is depleting the region people who are in their most productive years. In this, the city on the banks of the Murray is not alone since many rural and regional city demographics are like this. The changes identified by Hugo do not provide support for the 'despair' hypothesis, in that there is no evidence of significant exit/departure of those most directly affected.

Ron Johnston, in "*Science versus the Public: Water matters*", picks up the theme of competing perspectives of professionals and practitioners. The different perspectives are relevant to the analysis of past and current water management policies and regimes and the extent to which farmers who depend upon water accept or resist the introduction of new and changed water management policies. This is germane to social impact of the changed regimes. Johnston first examines views about the reliability of scientific knowledge, places many current disputes in what he calls post-normal science, which is characterised by high system uncertainty at the same time as the stakes associated with application of the science at very high. Such a scenario places great weight on trust between scientists and the community, and the essentially political nature of the decisions that need to be made – most particularly in the case of water supply and quality – requires that political processes to address conflicting positions emerge. There is much, he says, that we can learn from overseas experience in such matters.

The question of water cannot be separated from the question of land, and these two are strongly impacted by problems of rainfall, especially drought. For six years from 1998, Australia was gripped by perhaps the worst drought since European settlement in 1788. The drought affected the livelihoods of many people and it deeply coloured their attitudes and affected their optimism. In March 2004 the National Farmers Federation produced its Drought and Climate variability policy (www.nff.org.au/policies_farm%20business.htm) which recommended to Government a strategy incorporating an integrated suite of programs and partnerships to handle what they saw as three phases of drought: preparedness, management and recovery. Their objective was that drought resilient industries should be achieved through encouraging primary producers to invest in self-reliance, with incentives offered to prepare better for drought and appropriate assistance available when severe drought exceeds the capacity of self-reliant measure put in place.

Addressing the last of these points, by May 2005 the Commonwealth Government had made available over $2 billion for drought relief in various forms, with continuing investment in the Farm Management Deposit Scheme (pre-tax set-asides), and over $30 million in Environment Management Systems for farmers to plan for the resource management implications of drought and development of prediction tools to assist in adaptation to more variable future climates.

The crippling drought forms an ominous backdrop to the issues of water usage which is the focus of the Study. The voices heard in the interviews link pressing ongoing future concerns about drought, land care and water quality and supply. Thus social impacts of changing water management and regimes is in many respects a study of social response to the new reality produced by a severe drought and the realization by many that the cycle of drought, flood, etc required adjustments in attitudes, expectations and practices.

There has developed in a comparatively short time both increased awareness of and concern over changing water regimes in both urban and rural areas, and also greater Government acceptance of the need for change. This leads to the prospect of major economic changes in many rural industries and consequent social changes in communities based on cotton, forestry, fisheries, and cattle. In many parts of Australia, age-old practices are challenged by a greater realization of the impact of those practices on the environment and indeed on other industries and communities in a dynamic interconnected system.

Chapter 2 The Specialists' Perspective[1]

It became clear early in the study that there was a significant difference in the way that two groups of stakeholders viewed the social impacts of changing water regimes. On the one hand were the practitioners – those for whom using water was an integral part of the way they made their living - and on the other were the specialists who were employed by the authorities in charge regulation and supply, or by research organisations such as CSIRO and universities. The difference in approach had obvious roots. Practitioners had to put themselves and their immediate situation first, so long term supply and the welfare of other practitioners came in second place. The specialists, on the other hand, tried to develop a 'system' view that looked to sustainability of supply and use that that was consistent with minimal environmental disruption and was amenable to administration in as fair a manner as possible for both present and future practitioners.

In this chapter we establish the perspectives of the specialists by examining their written accounts and the reports of their speeches and presentations. To foreshadow the outcome of the discussion that follows, the specialists' perspectives as revealed by State and Commonwealth agency documents suggest a consistently utilitarian approach in which a range of explicit or implicit notions underlie the detailed analyses and proposals. These notions are directed away from individual practitioners but include 'communities or industries' while the practitioners may be seen as cogs in a system that can (or, perhaps, ought to) be given external guidance; that is, be driven by policy. The goals or obligations of the system relate to production – making full use of resources – as a contribution to the national economy. Concurrently the goals are set to protect specific resources (especially water) so as to ensure that these resources can continue to contribute to production.

The formalism developed by Manfred Max-Neef (1991, 1992, 1995) allows analysis of a practitioner's life-needs under nine headings:

- Subsistence;
- Protection;
- Affection;
- Understanding;
- Participation;
- Leisure;
- Creation;
- Identity and
- Freedom.

However, we shall see that the specialists' perspectives are concerned with just the first two – subsistence and protection.

[1] This chapter is based on the research report by Dr Farmar-Bowers, which is held by the National Academies Forum.

2.1 The Murray-Darling Basin Ministerial Council and the Murray-Darling Basin Commission, 'The Living Murray'

The Murray-Darling basin, which takes in the catchments of the two major rivers in south-eastern Australia and their tributaries, is the subject of a management agreement between four states - Queensland, New South Wales, Victoria and South Australia - and the Commonwealth. The Murray-Darling Basin Agreement is the foundation for the Murray-Daring Basin Initiative which is concerned with the management of water and other environmental resources on a basin-wide basis. The Agreement sets out the responsibilities of the Murray-Darling Ministerial Council and the Murray-Darling Basin Commission. A major focus of these organisations, especially in recent years, has been allocation of water to irrigators and related issues such as allocation of water for restoration of the health of the River Murray. The Council's report *The Living Murray* (MDBMC 2002) provides information on their perspective (a specialists' perspective). While at first the planned changes in water allocations appear to be based on their 'global' significance for the basin, when implementation of the current plan is completed the issue will impact on local people and local environments.

The position taken in *The Living Murray* is that allocation for environmental flows is one of a number of responses that started in the 1990s and stems from a change in our attitudes (MDBMC 2002 *The Living Murray,* p.25). The change in attitudes involves the improvement of the natural environment to maintain biodiversity and retain productivity for Australians generally. Thus, in respect of improving river health, "This undertaking, combined with other changes taking place in society, will allow opportunities to flow – to lift irrigation to a whole new level of efficiency and sustainability and to revitalise communities with new industries and modern technologies. It can help build new industries, jobs and skills across the basin, bolster the community's prosperity, attract new residents and create a better environment for our children" (MDBMC 2002 *The Living Murray,* p.41).

The ethic the Council is using is utilitarianism. "The aim of all these investigations is to ensure any environmental measure developed yields the greatest benefit with the least impact on water use" (p.38). "Given the complexity, it is possible that the best result for the River Murray with the least overall impact on water users may be to concentrate impacts on only a few regions or communities" (p.5). Those regions are predictable. "There may be trade-offs between different irrigation areas. For example, the value of irrigated agriculture downstream may rise because environmental flows enable farmers to use better quality water at the same time as the asset base of upstream irrigators reduces because if water recovery" (p.33).

In terms of fundamental human needs, *The Living Murray* decision process has relevance to aspects of subsistence, since it addressed water allocation and quality issues as well as the need for comparable production in terms of water quality in the environment. Overall, the perspective gained from examining *The Living Murray* suggests a specialist environment sustainability approach to protection of river water quality, aimed at maximising the benefits for the country.

2.2 Murray-Darling Basin Initiative: Human Dimensions Strategy

The Human Dimensions Strategy evolved from a review of the impediments to adoption in natural resource management. The Strategy is complex but seems to be related to the implementation of the Initiative's programs. Paraphrased, its goals are to use social inquiry, and to develop an approach to engage communities in Basin management. The initiative's emphasis on communities leads to the conclusion that understanding communities is important. The sequence of ideas is as follows: "Human behaviours … are the central element of resource management … Changes … are only possible through changes to human behaviour … In order to change people's behaviour it is important to know about the context in which they operate … the Strategy seeks to develop deeper understanding … and then to apply that knowledge .." (MDBC Natural Resource Management – Human Dimensions Strategy web page). Hence "the requirement of building capacity of communities to engage with natural resource management" (MDBI 1999, p.9) which seems top suggest governance-at-a-distance by applying that deeper understanding.

The Human Dimensions Strategy also has an Implementation Plan that includes a set of Values and Behaviours as a guide to partners in the Initiative. The headings of the set are: Courage, Inclusiveness, Commitment, Flexibility, Practicality, and Mutual Obligation. Their adoption may lead to "the need for shifts in MDBC partners' organisational cultures" as well as their own (MDBC Human Dimensions Strategy, Implementation Plan, p.2). Communities are identified specifically: "The quality of the relationship between the *Initiative* and basin communities will be changed by the adoption of the agreed values and behaviours … the Initiative partners will actively facilitate the empowerment of Basin communities through institutional change and responsive behaviour" (MDBC Human Dimensions Strategy, Implementation Plan, p.2).

The Human Dimensions Strategy seems to show the strength of the specialists' commitment to the notions of community and system-with-cogs. The Strategy involves obtaining information that will enable the specialists to turn the cogs in the direction they want, and to develop ways to make them better by suggesting which values and behaviours to adopt, and specific education to enhance their capacity to respond.

Aslin and Brown (undated) have developed a tool kit to help specialists with community engagement. Community participation and consultation is a feature of most programs, including the Living Murray. But this does not seem to go close to the participatory action research envisaged by Lal *et al*. (2001).

2.3 Murray-Darling Basin Ministerial Council: Integrated Catchment Management in the Murray-Darling Basin 2001-2010

Declining water quality has complicated the task of allocating water resources and it is self-evident that land use has a major impact on water quality. Since 1990, the Ministerial Council has been developing an approach called Integrated Catchment Management (ICM) which involves setting objectives (called Targets) and encouraging people to work towards achieving these objectives. In their 2001 report, the Ministerial Council "outlines an approach to ICM [Integrated Catchment Management] that is based on targets for catchment health and progressive evolution of the way we organise communities, institutions and governments to meet the challenges and opportunities of the future [that is, the targets]" (MDBMC 2001, p.ii).

The targets concern diversions (the cap on diversions) and River Murray salinity. The Ministerial Council is developing a target for water salinity in the main tributaries. "But we must protect our catchments if we are to protect our water. We will therefore need to set targets for other aspects of catchment health such as nutrients in rivers, water sharing, riverine ecosystem health and terrestrial biodiversity. These targets will need to be integrated with each other and with our social and economic aspirations to achieve the catchment health we seek" (MDBMC 2001, p.iii). The five targets concern water quality, water sharing, riverine ecosystem health, terrestrial biodiversity and catchment health, which within ten years will be supported by strategies (MDBMC 2001, p.12-13).

From this, the document logically follows with "The Basin community and governments must commit to the protection of the health and productivity of the Murray-Darling Basin … Therefore, the *Initiative* partners are committed to strengthening ICM and the partnership between governments and the community over the next decade" (MDBMC 2001, p.iii-iv). Further, "The Ministerial Council acts in partnership with the community through the Community Advisory Committee that includes a representative from each of the catchments in the Murray-Darling Basin" (MDBMC 2001, p.1). The Ministerial Council also includes a commitment statement – "WE the community and governments of the Murray-Darling Basin commit ourselves to do all that needs to be done to manage and use resources of the Basin in a way that is ecologically sustainable" (MDBMC 2001, p.3). They define ecologically sustainable development as "Using, conserving and enhancing the communities' resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased" (MDBMC 2001, p.27). 'Total quality of life' is not defined, but in our treatment we have tried to dissect this using the Max-Neef (1991) formalism.

The Commission's approach is to deal with water- and land-use at a regional scale and address people matters at a government and community level, although 'community' seems to be defined as consisting of a number of chosen representatives in a committee. Blackmore notes that "the Ministerial Council is almost, but not quite, a natural resources parliament of the Basin" (Blackmore 2001, p.4), and the Community

Advisory Committee reports directly to the Council. It should be noted that the members of the Community Advisory Committee are appointed, not elected. While the ICM addresses implementation issues to a degree, and asserts that "We must evaluate links between targets and actions at different levels" (MDBMC 2001, p.9) it stays mainly at the partners' level.

The notions of community and responsibilities are central to the Committee's perspective and are detailed in the report. The landholders' responsibilities as given there, are to:

- act to achieve agreed outcomes;
- generate and share knowledge;
- comply with regulations; and
- be involved with catchment planning.

The notion of a system-with-cogs is basic to the document, both in terms of nature and of organisations and arrangements. Each cog has a role that makes the system work or prevents it from doing so. Spread throughout the document is the notion that the system is hierarchical, with upper levels (such as the Ministerial Council) having the power to direct. This comes through in language such as "We must find the appropriate balance between community ownership of catchment management and government leadership and support" (MDBMC 2001, p.14). Key elements of roles and responsibilities will be assigning of accountabilities [by government], supporting a learning approach rather than a punitive approach, and the importance of engaging all partners" (MDBMC 2001, p.20).

2.4 MDBMC: Basin Salinity Management Strategy

The Basin Salinity Management Strategy was devised to be consistent with the Ministerial Council's Integrated Catchment Management policy statement. Both seem to be based on the idea of a system-with-cogs in which the notions of 'community', 'responsibility', and 'power/control' are important. The focus is again on the use of water resources for productive purposes. "It [the strategy] establishes targets for the river salinity of each tributary valley and the Murray-Darling system itself, that reflect the shared responsibility for action both between valley communities and between states. The Strategy will maintain the water quality" (MDBMC 2001a, p.1 of Summary). The Strategy follows a utilitarian ethic, as shown by the last of its four objectives: "Maximise net benefits from salinity control across the Basin" (MDBMC 2001a, p.1 of Summary).

The Basin Salinity Management Strategy is a framework to control the implementation of the National Action Plan for Salinity and Water Quality (NAP) as well as state salinity strategies and regional salinity plans, and catchment management plans. It furthers existing control mechanisms using salinity targets, salinity credits and debits, valley report cards, salinity registers (A&B), annual reporting to the Ministerial Council and a rolling five year review. "In endorsing this Strategy and its major policies including salinity targets, redesigning farming systems, the vegetation

bank and joint salt interception works, the Ministerial Council has signalled that it is prepared to take decisive action" (MDBMC 2001a, p.4 of Summary). Work has been continuing on these issues for some time, as shown for example in the work of Walker *et al*. (1999) on the effectiveness of farming systems in controlling dryland salinity.

2.5 Murray-Darling Basin Commission: Landmark Project

The Landmark is a three-year project related to the management of dryland in the Murray-Darling basin. The objective is "to identify the need for land use and land management change and explore policy responses which may facilitate change in broadacre dryland regions in the Murray-Darling Basin" (MDBC 2002a, Community Report, p.3). The project includes the development of 'Current Recommended Practices' (CPRs) for broadacre cropping and grazing land and the development of policies that would lead to their adoption (see MDBC 2002b Policy Discussion Paper). To achieve these outcomes the project appears to take the broad outcomes wanted on a Basin basis and convert them into actions that farmers should take at a property scale. There is quite a large number of CPRs, including 'Whole farm planning', 'Integrated pest management', 'Crop rotation', 'Tactical grazing' and others of this kind (Sinclair Knight Merz 2001). The focus of the project strongly supports the notion that specialists believe farmers require external expert advice. The project involved surveys and case studies and focuses on technical solutions and regional/national outcomes despite having small-scale information.

2.6 CSIRO: *Heartlands* Initiative

The sub-title for this initiative is 'Towards sustainable land use in the Murray-Darling Basin' and it has eight objectives (Heartlands Objectives 2002). "The *Heartlands* initiative aims to improve land use in the Murray-Darling Basin thereby preserving land and water resources and sustaining commodity production" (Heartlands Overview 2002).

The Heartlands addresses the environmental sustainability of dryland farming. It combines on-ground activities with strategic research and seeks to:

- support land use decisions and better targeting of change in land use against the question "What should we plant and where for maximum benefit and cost effectiveness?";
- contribute to a wider set of land use options, for example low rainfall forestry; and
- assess just what can and cannot be achieved through changed mosaic of land use incorporating more perennial species onto the farm to mitigate salinity, restore biodiversity, and maintain water quality.

Heartlands is supported by land and water agencies such as CSIRO, MDBC, Catchment Management Boards in NSW and Catchment management Authorities in Victoria, and other Commonwealth and State agencies. Heartland work is focused mainly on Billalong Creek catchment in NSW and Honeysuckle Creek catchment in Victoria.

The Heartlands program of research and implementation is directed to the long-term issues of allowing (promoting) productive agriculture in dryland areas, as long as it does not contribute to problems elsewhere via groundwater additions and consequent salinity and declining water quality. The significance of this last caveat for downstream users is clear when one considers instances such as the irrigation of high-value horticulture crops. In the Honeysuckle Creek study area, research is focused on groundwater and is showing where current and future salinity problems may lie. This information allows specialists to develop farming systems to ameliorate the problems (Heartlands 2002, p.4). The Heartlands project, while operating at a farmer scale, is pitched at solving regional problems for the overall benefit of the nation. It is technically focused but "mindful of economic imperatives" (Heartlands Open Day 2002, p.2). Heartlands has a range of research projects including a number on integration and adoption. One of these involves social research for effective community participation and adoption. "This project will enable effective community participation, integrate the *Heartlands* initiative with community decision making processes and ultimately enhance adoption and implementation of desirable land use change" (Heartlands 2002). Although social, the research is focused on compliance with sustainable land use. It markets what the specialists consider to be 'desirable land use change'.

Both Heartlands and Landmark represent moves towards the issues affecting individual families and their situations, but nevertheless they seem to be maintaining the specialists' perspective.

2.7 National Action Plan for Salinity and Water Quality

The Council of Australian Governments endorsed the inter-governmental agreement on the National Action Plan for Salinity and Water Quality (NAP) in November 2000. The plan refers mainly to salinity in dryland areas and links it to production, biodiversity, infrastructure protection and water quality. It operates through a number of mechanisms including regional plans and it refers to communities as 'management entities'. It has community capacity building provisions such as "#24. The Parties agree to support capacity building of communities and land holders to assist them develop and implement integrated catchment management / regional plans" (COAG 2000, clause 24).

The intergovernmental agreement contains a good representation of the specialists' perspective. It addresses the two items of production and environmental protection. It channels public money through the governance hierarchy and engages at a community level. It makes provision for 'communities' to be able to deal with the process via information, education and research initiatives.

2.8 Land and Water Australia: Strategic Research Plan 2001-2006

"Land and Water Australia is specifically responsible for research and development (R&D) aimed at the production and sustainable management of the land, water and vegetation resources underpinning Australia's primary industries and regional communities" (Land and Water Australia 2001). Its research program seems likely to be aimed not at sustainable development but at sustainable resource use (environmentally sustainable) which is consistent with the specialist perspective. The Strategic Research Plan includes a section on 'government expectations' and consists of the objectives of the Primary Industries and Energy R&D Act. These objectives refer to improving production, sustainable use of resources, making more use of resources, and making more use of scientific skill. The ethic is utilitarian, and is summed up by their statement that "the ultimate objective of Land and Water Australia-funded R&D is that Australia's natural resources are managed for the greatest possible long-term social, environmental and economic benefits for all Australians" (Land and Water Australia 2001, p.15).

Elements of strategy implementation occur throughout Land and Water Australia's management process but the main expressions seem to be in their Communication Strategy. Significantly, that Strategy covers education, including curriculum development, scholarships and major science education opportunities. "We are placing increased emphasis on our interaction with both post-graduate scholars and fellowships at both individual and collective levels" (Land and Water Australia 2001, p.44). Over time, this strategy is likely to help consolidate the specialists' perspective. Counter intuitively, however, the education envisaged in this perspective may be one of the factors underpinning conservatism and inertia since it would reinforce current views. As a result, advancement from the current perspectives is unlikely in the next few decades unless specialists are influenced by external events. Some illumination of this situation can be derived from the work of Maguire (2000), who notes that educational institutions are conservative and slow to change. He suggests that change in agricultural education is needed so that there is movement away from a concentration on production issues to focus on rural development. His suggestions may offer a small step towards education for sustainable development.

2.9 National Dryland Salinity Program

The National Dryland Salinity Program (NDSP) commenced operating in 1993 and after a second five-year phase came to an end in 2004. The program was a partnership in research, development and extension work relating to dryland salinity, and published a magazine *Salt* and a newsletter *Focus on Salt*. In the second phase of the program there were seven themes, paraphrased here as:

- recharge control treatments;
- impact of dryland salinity;
- information for local governments;
- decision tools;
- training for meat and cropping industries;
- ecology of saline environments; and
- use of saline land.

In 2002, the NDSP conducted a series of web-based surveys as part of its evaluation of the program. The objective was "to find out whether you think progress has been made in addressing dryland salinity over the last five years. Specifically, the evaluation team wants to gauge how much of this progress (if any) has been due to the NDSP" (Van Bueren 2002). With regard to future research, the National Manager of the NDSP, Richard Price, suggested that "There are still areas of research that require a concerted and coordinated approach. For example, there is a limited understanding of the interaction between salinity and biodiversity and what can be done to restore ecosystem function. Furthermore, the nation's pool of expertise remains limited, requiring a process to facilitate shared learning, training and information exchange" (Mitchell 2002).

Thus, the NDSP approach was about improving knowledge about the technical aspects of salinity and technology transfer that are widely applicable. The ideal outcome for these specialists seemed to be environmental sustainability of agricultural industries, representing large-scale national outlook.

The outcomes of the NDSP have been integrated with other research on dryland salinity in Australia and presented in the three manuals and CD ROM of the *Managing Dryland Salinity in Australia* resource kit. A further output was a national report on salinity mapping (Spies and Woodgate 2005), the development of which was monitored by the Australian Academy of Science and the Academy of Technological Sciences and Engineering.

2.10 Rural Industries Research and Development Corporation

The Rural Industries Research and Development Corporation (RIRDC) commissions research into new plant and animal industries as well as research in existing industries. Their goal is to improve sustainability of agriculture by finding new and improved practices. They also work to disseminate their findings. For instance, they produce a quarterly newsletter *Shaping the Future*.

A particularly interesting notion that seems to underpin the work of RIRDC is that achieving sustainability in agriculture rests on having the agricultural system mimic the functioning of the natural ecosystems. This contrasts with the compensation approach, which accepts the erosion of the natural resource base and looks for compensating measures. In 1997 a workshop was held to consider current knowledge (Lefroy and Hobbs 1998). There were two aspects to the proceedings. One concerned the farming practices employed in land use systems (for example, cropping, pasture and grazing), aiming to produce a farming system that was productive in terms of human needs and that also protected the resource base. The other concerned the inputs to agriculture. If these inputs are not sustainable, then neither would agriculture be sustainable. The changes required to achieve environmental sustainability may be massive, as may their impact on people. The potential impact on people may warrant a sustainable development approach rather than just working for the objective of environmentally sustainable agriculture.

2.11 State Government, Agriculture Victoria

The Victorian Government's involvement with agriculture includes five, five-year industry strategies - for dairy, horticulture, meat, grains and wool. The dairy strategy is relevant to this study area and is typical of the approach taken by the (then) government Department of Natural Resources and Environment (NRE). It was developed by the Victorian government with representatives of other state governments, the University of Melbourne, CSIRO, the Dairy Research and Development Corporation, the Victorian Farmers Federation (VFF) and the United Dairyfarmers of Victoria (UDV).

The group has adopted a two-part 'vision' extending to 2015 for the dairy industry. The first part aims to see the industry internationally recognised for profitable and sustainable business, quality products, commitment to excellence, and stewardship of resources. The second part, quite amazingly, relates to pride, stating that "industry participants will be highly regarded by the community, derive high self esteem from being part of an exciting and rewarding profession, take pride in being progressive and responsive to change, and enjoy an enviable quality of life" (NRE 2002).

About 90% of milk from Victoria is devoted to manufacturing, and 60% of this is exported. Together with the Government's export targets, this probably accounts for the international orientation. The seven projects that constitute the strategy are aimed at expansion of production via (1) improvement of the impact of research, development and extension (resource management, feed management, milk harvesting, pasture improvement, animal performance and manufacturing), and (2) increasing the efficiency of delivering results ti industry (their communication Target 10). Thus, the government approach is about industry and technology, and sends the message that production intensification and expansion are in the best interest of Victorians. The ethic is utilitarian and the notion of an industry replaces the notion of community as a collective; the emphasis is instead placed on communication to individuals from research organisations.

Evidence of these relative priorities is to be found in a discussion paper *Our Rural Landscapes* on Victoria's food and agriculture sector, which leads with phrases "The Victorian Government has adopted the concept of Ecologically Sustainable development (ESD)" (NRE 2002, p.1). However, the paper goes on "the government identifies as a high priority an improvement in the productivity and sustainability of the farming sector" (NRE 2002, p.1). Actions include research: "Much of the department's science and technology is aimed at increasing the productivity of agricultural industries … new production systems and technologies that dramatically improve the efficient use of natural resources and are more ecologically sustainable" (NRE 2002, p.5). It continues with policy development: "innovative policy instruments that help improve the allocation of resources and provide incentives to improve and reduce off-site impacts. For example, increasingly sophisticated water

markets and property rights to water". Market-based instruments (for example, bush tender), information provision and increased "participation in the development and implementation of sustainability policies" (NRE 2002, p.5). The discussion paper maintains the theme of increasing production through efficient resource use that also leads to sustainable resource use. Some of the over-riding concerns of the paper are property rights and the legitimacy of consumers' concerns about resource use.

The same perspective on agriculture appears in the draft Strategic Policy Framework for Natural Resource Management and Environmental Protection in Victoria (NRE 2002a). The sequence of ideas in this strategy begins with acceptance that the rate of consumption of natural resources is limited, and that in many instances the impacts of production cannot be absorbed by ecosystems. It follows, then, that failure to respond effectively will reduce the level of certainty and security required for investment. It is suggested that the key to maintaining growth, social cohesion and environmental improvement is new technology that will improve the productive use of natural resources and this leads to four key strategies:

- new policy drivers for accelerating the adoption of sustainable practices;
- improved knowledge;
- innovative technologies for resource productivity; and
- stakeholder participation in the management of natural capital.

"NRE has begun to realign its efforts with this long-term agenda with the development of its new objectives: sustainable growth from competitive resource based industries; a smaller footprint; capable, confident and innovative communities; and knowledge and understanding of biodiversity and ecosystems" (NRE 2002a, p.2). This draft Strategic Policy Framework takes a state view of how to apply the utilitarian ethic. Some issues that may arise are stated candidly, for example when impacts "will fall mostly on rural and regional communities already in the process of enormous structural change as a result of increased competitive pressures associated with globalisation" (NRE 2002a, p.2).

2.12 Individual Specialists

Commentaries and conference presentations by specialists also provide material in which their perspectives can be examined, and five cases (four specialists, one joint effort) are discussed in this section. The value of understanding the individual specialists' perspectives is that they may indicate the approach that will be adopted by specialist organisations to which they belong or contribute.

2.12.1 Shadwick

Shadwick provides a view of the water industry that will result from the water reforms that stem from governments' commitments under the National Competition Policy (NCP) (Shadwick 2002). Although the principles of water reform include the allocation of water to the environment, these principles are mainly focused on efficiency. "Properly managed and implemented, however, and with the appropriate response from irrigators, the reforms are expected to produce a more productive and

profitable rural sector, which will be beneficial for regional Australia" (Shadwick 2002, p.24). In terms of the adequacy of the reforms Shadwick suggests the following: "The pricing, investment and other obligations of the NCP reforms are producing an economically viable water industry. It is too early, however, to judge whether the expectations for an ecologically sustainable industry will be fulfilled. … Any shortfall between environmental expectations and outcomes will partly result from resistance to cutbacks in supply for consumptive use and from the cost of securing water for the environment" (Shadwick 2002, p.30).

The water reforms are focused on changing arrangements within the water industry that will generate more revenue and in turn stimulate innovation. "[T]he market-based orientation of the reforms is improving the performance of the industry … Where higher prices result, they can be an important driver for innovation and efficiencies" (Shadwick 2002, p.14). "Rural irrigators are generally paying higher prices for water with the introduction of consumption-based pricing and full cost recovery by water suppliers" and "the reforms will have their greatest impact on rural users" (Shadwick 2002, p.17, p.24). The action is not a mutual arrangement or one that is being generated by farm decision-makers despite the agency-led consultation and education programs.

Shadwick implies that the implementation ethic is utilitarianism; the desired consequences of the reforms are the overall greater production and financial returns. "[T]he reforms involve initial costs and dislocation for some. In the longer term, however, the reforms are likely to enhance the sustainability of economic activity that depend on water and lead to higher overall economic growth" (Shadwick 2002, p.19).

In terms of the fundamental needs, the water reforms focus on the subsistence need via economic activity. To some extent they may help the protection need via the protection of water resources used in production and because "maintaining water quality standards helps avoid sickness and associated health costs" (Shadwick 2002, p.26).

2.12.2 Blackmore

Don Blackmore, at that time the Chief Executive Officer of the Murray-Darling basin Commission, in a broadcast speech provided some of his views on the governance approach being taken through the Murray-Darling Basin Initiative. The charter of the Initiative is "to promote and coordinate effective planning and management for equitable, efficient and sustainable use of land, water and other environmental resources" (Blackmore 2001).

Blackmore's remarks concern the governments' and the Council's resource allocation arrangements for the Murray-Darling basin and are typical of the relatively high level at which the Murray-Darling Basin Council and Commission (MDBC & MC) operate. At this high level, they identify basin or sub-catchment wide issues and make decisions to facilitate solutions. Despite this, Blackmore seems to suggest that the main problem is non-compliance, possibly because of self-interest. For instance, "The

causes of rising salinity levels have been understood for many decades" (Blackmore 2001, p.5). However, there was no action until a response became an urgent necessity. The same argument applied to research, where he sees the problem as one of convincing others. In respect of the $70 million spent on research: "These investments have been fundamental to obtain Government and Community commitment to the Cap on water use and to the Salinity Strategy" (Blackmore 2001, p.9).

Implementation of the Council and Commission policy recommendations would involve moving to a situation in which local people have to manage the catchments on the basis of environmental targets and, as Blackmore pointed out, where they mutual obligations to manage shared natural resources. Community response is sought at the regional and catchment scale, and he suggest that "it is important that there is an institutional environment in which the community can participate with confidence" (Blackmore 2001, p.9).

The MDBC & MC seem to be working on two elements – economic productivity and protection of the environment and biodiversity. "Advocacy for these different values was institutionalised, with each jurisdiction sending to Council and Commission a team of ministers and senior public servants composed of representatives of the contracting agencies" (Blackmore 2001, p.4).

Blackmore seems to be suggesting that a steady progression in the specialists' perspective had occurred, about how to achieve effective implementation. Establishing water-related arrangements was initially thought to be adequate but strategies were later expanded to encompass more of a systems approach (as in the Salinity Management Strategy), and also moved to include 'people factors'. "The Commission and its agencies started out dealing with single issues. However the practicalities of working in the field, or in-stream, have made it clear that an integrated approach is essential. As a result the overarching approach is now being used to shape the way we deal with all natural resource management issues as that of Integrated Catchment Management (ICM). This approach takes account of the social and human factors that shape what happens in the environment as well as the bio-physical, and builds on the partnerships which the Council and Commission have been fostering with communities throughout the Basin since the first ICM policy was released in 1990. It set up the institutional framework catchment by catchment in which a community's 'mutual obligation' to manage its shared resources can be played out" (Blackmore 2001, p.8-9).

As a specialist, Blackmore seems to hold the perspective of a system-with-cogs, and that the issues are high-level in both economic and environmental spheres. The idea of 'community' seems complex and confusing, and perhaps there is a moral overtone being given in his speech where 'community' is taken as relatively virtuous, as opposed to individual self-interest which he suggests is "still alive and well". He also suggests that "competitive self interest created … a measure of social equity" (Blackmore 2001, p.1), but this could be a matter of scale. If the issues are taken to be the economy and environment, then the equivalent human scale is the community

rather than the decision unit of an individual business. Blackmore makes one statement that suggests he appreciates that this is a glitch in the specialists' perspective. "We considered that if we established an ICM [Integrated Catchment Management] arrangement and provided some seed money then the community would drive the change. This proved partly true" (Blackmore 2001, p.7). However, he does not follow this insight but reverts to the system-with-cogs notion that leads him into the idea that coercion is the right way to proceed to make the cogs turn appropriately. "However for the more invasive changes such as the threat from salt a much more structured approach is necessary … This means we must develop a clear view of what we are managing for and then put in place the arrangement to deliver it" (Blackmore 2001, p.7).

The specialists' perspective associated with the Murray Darling Basin Initiative outlined here seems to be still in line with the Initiative's twenty-year-old Charter. Moving to sustainable development ideas may not be possible.

2.12.3 Harris

Dr Graham Harris, then of CSIRO Land and Water Division, stressed the specialists' position in a speech he gave in 2001 entitled 'Water, Science and Society'. He suggested that "We need sustainable environments and sustainable rural communities" and he went on to say "We must balance the drive for profit (and profligate water use) with other concerns and other dimensions" (Harris 2001, p.2). Harris also related the idea of community with the idea of a system-with-cogs, thus making the community a cog. "We need sustainable communities on the landscape if we are to manage it effectively" (Harris 2001, p.5). He noted that the natural resource problems are over-population, resource depletion, over extraction of water, and destruction of biodiversity. "These are indeed wickedly complex problems - science can and must inform the debate, but society must choose its own path forward" (Harris 2001, p.6).

2.12.4 Quiggin

Professor John Quiggin of the Australian National University, in a 2001 paper on environmental economics and the Murray-Darling river system provides an insight into the specialists' perspective from an economist's point of view (Quiggin 2001). He lists environmental problems as:

- land degradation;
- river water salinity;
- land salinity;
- water quality problems (other than salinity); and
- loss of biodiversity.

Quiggin notes that policy "has been significantly affected by agreements reached by the Council of Australian Governments (COAG) including the National Competition Agreement." "The general effect of the COAG agreements is to reinforce the policy preferences for price-based and market-based solutions to environmental problems" (Quiggin 2001, pp.75-76). Quiggin noted that the Competition Principles Agreement

requires that policies relating to Ecologically Sustainable development be taken into account but he takes this no further and his discussion centres on the economists' approach to environmental issues. He suggested that the three main frameworks used by environmental economists to analyse environmental problems are based on the concepts of externalities, sustainability and property rights. He concludes that economic reasoning derived from these frameworks can contribute to an understanding of environmental problems and to the development of appropriate policy recommendations (Quiggin 2001).

Although economic analysis may be valuable in understanding and perhaps solving environmental problems, applying economic discount rates to environmental issues may greatly exceed normal investment time periods. Dryland salinity or biodiversity may be problems for which the time frame or the value may be impossible to determine. However, Quiggin maintains that "the general approach to sustainability based on reducing the rate of discount of future environmental benefits appears appropriate" (Quiggin 2001, p.82).

2.12.5 Cary, Webb, Barr

In a 2002 report from the Bureau of Rural Sciences entitled *Understanding landholders' capacity to change to sustainable practices. Insights about practice adoption and social capacity for change*, three specialists describe their perspective on the interaction between governments' desire for landholders to adopt certain agricultural practices, and the landholders themselves.

The ethic in their perspective is utilitarian because the reason to have landholders change their practices is to provide "a net benefit to society" (Cary *et al*. 2002, p.6). And "In recent years there has been an average annual 1.5% decline in the number of farm establishments in Australia. This decline is the price of maintaining competitiveness" (Cary *et al*. 2002, p.49).

The practices they want adopted would deliver environmental sustainability, which is essentially the protection of productive resources. "As problems such as land salinity and declining water quality have become increasing concerns the Commonwealth Government has increased its programs aimed at bringing about more sustainable land use" (Cary *et al*. 2002, p.vii). The definition of sustainable land management practices as "those which ameliorate unsuitable land use by rectifying biophysical constraints to agricultural production and which conserve the resource base" (Cary *et al*. 2002, p.3) confirms that the focus is on production. "The need for strategies for sustaining both food security and the need to conserve natural resources" (Cary *et al*. 2002, p.5) also reveals the production orientation of their perspective. With production comes efficiency, not only of resource use but also of technology. "This goal [sustainable resource management] requires an efficient use of technology" (Cary *et al*. 2002, p.5).

The report does not discuss systems but focuses on landholders as the agents that need convincing so change can occur. However, there seem to be unstated assumptions about the existence and operation of systems because the international commodity prices are noted as being important (p.59). The power of the supermarkets is mentioned (p.52), as well as the existence of a real estate market outside agriculture (amenity value of farmland for lifestyle rather than commodity production p.53). The impact of technologies such as genomics and information technology is also noted (p.49). These are all parts of systems. The focus of the report on how to get landholders to change practices seems to indicate that their perspective is one of farmers as cogs in a system and that they can make the requisite contributions to change within a system that is not explicit.

The authors' perspective includes the idea that landholders need external guidance by providing a listing of sustainable practices, although they caution against any attempt at universal application. "There are few sustainable practices which meet the test of global applicability" (Cary *et al.* 2002, p.59). They advocate that government should exercise power to get compliance. Methods such as moral suasion, codes of practice and regulations are mentioned, and the entire report is focused on achieving behavioural change.

The report discusses practices and their consequences in the environment but the focus is on how government (acting for the people of Australia) can persuade landholders to implement specific actions. Although their perspective in terms of fundamental human needs would seem to be subsistence and protection oriented, the authors emphasis protection not only in the form of security of food but also security for the landholder. "Research indicates that family, personal and financial security are generally the highest priority goals in Australian farm families" (Cary *et al*. 2002, p.10). However, the paper is concerned with the protection of productive resource, as is earlier work, which suggests that there may be an element of constructivism. Despite this possibility, it seems that in terms of fundamental human needs, their perspective relates to the protection need.

2.13 Conclusion

The specialists' perspectives are broadly similar in nature and, as we shall see, quite different from those of the practitioners. Those specialists who work in government agencies have to be aware of political sensitivities and financial constraints and so one can hardly expect them to espouse views that are, on the one hand, overly protective of present practitioners, while on the other they enthusiastically support an environment-first position. Theirs is the art of compromise, or rather of compromises since they seldom face the luxury of a simple two-determinant choice, and their work is marked by patience and supported by scientific insight. These two qualities, of course, are evident in the behaviour of every practitioner, if we are allowed to replace 'scientific insight' with 'experience' which may of course extend back over several generations.

Perhaps as we should expect, none of the more deeply personal needs of the practitioners such as leisure, creation, identity and freedom are evidently in the minds of the specialists. The strengths of their positions are in subsistence, in that they emphasise continuing production of agricultural commodities, and in protection in the sense that one of their major aims is the continued provision of one or more means of production, availability of high quality water and avoidance of salinity. The final two needs, understanding and participation, are implicit in the work of the government agencies but seldom find explicit expression in their output. Clearly, it would aid in administration of any system and especially of a system requiring changed behaviour, if the practitioners could broaden their understanding of the situation beyond their farm gates, at least to extend to the region. One means of achieving this, and certainly of allowing the development of two-way transfer of information in place of old-fashioned and often ineffective preaching by the experts, would be to bring practitioners into partnership in the development of new regimes. As well as filling a personal need, participation might be expected to achieve broader support for new schemes, albeit they might not be the schemes that specialists initially conjectured.

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Chapter 3 The Practitioners' Perspective

3.1 The Shire of Campaspe

As a study area in which to explore the differences between the views of the specialists and those of the practitioners, the farming area south of Echuca in the Shire of Campaspe was selected (see also Chapters 4-6 for more specialised information about the region). This Shire is located approximately 180 km north-west of Melbourne. The Shire occupies an area of 4,525.8 square kilometres and has an interlacing network of urban centres, that directly support approximately 65% of the Shire's population, which totals 36,363 (2001 census), and has a median age of 38.1. The median age for all Victoria is 35.8 (ABS 2002).

Agriculture and Agri-business (such as Nestlé Australia Ltd, Heinz Watties A/Asia Ltd, Cedenco Australia Pty Ltd, Henry Jones Foods IXL, Murray Goulburn Co-operative Co Ltd, Bonlac Foods Ltd) are important industries in the Shire, along with tourism. Echuca is located at the confluence of the Murray and Campaspe Rivers with a population of over 11,000. It is the Shire's principal town and attracts about 1.6 million visitors annually (The Australian Financial Review, "Where all the Rivers Run" - 19 January 2001 quoted in CEDB 2002 p.4). Facilities such as the $4.5 million Paramount Performing Arts Centre and Multi-Cinema Complex, which opened in March 2001 assist in the town's cultural development (www.vapac.org.au). The Shire supports dryland and irrigation agriculture and lies within the Rochester and Central Goulburn Irrigation areas, which are managed by Goulburn Murray Water. There are also private irrigation schemes including the Mt Camel Range pipeline that takes irrigation water to the new wine grape vineyards.

Agricultural production contributes significantly to the local economy, with dairy farming in the area alone accounting for about a quarter of Australia's national dairy production… more than $2 billion in exports per year. The Shire's primary industry activities include dairy and beef cattle, cereal crops, tomatoes, sheep and wool, aquaculture, viticulture, floriculture, rice and vegetables (CEDB 2002).

Dairy is the largest agricultural industry in the Shire. "The Shire has 730 dairy farms that, collectively milk more than 140,000 cows that produce around 690 million litres of milk a year... representing 62% of Victoria's total milk production. As a result there is a strong presence of many world class milk processing and marketing companies ... including Breakfast Milk Pty Ltd, farmer owned co-operatives, Bonlac Foods and Murray Goulburn, and the multi-national company, Nestlé. Over the last six years, regional milk production has increased by 11% annually, while the number of farms declined by 0.3%, and farm herd size and production per cow increased annually by 7.8% and 3.2% respectively. These trends are likely to continue with milk production more than doubling by 2010" (CEDB 2002, p.23).

Figure 3.1: Agricultural Production Total Amount ($) Campaspe Shire
Source: ABS 1996 & DNRE Regional Data (CEDB 2002, p.23).

	Dollars
Total pastures	19,751,228
Pastures for seed	24,709
Cereal grain	15,197,372
Non cereal	333,731
Vegetables	15,539,329
Fruit	4,988,584
Wool	6,111,449
Milk	188,491,843
Eggs	481,752
Livestock slaughtering	59,246,604
Bee keeping	254,202
TOTAL	$307,420,803

Over the decades farmers have had to increase productivity to compensate for their declining terms of trade. Drought in the 2002-03 season has created additional problems. Dryland farmers are dependent on local rainfall and have had a very poor year. Irrigation farmers have also suffered because of the reduced availability of irrigation water (less than 100% water right and no sales[2]) and the high cost of traded water as a consequence of demand. The two main water trade zones are 1A Greater Goulburn (Goulburn Irrigation Area - Lake Eildon water) and 4A Campaspe (Campaspe Irrigation District - Lake Eppalock water). In the Goulburn Irrigation Area, water rights have been restricted to 53% and in the Campaspe Irrigation District, to 97%. (G-M W 2003). The Shire has asked State government to waive the requirement that farmers have to pay for their entire water right allocation irrespective of whether or not they use it or have it supplied. "I have recently taken the opportunity to write to the Premier of Victoria to express Council's concern for farmers having to continue to pay for water which they are not receiving. Farmers are already struggling in the continuing drought conditions and this is just another added burden. It is not acceptable that they must continue to pay for 100% of entitlement when they are receiving substantially less than this. Farmers on the Goulburn Irrigation System are required to pay for 100% but currently only receive 53% of their Entitlement" (Elborough 2003).

[2] Water right is the basic entitlement of water attached to a property. It is a volume of water, which would be available in most years. Full Water Right must be paid for each year, whether used or not. Sales Water is a volume of water available in a particular season, which is over and above Water Right. The Sales Allocation is expressed as a percentage of Water Right (i.e. 30% Sales). Customers only pay for the volume of Sales Water actually used. (G-M W 2002 Glossary)

Traded water prices are reported weekly. They are high and fluctuate. For instance, in Zone 1A Greater Goulburn, water traded at $450 a mega-litre in the week ending 20 February and on the 2 January in Zone 4A Campaspe, one trader offered to buy 50 ML at $401 per ML. No sellers were received so no trade occurred (Watermove, DNRE 2001)[3].

Dairy farmers have additional problems such as the reduced price for milk they currently receive due to competition in the globalised milk market. Another is the increased cost of purchased dairy feed (grain and hay) due to the drought. The third is that cull cattle are fetching low prices, thereby reducing incomes even further. Another problem is looming, namely when the drought breaks the prices for replacement animals are likely to be high.

The Shire has been declared a drought region and so is eligible for relief. However, the Mayor, John Elborough, noted: "Whilst the Shire of Campaspe has welcomed the Federal Government's announcement that the region has officially been declared a 'drought region' and is therefore eligible for Exceptional Circumstances, we are now extremely disappointed to hear that the State Government has announced it will cut any future drought assistance. This basically means that some of our farmers will not be getting financial help at all" (Elborough 2003a).

There is also recognition that the drought has an impact non-farming businesses and some form of assistance is required here as well. "Small businesses in rural and regional Victoria affected by the drought can now obtain advice to assist them through difficult times. This assistance program announced late last year by the Minister for Small Business, Marsha Thomson, and forms part of the Bracks Government allocation of over $100,000 to encourage small business owners to apply business survival skills" (CEDB web site).

3.2 Echuca Workshop

A workshop was convened at Echuca on 18 July 2002 to bring together practitioners and other stakeholders from the Echuca region with the research team and a group of specialists in land and water management.

Session 1

Professors Ian Rae (Academy of Technological Sciences and Engineering) and Leon Mann (Academy of Social Sciences in Australia) introduced the study and explained its background, purpose and hoped for outcomes. It was focused on producing a framework to help future researchers, and other interested persons. It could enable them to obtain an understanding of the relationship between resource use decisions (such as land/water resources), the welfare of the decision-makers, and the community. The framework incorporates sustainable development ideas of improving human wellbeing and maintaining the quality of the environment. The Echuca area was the location of the pilot study.

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[3] Watermove is a water market for the purchase and sale of water entitlements. Goulburn-Murray Water facilitates Watermove on behalf of Victoria's water authorities and entitlement holders on a not for profit basis. Full details on prices and how to lodge offers are available at www.watermove.com.au

The participants introduced themselves and said why they were interested in land and water use in the Echuca area.

John Boehm, a Manager with Goulburn Murray Water in Tatura provided an overview of some of the pressures and changes that are occurring with land/water management in the Murray Darling Basin aimed at ensuring continuing prosperity.

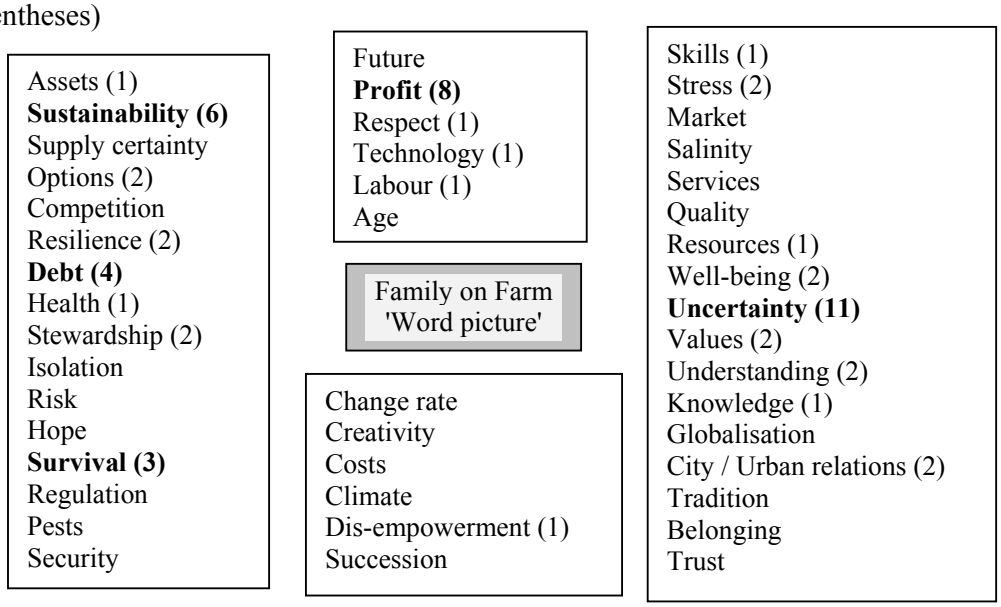
Session 2

This group session opened with a brain storming session which elicited the main issues that participants related to the word picture of a family living on a farm. The participants had been given this word picture a few days before and asked to consider the issues. Unfortunately, not all participants received this instruction. To give some extra time a 20-minute tea break was taken before the brainstorming session commenced.

The main issues were to be identified by a single word. Forty-five issues were identified. For each issue, the proposer suggested a meaning. In general, these meaning were instantly accepted. For some words a question or two was adequate to confirm the meaning. For example, 'age' meant the age of the decision takers in the farming family not the age of machinery. 'Survival' meant a family continuing to farm a property over many years so surviving physical things such as droughts and financial things such as market down turns. Survival was more than living through a particular event such as a wildfire. Sustainability meant the ongoing capacity of the farm to produce, and the family to live as other farming families. 'Profit' meant financial surplus and 'debt' meant financial borrowing. 'Uncertainty' meant randomness, something unpredictable; not knowing what people, organisations, markets, would do in future and not know what future seasons would be like.

Workshop White Board Diagram No 1

(The five most voted for issues are in bold font, and the numbers of votes are in parentheses)

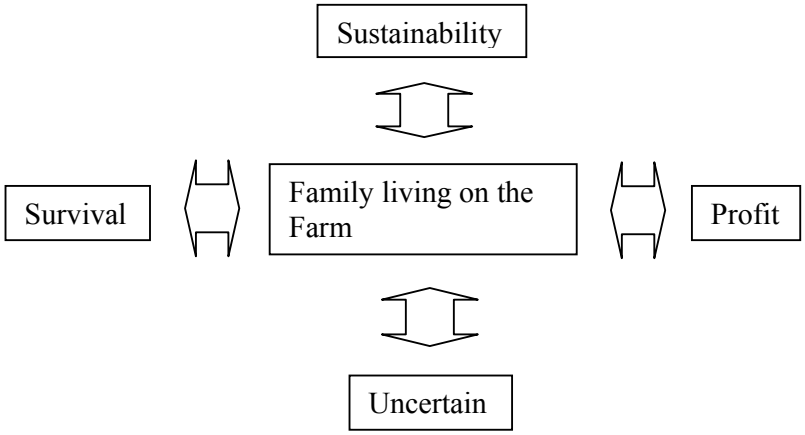


The participants were then asked to make a short-list of these 45 issues. They did this by casting three votes each on a show of hands. The five most voted for issues are given in table 1. The workshop participants then broke up into four small discussion groups. The five most voted for issues were offered as topics but only four were taken up. These are shown in Table 1.

Table 3.1: Issues voted for and issues discussed in small groups

Issue	Number of Votes	Topic chosen by workshop participants for small group discussions	Number of workshop participants in each discussion group
Uncertainty	11	Uncertainty	7
Profit	8	Profit	5
Sustainability	6	Sustainability	4
Debt	4	0	0
Survival	3	Survival	6

The four most important issues related to the family living on a farm are shown in the following diagram:



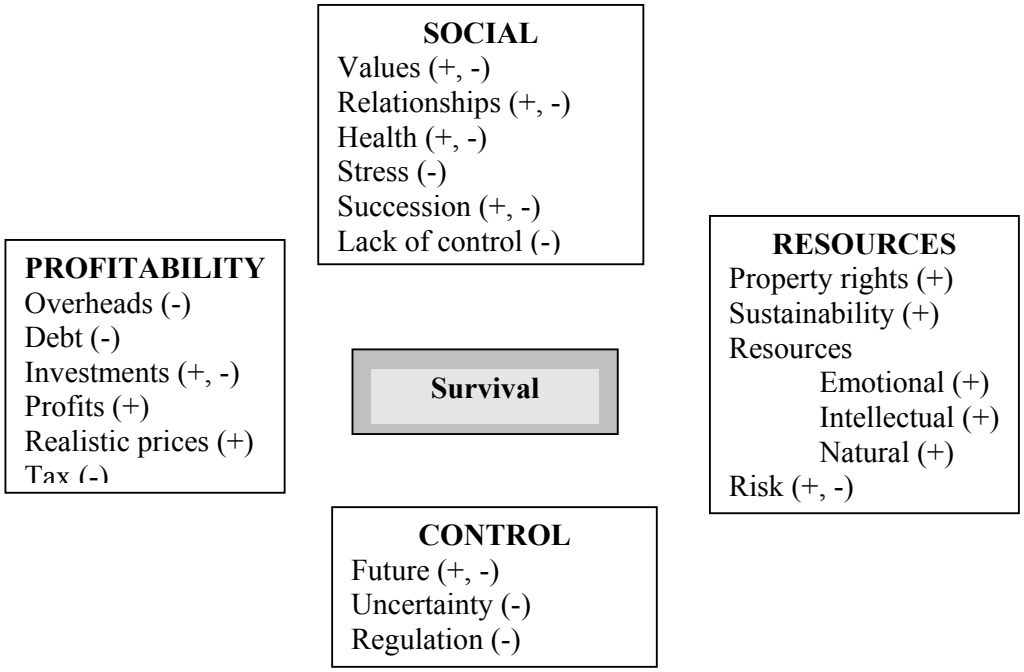
Superficially, it would seem that the participants assumed that the family should stay on the farm since survival and sustainability both implied being there and farming in the future. Uncertainty as a negative issue that might prevent this and profit as a positive issue might ensure this. It is interesting that 'debt' was dropped as a main issue between voting and selecting a group. We did not ask why but it may have less business significance for survival and sustainability than profit.

To elicit more information on these issues, the four discussion groups were asked to put their word in the centre of the page and identify other issues that relate to their word much in the same way as the previous brain storming session had done. However, they were also asked to make the linkages between their chosen word and the other issues.

After the small groups discussed and prepared their material and diagrams, one or two members of each discussion group presented their material to the whole workshop group using the white board.

1 The Survival Issue

The survival team put their issues under four headings (profitability, social, control, and resources). Arrows pointing towards survival indicated something that improved survival. An arrow pointing away from survival meant something that reduced survival. In the representation below + equals items that enhance survival. A minus sign (-) referred to things that reduce survival and (+ ,-) mean things that can do either depending on circumstances



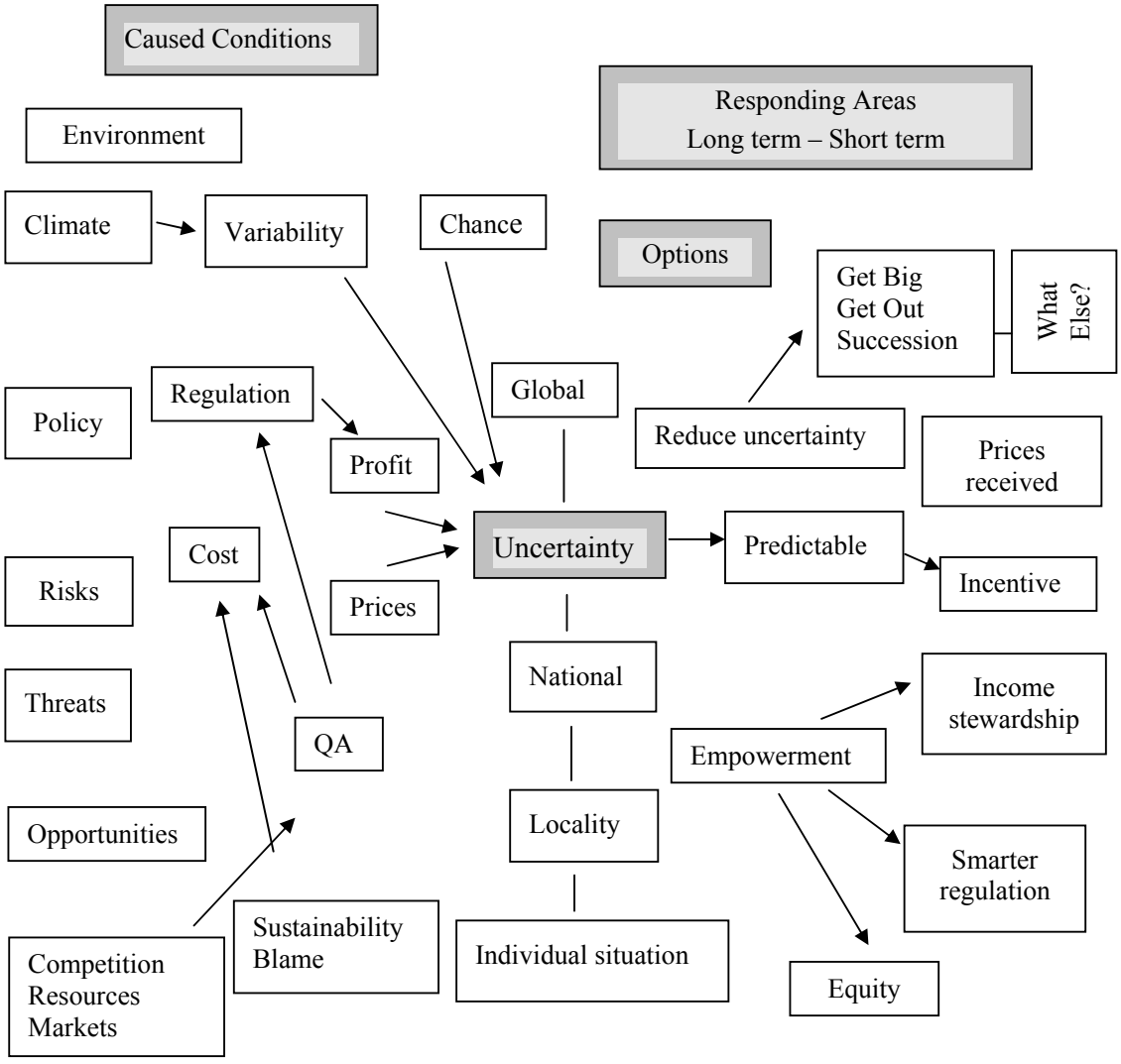
Within the farm, survival seems to be enhanced by more resources and by organising business to reduce debt and overheads. Health and organising succession were seen as important. Social issues were less clear as they contained issues that could reduce survival such as loss of control and stress and other issues could be negative or positive. Some external factors were seen as negative to survival such as regulations, taxes, and uncertainty. The meaning of some of the words used such as relationships, values, and future is not clear.

Although it seemed that the group meant survival as depending on business survival, the issues were not laid out in a business fashion. Debt was considered negative for profitability in spite of the fact that gearing could be a very profitable strategy. Regulation was considered negative to control in spite of the fact that regulations are essential for keeping the control needed for business operation. Survival for the family on the farm seemed contingent upon having control over resources.

2 The Uncertainty Issue

The uncertainty team developed a linear model with causes on the left leading to responses on the right side. They listed these according to scale: global, national, local and individual. Although environment gets a mention in climate change, the essential perspective was that uncertainty relates to business and stems from people's activities. The model could be applied to any business.

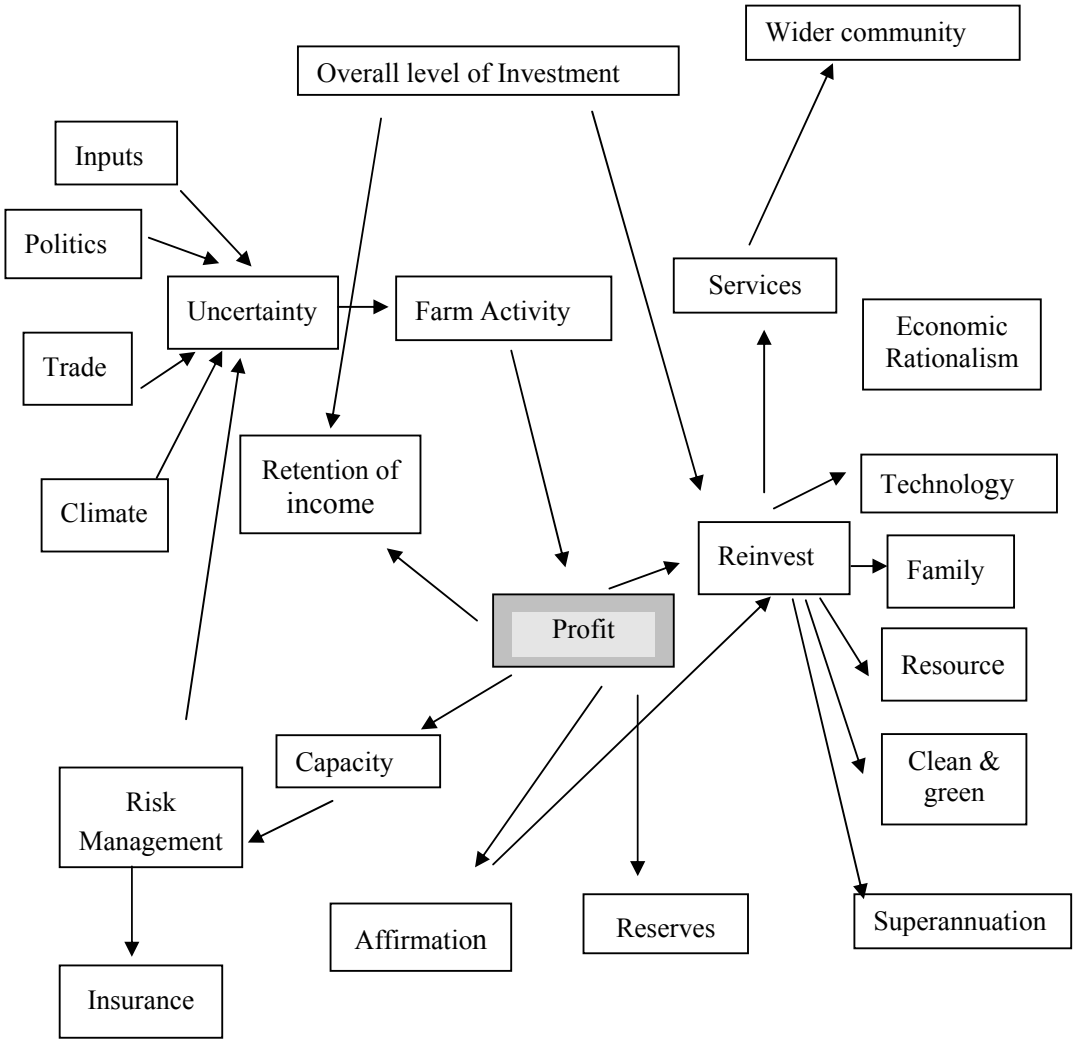
Regulations and 'prices' were issues on the incoming causal side and the outgoing responding side. In addition, the similar terms profit and income appeared on both sides. These responses seem to reinforce the idea that business uncertainty was the focus in this group.



There seemed to be no clear response to uncertainty, which may be why it is considered such an important issue. It seems that uncertainty has multiple origins that are external to the farm business, and the group hinted at external solutions such as incentives [income] and stewardship income.

3 The Profit Issue

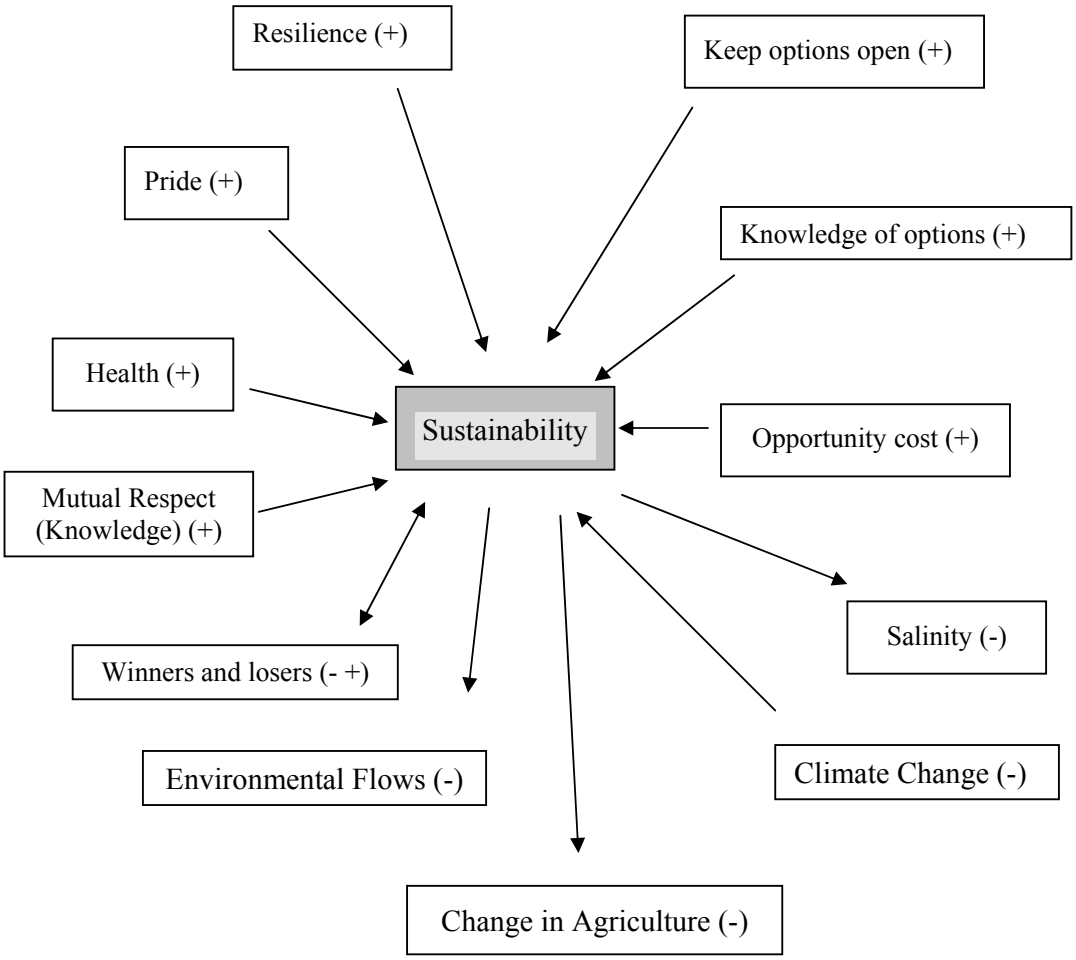
The profit group had a flow through model, from inputs through farm activity to profit, then out again for reinvestment. The input side contained uncertainty and risk management and seemed to suggest that what was coming into the business was uncertain and risky. The output side looked more controllable with investment including superannuation and reserves. The idea of investment seemed important for profitability.



The solution for the profit issue seemed to hinge on making investments while being aware of uncertainty.

4 The Sustainability Issue

The sustainability group seemed to be focused on the maintenance of landholders. For instance, change in agriculture and environmental flows (a reduction in irrigation water) were considered to be negative. Their other issues fell into two groups: things related to the person such as health and mutual respect, and things related to actions in the face of change, such as keeping and getting to know options.



Summary of the 4 main issues

- For survival the most positive flow was profit and resources.
- For uncertainty the positive flow was income certainty.
- For profit the positive flow was investments.
- For sustainability the positive flow was health and keeping options open.

The workshop participants took the maintenance of the individual farm business as the most important focus. Issues such as climate change, salinity and river health were taken to be negative issues for farms. Organisations outside the farm business were mentioned in a general ways as trade, clean and green, politics and wider-community. Change was addressed via the word globalisation and the need to get big or get out. Equity was mentioned as an issue in uncertainty.

Relationship between these Issues and Fundamental Human Needs

In the preliminary framework nine fundamental human needs are used as headings to explore the reasons landholders take resource use decisions. This will be explained further in the report of the study. However it may be useful to list the issues identified by the workshop participants under these nine fundamental human needs.

Table 3.2: **Fundamental needs and the issues identified by participants in Part 1 of Session 2 (issues are listed according to the number of times they are mentioned)**

Fundamental Human Needs	Words chosen to represent issues in Part 1 of the second workshop session
1 Subsistence 20 issues	Assets, Stewardship, Options, Competition, Debt, Regulation, Pests, Survival, Profit**,** Technology, Labour, Costs, Succession, Market, Globalisation, Climate [change], Salinity, Services, Quality, Resources
2 Protection 11 issues	Security, Risk, Health, Supply, certainty, Future, Change-rate, Stress, Well-being, Resilience, Uncertainty
3 Participation 2 issues	Isolation, Dis-empowerment
4 Understanding 5 issues	Skills, Knowledge Understanding, City / Urban relations, Values
5 Affection 2 issues	Hope, Trust
6 Creativity 1 issue	Creativity
7 Leisure	
8 Identity 4 issues	Respect, Age, Tradition, Belonging
9 Freedom	

In addition the word Sustainability was mentioned but this could not be categorised in Table 3.2.

Table 3.3: Fundamental needs and the issues identified by participants in Part 2 of Session 2 (issues are listed according to the number of times they are mentioned)

Fundamental Human Needs	Words chosen to represent issues in the second workshop session
1 Subsistence 41 issues	Profitability, Overheads, Debt, Investments, Profits, Realistic-prices, Tax, Regulation, Property-rights, Natural-Resources, climate, opportunities, competition, resources, markets, costs, profit, prices, get-big, get-out, prices-received, incentives, income-stewardship, inputs, trade, climate, retention-of-income, reserves, level-of-investment, farm-activity, profit, services, reinvest, technology, resources, clean-and-green, change-in -agriculture, climate-change, salinity, opportunity-cost, keep-options-open
2 Protection 22 issues	Health, Stress, Future, Risk, Risks, Threats, policy, variability, regulations, quality-assurance, blame, options, predictable, smarter-regulation, reduce-uncertainty, risk-management, insurance, uncertainty, health, resilience, winners-and -losers, environmental-flows,
3 Participation 4 issues	Lack of control, control, empowerment, politics,
4 Understanding 6 issues	Values, Uncertainty, Intellectual-Resources, capacity, knowledge, knowledge-of-options
5 Affection 8 issues	Relationships, Succession, Emotional-Resources, equity, wider-community, family, superannuation, mutual respect,
6 Creativity	
7 Leisure	
8 Identity 2 issue	Pride, affirmation
9 Freedom	

The following words could not be categorised for Table 3.3: Social, Sustainability.

The majority of issues fall into the first two categories of fundamental human needs subsistence and protection. It is difficult to know if this resulted from steering by the facilitator (Quentin Farmar-Bowers) or from the participants' interests. The facilitator was aware that this interest might exist and tried to steer away from it. So maybe this really represents the interest of the participants. This is mildly supported by the fact that the categorisation of issues was about the same in both parts of the workshop, yet the facilitator had much less input in the second part.

The number of subsistence and protection issues mentioned suggests that the participants' focus was income and business. Perhaps Maslow's hierarchy of needs (Maslow, 2000) is appropriate because the first priority is seen as ensuring the basics. However, this is not a good position from which to deal with sustainable development ideas since the ever-increasing flow of income (and concomitant resource use) delivers less welfare (declining marginal utility) but with at least the same (if not increasing) costs. Declining welfare and well being and increasing environmental costs are not in accord with sustainable development ideas.

This ensuring the basics perspective makes it very difficult to even think that another viewpoint might exist. The framework being invented in this study asks future researchers to organise their material so that they can at least start to see ways of change that will deliver welfare and well being yet at the same time reduce the environmental delivery costs. This requires a reversal in thinking.

Session 3

Professor Leon Mann facilitated session 3. It centred round a discussion of what the term community meant to the participants. The suggestion was that people living in the region belonged to a single community. Participants had a variety of opinions. For instance, some suggested that residents usually belonged to a number of communities, some of which were not located in the Echuca area. Others suggested that just because you shopped or did business with people did not make you part of their community. Other participants suggested that a clarification of the criteria of what made a community was needed.

Session 4

Quentin Farmar-Bowers used a Powerpoint presentation to provide an outline of the preliminary conceptual framework for the study.

Several comments were made on the proposed pilot study.

(1) Medical practitioners and welfare workers should be interviewed not farming families

(2) The number of in-depth interviews proposed (10) is too few to gather useful and reliable information on the social aspects of water and land management issues in Echuca

(3) The study should use a quantitative not qualitative paradigm.

(4) In-depth interviews with farming families should be replaced with focus groups.

The response is as follows:

(1) The framework requires information to be gathered from the decision-makers. Hearsay information from medical practitioners and welfare workers on the processes used in making resource use decision in farming families would not be reliable. In addition, medical practitioners and welfare workers may not have clients who represent healthy active people and also farm decision-makers may not have told their medical practitioners about how they make farming decisions. There may also be a confidentiality problem preventing the professionals talking openly about their clients.

(2) The purpose of pilot study is to test and demonstrate the value of using the conceptual framework and only a few interviews would be needed to do this. Once tested, the framework could then be used in a full study to gather and analyse comprehensive social and environmental information. A larger number of interviews would be needed in a full study.

(3) It would be impossible to give a meaningful description of the relationship between resource management decision and welfare of the decision-makers' families in quantitative terms.

(4) The framework requires in-depth interviews with decision-makers because many of the issues are not easy to handle and not easy to explain. In-depth interviews allow the information to be kept confidential, as only the interviewee and interviewer are present. Focus groups may not facilitate the exploration of difficult issues. Participants in focus groups may withhold information because of concerns about confidentiality.

Table 3.4: Workshop Participants

Participants	Number
Academics	7
Local Government councillors	4 (2 are also farmers)
Employees of water management organisations	3
Farmers	3
State and Commonwealth Public Servants	3
Academy of Technological Sciences & Engineering, staff	2
Agricultural organisations	2
Local Government staff	1
Total	23

3.3 Interviews

Information about the practitioners' perspective was gathered in fourteen in-depth interviews using open ended questions based on the nine fundamental human needs (Max-Neef 1992).

After explaining the project and outlining the question on the nine fundamental needs, the interviews started with the question on subsistence - How does your family make its living? The interview then proceeded with a normal conversation so that some aspects of all nine fundamental needs were covered.[4] The conversations referred to the farm and also to the regional environment and infrastructure as appropriate.

3.3.1 Ethics of interviews

Stake points out: "Qualitative researchers are guests in the private spaces of the world. Their manners should be good and their code of ethics strict" (Stake 1998, p.103). Janesick notes that in the field, researchers deal with people on a face to face basis and this attunes them to ethical concerns, "qualitative researchers need to allow for the possibility of recurring ethical dilemmas and problems" (Janesick 1998, p.41). This valuable advice was kept in mind by the interviewer.

[4] The nine needs are: Subsistence, Protection, Affection, Understanding, Participation, Leisure, Creation, Identity and Freedom.

Patton noted that "people in interviews will tell you things they never intended to tell. Interviews can become confessions, particularly under the promise of confidentiality. But … beware that promise. Social scientists can be summoned to testify in court….The interviewer needs to have an ethical framework for dealing with such issues" (Patton 1990, p.355). Patton lists seven ethical issues:

- promises and reciprocity: promising the interviewee something;
- risk assessment: whether the interview puts people at risk;
- confidentiality that can be honoured;
- informed consent;
- data access and ownership, who owns the data;
- interviewer's mental health; and
- advice on ethical issues, who will provide ethical advice during the project.

An ethical statement based on these points was developed for this proving study. The ethics of the interview, especially confidentiality, were discussed with the interviewees and a copy of the ethical statement was left with the interviewee. Because of the small number of interviewees and considering confidentiality, the information given in this report is presented in a general way to avoid interviewee identification.

3.3.2 Interview Questions

The in-depth interviews used a general interview guide approach (Patton 1990, pp 277-359). The guide listed the nine fundamental needs and outlined questions relevant to each need. Within this approach, a number of standardised open-ended questions were asked during each interview. The interview guide is given in Section 3.5.

This approach allowed the interviewees to talk about what they felt was important but also ensured that the nine needs were addressed. Alan and Curtis in discussing a similar interview approach used in New South Wales, noted that "Semi-structured interviews allowed divergent views to emerge, and a deeper understanding of the issues to develop" (Allan and Curtis 2002, p.33). This approach puts pressure on the interviewer to record and interpret what was said. Audio recording was used but in three cases the recording was not complete and the material had to be supplemented by notes written from memory after the interviews.

3.3.3 Information to corroborate the interviews

The study program did not allow observational information to be collected because of time and cost constraints. May and Pope noted how observational data could overcome discrepancies between what is said and what they was actually done. These discrepancies include biases such as recall, selectivity and other influences of which the interviewees may not have been aware (Mays and Pope 1995). Observational information may be useful in a full study.

However, corroboration in this way may be difficult and perhaps may not be very important because the perceptions of the decision-makers are the focus of the interviews. There is no reality against which the perceptions of the farmers can be assessed (even though different decision-makers in the same farming family may disagree). In one sense the conceptual framework provides this corroboration in that particular stakeholder groups tend to say the same kinds of things and so seem to have similar perceptions (element 2 in the conceptual framework). Also the overall perceptions of one stakeholder group can be compared with overall perceptions of other stakeholder groups (element 3 in the conceptual framework). Thus farmers' perceptions become the reality check for specialists' perception, and visa versa (but all stakeholders need to be included to provide a full picture). Ultimately sustainable development ideas become the reality check for all stakeholder groups, and this comparison is also part of element 3 in the conceptual framework.

3.3.4 Time Available for Families to meet their Needs

Although all nine needs are important, the family only has a set amount of time each week to distribute between activities that deliver these needs. If they adopt a new technology that releases time, they are free to choose this released time is used. Jalas discusses this rebound effect in terms of consumption of resources. However, Jalas's approach is relevant to 'needs'. By buying in services, such as paying for a contract hay maker instead of the farmer doing it themselves, time may become available that could be used for the delivery of other needs. It depends on the case whether or not a synergistic relationship exists. Without synergy, market purchases may deliver only a single need (Jalas undated). Buying hay brings hay but also may buy leisure time with the family - meeting leisure and affection needs. Needs relate to a person's entire life, so a particular need may not be addressed for some time. Not all needs have to be met in every period.

3.3.5 Interviewees

The interviews and identity of interviewees are confidential but it is possible to provide general information about people interviewed. There is no suggestion that they are representative of the farmers in the Shire of Campaspe.

The general information was collected as background to the main purpose of the interviews, which was to discuss the nine fundamental needs. The details given below are approximate and provide only a sketch.

1 Agricultural product and production methods

Dairy was a significant enterprise for ten farming families. Horticulture, including grapes, was important for three farming families and four families had significant dry land farming enterprises. All fourteen farming families had some irrigation.

2 Off farm incomes

All fourteen farming families ran commercial farming enterprises. Six members of the principal decision-makers in these families also had long term regular employment off the farm. And six farming families had income producing investments outside the farm enterprise.

3 Family involvement in farming

Partners (in these cases, married couples) invariably shared decision making as regards the farm enterprise. Both partners participated in the interviews unless there was some special reason, such as having to work, being sick or being away. In addition to partner involvement, nine of the farming families had arrangements with relatives to run farm enterprises in some cooperative way. These relatives included adult children, siblings, parents and more distant relations such as cousins.

4 Age and succession

Although the farm decision takers were not asked their age, they could be categorised on their position in life. Nine were 'younger' implying that they are at the stage where they have or could have responsibility for children. Five were 'older' implying that they are at the stage of not having responsibility for children (any children were independent adults). Six farming families seemed to have succession arrangements while eight had none for a variety of reasons. These reasons were an expectation of selling on retirement – or of being able to make these successions arrangements in later years.

3.4 Summary of interviews

The first perspective is that farming families were the critical unit not family farms. Although some families had been on their farms or in the locality for more than two generations, the family was more important in terms of decisions than the farm. The needs of the family were invariably put before the needs of the farm business. Some mentioned that this probably represented a change since they remembered that in the 1950s and 60s the farm investment tended to put first and the family consumed less. A number of farmers had made conscious decisions to ensure that the farm business did not run the family. Farming families seemed to employ a caring or Kantian ethic[5] in that the process was more important than the outcome and people (especially family) were treated with dignity (their needs as individuals were respected).

[5] Kant's first formulation of the categorical imperative removes consequences from the consideration of what makes an act right or wrong. Act only on that maxim [principle] by which you can at the same time will or should become a universal law. Kant's second formulation of the categorical imperative is important for equity. Act so that you treat humanity whether, in your own person or in that of another, always as an end and never as a means only. See Bowie 1999.

The interviews are summarised in terms of the nine fundamental human needs: subsistence**,** protection, affection, understanding, participation, leisure, creation, identity and freedom.

Subsistence	Understanding	Creation
Protection	Participation	Identity
Affection	Leisure	Freedom

Although the farm tended to be the main source of income and variable yearly performance impacted on living standards, farmers had a number of strategies for maintaining or improving their incomes.

(1) Reduction of debt

Practitioners tended to have high debts when they started a farming business because they had to buy land, stock and machinery. Some farmers got a good start through succession arrangements within their families. Debt increased again when farmers expanded their business to take advantage of additional labour and technological improvements. High debt levels made farmers vulnerable in downturn periods or when interest rated increased. Some practitioners noted that this often caught the more progressive farmers, namely the ones who were prepared to gear up their businesses. Low debt levels allow farmers to survive when farming returns are low. Some practitioners had strategies to deep the home farm or family home and its subdivision debt free to ensure that the family had a degree of security should there be further downturns in agriculture. This could also raise a planning issue, as these small subdivisions are generally not permitted. It becomes a regional issue when farming business transactions follow a cyclical pattern, having to purchase when prices are high and sell when prices are low.

(2) Expansion of production

For dairy farmers, expansion means more milk and this was achieved by buying more cows. Feed for the cows could be obtained by buying in feed or by growing more feed. Growing required intensification of fodder production (say by using more fertiliser and irrigation) or using more land or both land and irrigation. There were significant problems involved in expansion because of the lumpiness of the investments needed and ongoing labour problems. At some point in the expansion process the practitioners would usually have to gear their enterprises with more debt. This was a good strategy as long as the additional returns more than paid for the debt repayment. It could however have a negative longer term effect via water quality and use impacts.

(3) Diversification

Some farmers had businesses other than their farm. These included agricultural contracting, agribusiness, financial investment, property investment and building contracts. Some also operated other farming enterprises under a range of business arrangements. A major incentive for diversification was to move away from being price takers and get closer to the final consumer of the product so they could get more

control, especially of marketing. Gaining knowledge, skills and experience in other areas was a problem and chronic shortage of skilled workers hindered expansion. Initial lack of experience, usually meant that the first venture into a new area was difficult and mistakes were made. Practitioners used a number of avoidance strategies. An important strategy was to apply existing skills. If a practitioner had good organising skills, they would use this in a new venture. This meant that they would organise people with the relevant technical knowledge rather than try and develop the skill themselves. Another strategy was to ensure that they obtained good professional advice before making the decision on a new enterprise. A variation of this strategy was to take time to ask people who worked in the area about problems, issues and opportunities. In this way they prepared themselves slowly but thoroughly. This approach merges with that of undertaking courses and participating in study groups and farm visits programs.

(4) Non-farm employment

The female in a farming family was often, but not always, the person who worked off farm. Employment opportunities in the adjacent areas were critical factors in facilitating this option. Many, but not all of these people with off-farm jobs had obtained experience or qualifications before becoming a farmer. The purpose of off-farm income was varied. Very often it was to supplement family income. Sometimes the income was devoted to specific purpose, but most practitioners said that there was social value in working off farm that came from the interaction with people in the work place. In addition, independence and improved self-esteem might be important and encourage off-farm work to be continued. Some said they felt valued as they were doing work that was socially valued. Off-farm work might also contain an element of escape from the isolation of a farming life.

Other aspects of subsistence

Although the need to secure income is strong, farming families were often influenced by other factors such as the desire to do useful work, do a good job, undertake stimulating projects, and completing a project successfully. A number said they were more motivated by the possibility of running a project successfully than by money alone.

A major issue was the hours they had to spend working. This might have a number of long-term impacts on family life. Some practitioners have a number of strategies in place to try to provide family time despite the long work hours.

Globalisation was seen as a major and growing factor in making a living. Some suggested that globalisation was introducing a major uncertainly. Price fluctuations were no longer as predicable because they depended on what was happening overseas and how transnational corporations were operating. It was no longer simple supply and demand as the supply could now be accessed from anywhere overseas (notably South America and China) and demand could also change depending on a range of unknown factors. For practitioners, the businesses in the supply chain (agribusinesses) were seen to be of paramount importance in governing income levels

over the long term. These companies and corporation could adjust prices and volumes in order for them to take advantage of globalisation. A few practitioners noted how inefficient many of these huge corporations seemed to be. They noted that corporations could increase their returns by 10% more easily by cutting the commodity price to farmers than by improving their own efficiency by 10%.

Mostly practitioners were clear that the reason for earning living was to provide for their family's income needs. Specific subsistence activities such as expansion, diversification and off-farm income were usually relatable to some specific family need or future need.

Subsistence	Understanding	Creation
Protection	Participation	Identity
Affection	Leisure	Freedom

There were several issues involved with the protection need.

(1) Health

Practitioners were generally satisfied with the medical infrastructure in the locality although they did recognise the heavy workloads of doctors. Some farmers routinely took a sick member of their family to Melbourne for treatment. There seemed to be especially good aged hostel accommodation in the region. Access to specialists might be a problem for some people.

(2) Income

Practitioners recognised that declining farm incomes also meant declining farm property values. Some practitioners spoke about the low amenity value of the area for lifestyle farming' compared to hilly country near Melbourne. This declining capital value may be especially important at retirement, when the farm may be sold. Several practitioners mentioned that the farm was expected to act as a superannuation scheme but that the comparative decline in land values meant that their superannuation was small. Some were offsetting this trend by real estate purchases in centres such as Echuca and Melbourne. Superannuation funds, shares and other forms of investments were strategies used.

The principal way of protecting income was to expand production and thereby increase productivity. Several practitioners noted that a husband and wife team could still make a reasonable living from a dairy farm but they would be faced with constantly falling returns. Productivity can be increased by improving pasture and irrigation management and by installing more efficient dairies. However these improvements can be very expensive. Another strategy is labour gearing; employing staff to help. Larger herds, requiring additional resources such as land, water and other inputs, were needed to off-set the increased wage bill. Maintaining a fixed income meant increasing output. Moving from a farm that uses principally family labour to a business that employed workers tended to involve a substantial change in organisation and business size. While expanding production was normal, not all practitioners achieved this by employing external labour.

(3) Productivity

Practitioners were aware of the potential for land degradation and water quality decline. Most followed a program of whole farm planning, and investment to improve water use efficiency and reduce land degradation problems. Many had been involved in local conservation and drainage programs. Some were involved with salinity programs. These issues could be referred to a environmental sustainability and is a major and perhaps increasing focus of state and federal government agencies.

Maintaining the farm as a productive resource although important, did not feature significantly as a topic of conversation. When raised, the interest lay in discussing how to increase production. A drainage scheme may reduce additions to ground water, thereby ameliorating regional salinity and thus provide protection, but it also provided additional irrigation water in summer and reduced winter flooding, both of which enhanced production.

Trickle irrigation was discussed as a resource efficiency measure. This technique allowed more crop to be grown with the same water resource. It also helped prevent waterlogging damage should it rain after irrigation. The salinity protection aspect of trickle irrigation was recognised but the main reason for its use was improving production efficiency.

Subsistence	Understanding	Creation
Protection	Participation	Identity
Affection	Leisure	Freedom

Affection is a major element in decision making for practitioners. In the longer term the 'family' tended to have priority in decisions. Thus the farm business was adjusted to cater for the needs of the family. For instance many farm business expansions were undertaken to provide more money for the growing family. Some practitioners also expanded their operation considerably to provide an opportunity for children to join the family farming business. This usually involved increased debt. There was some evidence that family members were now tending to run farming businesses cooperatively whereas formerly (in the 1960s and 70s) they had tended to go their own way and develop separate businesses.

Affection was a major driving force in how families operated and how they organised their business actions. Some practitioners mentioned that at times their parents had tended to be more concerned with the prosperity of the farm than the welfare of the family. This seemed to suggest that attitudes might be changing. Quite a few practitioners said they hoped their children would not become farmers but find careers that suited them and made them happy. Although a count was not made, it seemed that the majority of practitioners' children had or intended to find non-farming careers. The practitioners' approach to their children's career (getting something that benefited their children) is in marked contract to the narratives about rural youth exodus used by journalists, politicians, bureaucrats and parents quoted from the popular press. One narrative stresses the need to stay the same (young people should stay at home) and

the other stresses the brain drain: “rather than attending to the difficulties faced by young people who do remain in regional communities…. key spokespeople worry incessantly about the 'Einsteins' who have for the most part, already secured a comfortable place in the global village” (Gabriel 2002, p.211).

Affection and the actions needed to care for family members were a major consideration and references to this were made throughout the interviews. Affection seemed to be a major driving force influencing many decisions.

Affection, meaning love and caring between people, may also have a religious meaning: love of God, and perhaps through that the love of humanity and respect of God’s creations. A number of practitioners suggested religious beliefs were very important in deciding their actions and their priorities. An example of a descending priority is: God, family, farming businesses, local community. Even though local community is scored lowest, it still is a priority that results in long term charity and volunteering. Spirituality was also an important consideration that seems to influence some practitioners' decisions about the natural environment and the dignity they feel people deserve. Ali *et al.* noted that religious beliefs could be an important influence in decisions and in establishing institutions (Ali *et al.* 2000). It was not possible to say from the information in the interviews what direction these influences were taking except that they seemed important to the practitioners and involved them in various religious communities. Religious views may have relevance to implementing sustainable development ideas. There is evidence that they can impact farming. For example, Curry in a study of five Iowa farm communities, showed that different religious beliefs resulted in different farming decisions over the long term (Curry 2000).

Subsistence	**Understanding**	Creation
Protection	Participation	Identity
Affection	Leisure	Freedom

Understanding was a major issue in most farming families. It could be broken down into a number of areas.

(1) Education of young people

Most practitioners considered school education as very important even though quite a few had themselves left school before year 12. The quality of current schooling was considered by some to be a problem. Parents seemed concerned with the schools' reputations and what success rates they achieved for tertiary entrance. They were concerned that schools may not provide the stimulation to maintain active learning. This was seen as a problem over the last few years of school, especially for boys. Others were concerned with drug problems they associated with schools. Schooling in Melbourne was an option for some.

Education was seen as a primary way of providing career options to children so they could choose to leave the farm. Some saw this as essential as the farming would no longer provide adequate income support.

Many practitioners, even when a child wanted to farm, were adamant that their children should not come directly onto the farm. They considered options such as an internship on another property backed up with TAFE courses, or developing other skills and seeking non-farming career before returning to farming. A few of the practitioners had themselves had alternative careers before settling down to farming.

(2) Self education

Many of the practitioners had attended a range of agricultural training courses. Some were concerned with their lack of education and saw limited alternative employment opportunity as a result.

(3) Understanding

Some practitioners expressed concern that they did not know what the best options were. The current situation is very complex and the strategy of expanding production seemed like a poor investment.

(4) Understanding through participation

Some practitioners were involved in public affairs, through representative committees or elected office. This opportunity invariable presented the practitioner with considerable scope for improving their understanding related to the participation topics.

(5) Capacity building

Specialists are currently promoting community capacity building which suggests an increase in education opportunities but practitioners did not mention this specifically.

Subsistence	Understanding	Creation
Protection	**Participation**	Identity
Affection	Leisure	Freedom

Participation was equated with getting control of one's life, being in charge, and fully participating in decisions that have an impact on one's future.

By operating their own businesses, farming families have taken a step in meeting their need for participation. This step may provide more participation for them than it does for an employee. A business owner has more options and more say in financial success (or failure) than an employee. However, more participation does not automatically mean taking more responsibility for their family's economic success. A doctor in a hospital, or a mechanic in a motor repair shop, also has responsibilities to deliver professionalism. If they do not they can lose their living. They are all operating within systems. Being a business operator is no guarantee for meeting participation needs. Meeting participation needs is more about the ability to work the

system for the family benefit. Only fourteen farming practitioners were interviewed but there seemed to be differences in participation; in the degree to which individuals were taking opportunities of being in business for themselves. This is a difficult area because participation needs may vary greatly between people so there can be no independent measure (such as the number of new ventures taken up). Meeting the need may be more to do with how successful or how in control the family feels rather than any objective measure. Some practitioners mentioned that they currently felt unsure of what was going on in farming and what they should be doing for the future which might suggest that participation was particularly hard at the moment.

There was one aspect of farming that clearly was a problem to many and that is being 'price takers'. Many practitioners mentioned this. Some said this was why so many wineries were established. People saw wineries as providing direct interaction with the customer. None of the interviewees had established a winery but some had vineyards with arrangements winemakers for private labels. A few practitioners had established alternative ventures that improved their control of the prices they received. The diversification strategies many practitioners were using provided some control by reducing the severity of downs turns when particular commodity prices fell.

Practitioners also mentioned other areas (not farming business) in which they were participating. Some were active in Local Government and to some extent with Regional, State and Commonwealth farming, policing, resource management and political organisations. Others were involved in organising and running sports, aged care, and contributing to religious education.

In discussing participation, participants tended to focus on participation associate with business but they were also participating in other needs areas such as protection (health and resource sustainability), affection (family sports, religion), understanding (education and training), leisure (sports and clubs) and so on.

Overall the ability of people to participate is partly governed by the organisations that exist.

Subsistence	Understanding	Creation
Protection	Participation	Identity
Affection	**Leisure**	Freedom

Practitioners worked long hours but had a variety of strategies to participate in leisure activities.

(1) Off-farm holidays

Some took time away during quiet periods of the year. Some dairy farmers dried their cows off in winter so as to allow for holidays. Extended off-farm holidays seemed to be a rarity although a few farming families had managed a number of trips, including overseas trips.

(2) Short semi-regular breaks

These breaks could be half a day to a couple of days to attend and /or participate in local or regional activities such as sports, theatre, racing, motor-bike riding, bushwalking, camping, fishing, swimming, skiing, caravanning, or visiting relatives and friends. The tactics to allow these breaks varied. Some employed labour for the sole purpose of creating recreational time for the whole family. Some had delayed taking trips until they were sure that the farm would be managed well in their absence. In other families, one partner would take over the normal chores of the other, to allow time off to participate in a recreational activity. A wife for instance, may do the Saturday afternoon milking to allow her husband to participate in sport.

(3) After work activities

Some had ongoing hobbies and interests that had nothing to do with their farming activities but which provides a break after normal work hours such as theatre or learning a language. Other practitioners and family members had participated in events such as agricultural shows and pony clubs.

Many participants found recreational enjoyment from their own properties, notably enjoyment from the nature they observed on their farms. Some suggested that part of every day was recreation. Other practitioners were adamant that they separated work (running the farm) from home life and recreation.

Discussing recreation was easy (and clearly a pleasure) for those practitioners who had well organised active forms of recreation that were distinct from their farming activities. A weekend on a houseboat, a week on the Gold Coast or a trip to watch the football in Melbourne provided easy topics. Recreation that was more passive and fitted in around work was harder to discuss. Sometimes it seemed as if practitioners were asking themselves whether or not they actually had any recreation.

The work hours of some dairy farming systems certainly made getting time away difficult. Some noted that the preparation and the catch-up work needed for a holiday could be a stress and reduce the value of a break. The local infrastructure and opportunities seemed to be very important. Having clubs, organisations and groups provided a major opportunity for social interaction and recreation. Some noted that the tourism development in Echuca was a bonus as it was increasingly providing recreational opportunities.

Recreation seemed to address two problems. Firstly it helped with the isolation that can come with farming. Some practitioners had said that there were periods (or had been periods) in their lives when the only way they knew what day it was, was when a visitor or the milk tanker arrived. Some suggested that the feeling of isolation grew with age and the older they got the more they realised they needed social contact. The second problem was the need to broaden life's experiences and to have the ability to relate. This seemed to be about relating their lives to the lives of other people. Many practitioners talked about the importance for their children, who wanted to farm, to have a break after school either by farming elsewhere, going to university or doing

something different such as a trade apprenticeship. Many of the practitioners had done this themselves and some had stories of other people who had gone directly from school to the farm and left farming a few years later having become disillusioned. Recreational activities seemed a way of maintaining, renewing or deepening this understanding of the farmer in society. Perhaps the interest in genealogy by some practitioners is part of being able to understand relations between people. For some practitioners genealogy is a significant part of their recreational activity, and it is probably also related to the identity need.

Subsistence	Understanding	**Creation**
Protection	Participation	Identity
Affection	Leisure	Freedom

Everybody has creative capacities. The degree and application varies. Many practitioners said they expressed their creative abilities through their farming activities, by developing and adapting systems that worked well in their situations. Although there was certain uniformity between farms, especially those producing the same products (dairy farms, for example). Farms were unique expressions of the historical record of the practitioners' creativity and values. Creativity and the identity need, are closely linked.

Music was an important outlet for many. Some practitioners played musical instruments and also played in groups while others sang, sometimes in choirs. A number were (or had been) involved with a theatre group.

Some expressed their creativity through their homes and gardens. This avenue probably appealed more to the women in farming families.

Subsistence	Understanding	Creation
Protection	Participation	**Identity**
Affection	Leisure	Freedom

Most practitioners said that their farms (and how they operated their farming enterprises) were reflections of themselves, their identity. Property ownership was an important aspect as ownership encouraged investment in the very long-term protection of the farm and its resources including native vegetation, and this investment was done for non-commercial reasons. Some suggested that a totally commercial orientation would logically lead to leasing their properties, stock and equipment, leading to a maximising of income and minimising loss of equity. Most practitioners were fully aware of the equity loss that had occurred over the last decades on the capital value of their farms. A number of practitioners compared the changing value of their farms when the purchased to now to the change in city houses. Practitioners felt that farms had declined substantially in value relative to urban housing.

As well as being reflected in physical property some said that their identities and values were reflected in the way they operated across the board, in terms of business, family, and the communities to which they belonged (for example, service clubs such as Lions, or Landcare or religious groups). A number of practitioners said they were attracted to projects because they could see their usefulness and hoped to be able to organise them so they would be successful ventures. Several practitioners said that money-making aspects were a secondary consideration. They wanted to hone their organising abilities and do things that were useful and exciting to achieve.

Subsistence	Understanding	Creation
Protection	Participation	Identity
Affection	Leisure	**Freedom**

Freedom was interpreted as the ability to set goals and organise activities to meet these goals. The ability and desire to do this varied, depending partly on attitude and personality. Planning for the long-term was an important activity and some practitioners sought professional help in organising their planning and goal setting. Succession planning was an important element in planning (organising the transfer of assets and responsibility between generations). Many practitioners were very positive about the importance of long term planning and goal setting. They suggested that it made a tremendous difference to their progress over the years.

Debt, high family expenses, and the current economic problems (drought, low milk prices, high feed costs) tended to have a negative effect on the ability to implement plans. However practitioners tended to say that the current situation meant that they had to put their goal achievement programs on hold, not drop them. Having plans seemed to have a beneficial impact of practitioners' mental attitude. For instance, some said that they could accept that they would make more progress in achieving their goals in some years than in others and that poor years did not mean their goals were meaningless. Having goals seemed to keep them focused in difficult times helping them avoid feeling powerless or despondent.

Goal setting covered more that just business planning and seemed to start with personal goals and lead to areas such and education, business and succession planning. The family was the centre of the planning process; they planned for their family as first priority. They did not for instance, plan their business as first priority and let the family fit in as best it could. Some practitioners made a strong point of this, noting that they did not let the business run the family.

Planning seemed a very important activity that spilled out into all other needs areas because it seemed to keep the practitioners focused and so looking for the best opportunities for their families in the very long term.

3.5 Question guide for interviews with decision-makers in farming families in the Echuca area

3.5.1 Introduction

The purpose of the study is to develop a conceptual framework for dealing with the relationship between managing natural resources such as land / water and the welfare of the land-owners. The conceptual framework has to embody and promote the ideas of sustainable development.

The value of the conceptual framework is to provide a shell that future researchers, policy people and interested parties can use to organise and analysis their information, which will give them new insights into the relationship in terms of sustainable development ideas. These new perspectives can then be turned into action that promote the welfare of local farming families and improve the quality of the landscape in which they live and use productively.

The study has four phases: drafting a conceptual framework that describes the relationship, undertaking a pilot of the conceptual framework, editing the conceptual framework and reporting. It is a set of ideas about the process through which people meet their needs throughout life and the support required in this venture. This framework comes from the doctoral thesis being written by Quentin Farmar-Bowers. The ideas have been developing since the late 1980s although the first publication in which they take form was in 1994 (Farmar-Bowers 1994, 2002).

The pilot of the conceptual framework began in May 2002. It has three components:

Component 1

The first is gathering information about the relationship from the specialist literature and from organisations directly involved and otherwise interested. This material needs to be organised and interpreted and this task will continue through the study. It is probably that a number of interviews with specialists will be conducted.

Component 2

The second component is a workshop involving people from a range of organisations and practitioners; landholders who use land/water resources to earn at least some of their family living. The workshop was held on the 18 July 2002. The workshop has a number of values. One has been the identification of issues relevant to the mental image of the practitioner (the family and farm). The issues identified by the workshop participants provide an indication of the perspective being taken on the relationship by partisan and disinterested people.

Component 3

The third component of the pilot is gathering information on the relationship from practitioners; the decision-makers who use land/water resources to earn at least a proportion of their family living. These decision-makers will be interviewed to gather the information. This component requires a question guide. The question guide is set out in the main section below. Practitioners' information will be categorised and used in a comparative analysis with the information from the other two components of the pilot.

The conclusions from the pilot are used to edit the preliminary conceptual framework (the current draft). The reporting phase is already underway. The workshop and interviews will help in setting out the conceptual framework in language that reflects the current perspectives. However, the conceptual framework will not be easy to explain. The framework may only be understood after it has been used in a study that was followed by actions. One could consider this current study as the research in RD&D phase and that the consequent study is the D&D (development and demonstration). The latter sets out what all new approaches require so that there is any chance of adoption.

3.5.2 Question guide

The questions are in two sections.

Section 1: Qualification questions

1 As a farmer do you irrigate any part of your property?

All	
Part	
Regularity of irrigation	

2 As a farmer is any of your property subject to water related problems such as dry land salinity or water logging?

Dryland	
Water tables	
Water erosion	
Flooding	

3 As a business-person what proportion of your business relates to irrigation farming, water supply or water issues?

All	
Part	

4 Who in your family is regularly consulted about farming and business decisions? (who are the decision-makers?)

None other	

5 Do you expect your children to become involved with this farm in the future? [yes] [no] [info…….

6 As a family how important for your livelihood is non-farm income?

No non-farm income	
Crucial	
Supplementary	

Section 2: Addressing the nine needs

The nine fundamental human needs we want to cover are:

Subsistence	**Understanding**	**Creation**
Protection	**Participation**	**Identity**
Affection	**Idleness**	**Freedom**

The questions need to touch on each need in a way that illustrates how the decision-maker is taking decisions that lead to meeting that needs of the family. There may be synergy between these needs. Understanding may be synergistically related to participation. Parents may decide to milk their business of money to give their children a good education (understanding need) so that they can choose from a variety of careers and thus take control of their own lives (participation need). Being in control of your own life could also help with identity needs.

We do not want to develop a wish list (things that practitioners would like) because wish lists tended only to relate to 'subsistence needs' (such as, getting lots of money) and protection needs (such as, having good health and living a long life). However, the position of the farm as a support to the family means that subsistence and protection needs have to be explored thoroughly.

Issues that influence practitioners form a continuum; from issues they can control completely, through issues they control partly, and finally to ones that they just have to accept. We can simplify this into 'Issues within their sphere of sues in the locality' (which are therefore mainly outside their ability to influence). [It depends on where in the 'people matters' pyramid control of these items lie.]

We accept that over time some issues from the locality could migrate into the practitioners' sphere of influence. For example, an example of an issue within the control of a family is whether they conducted their farming business prudentially. An issue outside the practitioners' control is the tax rate for farm business.

The nine 'tell me' statements listed below are the primary questions. The questions listed below each 'tell me' statements are supplementary. They would not necessarily be asked. It depends on how well the interview is going.

At the end of each section there are questions in a box. These will be backup questions to ensure we have information on the topic.

Subsistence: Tell me about how your family makes its living.

1 Apart from your farm, what other sources of income does your family have?
2 In difficult farm years does your family have alternative sources of income to tide it over?
3 What organisations / arrangements have the most influential on your farm income?
4 Apart from your water supply organisation, what other organisations are important for your business?
5 What actions of these organisations concern you most, eg contracts, market requirements, etc?
6 What are the main activities and changes occurring in your farm business?
7 Are you planning changes? And, do you think changes will become necessary?
8 What proportion of your time goes on these activities?
9 What significance does irrigation have for your income?
10 Are you moving into irrigation or out of irrigation?
11 What issues do you have with irrigation cropping, water quality, supplies and water suppliers?
12 What are the most important water-land related issues / problems, and what are the organisations involved?
13 What aspects of these issues are under your control (fully or partly) and what aspects aren't. Who is in control?
14 In what ways is making a living becoming easier [harder] for your family [individual members of your family]?
15 Lots of organisations have lots of different roles, but they don't always supply what you require. Can we run over these organisations and roles and talk about their significance to your income? Are there roles that should be done, that are not currently being undertaken by any organisation?

Protection: Tell me about protecting family members in terms of maintaining a living, security and health.

1 What are your concerns for the long-term viability of your farm, the farm-business, and your ability to earn a living farming?
2 What can you do about these concerns, who else is involved?
3 What actions by other people and organisations are influencing your concerns about earning a living?
4 What actions by other people and organisations are impacting the productivity of your farming enterprise?
5 In what ways are business facilities, services, and amenities and arrangements concerning business in the locality improving [deteriorating].
6 What concerns do you have regarding personal security / health of your family?
7 What are the main things you can do about these concerns?
8 In what ways are security, health and welfare facilities, services, and amenities and other arrangements relevant to your family in the locality improving [deteriorating].

9 How are changing services altering the supportiveness of the region for your family?

Affection: Tell me about the decisions made that are influences by the special needs family members.

1 What issues in your way of life as an irrigation farmer are positive / negative for family harmony?
2 What investments and business changes have you make to meet specific changes in family needs?
3 What time is spent on seeing to the needs of family members?
4 What issues [facilities and services] in your locality are beneficial [negative] for family living and the special needs of family members?
5 What are the best features of this locality for family life?
6 What concerns do you have for the ongoing [future] welfare of your family living in this region?
7 What are you able to do about improving the features or services in this locality for family life and the special needs of family members?

Understanding: Tell me about obtaining farming and business information and also about obtaining education, training, skill development and experience for family members.

1 What are the issues that must be understood in your business and on your farm?
2 What are the topics that must be understood in relation to water use and irrigation?
3 What are the sources of information available to you on farming and business matters?
4 What facilities, organizations and businesses can you turn to for information and advice?
5 Where do you get information, advice, skills and experience on irrigation matters?
6 What areas, topics or issues lack information?
7 Where would you go to get help with an irrigation/dryland business problem?
8 What opportunities in the area are family members taking for education, training and skill development?
9 What advantages [drawbacks] are there in this locality for education, training and personal development?
10 What time is needed for getting information and developing expertise?

Participation: Tell me about your family's experience in participating with various opportunities in life.

1 Do you discuss water / land use problems with neighbours, local government, advisers, water authorities?
2 When you take farming decisions, with whom do you consult?
3 How would you like to change the handling and arrangements for current water / land use problems?

4 What organisations seem interested in your views and seem to act on them?
5 With what local organisations are members of your family actively involved?
6 With whom do you discuss / develop future plans?
7 What person(s), or what organisations are most influential with your family?

Recreation and Leisure: Tell me about what leisure time and activities you and your family have.

1 Is the lack of spare time an issue for your family?
2 Do members of you family have all consuming interests, special hobbies or particular recreational interests?
3 Do you have special places in this locality for recreation and relaxation?
4 Are you finding that you are working longer [shorter] hours than you used to?
5 What are the main causes of longer [shorter] working hours?
6 What recreational or leisure activities involve the whole family?
7 Are you and family members enjoying life more [less] than ten years ago?

Creation: Tell me about the outlets you and family members have for their creative energy.

1 Are you able to develop new ideas in your farm business and on your farm?
2 What interesting ideas or innovations have you applied to the water / land use problems on your farm?
3 What new projects are you doing on your farm that you find exciting?
4 What outlets do members of your family have for their creative talents?
5 What do family members like making?
6 What arrangements and organisations in the region provide outlets for the creative energy of family members?
7 What activities and accomplishments give your family members great satisfaction?
8 What help do family members require to help them pursue their special interests?

Identity: Tell me about how you and family members relate to the farm and how they express their personal values (individuality).

1 Do you feel that your farm says something about your family's values, worldview and attitudes?
2 Do you feel your personal values influence what happens about water / land use problems on your farm?
3 Do water / land agencies and other organisations you deal with give you and your family members a fair hearing?
4 Who are the most influential members of your family?
5 Who are the most opinionated member of your family and are they able to get their opinions aired / accepted by local people?
6 Are some members of your family committed to dealing with issues that really concern them as individuals?

Freedom: Tell me about the ability of your family to set and follow their own objectives and create a life that is satisfying for them.

1 Running your own farm can give you the freedom to choose various courses of actions. What is the most important aspect of this for you?
2 What issues / problems on the farm are becoming harder?
3 Can you always find alternatives or new options for getting over problems?
4 Do you and members of your family ever feel trapped by the circumstances of farm life?
5 Is your farm business becoming more [less] integrated into other business and are commitments and responsibilities therefore increasing [decreasing]?
6 What particular problems lie ahead for your family / business / farm that might require substantial changes?
7 What are the greatest hurdles for fulfilling your family's plans?
8 What would be the best things your family members could do to increase their options for the future?
9 If you had to leave farming what would you prefer to do?
10 What arrangements, organizations and people enhance your family life?

Summary of the 'Tell me' statements:

Subsistence: Tell me about how your family makes its living	**Understanding:** Tell me about getting farming and business information and also about getting education, training, skill development and experience for family members	**Creation:** Tell me about the outlets you and family members have for their creative energy
Protection: Tell me about protecting family members in terms of maintaining a living, security and health	**Participation:** Tell me about your family's experience in participating with various opportunities in life	**Identity:** Tell me about how you and family members relate to the farm and how they express their personal values (individuality).
Affection: Tell me about the decisions made that are influences by the special needs family members	**Recreation and Leisure:** Tell me about what leisure time and activities you and your family have	**Freedom:** Tell me about the ability of your family to set and follow their own objectives and create a life that is satisfying for them.

3.6 Issues identified in the interviews

The issues are difficulties that farm practitioners mentioned that concern the farming family, and that are also candidates for resolution or amelioration should the farming practitioners decide to work (or lobby) together. The candidate issues have been grouped under the headings for the nine fundamental needs. Candidate issues are the issues that if solved or catered for in some way would help farming families get more of their needs met.

It is unlikely that resource use specialists would be interested in helping with these issues although there may be exceptions. Other specialists and governments may have an interest in helping or have the capacity to help if the issues were presented and pressed.[6] There may be others that would have to be handled by practitioners on their own.

Although each candidate issue is listed under one of the nine fundamental needs, some issues refer to more than one need.

3.6.1 Subsistence

Finance and debt:

This issue goes beyond interest rates and collateral. It concerns the effective use of resources over the region and over long time periods (30 - 40 years). There may be several ways in which practitioners can help one another. They could provide advice and information. They could reduce their indebtedness by establishing business arrangements that reduce the total amount of debt between the participants in the region by using assets more effectively. They may consider establishing local currencies to enable transactions to occur when there is insufficient access to Australian Dollars (Gaines 2002). They may find ways of avoiding over-investing in assets that are declining in relative value (such as farms) and find other assets that are more likely to maintain their value over long periods of time. Through cooperation they may find more productive ways of using the assets they currently have.

Employment and skilled labour:

Obtaining reliable employment and skilled workers (non-family labour) are issues that may become more important as farming enterprises grow. Individual practitioners may find these issues very difficult to resolve on their own. However, by working together they may be able to establish reliable employment contracts and skill improvement programs on a regional basis. They may also devise model contracts and run programs about contracts and employment obligations. By working together and with local government they may be able to develop arrangements for high quality housing for farm workers throughout the region.

[6] For instance, in a review of the Rural Communities Program (RCP) by the Bureau of Rural Sciences commissioned by Agriculture, Fisheries and Forestry, Australia (AFFA) the review team suggested that "…. differences in the socio-economic status and access to services between rural and urban Australians are declining. Nonetheless, areas of significant disadvantage remain in rural and regional Australia, some examples of which were noted in evaluation case studies. There is therefore an argument for a continuing need for additional government support for rural and regional communities through programs like the RCP, especially if they are appropriately targeted to the most disadvantage communities and regions" (AFFA accessed 02 /04/2002)

Farm business arrangements:

Inflexibility in the business arrangements of the farming family means that many opportunities are foregone because a growth in activity tends to involve large lumps of investment. Other business arrangements such as partnership ventures, partnerships, cooperatives and vertical integration companies may provide ways for large numbers of practitioners to pool their resources, sharing risks and gaining incremental income improvements. Practitioners may be able to establish a communication system that brings parties together. They may also be able to ensure that TAFE colleges are able to supply the business training needed to understand all the possible alternatives. Third, participants in successful ventures may encourage other farmers by running open days to provide information on how things are run for maximum advantage.

Diversification:

Single enterprise farms allow the time for practitioners to become very skilled in specific industries and activities but at the expense of business vulnerability such as market downturns (global oversupply) or physical problems (local drought). Conversely, entrants into highly skilled industries are vulnerable due to high debt ratio and lack of skill and knowledge. There may be ways of facilitating, on a regional basis, business diversification for the farming practitioners. This may be a variation of the 'farm business arrangements'. For instance, if a dairy farmer wanted to invest in fine wool production, it may be wiser to invest in an expanding and successful wool farm, than buying their own property and sheep. To do this, practitioners need new business skills such as the capacity to create fair long term contracts (Maguire 2000).

Off-farm income:

Practitioners with off-farm income often have previous training and experience such as teaching, nursing and accountancy. There may be ways of improving access of practitioners without this advantage to train and find local employment. Practitioners may be able to work with local educational institutions in developing adult education programs that most suit local people. Centrelink could find employment opportunities. Improving communications will reduce the tyranny of distance. New communication based business can be established in small towns.

3.6.2 Protection

Health care:

There are aspects of health care that could be candidate issues. These issues can range from improving access to general practitioners, to establishing day hospitals, to facilitating the visits of city-based specialists. Some of these arrangements may be facilitated through investment by farming families as a form of diversification. Farming families could for instance own clinics and hospitals and employ medical staff to operate them.

Income maintenance:

There are two aspects of income maintenance:

(1) One is the long-term declining financial returns from farming that has been going on for decades. This decline is caused by rising costs and falling returns and more recently by globalisation. There may be little that can be done to improve returns other than moving to different products, value adding to existing products or more direct marketing. Practitioners may be able to assist each other in alternative products and in more direct selling arrangements (from farmers' markets to establishing food manufacturing and retailing businesses). The business skills and knowledge to do this may be lacking. Business education may be important but practical experience would seem essential. There may be ways that practitioners could work with government agencies and private industries to gain experience through joint ventures or internships. Developing companies that are run by professionals may be a practical option.

(2) The second aspect is variation of income between years. Diversification may be important and this might require geographic diversification as well as product and market diversification. In terms of geographic diversification to overcome regional droughts, Dunlop indicated that there was great potential for irrigation in Northern Australia (Dunlop *et al.* 2001).

Productivity:

There are three considerations:

(1) The first is the capacity of the farmer to work. Increasing the productivity of labour creates a treadmill but becomes necessary when margins are falling. As people get older they gradually lose the physical capacity to put in the average work hours for their industry. One solution is organising work to be less physical and reducing the amount of night work. Computerised irrigation is one technical solution.

(2) The second consideration is maintaining the capacity of the farm to produce efficiently. This requires using soil and water resources effectively. This can involve considerable expenditure on works such as surface drainage, ground water pumping, more efficient irrigation and laser grading.

(3) The third issue is maintaining the capacity of the region to support the productivity of the farm. Water quality can be an important issue and so can regional salinity. Some of these issues are also of interest to specialists. For instance, the strategic directions identified by the Department of Natural Resources and Environment include 'sustainable growth' with 'a smaller footprint' (reduced environmental impact). To achieve long-term growth in agriculture, the department would have to ensure that productivity of some resources such as water and soils was preserved (NRE Strategic Directions get web address). The 'public good' aspect of maintaining the productivity of regional resources would tend to encourage government involvement and investment, as opposed to the 'private benefits' involved in resource protection on individual farms.

3.6.3 Affection

Education:

(1) The number of careers available as farmers is declining and most children in farming families need to move off the farm to get employment. Some children apparently fail to be motivated by school and do not get an education that allows them to progress into non-farming careers. It may be that educational options need to be increased. Some farmers are able and willing to send their children to schools outside the district (Melbourne or Geelong) with the expectation that they will be able to improve their options for careers in this way.

(2) In addition many people who start in farming will not be able to complete their careers as farmers. Opportunities created by adult education will facilitate them finding alternative careers.

By working practitioners may be able to help educational specialists develop more relevant curricula and they may also be able to fund scholarships. In a sense this is an extension of the social capability ideas (Cocklin *et al.* 2000). Instead of identifying "ways in which to enhance the capabilities of people in food and agriculture sector to manage and respond positively to change" (Cocklin *et al.* 2000 executive summary), a positive response involves finding careers outside the food and agriculture sector for people currently in the sector.

Succession planning:

How a farm business is passed on to succeeding generations influences the future success. Practitioners may be able to help other farming families by sharing experiences. Since many farms will be passed on to other family members, it may be possible to employ professional succession planners to run seminars at appropriate times.

Family longevity:

Farming can be a stressful and unrewarding occupation, especially when both husband and wife have to work long hours. There may be strategies to ameliorate these problems and help the family stay together. Affordable child care, children's recreational facilities, holiday programs and holiday trips and tours may help greatly and could involve local and state government, as well as farming families and youth organisations (such as scouts).

3.6.4 Understanding

Planning:

Planning is a major element in achieving success. Techniques and processes as well as information are needed for planning. One element is being able to identify what one wishes to achieve in life. Planning tends to be about matching ambitions with a realistic assessment of the opportunities. Clarity on fundamental human needs will help practitioners achieve plans that cater for all the family's needs rather than just maximising financial wealth, with the hope that other needs, (like affection, identity, creativity etc), can be purchased.

Skill development:

Once objectives in life are identified and career choices that will help get the objectives are made, the next step is developing the necessary skills. This is an iterative process. When starting out in farming, technical skills such as tractor driving, animal health, cropping techniques, book keeping and so on, are very important. When farms expand and take on staff, develop contracts and engage in more complex business arrangements, then management skills become paramount. Before retirement, still other skills are needed. These include skills associated with succession planning and the new skills needed for a successful retirement. Skills need to be developed before they are needed. Practitioners can help establish and operate skill development programs and can lobby governments and the relevant specialist groups to help.

Monitoring the Consequences of Change:

Change is occurring in many different areas and over the coming decades these changes may create a very different agricultural industry. Kefford suggests that by 2020 "A handful of cooperatives and corporations are responsible for the vast majority of food production from large-scale, internationally competitive, cost efficient systems". And "This vision, I believe can be made a reality and I think it is pretty clear what needs to be done to achieve it" (Kefford 2002). To respond in good time should substantial changes actually occur, farmers would have to understand the changes thoroughly. Some form of monitoring process might be necessary, as it may be very difficult for individual farming families to understand the consequences of these changes. Specialists in promoting these changes may help farming families who are leading the changes. These may be the minority. Independently researched information may help the majority in their long term planning.

3.6.5 Participation

Responsibility:

Taking control of one's life involves taking responsibility for a range of events some of which will be more important than others. Taking control and fully participating in life, is a very difficult activity that is likely to be stressful at times. It may be that some guidance would be beneficial. This could be via education but other processes such as group discussions, role-playing workshops and publications may help people share ideas on important issues.

Local and regional participation:

Farming families tend to work very long hours which makes the task of understanding changes and appreciating opportunities in the region difficult. Practitioners may be able to help each other by developing discussion groups specifically to identify and review participation issues. There may also be many opportunities to participate in local issues through existing arrangements but the Internet provides a new medium that might provide an ideal support mechanism.

Social participation:

Social participation, such as sports and culture, helps to reduce the isolation that can occur in farming. Maintaining the facilities and organisation for social participation may be a task for practitioners in collaboration with local organisations such as local government and sporting and cultural associations.

3.6.6 Leisure

Leisure opportunities for short blocks of time:

The greatest opportunities for leisure for farming families occurs during short blocks of time after work, between shifts or during less busy periods of the year. Having arrangements that facilitate leisure opportunities during these short spaces of time greatly improves overall recreation. These arrangements can be commercial or semi-commercial. A number of practitioners noted that the growing facilities in Echuca were a bonus. These include wide range of leisure activities such as study groups or language classes.

Farm Visits:

Many farmers are interested in other faming enterprises and some practitioners mentioned that they often took time to visit other farms during family vacations. Developing arrangements to facilitate farm visits or tours including accommodation may help leisure needs and also add to other needs such as participation. Commercial aspects may assist with subsistence needs (income).

Community facilities:

Although the larger towns have facilities, maintaining community facilities for small centres, such as swimming pools and sporting ovals may be a growing problem. There may be room to devise innovative ways of maintaining the faculties.

3.6.7 Creation

Creative opportunities:

Creativity can be expressed in almost any field. The development of arrangements for theatre groups, choirs, sports clubs, drawing and painting groups provide opportunities for individuals to develop skill and can provide and outlet for creative talent.

3.6.8 Identity

Long term condition of the farm:

In a commercial situation, investment with very long term paybacks is uneconomic. In contrast, when a property is privately owned many changes are valued even when they are not economic in net present value terms. These changes could relate to the commercial productivity of the property (environmental sustainability issues) but they can also relate to the aesthetics of the property. Aesthetics could relate to the houses and their surrounds, but equally to the trees, woodlands, riparian areas, wetlands, native grasslands and wildlife on the farm property. Especially those changes that would not be undertaken if net present value were the sole criteria, may relate to helping the practitioners to express their identity.

Practitioners might consider two kinds of arrangement to support these environmental/aesthetic changes. One could relate to information exchange about the long-term conditions, advice on what to do to improve environmental sustainability. The other could relate to some form of recognition. Perhaps a certification scheme based on environmental management systems or some similar continuous improvement quality system would be appropriate.

3.6.9 Freedom

Getting out from under:

Freedom to set and achieve goals is available to all. However, people become trapped in situations which leave little choice bother than grinding away to pay debts and meet responsibilities. Despondency or depression may keep them there. In spite of great difficulty many people have been successful in escaping such situations. Their experiences and techniques can help others. It may be possible for practitioners to develop information about 'getting out from under', achieving more freedom, and then passing this information on to others in need. Information may be produced in the form of written material, counselling services or new work arrangements. There may be commercial aspect to this work.

Competition via globalisation, along with changes due to new technology and climate are growing factors that put pressure on practitioners to expand or leave commercial farming. It may be much harder in future for farming families to set plans and then work to achieve them because these forces influencing change our outside their control.

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Chapter 4 Echuca – the Last Fifty Years (or so)

Selina Handley

4.1 Introduction

Every community has an essential core, and in the case of Echuca, situated on the Murray River, the river itself is the defining vital spirit. It is the focal point of Echuca and its environs, for it provides drinking water; irrigation for dairy, vegetable, grape and other agriculture; recreational leisure activities for residents; a magnet for tourists; and above all a historical heart to the town.

I write this chapter about Echuca and its changes over the past fifty years as a resident with a deep attachment to Echuca. This chapter will help the reader to understand some of the key issues that have occupied us, especially those having to do with the river and the use of water. It identifies some of the diverse interests and industries that are dependent on water, and describes how they have been affected by social, economic and demographic shifts and by changes stemming from new regulations and regimes for managing, conserving and distributing water in a region prone to flood and drought.

The point is made that a community is a complex system of interlocking and overlapping groups and interests. Any adverse effect on community members engaged in water-dependent industry such as dairy farming has a direct effect on the interests and businesses of many other members of the community. Similarly, when small satellite towns in the wider region experience business failures and closures, there is a direct impact on other towns. This applies particularly to their institutions such as banks, retail shops, schools, transport and other services. In brief, the impact of change in one part of the system has an impact on other parts of the system. The effect of changes in the quality and availability of a vital natural resource such as water on a wider community is often more consequential and pervasive than is at first apparent.

I have relied on four kinds of source: firstly texts, especially Helen Coulson's excellent *Echuca-Moama on the Murray* (1995), together with reports and documents on Echuca and Campaspe Shire. Secondly, a number of websites have useful information about water, demography, resources and industry in our region. Thirdly, informal interviews with eleven residents, some of whom have lived in the region for the whole fifty years of my tapestry, enabled me to appreciate the effects of droughts and floods, and of changes to water supply and prices, on residents. Finally, my own observations provided unifying material that helped me knit the story together.

4.2 A brief recent history

The past half century has seen myriad changes in the face, and to a degree the soul, of Echuca. Henry Hopwood who operated a punt across the Murray River founded Echuca in 1853. The 1854 census recorded 18 settlers (Priestley 1965, blurb) in Echuca and over the next 30 or so years the town flourished, and was referred to as the second Victorian Port, after Melbourne. In 1864 Echuca was recognised as a municipality, and the next twenty or so years saw the arrival of banks, hotels, sawmills, a Post Office, factories, ship building, a waterworks programme, schools, a hospital, and sporting clubs. Around the turn of the century, the river became less important due to rail taking over as the favoured form of freight. The population reached "its lowest ebb – a mere 3,745" (Coulson 1995, p.91) in 1911, and Echuca found itself needing to encourage settlement from elsewhere, including overseas. This tactic was successful, and as a result much of the district was turned to agricultural use, mainly wheat and dairy and later pigs, and had something of a multicultural flavour.

Once again, in the 1940s, Echuca found itself needing to do something to ensure its survival, due primarily to the effects of World War II and the Depression. Other impacts, such as the lessened use of the Port of Echuca as a working port and the diminishing need for travellers to have a stopover in Echuca due to faster cars and better roads, also encouraged the town to reshape itself.

> "The town no longer basked sleepily in the nostalgia of its days as a river port; instead it began to see the past as a heritage which could have its own rewards in a new industry – tourism."
> (Priestley 1965, p.179)

The river is the heart of the town, and it has proved a wonderful drawcard since the inception of Echuca as a town. There was great vision and passion within the town and townspeople to meet the challenges of the future head on, and many would argue this trait is still alive in the town today. By the 1950s, the town had a wealth of life experience and was ready to face an exciting future. The councils of times past were visionary enough to realise that the Murray River was Echuca's key to a thriving and prosperous future, and just as the River ebbs and flows to meet the challenges and 'snags' around each bend, so has the township of Echuca.

So what's happened since then? Echuca began as an inland port and now has developed into a thriving tourist destination. This paper looks at the changes over the last 50 or so years, in particular related to population, employment, local business, culture, industry, recreation, transport, health, crime and safety, religious affiliation, and community groups. In addition, current issues are discussed, specifically related to water, and a brief reference is made to future aspirations and expectations held by some people currently living in Echuca.

In the 1950s Echuca 'cleaned itself up' with the expectation that tourism was the key to the town's longevity. Many of the old shops in High Street and in the East had fallen into disrepair, and Hare Street had become the retail hub. So new shops were built and existing shops in the Old Port area were refurnished. Kerbing and footpaths were improved, and new channels were laid in the farming areas. Streets were resurfaced and plans were developed to renew the water supply (it was pumped directly from the River and therefore was viewed by some as unsuitable for domestic use).

In order to provide quality water for food and add to the attraction of settling in Echuca, the Council established a Water Treatment Plant in East Echuca in 1970 (Coulson 1995, p.165). Before this, particularly when the River was high, Echuca's water "became orange or even plain brown and the filtration plant was a major benefit to the community" (Coulson 1995, p.165). Coliban Water, formerly the State Rivers and Water Supply Commission until 1992 (Coliban Water 2003), manages Echuca's water supply which comes from the Murray River. Water is pumped out of the River upstream of Echuca, and pumped to the water purification plant in the East where it is treated with alum to settle the clay and then filtered through sand. Chlorine and fluoride are added and it is pumped to the water tower in the South. The result is clear and very palatable drinking water.

Coliban Water receives a yearly water allocation from Goulburn-Murray Water, like any other water customer. In the year 2001-02 Echuca used a total of 4,235 megalitres for domestic and commercial purposes, according to the Education officer at Coliban Water. The average usage in Northern Victoria per household is 1,000 litres per day. Total consumption hasn't changed much over the past ten or so years: people generally have smaller lawns and gardens and greater awareness of the need to conserve and education about water efficient systems. Coliban Water is considering introducing a sliding scale for domestic water costs, perhaps based on the season. One threat to Echuca's water supply today is blue-green algae. When there is an identified bloom in the River, Coliban Water ceases pumping until the bloom passes.

In 1953 Echuca celebrated its centenary, and the Borough Council moved out of its old premises, the Town Hall that now houses the Echuca Library, and into the new Echuca Civic Centre. In 1987 an even newer Civic Centre was opened, situated on a prime location on the River overlooking the Aquatic Reserve. This apparently 'ruffled a few feathers' at the time because it cut a superb River drive for locals and tourists. The City of Echuca ceased to exist in 1994, and the Shire of Campaspe was formed following local government amalgamations in 1995. The Shire now encompasses the former City of Echuca, Town of Kyabram, and Shires of Deakin, Rochester and Waranga. Echuca covers an area of 26.8 square kilometres and has 373.4 persons per square kilometre (Department of Sustainability and Environment 2003).

4.3 Population

During the reshaping boom of post war and beyond, between 1950 and 1965, the population of Echuca grew. In 1961, when Echuca became a Borough, the population was 6,443 (Priestley 1965, p.152), and when the Borough of Echuca became the City of Echuca four years later it had a population of 6,900 (Coulson 1995, p.93). Thirty-one years later, in 1996, the census data recorded Echuca's population as 10,014, (576 more than five years earlier) (DSE Datasheet). The 2001 figure for population in Echuca is 10,955 (www.med.monash.edu.au). It is worth including the population of Moama, Echuca's NSW counterpart across the river, because in many ways the two towns are one community. In 1995 Moama had a population of 3,600 (Coulson 1995, p.96). The feeling amongst some residents is that they know fewer people now than they used to, which is an effect of many factors, one being the population increase and another perhaps the trend of people being less involved in their community. The role of women has also altered community dynamics, with more women entering the paid workforce and thus spending less time in community activities.

Of the 10,014 people living in Echuca in 1996, 4,073 were employed. This may lead one to the assumption that many people retire here and/or there are perhaps a large number of people in unpaid work, for example motherhood. The current unemployment rate is 7.2%, which is a distinct improvement on the 11.5% it was just four years earlier (Department of Sustainability and Environment 2003).

Currently Echuca has more females than males (52/48 ratio). As Echuca is a popular retirement location, it could be surmised that the male/female ratio is partly due to the longevity of females in relation to males, our ageing population, and the arrival of retirees. Almost half the population had lived at the same address for the past five years.

Despite the well-publicised low birth rate of Australia, Echuca seems to be 'doing its bit' to reverse this trend! The Echuca Hospital, which opened its maternity wing in 1937 (Priestley 1965, p.173) has a fairly static number of births, averaging 300 births per year. However, the year recorded to June 2003 had 335, which is an approximate increase of 10%. Word of mouth has it that in January 2003 there was the highest number of babies in the maternity wing at one time. There were ten babies, which included two sets of twins. This may reflect the fact that some of the surrounding hospitals have closed or no longer provide childbirth facilities.

Most Echuca residents fall into the 35-49 age group (21%), closely followed by the 5-17 age group (19%). The next highest group is 60-74 and then 25-34. Interestingly the 1996 Census was the first time over the last 15 years of Census collection, that Echuca's highest populated group was 35-49. Previously it had consistently been 5-17 year olds (Department of Sustainability and Environment 2003). This is born out by the fact that people are having children later, and therefore perhaps less children. There may be an increase in cases of sending children away to boarding school. The majority of households consist of 1-2 people (62%) (Department of Sustainability and Environment 2003), which indicates that there are many singles or couples without children, or older or retired people whose children have left 'the nest'.

4.4 Business, manufacturing and development

In the last 50 years there have been many closures of businesses, and many new businesses opening their doors. This is partly due to diversification as a result of the changing nature of our society, but also due to the growth in the Echuca population and therefore increased demand. Echuca is purported to be the "region's business, shopping and financial hub, servicing a wider community of more than 60,000 people within a 70 kilometre radius" (Shire of Campaspe 2002, p.6). The town is partly supported by the newly formed *Campaspe Economic Development Board Inc.* The Board is "the peak body for economic development in the Shire and is driven by a group of skilled volunteers with a dedicated executive. The role of the Board is to facilitate the expansion and diversification of the Shire's industrial, agricultural and commercial base as well as promoting employment creation and business opportunities"(Shire of Campaspe 2002, p.3). The Shire recognises successful businesses through its annual Business Achievements Awards.

During the 1980s there was a push to increase industry in the town. An ordnance factory built and run by the Federal Government in 1943 was bought out in 1959 by the United Bearing Corporation, and was a major employer of townspeople (there are varying recollections of exactly how many men and women it employed, the range is from 200 to 500) and the trainer of 12 new apprentices every year. It was then taken over by a Swedish firm known as SKF and subsequently closed down in 1978 around Christmas time. The town was greatly affected. It was an efficient factory, but could no longer compete against the Japanese production line, and so it and the other SKF factories in India, Germany and USA all closed. Some staff felt that this closure was so significant it would cause the end of Echuca. Some employees found similar work in Albury, but the majority stayed in Echuca and found alternate jobs or were unemployed for a period of time. As a reactive move, a couple of councillors drove a plan to bring more industry to Echuca, along with a push for tourism, and this seemed attractive to prospective businesses as there was a ready and willing workforce looking for factory or other jobs as a result of SKF's closure.

> "I thought that would be the end of the town. I couldn't see how the town could possibly survive. It seemed like when I went down town every second person I saw worked at SKF, so how could Echuca survive if the factory wasn't operating anymore? Then tourism took over, businesses improved and past SFK staff got various jobs. Tourism just got bigger and bigger. I never would have thought of it. I thought the people pushing tourism were just talking rubbish. "
> *Allan McCallum*

This industrial push was successful and Foodmach, which manufactures can and bottle palletisers, was founded in 1972. Plumrose arrived in 1978 and expanded its Yoplait production in 1983, Kortex arrived in 1984, Safeway came to town in 1987, and McMillans gas cylinder production factory was built in 1989 and is now owned by American company Manchester Tank and Equipment Co. More recently Cedenco (1997) and Simplot (1995) have been major employers for Echuca, in the business of agricultural processing, particularly tomatoes. Other large employers include Nestlé (1995), CSR Humes, Riverside Meats Abattoir, Heinz Watties A/Asia Ltd (2000) manufacturing baby food, and Alabar Bloodstock Corporation (1982) one of the

biggest standard breed nurseries in the Southern Hemisphere. The fact that natural gas came to Echuca in 1991 may have been a renewed drawcard for industry. In 2003 Ricegrowers rice mill closed its doors, and the MON Beverages factory which was begun in 1900 by Manger and O'Neill as a cordial and tomato sauce factory was taken over and moved to Cobram. Both these closures have had an impact on the town. Some businesses that began, in one form or another, in the early 1900s are still operating today, such as Sutton's Bakery, Evans Shoes and Symon's Pharmacy.

> "The township was recognised as the commercial centre for the surrounding rural areas." (Coulson 1995, p.93)

Despite being a tourist town, in order to maintain viability much of the commerce still relies on the agricultural sector. The most significant primary industry in the region is dairying, but also important is the production of wine grapes, hay, sheep, tomatoes, and fruit. During the 2002/03 drought, which is purported to be the worst in 100 years, there was a marked detrimental flow-on effect on local business houses, Echuca has suffered drought before, notably in 1914, 1942-5, 1982-3 and 1994-5 (Coulson 1995, p.135). In the past it was said the local pharmacist could tell what was happening in the agricultural industry by the speed at which farmers were paying their bills. Today consumers, many of whom are farmers or other business owners, are just not spending the money as they had in the past. As a goodwill gesture during the drought, Carters, the department store in Echuca, offered farmers who are members of the Victorian Farmers Federation a 10% discount on all purchases in an attempt to support and encourage local business.

The region is serviced by the Murray Goulburn milk processing plant, located in Rochester, which is a major employer and player in the prosperity of the region. According to Doug Sims, Murray Goulburn Co-operative's Plant Manager, "The region's extensive irrigation system allows Murray Goulburn to produce 70% of the State's milk supply…without which, the dairy industry would not even exist in this area. The industry's support structure in the Campaspe Shire is large enough to allow us access to a skilled and reliable workforce…like mechanics, plumbers and other contractors……while our central location to the milk pick-up area and our factory's close proximity to the docks in Melbourne, enables us to process and pack product ready for export markets within a few days" (Shire of Campaspe 2002, p.4).

Horticulture has increased in the form of vineyards in the last 10 years, more so in Moama than Echuca, but obviously has an impact on the township of Echuca. Productive vineyards have been planted and cellar door tastings are attracting tourists and thus employment opportunities for itinerant workers have increased. In addition to vineyards, it is worth mentioning that Moama is the site for a number of manufacturing plants, a large engineering works producing stainless steel vats, tankers, etc., and a business which constructs portable homes. These businesses employ both Echuca and Moama residents.

Echuca exemplifies the national long-term trend of decreasing numbers of farming businesses. During the last couple of years in particular, some of the small towns around the Echuca district have found it tough to maintain services. The number of viable farms has decreased, and so services have been withdrawn resulting in people being forced to come to Echuca for such services as banking.

In Echuca, of those employed, over one quarter work in the wholesale and retail trade. This is closely followed by community services, manufacturing and recreation, personal and other services (Department of Sustainability and Environment 2003). This can be explained by the nature of the town: Echuca, arguably, could be described as one big shopping centre where regular customers come from many kilometres away to shop and where tourists come to spend their holiday money, and where local businesses rely heavily on other local businesses to provide them with products and services. For example restaurants require local wholesalers to provide appropriate produce. Therefore strong relationships amongst retailers and wholesalers are vital.

Given the ageing nature of Australia's population, and the abundance of older retirees to Echuca, it is understandable that almost 20% of Echuca's workforce is involved in community services. As in many country towns, sport and recreation are cornerstones of the community, and in Echuca's case a reliance on tourism-related sports such as water skiing and bowls, the large amount of sport played by residents, and tourism in general it follows that 15% of the workforce serves this sector.

The 1996 Census figures show that only 3.4% of Echuca residents are employed in agriculture, forestry, fishing, etc., and this is over 1% less than in 1981. The farming business is certainly becoming less attractive to many farmers and farming families. Offspring are staying at school longer and taking up the many opportunities open to young people today. Many of them, understandably, are not interested in carrying on the family farm, or in a financial position to do so. As a result, combined with the 'cost-price squeeze' in farming, many older generation farmers are staying on the farm longer, or selling up. Thus, in general, farms are getting bigger and small outlying towns are suffering because the number of families supporting them is decreasing as people leave the district or move into town.

Real Estate businesses have flourished in the property boom, and new agencies have come to town. Currently there are twelve agencies, and these are providing increased employment opportunities. The property boom has also had the flow-on effect for builders, plumbers, electricians, architects, surveyors, draftspeople and conveyancers, based in and outside of the town.

Shopping behaviour has changed enormously over the years, due to the shifting nature of the shopping environment. Some residents who arrived here in the early 1970s feel that Echuca provided less than satisfactory service for the shopper. Since then there has been a massive change, spurred on by the attraction of the tourist dollar. Businesses have to provide a professional and friendly service to meet the demand of the tourists and keep them returning to Echuca.

Coles Variety Store moved out of the main shopping strip in 1978 and diversified into groceries, and in so doing heralded a change in the shopping environment in Echuca. Echuca is no longer simply a linear shopping precinct. It has spread out into parallel streets of shops, plazas have appeared, there has been a return to the old High Street, and smaller shopping centres are operating in the South and East. During the 1940s there were many department stores and grocers, whereas now there is only one department store and the majority of people purchase their groceries from Safeway or Coles.

In the past ten years there has been an increase in number of chain stores coming to Echuca: McDonalds (which had originally planned to build opposite a primary school but were encouraged to move it further along High Street to its current location), Just Jeans, Target Country, Jay Jays, Sportsgirl, The Cheesecake Shop, Lennards, Subway, KFC, and Beaurepaire Tyres are some examples, and a Big W and IGA supermarket are currently under construction.

4.5 Tourism

In 1952 there were plans to demolish the remaining portion of the wharf (Coulson 1995, p.96), but protests prevented this from going ahead. Many people realised the value of the wharf and the monetary incentive to restore and revitalise it in view of the tourist led renaissance of the town. The Echuca Historical Society made plans to restore the Port area in 1965, and in May 1972 the Port was opened to the public once again. This was after a feasibility study, formation of a committee, gaining government funding and taking out a substantial loan. Some community members were uncomfortable with the money being poured into the restoration, but those pushing it never doubted their cause.

Paddle steamers were restored and refloated, and the filming in 1984 of *All The Rivers Run* featuring Sigrid Thornton, John Waters and the 'Philadelphia', put Echuca and its beautifully restored wharf and paddle steamers on the map. The screening of it resulted in the kick-start Echuca's tourism venture needed. This couldn't have come at a better time for the town, as the farming community and thus the business community of Echuca was reeling from the effects of the 1983 drought.

Tourism saved the day for many businesses, and many owners of historically significant buildings around the town were encouraged to utilise the 'rotating loan' offered by the local government to restore their buildings (Coulson 1995, p.102). There is a concern amongst some residents that there is no 'new guard' of younger locals making the move to take over from the older generation of visionaries, and the result will be a less prosperous and progressive town. The 30-something generation may well be busy bringing up families, unlike their predecessors who may have been less tied to young children because they started their families earlier, or the high debt level in running a business or buying a home and therefore can't afford time and energy to contribute to their community.

The vision of those who pushed for the restoration of the Wharf is to be commended. Besides being a tourist attraction simply for its historical significance, it is also the regular venue for wedding ceremonies during the warmer months, parties, concerts, a viewing site for fireworks, and much more. In addition, the number of motels has increased, from approximately four in 1970, to 30 in 1995 to over 40 in 2003. Visitors stay an average of 2.7 nights, and can choose from the 2,509 beds, 2668 caravan spaces or 859 holiday cabin beds. Total visitor numbers is estimated at 1.6 million per year, and the combined occupancy rate of all accommodation is 67% (Shire of Campaspe 2002, p.31). There are seven banks in Echuca, most with automatic teller machines to assist the spending of the tourism dollar.

Echuca is now regarded as a first class holiday destination, and international tourists can be seen wandering around the Port area any day of the week all year round. Some people believe that Echuca benefited from the oil crisis during the late 80s because holidaymakers who patronized Swan Hill were 'forced' to come to Echuca instead because it was closer to Melbourne and therefore less expensive in fuel costs. Others suggest that it was the attraction of poker machines in Moama's various Clubs that really put Echuca on the map as a tourist destination. Another suggestion is people's growing concern with airline travel and safety encouraged car trips, and Echuca is only two and a half hours from Melbourne.

> "Echuca - Moama, the paddlesteamer capital of Australia, is an ideal holiday destination. Just two and a half hours from Melbourne, it offers a host of things to enjoy. Visit the Port of Echuca to discover the early history of the region when Echuca-Moama was a bustling riverport. Experience the Murray River, the centrepiece of the towns. Travel down it in a paddlesteamer, hire a houseboat, go fishing, swimming, canoeing or waterskiing. You can also use Echuca-Moama as your base to explore nearby towns, magnificent red gum forests, wetlands and fauna parks. You'll be delighted with the variety of shops, restaurants, cafes and accommodation available. Echuca-Moama enjoys a wonderful climate, perfect for holidays - whatever the season." *www.echucamoama.com*

The old Port area is a great asset that brings prosperity to the town and therefore there are restrictions on new developments and changes to the area. Any alterations must be in keeping with the town's heritage, and some people who wish to develop or alter constructions in the vicinity may find this frustrating. Currently the Shire of Campaspe and the Echuca Port Authority are preparing a Port of Echuca Tourist Investment and Wharf Rectification study, prepared by a team of consultants, to ensure the protection of the Port of Echuca's heritage.

Interestingly there has been a push for some years to recreate the railway line that connected the Wharf with the rest of the line to Melbourne. Some residents had reservations because it would have to bisect the central roundabout at the entrance of the bridge between Echuca and Moama, bisect the Aquatic Reserve, and run straight through the car park servicing the Port area. Despite these concerns the railway was built, however it is not functioning due to other complications.

There are dedicated people who formed the 'Friends of the Port' group designed to encourage locals to be a part of the Port heritage and 'do the touristy things' that many locals don't do because they live here. There is a belief held by some residents that the new comers to town realise and appreciate the beauty and uniqueness of the Port area more so than the locals, who take it for granted. Despite this there is certainly a band of loyal supporters who have made 'capturing and living' Echuca's heritage their life.

Many people enjoy living in or visiting Echuca because it has so much to offer in terms of entertainment and recreation. There are wonderful eateries, a good selection of pubs, great sporting facilities, paddlesteamer rides, entertainment venues such as indoor heated swimming pool, ten pin bowling, a cinema, horse-riding trails, and much more. However, it is the practice of some locals to leave town on particular weekends when vast numbers of visitors are expected to descend on Echuca.

The number of pubs in Echuca has decreased markedly from years ago in 1878, when Echuca was described as the 'Thirsty Village' and there were 70 hotels (Priestley 1965, p.111); currently there are nine hotels. Often visitors comment on the large number of 'watering holes'. Many of the hotels are the original buildings and carry the names from bygone eras, but have had internal renovations and/or face-lifts.

In recent years a number of cafes have acquired liquor licences and so can provide alcohol with their meals, and many of the Motels have licensed restaurants. There has been an increase in the facility and popularity of dining at local wineries. There is also a wide variety of fast food available, such as McDonalds, KFC, fish and chips, Subway, pizza, kebabs, etc. In addition fast and very reasonably priced meals can be found at the Echuca Workers' & Services Club and four clubs in Moama. (ie. Echuca-Moama RSL & Citizens Club Ltd, the Rich River Golf Club Resort, the Moama Bowling Club which has undergone many expansions in its lifetime and attracts National and International Bowling competitions to its greens, and the Sportsman's Club).

The original Echuca Golf Club, still operating as the Echuca 'Back Nine' Golf Course by the YMCA and fairly central to town on the Campaspe River, is located in a flood-prone area and endured flooding during 1973, 1974 and 1975. With the (very real) prospect of further flooding, and the great possibility of developing an 18-hole golf course just over the border in NSW and housing poker machines to increase revenue, the Club relocated to Moama and became known as the Rich River Golf Club Resort. This caused some dissension amongst the golfing community, and allegedly some members withdrew their membership due to the Club becoming licensed and encouraging gambling.

The move was a financial success and displayed vision on behalf of the instigators, as the Clubs on the NSW side of the River were prospering due to clever marketing based on tourism. Buses were arriving from Melbourne for the day, full of tourists wanting to spend a day playing the pokies, having a cheap lunch and enjoying a trip to the country. The Club was renovated in 1979, and today offers croquet, lawn bowls, accommodation, swimming pools, tennis, and conference facilities in addition to golf. It is a drawcard for holidaymakers and golfing enthusiasts: people travel to Echuca purely for the golf.

There are also many great restaurants in Echuca, as a result of the thriving tourist industry. On the weekends the cafes and tourist precinct in general are bustling with holidaymakers; families; couples; groups of all ages. Three of Echuca's eateries have received awards in *The Age 2003 Good Food Guide*. They are Oscar W's Redgum Bar and Grill, the Cock 'n' Bull and The Black Pudding. In addition, many of the pubs and wineries provide restaurant meals.

4.6 Cultural Life

There is a cultural side to Echuca. The Paramount Arts centre was relocated and a wonderful new $4.5 million Paramount Performing Arts Centre and Multi Cinema Complex was officially opened in March 2001. A flow-on from this development was the establishment of a film appreciation society. Many fund-raising activities are run at the Paramount consisting of a film night with supper, providing much needed funds for schools, pre-schools, accident victims, etc. The Echuca Musical Theatre Company, which has been performing for many years, is an annual performer at the theatre and produces highly acclaimed shows.

The new Paramount complex also makes it more attractive for national and international acts to appear in Echuca. The Melbourne Symphony Orchestra came to Echuca this year for the first time, the Melbourne Theatre Company offers performances, and annual appearances such as the Comedy Festival Travelling Roadshow are a favourite.

Echuca is always keen to promote itself through festivals and special events. Two major events inaugurated in the 1960s are still being held to this day; the 'Rotary Vintage, Horse and Steam Rally' and the 'Southern 80 Ski Race'. Both events attract large crowds to Echuca and accommodation needs to be booked well in advance. Both events therefore are vital contributors to Echuca's economy. In the past the Easter Tennis Tournament in Echuca was a 'huge' event for the town, greatly anticipated by all, and brought people and disposable income to the town on an annual basis.

The ‘Rich River Festival’, which began in 1971 to revitalise the town’s commerce and community spirit, has since ceased. In its heyday it was allegedly the biggest festival in country Victoria, consisting of a street parade, Henry Hopwood ball (which was ‘the’ social event of the year, and incidentally is making a comeback this year), competitions, Turkish Bazaar to encourage people to shop in Echuca, Charity Queen contest, marching girls and much more. It was organised and run by volunteers, and very successfully until it became so big that a paid Festival Director was appointed, and the volunteers were less comfortable with donating their time. Some residents believe volunteerism has become a thing of the past in Echuca, and comment that people seem to be much busier with running their own lives, and the retirees that come to Echuca perhaps prefer to spend time playing golf or bowls, having cheap meals at the Clubs in NSW, babysitting their grandchildren, or generally relaxing.

Some local clubs, such as Rotary and Kiwanis, are finding it difficult to get volunteers to carry out their charitable work. However, there are many people who selflessly devote their time to things like the Port Authority and being ambassadors for the tourist industry by dressing up in period costume and wandering around the Port area on weekends in order to help tourists get the most from their visit to Echuca. There are also groups such as the Hospital Aged Services, School bodies and Friends of the Library, Lions, Apex, Paddock Project, Beacon Foundation, and Lead On, to which people generously donate their time and expertise.

Some residents believe people aren’t as social as they used to be, partly because there is so much ‘ready-made’ entertainment available to them, people don’t need, or feel the urge, to band together and create activities and social functions for themselves. As an example, years ago families and young people would gather at the river for entertainment and to learn how to swim. The boat wrecks along the riverbank and the derelict Bridge Hotel were all part of Echuca’s charm. It was a peaceful place with palms trees along the main street. But now, according to some long-time residents, not as many people go down to the river to socialise, they make their own entertainment in their homes such as playing computer games or watching DVDs. Many women have entered, or returned to, the workplace and so may not have the time to spend socialising with their young family. As a result, according to some residents, people don’t know their neighbours like they once did and there is a lessened sense of community.

In place of the ‘Rich River Festival’ there are a number of cultural and entertainment events run annually, and parts of the original Festival such as the ‘Turkish Bazaar’ still occur. The ‘Riverboats Jazz, Food, and Wine Festival’ is also a major event that is enjoyed by locals whilst at the same time attracting many visitors to the town, as is the ‘Winter Blues Festival’. The Campaspe Economic Development Board has encouraged and promoted successful events, in collaboration with Echuca-Moama Tourism and the Chamber of Commerce.

Water skiing is a major leisure activity for Echuca residents as well as visitors. The population swells over the summer months, when Echuca offers a warm climate, particularly noticeable during the Christmas holidays and on weekends. Skiing enthusiasts take over the River, and bring much valued income to the town. In recent times ski schools have sprung up, including one run by a local international champion skier Brett Sands. Many houseboats travel the River during the warmer months, and this supports a number of local houseboat hire businesses. Therefore, any regulations put in place that may alter the flow and level of the River may have significant impact on local business.

Currently there are regulations, for example speed limits for ski boats, introduced as measures to preserve the banks and habitats surrounding the River. However issues such as pollution, accidents due to overcrowding and speed, noise, rubbish disposal etc. remain areas of concern for some residents and authorities. Echuca is faced with the difficult position of 'needing' to preserve the River and its attributes from an environmental perspective but at the same time 'needing' to utilise the attributes of the River to remain a viable and prosperous town; it is a balancing act. Some residents believe more needs to be done to ensure the sustainability of the River.

Another popular pass time in and around the Echuca area is fishing, and the town boasts a fishing shop, hardware stores and camping shops that have fishing provisions. The River is also used for the 'Red Cross Murray Marathon' each year, where Echuca is a stop over and the town is inundated with weary paddlers and their support crews. Local clubs, such as Lions and the Red Cross, are utilised for providing catering and essential services.

Echuca is a sporting town. The original War Memorial Swimming Pool was totally revamped and became the Echuca War Memorial Aquatic Centre in 1996 at a cost of $2.7 million, and now boasts a 50-metre indoor heated pool with gym facilities, exercise classes, and a crèche. This was viewed as a very costly project at the time, and one that would not ever realise the investment, but was carried out as a service to the community.

There is healthy rivalry between the three lawn bowls clubs in the district: Moama Bowling Club, Rich River Bowling Club and the City of Echuca Bowls Club. Moama Bowling Club has just been listed as one of the 64 wealthiest Clubs in NSW. Echuca also boasts a racecourse, a trotting track and Showgrounds that are all regularly utilised. People can be seen doing Tai Chi in the mornings along the Campaspe, netball and tennis is played all over the district and beyond on Saturdays, midweek and at night, there are running clubs, triathlon, a strong swimming club, a gun club, and one can expand one's mind through the myriad courses offered by the Council of Adult Education.

Football is a very large and important part of Echuca life. There are two main football teams in Echuca, Echuca Football and Netball Club and Echuca United Football and Netball Club. There is also the Moama Football Club just over the border, which consists of many Echuca residents. A few very talented players have gone from playing in Echuca to playing for the Murray Bombers at Bendigo from where they were drafted to the Australian Football League.

Echuca Football and Netball Club, formed in 1876 and recently celebrating 30 years of playing in the Goulburn Valley Football League, has had great success over the years, including the Senior Football team winning back-to-back Premierships in 2001 and 2002, and making it to the Grand Final in 2003. The Echuca United Football and Netball Club were created in 1993 when Echuca East Football Club (established 1893) and Echuca South Football Club (established 1954) amalgamated due to an inability to field separate football teams.

Echuca's original inhabitants are the Aboriginal people, and specifically the Yorta Yorta tribe. Currently 3.1% of Echuca's population is indigenous (Monash 2003), which consists of more than one tribe. Echuca's Aborigines are a 'mixed crowd', and intermarriage has become common. In general over the last 50 years the prosperity of Echuca's aboriginal population has increased. The local government has made conscious policy development regarding the aboriginal needs, for example they introduced jobs and traineeships specifically targeted to aboriginal people. In general, retention rates at school have improved, unemployment has decreased, and life expectancy of males has increased. The Victoria University set up a campus in Echuca, which runs cultural courses for all, and provides Aboriginal adolescents with a chance to stay in their family support group whilst studying. Some residents believe the level of racism in Echuca has changed little over the past 50 years.

There is also a history of Chinese, Spanish and Italian influence in the area, as far back as the 1860s when market gardeners arrived in the Echuca area. Despite this initial multicultural flavour to Echuca, today the community seems remarkably Anglo-Saxon. There is perhaps more evidence of multiculturalism in the outlying farming districts than in the town itself, due to original schemes to bring overseas settlers to farm the land. Approximately 2% of Echuca's residents are non-English speakers, and of the residents not born in Australia, the most common birthplaces are United Kingdom, New Zealand and Italy (Monash 2003).

In general residents feel safe living in Echuca. People can be seen walking and/or exercising their dogs at night in the town, and over the weekend many people walk around the tourist precinct and to and from restaurants and accommodation. There have been some incidences of bashings and shop-window smashing, generally on weekends and related to drunken behaviour, but overall the town is a law-abiding one. The five-year average of recorded offences is approximately 1,450 but totals as high as 1,784 offences have been experienced (Victoria Police 2003). Like many country towns, it would be preferable to have more Police Officers stationed here, but resources are very limited and it is difficult to attract police away from Melbourne.

Echuca feels the effects of farming issues. An issue that sticks in the mind of one resident who was involved in politics at the time, as being the greatest 'anger rouser' in her ten years on the job was the Federal Government's gun buyback scheme. Residents, and farmers in particular, were very angry about having to give their guns in and saw it as a slight on their ability to handle guns, and knowledge about the associated laws.

> "……biggest political issue in the past ten years……..just after Port Arthur……when the gun buyback was enacted…….farmers maybe saw it as an insult to them as they saw themselves as law abiding citizens who knew how to use guns safely and did so as part of their business." *Wendy Nolan*

4.7 Farming, Water and Drought

Today one of the major issues for farmers is water, and particularly whether there will be sufficient water available to continue to viably operate their irrigated farms. Farmers in this area rely on irrigation water for their livelihoods, and purportedly having just gone through the driest year in 100 years, which meant paying highly inflated prices for water, they are concerned about what the future holds for their businesses and their families.

Farmers in Northern Victoria have felt the effects of the drought more than anywhere else in the State, according to Ian James (Senior Economist, ANZ Bank) and in particular dairy farmers who experienced a 16% drop in production, the lowest water allocation on record, a 30% drop in milk receipts, and a 50% increase in fodder costs. However, in contrast to past droughts, farmers have become more astute at managing drought and have held up better this time because the previous two seasons were buoyant, according to James (2003).

Echuca, along with other regional towns along the Murray, is interested in the Murray Darling Basin Commission's *Living Murray* initiative. The proposal suggests in order to improve the health of the River, flows may be altered. A Murray Flow Assessment Tool (MFAT) has been used to explore the merits of various scenarios and options. Currently, according to *The Riverine Herald* (26 September, 2003) "the document has proposed either 350GL, 750GL or 1500GL is needed per year over a 10-15 year period to flush the Murray River to improve its health". Both farmers and non-farmers are interested in the initiative because it may not only affect farming businesses but also many local businesses that rely on the River for their custom. Any proposed change to environmental flows of the Murray concerns almost all the community, and it has encouraged Echuca people to come together, listen to the visiting politicians, and discuss and explore the ramifications.

> "The Murray River at Echuca-Moama is narrow and the area is sometimes subject to flooding. When heavy rain occurs in the catchment of the Goulburn and Campaspe Rivers and if the Murray is already high, water overtops the banks of all three rivers and inundates nearby floodplains." *Helen Coulson*

Natural flooding is not a common occurrence, with an average rainfall of 436mm, but Echuca does have a history of it. There have been nine major floods since the settlement of the town. There were tow major floods in 1867 and 1870, when the River peaked at 95.35 metres and 96.2 metres respectively (measurements taken at the Echuca Wharf). Since then there have been seven floods, of which none reached beyond 94.8 metres. The years and their respective heights are as follows (Sinclair Knight Merz 1999, p.18):

Year	Water Level
1867	95.35m
1870	96.2m
1916	94.8m
1917	94.55m
1956	94.58m
1974	94.52m
1975	94.75m
1981	94.27m
1993	94.8m

Small communities rally when there is an emergency or someone in need. During the 1993 floods there was much action and assistance building levee banks made of sandbags to save the houses and businesses located on and near the river. One resident believes that the 1993 flood "shouldn't have happened" because it was less a case of natural phenomenon and more to do with the restrictions on flows occurring downstream.

Due to the introduction of tradability of water as a commodity, water traders in Melbourne have entered the market. According to some local residents, their presence skews the water price and they believe this is inappropriate activity, as water is not a commodity like many others: man cannot manufacture more of it. Therefore, they argue, it can't have the same boundaries as those of other commodities that can be manufactured. Other residents believe it is a business just like any other, and have no qualms with the practice. Another issue for farmers is that because of the huge infrastructure that the irrigation system requires, all irrigators have to pay rates to maintain the system whether the allocated water is received or not. In 2003, farmers had to pay for water right they didn't receive.

> "Farmers have a right to an allocation of water to use as they wish; no-one owns it as such. Water belongs to everyone. Farmers will use it to their best benefit with the implication that will be of best benefit to the community." *Roger O'Farrell*

Water right has been sold off some farms in this area and shifted to properties elsewhere, resulting in dry farms. The value of many farming properties is based on their water right, and sell accordingly. Some believe the water right system, which dates back to the 1920s, is outdated and unuseful in today's farming business and current 'water-squeeze' situation.

4.8 Transport

Access to Melbourne has significantly improved over the last 50 years. Apart from the advent of the car making an approximately 200km trip relatively easy, the roads have improved, as have the public transport services. The Northern and Midland Highways provide direct links to metropolitan Melbourne, and to the major provincial cities of Bendigo and Ballarat. There is also a council-owned aerodrome in Echuca, and although there is no scheduled service, planes can be chartered for all manner of trips, including joy rides.

As a result of improved transport, Echuca people go to Melbourne quite often, and many on a regular basis. It is not uncommon for some business owners and government employees to be in Melbourne once a week or fortnight for work purposes. On the other hand, some residents travel to Melbourne once for the entire year. For example some fishmongers would travel to Melbourne at least once a week to select and buy their supplies from the Victoria Market. Some people travel to Melbourne for their shopping, and many of the younger residents look to the 'big smoke' as an exciting option for clothes, entertainment, and yearn for the day they can move to Melbourne permanently. There are some companies that offer bus trips to Melbourne, related to special events such as sporting events, theatre, concerts, shopping trips, and the like.

Currently there is no option of a train directly to Melbourne, although it has been trialled in the past, and twice a week a train goes via Bendigo. There is a freight line between Deniliquin-Echuca-Melbourne, but no passenger service. Alternatively one must travel by coach directly or coach/train via Bendigo or Murchison East. The direct coach trip takes approximately three hours and longer for the other two services. The State Government pledged $10 million in its 2002 budget to enhancing bus services, and Echuca/Moama is noted as one of the regions to benefit. Within Echuca there is a bus service that appears to be fairly well utilised, and the school students have access to numerous bus services to transport them within and outside the Echuca area.

In terms of religious affiliation, Echuca found itself in 1996 fairly evenly distributed between Catholic and Anglican, 28% and 27% of the population respectively. There is also a Uniting presence (13.5%) and Presbyterian (6.9%). Of the population 18% of people said they had no religious affiliation (Department of Sustainability and Environment 2003). Like most places in the Western world, the number of people committing their lives to a religious vocation is decreasing. It seems fewer people are attending religious services, but there are also fewer services being offered due to the lack of priests/pastors/etc. The different denominations are doing more activities together, and they share the role of providing breakfast and necessities to the poor and homeless. Fewer people are donating their time to such charitable causes, and this is further hindering the assistance that can be given to the needy.

There are primary and secondary Catholic schools in Echuca, St. Mary's and St. Joseph's respectively, but both have lay principals, and only very few nuns on the staff. Four Brigidine nuns came out from Ireland 1886 and founded a co-educational secondary school. However, there are many non-Catholic students and staff at St. Joseph's.

The quality of the education has been a drawcard to Echuca over the years. There were a larger number of schools in Echuca during the late 1800s and early 1900s; many privately run, with many students travelling from around the district to be schooled in Echuca. Over time the demand dwindled. Currently there are four Pre-schools, four State Primary Schools and two Secondary Schools. There is also the River City Christian College which is an independent Primary/Secondary school. The two Government Secondary schools and St. Joseph's College have a sharing arrangement where their senior (VCE) students can attend the other schools for subjects not offered at their own school.

Today some families send their students to Shepparton or Bendigo for schooling, or to board in Melbourne. Some gain scholarships for private schools in Melbourne, and others choose to pay full fees because they believe there are more opportunities for their students to excel due to wider curriculum and extra-curricula activities.

Echuca also provides further education services in the form of Technical And Further Education, a Victoria University Campus, and a Bendigo Regional Institute of TAFE. According to the Monash website (Monash 2003) approximately 12% of Echuca's residents have a Degree or Diploma, and approximately 17% have certificate or vocational level of education. Echuca has fewer Professionals/Managers (20.8%) than the State figure (28.7%) and more Trades/Labourers (34%) than the State figure (28.5%). In addition, 28% of residents use the Internet.

4.9 Housing

As the population increased, so did the need for housing. The housing boom began in Echuca in the 1960s and 1970s when the town began to sprawl out to the South. According to one source, on average 57 new houses were built per month between 1953 and 1963, predominantly in the South (Priestley 1965, p.180) and Rutley Crescent area. Others argue that 57 houses per month is an unrealistically high figure and Rutley Crescent was not developed until the 1970s at the earliest. Nevertheless, the town was becoming more like a suburb, and there is evidence that some farmers had moved into town and were driving out to their farms thanks to the improved roads and faster cars (Priestley 1965, p.181). The 1970s also saw the establishment of an Industrial Estate, the original Paramount Theatre in Hare Street, and a Community Recreation Centre built on the Technical School land.

The latest housing boom, perhaps fuelled by Echuca residents wanting investment properties as well as the influx of retirees, improved employment prospects in agriculture due to farm consolidation and growth in more intensive areas of agriculture (until the drought), lifestyle considerations, movement of lower income groups out of metropolitan areas due to affordability, investors seeking the better yields available in country towns than capital cities, growth of tourism, and improved communications and infrastructure (James 2003) that Echuca offers, has seen a new wave of suburban sprawl in the Echuca township. This time not only are people going south to Fehring Lane and expanding along Anderson Road, there are new housing developments in the West known as Westwood Park, north-west to Woodlands Estate and Wharparilla, south-east past the race course, and many of the larger older blocks within town are being subdivided and units being built. Good rental property has always been difficult to source. There is a big range in rental prices, but in general it costs $170 to $220 per week to rent a 3-bedroom house and approximately $150 for a unit.

Between 2002 and 2003 the median house price has increased approximately 17%, compared with a rise of only 6% between 1993 and 2002 (James 2003). Some people believe house price data for Echuca may be slightly skewed due to the very high price people expect and get for properties on and near the river, and the high price retirees from larger cities are prepared to pay. Rural land sales have also increased, with dairy farms in the Shire increasing from $3,000 per hectare to over $8,000 per hectare between the years 2000 and 2002 (James 2003).

4.10 Health Services

Echuca's health services are receiving a much-needed facelift. Currently there are renovations occurring to the hospital, known as Echuca Regional Health because it includes the hospital's associated health services. In three stages the hospital will be completely updated and the accommodation modernised. There has been some renovation over the many years it has been in existence but it is certainly due for an overhaul. The $26million redevelopment of the 1882 building will be completed by 2005, and includes a $17million acute hospital, a new operating theatre, accident and emergency department, radiology and a new $7million aged care facility, including both hostel and nursing home accommodation (Shire of Campaspe 2002, p.21). The original aged care facility, known as Illoura Homes was built in 1956, followed by the building of additional and diversified nursing homes such as 1967-Tehan House, 1972-Englebert Lodge, 1978-Lumeah, 1986-Kanyana and 1993-Glanville Village (Coulson 1995, p.95).

Aged care is an issue in Echuca as there are not enough places available for the aged, and the pressure is increased by retirees moving to Echuca and then ultimately competing for places with elderly people who have lived here all or most of their lives. Currently people are travelling to outlying areas such as Pyramid Hill and Cohuna for aged care facilities and even as far as Albury. This can make the shift all the more unsettling and very difficult for family to make daily visits.
The services provided by the hospital are very good, and it is Echuca's largest single employer, employing 400 people (the equivalent of 275 fulltime staff) (Shire of Campaspe 2002, p.21). Many visiting surgeons are available, and the hospital can provide cancer treatment on site. As with any large health service, some people have good experiences and others are disappointed, but the overall impression from speaking with residents is that they value the service provided by the hospital and ancillary services.

Large regional centres, such as Bendigo (50 minutes south-west of Echuca) and Shepparton (45 minutes south-east of Echuca), offer extensive health services. In emergency situations patients are airlifted to Melbourne. Some residents choose to go to Melbourne for specific care or to deal with a specific doctor/surgeon**.** It is difficult to gauge the proportion of patients who travel to Melbourne for surgery or specialist services. There are approximately 19 General practitioners, two dentists, two optometrists and five pharmacies in Echuca. Echuca also offers Mental Health Services, Maternal and Child Health, Community Health Centres, and the Njernda Aboriginal Medical Service.

The majority of income, as a percentage of households, falls into the lower two quartiles, and as in all communities, there is a perception by some residents that there is class-consciousness in the town. When issues arise such as the decision on the location of the new bridge to link Victoria and NSW, this class consciousness seems to be raised, and the argument reduces to the options based on the 'haves' versus the 'have nots'. The fact that the bridge controversy has been going on for years doesn't help the situation, and much anger has been vented through the local paper's (*The Riverine Herald*) 'Letters to the Editor' section. Despite a decision being made this year but not handed down by Government, the controversy continues due to the red tape that needs to be addressed in the NSW government. This highlights an ever present issue faced by the residents of Echuca-Moama; rules and regulations may differ depending which side of the River you live on, and in the case of the new bridge the Federal Government is also involved adding more complexity to any planning and funding decisions.

A small community relies on community groups to help those in need. Apart from the Benevolent Society which runs aged care facilities, and the groups already mentioned throughout this paper, some other community groups are; Probus; Girl Guides; Scouts; Senior Citizens; Dog Obedience; Pony Club; Gem Club; Family History Group; Gun Club; Pistol Club; Model Railway; Bird Observers; Lawn Tennis Club; Racing Club; Trotting Club; Harness Racing Club; Netball Association; the Echuca Club; Agricultural Society; Adult Literacy Group; Masonic Lodge; Country Women's Association; to name just a few. Echuca also has an SES, fire brigade and ambulance service, all of which are in regular use.

4.11 What are they worrying about?

Despite being a sophisticated town, there are a number of issues that Echuca has faced over the last 50 years, which are not uncommon to many towns of similar size in regional Victoria, which include; the high cost of fuel (due apparently to additional freight charges); a reasonably high cost of living comparable to Melbourne (this surprises many people who come here because they assume that costs and prices are cheaper in the country); availability of child care and aged care; waiting lists for housing for families on welfare; a perception that young people are lacking in social skills; drugs and alcohol abuse; racism; and others.

In general townsfolk are optimistic about the future; arguably a trait of country people. Small communities tend to support one another and buoy each other up when things are tough. The sorts of things that people foresee for the future of our town are as follows:

- The Campaspe Economic Development Board has been negotiating with developers to establish an Inland Port/Freight Centre in Echuca (Shire of Campaspe 2002, p.34).
- Moama will burgeon as a business centre, and add further to the tourist attractions.
- Prospects for a return to affluent farming communities are lessened by the water situation, and in general the fact that overhead costs are beating the farmer out of business.
- If the price of water continues to increase and farmers continue to have expenses that are greater than income, farming businesses will find it very difficult to continue operating, and the number of farms in the area will decrease. Perhaps the number of corporate farms may increase.
- Less farming businesses means fewer farmers to pay the cost of irrigation channel infrastructure and operations, and may cause increased fees for water use.
- More and more farms may be subsidised by off-farm income, if people make the lifestyle choice to continue farming in a situation where they make a loss or a low return.
- Echuca is reliant on wage earners having discretionary income to visit and spend money here. During recessions/depressions, towns like Echuca suffer greatly because they rely on people having disposable income. However, during the last recession Echuca found that it fared relatively well as people who would normally go interstate or overseas, holidayed in Echuca instead.
- Echuca is prospering at the moment due to tourism and can only improve from here because it has the infrastructure and the history.
- Echuca is continuing to attract visitors and residents, and as more people come, the more the town can provide.
- The location of the town and proximity to Melbourne will maintain its attraction as a choice location for big business/industry.

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Individual People:

Wendy Nolan, *resident for past 50 years*
Joan Mitchell, *Echuca Historical Society*
Lyn McCracken, *Shire of Campaspe*
Judie & Roger O'Farrell, *residents since 1974*
Jenny & Graeme Hawker, *residents since 1972*
Pat & Norm D'Angri, *residents since 1954 & 1943 respectively*
Lesley Murphy, *Echuca Regional Health*
Allan McCallum, *former SKF employee*
Donna & Adrian Hansen, *residents*

Chapter 5 Echuca's Changing Population

Graeme Hugo

5.1 Introduction

One of the main distinguishing features of Australia's regional areas in recent years has been the growing polarization between rapidly growing populations in coastal areas and stability and decline in much of the wheatbelt and rangelands of the interior (Hugo 2002, Holmes 1994). This pattern is broken by some areas of growth in the peri urban areas of major cities, along some rivers and a few mining and tourist oriented areas (Hugo 2002). The present chapter outlines the patterns of population change, which have been experienced in Echuca in recent years. We will examine the demographic processes which are shaping population growth in the region focusing especially on migration. One of the most striking features of the demography of regional population in Australia in recent decades has been its increasing diversity. There has been a convergence between metropolitan and non-metropolitan areas with respect to many demographic variables. The paper examines changes which have occurred in the demographic, social and economic characteristics of Echuca's population. Finally an examination is made of some of the policy implications flowing from recent and likely impending shifts in Echuca's population.

5.2 Population Change in Echuca

Table 5.1 shows the trends in population growth in Echuca SLA over the last quarter century. There has been a steady pattern of population growth with Echuca increasing its population by 36.1 percent over the 1976-2001 period. Victoria's population has increased by 32.4 percent and the Australian total population by 43.1 percent over the same period. The table indicates that there have been substantial fluctuations in growth rates but since 1981 there has been steady growth although at lower than national levels except in 1986-1991. The current (2001) rate of growth in Echuca is 7.0 percent per annum compared to 6.2 percent in Victoria as a whole.

Table 5.1: Echuca: Intercensal Population Change 1976-2001
Source: ABS Australian Censuses

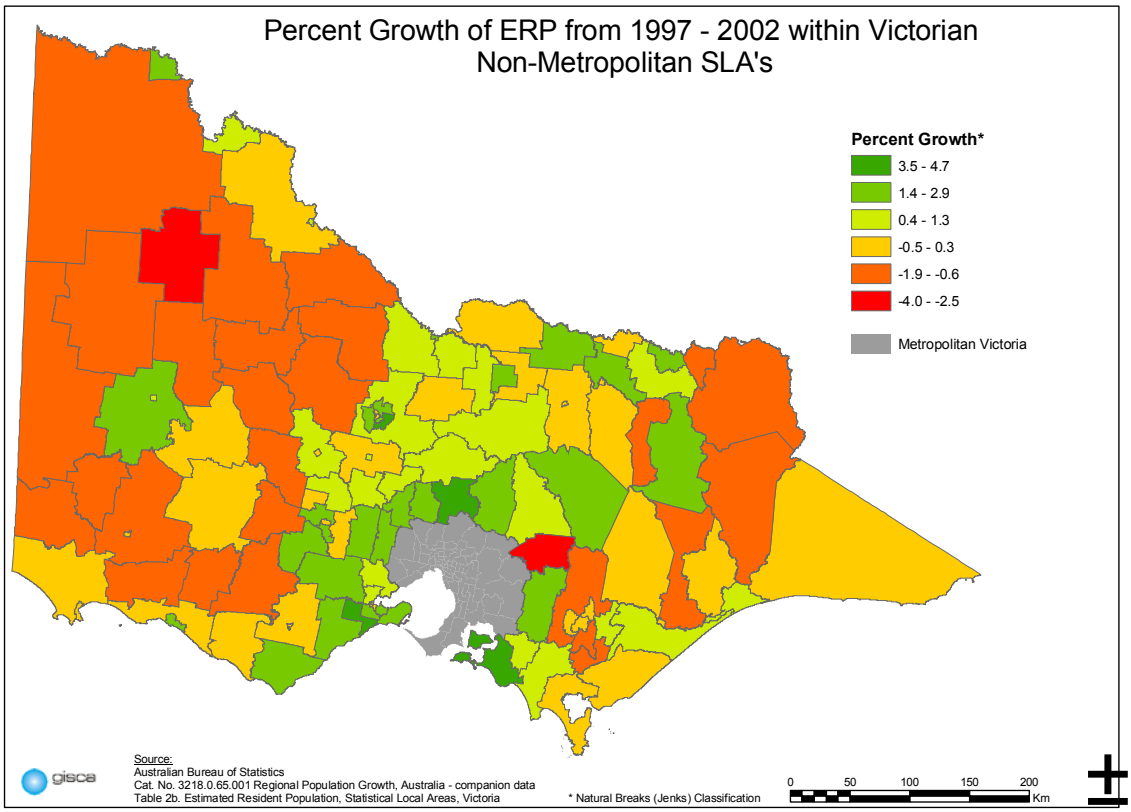
Year	Population	Intercensal Population Change
1976	7,873	-
1981	7,943	0.9
1986	8,409	5.9
1991	9,438	12.2
1996	10,014	6.1
2001	10,717	7.0

Table 5.2 shows that Echuca is growing at a faster rate than the rural population of Victoria but at a somewhat slower rate than in Melbourne. Figure 5.1 shows the pattern of recent population growth in non-metropolitan Victoria. This shows that Echuca is part of the belt of substantial population growth across Central Victoria. On the other hand, population decline is characteristic of the dry land farming areas to the east and west of the state.

Table 5.2: Australia, Victoria and Echuca: Population Change 1996-2001
Source: ABS 1996 and 2001 Censuses

	1996	2001	Percent Growth Per Annum 1996-2001
Australia	17,892,423	18,972,350	6.0
Victoria	4,373,520	4,644,950	6.2
Victoria Major Urban	2,990,711	3,290,365	10.0
Victoria Other Urban	841,901	841,367	-0.1
Victoria Rural	463,457	423,348	-8.7
Echuca	10,014	10,717	7.0

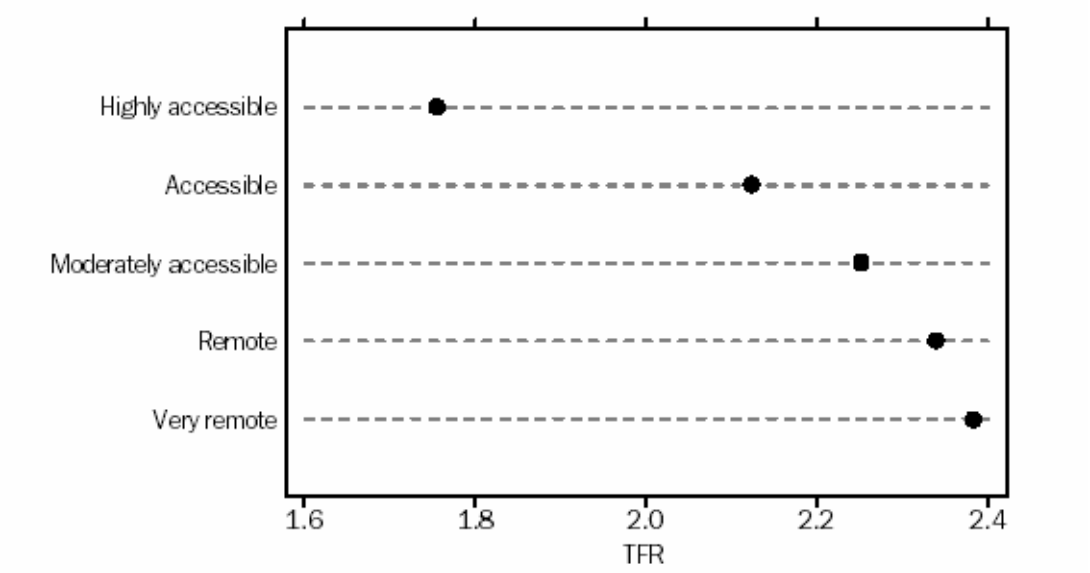
Figure 5.1: Non-Metropolitan Victoria: Population Growth 1997-2002 (Percent)
Source: ABS 2002



There are three demographic processes which shape population growth – mortality, fertility and migration so it is necessary to examine the contribution of each to recent population change in Echuca. Firstly regarding mortality, there are minor variations from area to area in Australia, although higher death rates have been observed outside major metropolitan areas (Hugo 2002a, AIHW 2003). The level of mortality in Echuca as measured by the indirect standardized death over the 1999-2001 period was 6.5 per thousand. This is significantly higher than 5.5 for all of Victoria (ABS 2002a). As is the case across Australia, we can anticipate that life expectancy can be expected to continue to improve in Echuca. The explanation for higher mortality levels in rural areas than in metropolitan areas includes the lower level of access to health services, greater risk factors to some forms of death (e.g. from car accidents) and higher representation of the indigenous population outside of major cities.

Turning to fertility, there is a well established pattern in Australia of fertility being higher in non-metropolitan areas than in metropolitan areas. Figure 5.2 shows how fertility increases with degree of remoteness in Australia.

Figure 5.2: Australia: Total Fertility by ARIA Areas
Source: ABS 2000



Average births per woman

Note: ARIA is the Accessibility/Remoteness Index of Australia

Table 5.3 shows the Total Fertility Rate[7] for Echuca in 2001 and compares it to that of Victoria as a whole as well as the Goulburn Statistical Division in which Echuca is located. Echuca's fertility is significantly higher than the state average (26.5 percent) and especially than the Melbourne metropolitan area (32.3 percent). It is also marginally higher than the average for the Goulburn Statistical Division. The fertility level is close to replacement level and means that in the absence of migration, in the long term Echuca's population numbers would be relatively stable with births more or less being the same as deaths. However, Echuca's population is strongly influenced by the impact of migration.

Table 5.3: Victoria and Echuca: Total Fertility Rate 1999-2001
Source: ABS 2002

Region	Total Fertility Rate
Victoria	1.62
Melbourne	1.55
Goulburn Statistical Division	2.03
Echuca	2.05

Local populations in Australia are influenced by two types of migration – international and internal movements. With 23 percent of its inhabitants born overseas, Australia's population is more influenced by international migration than most other countries. However with 5.9 percent of the 2001 population born overseas, Echuca is much less influenced by international migration than Australia as a whole. Indeed there was a small decrease in the number of Echuca residents born outside Australia from 635 to 630 persons between 1996 and 2001. Australia's foreign born population has become increasingly concentrated in the nation's major cities (Hugo 2003a). However there are increasing efforts to settle recently arrived immigrants outside of metropolitan Australia so in the future Echuca may attract more overseas born residents (Withers, 2003).

Internal migration has had much more influence on population change in Echuca than international migration and this is reflected in the results of population census questions asking people's place of residence five years prior to the census enumeration (Bell and Hugo, 2000). The results of the 1996 and 2001 Censuses migration questions for Echuca are summarized in Table 5.4. In 2001 only 50 percent of Echuca residents had not moved in the previous five years. This points to a high level of population turnover in Echuca since over all Australia some 60 percent did not move between the 1996 and 2001 censuses. It is apparent however that most of the movement into and out of Echuca is compensating in the sense that the numbers moving out to particular destinations are similar to the numbers moving into Echuca from that place. For example, 1,670 residents of Echuca in 2001 (18.1 percent of the total community) moved house *within* the Echuca SLA and a further 1,055 (11.4

[7] The Total Fertility Rate is approximately the number of children borne by women by the time they have completed their fertility.

percent) had moved into Echuca from other parts of the Goulburn Statistical Division. This 'churning' factor is a common feature of Australian internal migration and leads to low levels of migration 'effectiveness' or impact on changing population distribution (Bell and Hugo 2000). It will be noted that there is also substantial movement into and out of Murray Statistical Division, which is located across the River Murray in New South Wales. However, like the local movement in its Victorian immediate hinterland, the movement to and from Murray is large but inflows are similar to outflows in size.

Table 5.4: Echuca SLA: Place of Residence Five Years Prior to Census of People in Echuca in 1996 and 2001 and Place of Residence Five Years Later of Echuca Residents in 1991 and 1996

Source: ABS 1996 and 2001 Censuses

	1991-1996			1996-2001		
	Out	**In**	**Net**	**Out**	**In***	**Net**
Didn't Change Address				4,614		-
Same SLA	6,891		-	1,670	2,760	+35
Other Goulburn				1,055		
Adjoining S.D. (Vic)	227	205	-22	236	210	-26
Melbourne	598	683	+85	596	563	-33
Other Victorian	252	450	+198	251	484	+233
Murray (NSW)	358	368	+10	421	41	-10
Other NSW	92	91	-1	127	115	-12
QLD	237	62	-175	130	84	-46
SA	39	26	-13	29	62	+33
WA	66	15	-51	42	27	-15
NT	33	17	-16	16	29	+13
Tasmanian	26	3	-23	6	22	+16
ACT	13	9	-4	23	4	-19
Total	8,832	8,820		9,216	9,385	

* 417 Echuca residents in 2001 did not give their 1996 residence.
101 Echuca residents in 2001 were overseas in 1996.

Table 5.4 shows that virtually all of the pairs of in and out flows with other areas are similar in size and the overall numbers of in and out migration are similar pointing to the high circularity of movement. The largest net gains in both 1996 and 2001 were from 'other Victoria' Statistical Divisions[8]. The greatest number of net immigrants comes from the nearby statistical division of Mallee which includes dry farming and irrigated settlements. There were 198 inmigrants from this area and only 58 outmigrants. The other significant net gains were from the local hinterland and South Australia, especially from the Riverland areas adjoining the Victorian border. There were also small net gains from Tasmania and the Northern Territory.

[8] ie. Mallee, Wimmera, Western District, Central Highlands, Gippsland and East Gippsland.

The largest single population exchange is with Melbourne but it will be noted that between 1991 and 2001 inflow and outflow were similar with a small net loss in 1996-2001 and a small net gain in 1991-96. The most substantial net losses in both periods is to Queensland, especially Southeast Queensland – the major area of net internal migration gain in the country (Bell and Hugo 2000, Hugo 2003a).

While the in and out migration flows for Echuca are similar in size, it is important to point out that they do differ in terms of composition. This is especially true of age structure. In Table 5.5 the net migration in different age-sex categories is shown and indicates that there are two groups among which net out migration occurs 15-24 and 75-79.

Table 5.5: Echuca SLA: Age Sex Specific Net Migration 1996-2001
Source: Calculated from 1996 and 2001 Census Data

	Males	Females
0-4	13	14
5-9	4	23
10-14	3	15
15-19	-43	-55
20-24	-29	-24
25-29	40	66
30-34	32	38
35-39	7	8
40-44	-	-3
45-49	3	1
50-54	48	23
55-59	34	27
60-64	22	15
65-69	21	28
70-74	24	18
75-79	-16	-2
80-84	4	20
85+	3	-2

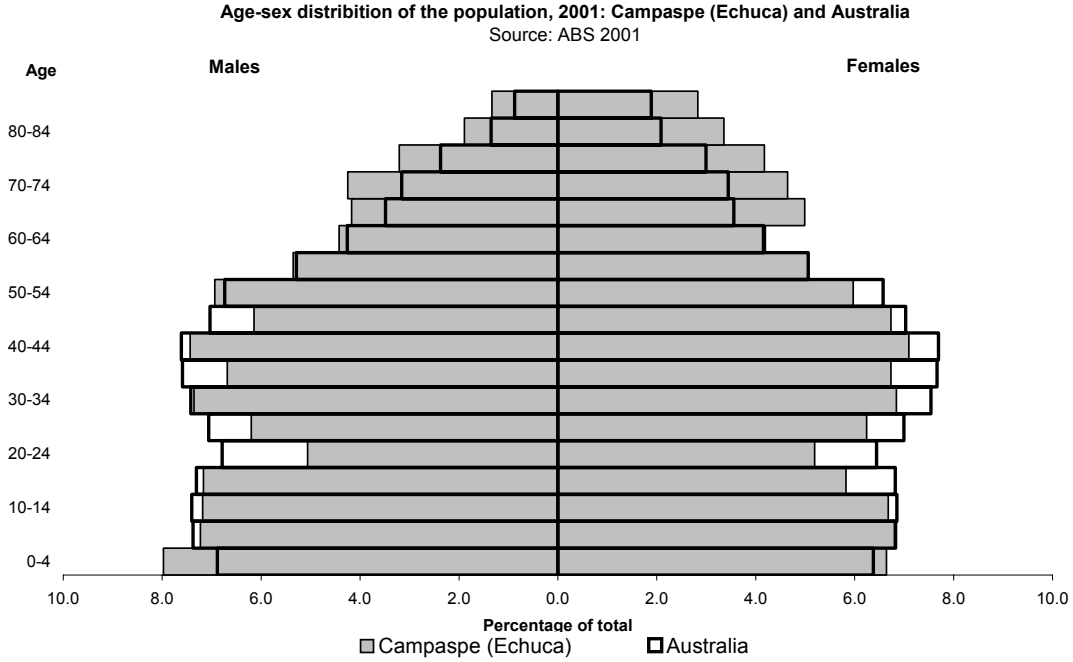
5.3 Changing Age Structure

In Figure 5.3 the age-sex distribution of the population of Echuca is overlain the national age structure and shows in which ages it has on above the Australian concentration and where it is under represented. The over representation is in two groups:

- the 0-4 age group; and
- the 60+ age group.

Figure 5.3: Campaspe (Echuca) and Australia: Age-Sex Distribution of the Population, 2001

Source: ABS 2001



It is especially under represented in the 15-29 age groups but also, to a lesser extent, in the 30-49 prime working age groups. There are a number of elements involved in shaping these differences in age structure.

- Higher levels of fertility than the national average resulting in a strong representation of dependent age children. However the children aged less than 15 as a proportion of the total population has declined from 23 percent in 1991 to 21.2 percent in 2001. The actual numbers have increased slowly from 2,159 to 2,270 over the same period.
- The under-representation of the young adult population is typical of non-metropolitan communities in Australia. It reflects the exodus of young school leavers to metropolitan areas in order to access higher education and a greater range of job opportunities than those available in the local area.
- The under representation of people in their 30s and 40s is not as common in non-metropolitan areas and reflects a net outflow of young working age population is occurring from the area.
- The over representation of the older population is of significance given the well know trend of general ageing in the Australian population generally. The 65+ group has increased its share of Echuca's population from 16.5 percent in 1991 to 17.5 percent in 2001 compared to 13.7 percent of the national population. The numbers aged 65+ increased from 1,554 to 1,874 over the same period.

- An important characteristic of the aged population in Echuca, as elsewhere in Australia is an 'ageing of the aged'. The 75+ population are making up both an increasing proportion of the 65+ population as well as the total population. They have increased their share of the population from 7 to 8.4 percent over the 1991-2001 period. This is of considerable significance from the perspective of service provision since it is the 75+ population which have the most intensive demands for health and specialized aged services since rates of disability and illness increase exponentially in these age groups.

From the perspective of the changing demand for services in Echuca, it is important to realize that different age groups are changing at different rates. Table 5.4 shows that in both 1991-96 and 1996-2001 there were declines in the 20-29 age group. The passage of the postwar baby boom up the age pyramid is indicative in the rapid growth of the 35-54 age group in 1991-96 and 40-59 age group in 1996-2001.

Table 5.6: Campaspe, Echuca: Change in Population by Age Group, 1991, 1996 and 2001
Source: ABS 2001

	1991-1996 %	1996-2001 %
0-4	-3.1	7.9
5-9	-3.7	2.9
10-14	18.8	-6.3
15-19	-6.1	15.0
20-24	-4.4	-2.1
25-29	-0.6	-3.3
30-34	-10.1	7.8
35-39	21.6	-8.3
40-44	17.3	12.1
45-49	25.4	9.9
50-54	16.9	36.0
55-59	9.3	27.8
60-64	5.7	-0.4
65-69	-5.9	5.4
70-74	19.8	-0.6
75-79	7.1	20.0
80-84	31.8	19.9
85+	2.9	28.6

The post World War I baby boom is also represented in the rapid growth of the 70+ age group in 1991-96 and 75+ age group in 1996-2001.

The changing age structure of Echuca presents a number of challenges to the local community. Certainly the loss of the young adults is especially significant as it is in most rural communities. It is not just that the community is losing many of its most productive workers, (especially future workers), but the migration is very selective of more highly educated groups, entrepreneurial oriented and risk taking groups. These are not only crucial to the future workforce of the community but they also are an important element in community social capital. They are the group most likely to take economic initiatives and be entrepreneurial in developing new and existing economic activities. Moreover they are most likely to take on social leadership roles in sporting, social and community organizations. Hence their loss is not only significant from an economic perspective but also from that of social capital.

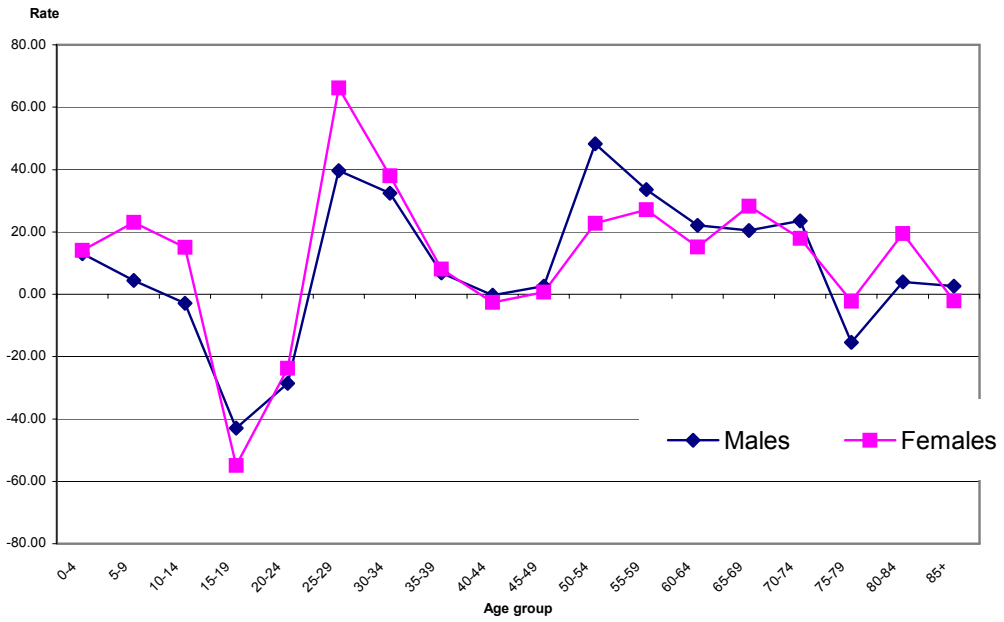
The loss of school leavers has been a long established feature in Australian rural areas (Hugo 1971). However in the past the loss of this group has been tempered by two elements:

- Firstly, there was a significant backflow into rural communities of returnees. Particularly significant here were young women who after spending some years in major cities attending higher education institutions and/or working in the city and experiencing big city life return here to get married and begin family formation.
- Secondly, there was a significant inflow (and subsequent outflow) of what were called the 'floating population'. This group comprised employees of the education department, banks, police, stock and station agents, etc. There was a well established practice of young people employed by the public and private sector to gain experience and seniority by spending considerable periods in country towns. While they often did not settle in the town and moved after a few years, they made a considerable contribution to the social and economic life of country town. Not only did they compensate to some degree for the loss of local young people, but they also contributed substantially to the development of local social capital. They and their families had high participation rates in sporting and community organizations and they were key leaders of social and community activity. Unfortunately the floating population have become a much smaller group in Australian country towns. The closure of non-metropolitan banks, the 'rationalization' of government services into concentration in major regional centres and the decline of local service provision generally has seen their numbers dwindle. Table 5.5 and Figure 5.4 shows that there is still a significant net migration gain in the late 20s and early 30s age group. This indicates that these two types of movement still occur in Echuca. Nevertheless it seems that the nature of the influx of people in this age group into country towns has changed. In many country towns the cheaper cost of housing has been a factor in attracting some populations who are seeking cheaper housing especially people dependent on transfers from government for income such as aged pensioners, unemployment groups, single parents, etc. (Hugo 1989, Hugo and Bell 2000, Murphy, *et al.* 2003,Burnley and Murphy 2003). While

these groups have the potential to make a significant contribution to the economic and social life of country towns, they rarely can make the same amount of contribution to social capital as was provided by young locals who have left and the former 'floating population' group.

There has been much discussion in Australia of the implications of the impending ageing of the population. It is true that much of this discussion focuses on 'problems' and does not recognize the positive contribution that the older population can and do have in communities. As was indicated earlier the older population is over-represented in Echuca. This is partly a function of the out migration of young people but is also a net migration of retirees into the community. Figure 5.4 shows the age

Figure 5.4: Echuca Age Sex Specific Net Migration Profile 1996-2001
Source: Calculated from 1996 and 2001 Census data



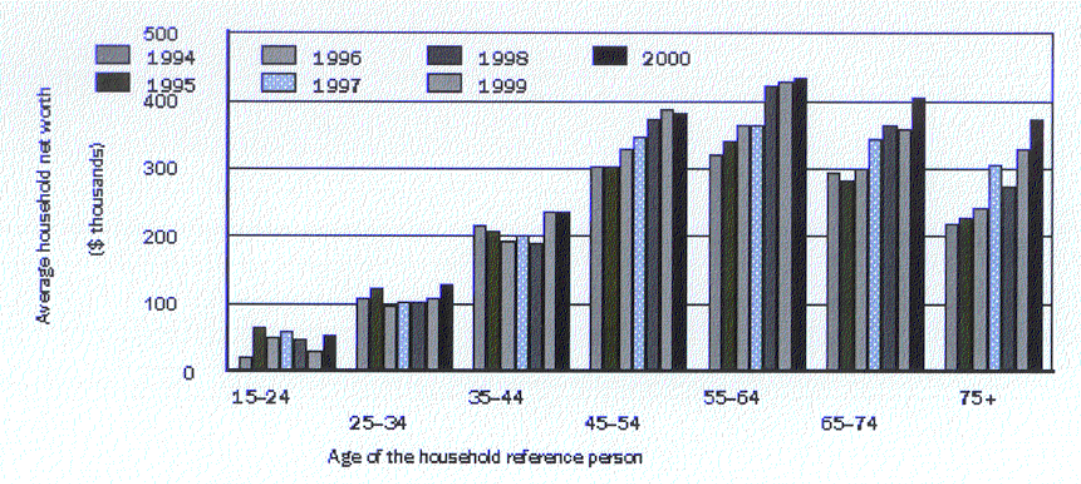
of net migration recorded by Echuca over the 1996-2001 period. This indicates there has been a small net gain of persons aged 50-74 – 260 persons. This is typical of Australian country towns with many people retiring off rural properties into local towns. This raises the issue of changing demands for goods and services to older people in non-metropolitan communities. In this respect it is interesting to observe in Figure 5.4 that there appears to be a net out migration of persons in the 80+ age groups. This also is typical of country towns with many elderly people having to move to large cities if they require specialized medical or aged care services.

The phenomenon of an over representation of older people in centers is an important phenomenon in Australian regional centers and country towns. Over the 1981-2011 period the population of these centers grew by 0.5 percent per annum but the 65+ population of these centers grew by 2.52 percent per annum. This has significant implications for an increasing demand for health services and aged care services in country towns – a trend which will increase over the next two decades. The expanding aged care system in Australia needs to be aware that fully a quarter of the nation's aged population lives in these centres and a further 11 percent in rural areas. Too often, the rapid growth of the aged population is seen as a totally negative factor in economic development. However, there are a number of elements associated with ageing which have positive economic impacts. McDonald and Kippen (2000), for example, argue that the population ageing creates considerable locationally specific demand for locally delivered and labour intensive care and administrative services. Moreover, as Jackson and Felmingham (2002, 112) argue, "Regions which have higher proportions of elderly may in fact soon come to appreciate the … local spending of … pensions". They also point to the evidence presented by Access Economics (2001) that the growth in the numbers of elderly, both pensioners and self-funded retirees, will create a bonanza in aggregate demand. This is because the 55+ population who make up 21 percent of the population account for 39 percent of household wealth and 43 percent of total growth in retail spending over the next decade. There are thus flows of capital to states with large numbers of older people by virtue of age pensions provided by the federal government but also the inflow of superannuation funds to self-funded retirees.

Recent work by the ABS National Ageing Statistics Unit (NASU) supports the points made above that the older population must not be conceptualized as poor, non-spenders and purely recipients of government spending. They have a highly positive economic role to play in states and regions. Figure 5.5 shows clearly that the net worth of Australian households increases with the age of the household reference person. There is a pattern of wealth accumulation with age with the wealthiest households being of people in the 55-64, retirement, age group. While there is a small decline in wealth in later ages as people draw down on their assets in later years it will be noted that the average net wealth of the 65-74 aged persons was over $400,000 and that of the 75+ population over $375,000. This indicates that there is immense spending power among the older population. One interesting aspect of Figure 5.5 is the time series. This shows that while there has been little change in the net wealth of households with reference persons aged under 45 years over the last 7 years there have been substantial increases in the net worth of middle and older age households.

Figure 5.5: Australia: Average Household Net Worth By the Age of the Household Reference Person, 1994-2000

Source: ABS, NASU, 2002



Hence, there is a substantial positive role that the older population can and does play in local and regional economic development. However another dimension needs to be mentioned. This relates to the fact that the growth of large numbers of retirees in communities presents a substantial opportunity to enhance the social capital of communities. In recent decades the increasing participation of women in the workforce and longer and unregulated working hours has resulted in a substantial decline in volunteerism. This can be reversed and a huge reservoir of diverse human resources will be available to participate in a range of community activity. This can play a positive role, both in terms of the performance of roles to enhance the life of communities but also in assigning to older persons meaningful roles that maintain dignity, enhance self-esteem and encourage social interaction. However, such community involvement will not just happen. There is an important role for community planners in providing the structure, conditions and encouragement for it to flourish. It needs to be managed in a way so that it is not exploitative of the volunteers. Indeed, it may be that there should be some payment for some of the roles played by the retirees. There may be some gradations between fully paid workers and full volunteers and intermeshing of the paid and volunteer groups. The model of the Meals on Wheels organization where much of the volunteer work involves retirees providing services for older people with reduced mobility is an exemplary one.

The local and regional level is most important in planning for an ageing population. This is partly because local government is the tier of government closest to people and with a level of responsibility for providing community based services as well as having to operationalise many of the state and federal programs for the aged population.

The local community is more important in shaping the wellbeing of the older population than other groups because:

- older people have lower levels of personal mobility, which restricts the area over which they can go to obtain services and social interaction;
- the local community can have special memories and associations for the old since they have often lived in an area for a long time; and
- the social network of other people, which is so crucial to their wellbeing, tends to be local.

5.4 The Labour Force

An important characteristic of the Australian non-metropolitan population in recent years has been its increasing diversity. Non-metropolitan communities are often stereotyped as being homogeneous compared to metropolitan populations but there has been a convergence in the population profiles of the two groups. Fundamental to the Echuca community is its labour force. Table 5.7 shows the substantial changes which have occurred over the last decade. The workforce has grown significantly faster than the population as a whole in Echuca over the last decade. While the number of males grew by 12.9 percent those in the workforce grew by 17.7 percent. The difference was even more striking among females, the workforce grew by 27.9 percent compared to 14.1 percent among the total population. This difference is partly due to a decrease in the workforce participation rate among males (5.1 percent) and an increase in that for women. In addition there was a significant decline in the unemployment rate over the period. For men it halved from 12.3 to 6.6 percent and for women it fell from 9.9 yo 5.8 percent. However both among men and women, the proportion who were working part time increased significantly – from 16.4 to 21 percent among men and from 49.5 to 55.6 percent among women. Table 5.7 also indicates there was a slight ageing of the workforce in Echuca although not as much for the non-metropolitan workforce as a whole. Indeed the ageing of the workforce in non-metropolitan Australia is predominantly in the rural areas while in country towns it has not been so marked.

Table 5.7: Echuca SLA: Changes in Labour Force 1991-2001
Source: ABS 1991 and 2001 Censuses

	1991		2001		% Change	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**
Number Employed	2,094	1,614	2,464	2,064	17.7	27.9
Number Unemployed	294	178	175	127	-6.8	-2.9
Percent Unemployed	12.3	9.9	6.6	5.8	-46.3	-41.4
Participation Rate	69.2	47.1	65.7	49.8	-5.1	+5.7
Percent Part Time	16.4	49.5	21.0	55.6	+28.0	+12.3
Median Age	37.8	35.0	38.8	38.8	+2.6	+10.9

The changes which have occurred in Echuca's economy over the last decade is evident in Table 5.8, which shows the shifts in the numbers employed in different industries. The numbers employed in agriculture have increased significantly due to the increased incidence of town farming. With improvements in transport across Australia, farm operators especially in intensive horticulture, market gardening and irrigation areas are moving into nearby towns and commuting out each day to their holdings. The growth in numbers employed in manufacturing is interesting and reflects the increased significance of processing of dairy products and fruit and vegetables in Echuca. Construction is another area that has grown in significance reflecting inmovement of retirees, horticulturalists and others. Services accounted for more than two thirds of employment in Echuca but the trajectory that difference services have taken in employment terms has varied. On the one hand the withdrawal of government services from rural areas is reflected in the decline in government employment in Echuca between 1991 and 2001. Similarly, there is only a marginal growth in utilities, transport and communication also due to the increasing centralisation of provision of many of these services in non-metropolitan Australia.

Table 5.8: Echuca SLA: Changing Industry Composition of the Workforce 1991-2001

Source: ABS 1996 and 2001 Censuses

Industry	1991		2001		% Change
	No.	%	No.	%	
Agriculture & Mining	103	2.8	200	4.4	+94.2*
Manufacturing	423	11.4	688	15.1	+62.6*
Utilities, Transport & Communication	196	5.3	205	4.5	+4.5
Construction	208	5.6	326	7.2	+56.7*
Wholesale & Retail Trade	932	25.1	1,080	23.8	+15.8
Accommodation, Cafes & Restaurants	401	10.8	430	9.4	+7.2
Finance, Property & Business Services	282	7.6	369	8.1	+30.9*
Government, Administration & Defence	127	3.4	102	2.3	-19.7
Education	289	7.8	3198	7.0	+10.4
Health and Community Services	364	9.8	511	11.3	+40.4*
Other Services	160	4.3	240	5.3	+50.0*
Other	3	0.1	12	0.3	-300.0*
Not Stated	216	5.8	48	1.1	-77.7
	3,710	100.0	4,530	100.0	+22.1

* Above average growth

The ageing of the population is reflected in the substantial expansion of health services. Retail and wholesale trade has grown only moderately due to the increased influence of larger centres on shopping patterns in non-metropolitan areas. Education has grown less than the total workforce reflecting the fact that still many older children travel to capital cities or regional centres in the latter years of high school and for tertiary training. The growth of tourism-related employment in Echuca has been less than in many other areas of non-metropolitan Australia, especially in coastal areas.

The changing occupational structure is shown in Table 5.9. It will be seen that there has been an increase in the number of managers, professionals and especially para professionals over the last decade. This reflects the expansion of the local health industry and, to a lesser extent, other services. On the other hand the withdrawal of government services is reflected in the decline in the number of advanced clerical and service workers. The expansion in manufacturing however, has seen a substantial increase in the number of intermediate clerical, service and sales workers. The numbers of tradespersons has increased only marginally while the number of labourers increased by almost a quarter.

Table 5.9: Echuca SLA: Changing Occupation Composition of the Workforce 1991-2001

Source: ABS 1996 and 2001 Censuses

Occupation	1991		2001		% Change
	No.	%	No.	%	
Managers & Administrators	252	6.8	309	6.8	+22.6
Professionals	457	12.3	630	13.9	+37.9
Associate Professionals	332	8.9	601	13.3	+81.0
Tradespersons	590	15.9	624	13.8	+5.8
Advanced Clerical	168	4.5	134	3.0	-20.2
Intermediate Clerical, Sales & Service Workers	456	12.3	760	16.8	+66.7
Intermediate Production	341	9.2	356	7.9	+4.4
Elementary Clerical, Sales & Service Workers	469	12.6	482	10.6	+2.8
Labourers and Related	451	12.2	558	12.3	+23.7
Other	25	0.7	25	0.6	-
Not Stated	169	4.6	51	1.1	-69.8
	3,710	100.0	4,530	100.0	22.1

The educational qualifications of residents in non-metropolitan Australia are significantly lower on average than the population living in capital cities (Hugo, forthcoming). This is a function of the different types of labour markets and industry mixes in the two sectors but also to different levels of access to education facilities. Table 5.10, however, shows that there was a considerable increase in the average level of educational qualifications in Echuca over the last decade. The proportion with no qualifications fell from 65.5 to 57.4 percent between 1991 and 2001. The proportion with degrees almost doubled to 8 percent.

Table 5.10: Echuca SLA: Changing Non School Qualification of Persons Aged 15 Years and Over 1991-2001
Source: ABS 1996 and 2001 Censuses

	1991		2001		%
	No.	%	No.	%	Change
Bachelor or Higher Degree	330	4.5	677	8.0	+105.2
Diploma	344	4.7	349	4.1	-98.2
Certificate	955	13.2	1,449	17.2	+51.7
Not Stated	875	12.1	1,109	13.2	+26.7
No Qualification	4,751	65.5	4,836	57.4	+1.8
Total	7,255	100.0	8,420	100.0	+16.1

5.5 Changing Social Profile

The postwar period has seen a significant increase in the ethnic diversity in Australia due to the upswing in immigration and the change in origins of immigrants away from the dominance of those from the United Kingdom. However this ethnic diversity has been strongly concentrated in the metropolitan parts of the country. Table 5.11 shows that the indigenous population has slightly increased its share of Echuca's population over the 1991-2001 period and the proportion of 2.9 percent is slightly higher than the indigenous population's share of Australia's total population. The indigenous community is more strongly concentrated in non-metropolitan areas than the

Table 5.11: Echuca SLA: Changing Ethnic Diversity 1991-2001
Source: ABS 1991 and 2001 Censuses

Characteristic	1991		2001		%
	No.	%	No.	%	Change
Indigenous Persons	255	2.7	314	2.9	+23.1
Born Overseas	599	6.3	630	5.9	+5.2
Speaks Language Other than English	228	2.4	201	1.9	-11.8

community are of non-indigenous population. While a small group, the indigenous community are of particular importance. Their demography is quite different from the non-indigenous population as is evident from Table 5.6. They are a very young population with more than half being aged under 18 compared to a quarter of the total population. On the other hand only 6 percent are aged 60 or over compared to 21.8 percent of the total population. They also differ with respect to the total population with respect to income, occupation, housing, education and household characteristics (Hugo 2003b). Table 5.12 shows how their unemployment level is several times greater than for the total population.

Table 5.12: Echuca SLA: Comparison of Indigenous and Total Population 2001
Source: ABS 2001 Censuses

Characteristic	Indigenous		Total Population	
	No.	%	No.	%
Aged under 18	158	50.3	2,735	25.5
Aged 60+	19	6.1	2,331	21.8
Workforce Participation Rate	-	60.4	-	
Unemployment Rate	-	34.6	-	

Turning to the population born overseas, Table 5.13 shows that only 5.9 percent of Echuca residents were born outside Australia compared to over 23 percent for the nation as a whole. There was a small increase in the overseas born between 1991 and 2001 but their proportionate share of the national population fell. Several immigration based settlers on the Murray-Darling-Murrumbidgee system have significant overseas-born communities but generally they favour settling in large cities. Moreover it is apparent from Table 5.13 that the Echuca overseas-born population is dominated by those born in mainly English speaking countries like the United Kingdom and New Zealand which accounted for 58.6 percent of the total overseas born. The small and declining numbers of the persons with

Table 5.13: Echuca SLA: Largest Overseas Born Groups 1991- 2001
Source: ABS 1991 and 2001 Censuses

Birthplace	1991	2001	% Change
United Kingdom	312	270	-13.4
New Zealand	37	99	+167.6
Italy	40	36	-10.0
Netherlands	25	35	+40.0
Greece	29	29	-
Philippines	6	15	+150.0

LOTE (Languages Other Than English) backgrounds is evident in Table 5.11, which shows that the population of Echuca speaking a language other than English at home fell from 228 (2.4 percent of the residents) to 201 (1.9 percent) between 1991 and 2001. Table 5.13 indicates that the largest LOTE groups are from Europe – Italy, Netherlands and Greece. These are longstanding communities in Echuca and the numbers born in Southern Europe are declining. Echuca has been little influenced by the increase in Asian immigration over recent decades. The largest group are Filipinos and it is interesting to note that 80 percent of the Echuca Filipino community are women – a typical pattern in non-metropolitan Australia. Filipinos are the Asian group most strongly represented in non-metropolitan Australia largely due to the marriage migration of Filipino women into these areas. There are a complex of factors influencing this movement but one is the imbalance between young marriage age men and women in many rural areas because of the heavy outmigration of young women.

Another important dimension of the changing social profile of Echuca relates to families and households. While the family remains the basic unit of social organization in Echuca, it has undergone some distinct changes in the last decade as is evident in Table 5.14. This shows that the proportion of Echuca residents who lived in 'couple with children' families fell between 1991 and 2001 and their proportion of the total population fell from 55.1 to 45.3 percent. This points to a greater diversification of families and households in the community. There was a rapid expansion of single parent families and their proportion of Echuca's population living in those families increased from 10.3 to 13.1 percent. This is above the state average and it is due not only to the break up of marriages and partnerships in Echuca, but also to the inmovement of single parent families into the areas. This is a characteristic of many country towns and is partly due to the availability of relatively cheap rental housing and housing authority practices.

Table 5.14: Echuca SLA: Changing Family and Household Type 1991- 2001
Source: ABS 1991 and 2001 Censuses

One Family Households	1991 Persons		2001 Persons		% Change
	No.	%	No.	%	
Couple with Children	4,757	55.1	4,395	45.3	-7.6
Couple without Children	1,796	20.8	2,348	24.2	+30.7
One Parent Family	886	10.3	1,270	13.1	+43.3
Other Family	71	0.8	83	0.9	+16.9
Total One Family Household	7,510	87.0	8,096	83.5	+7.8
Multi Family Households	51	0.6	68	0.7	+33.3
Lone Person Households	817	9.4	1,157	11.9	+41.6
Group Households	250	3.0	384	3.9	+53.6
Total	8,628	100.0	9,705	100.0	+12.5

The ageing of Echuca's population is evident in the substantial growth of couples without children and single person households. The proportion of the Echuca population living in such household increased from 30.3 to 36.1 percent over the decade. Moreover this share will continue to increase. Overall there was a decline in the proportion of Echuca residents living in households with children from 65.4 to 58.4 percent between 1991 and 2001. The median household size fell from 2.6 persons to 2.4 persons over this period while that for the state fell from 2.8 to 2.6 persons.

Income is an important element in wellbeing, although one has to take into account the fact that the cost of living varies between particular areas. Table 5.15 shows that the median family, household and individual incomes in Echuca in 1991 were level to or less than those in Victoria as a whole or Melbourne. Moreover while these have increased over the 1991-2001 period the increases have generally been lower than in the State or in Melbourne. However the lower cost of living in Echuca, especially when compared to Melbourne needs to be considered.

Table 5.15: Echuca, Melbourne and Victoria – Change in Median Income 1991-2001
Source: ABS 1991 and 2001 Censuses

Median Wellbeing	Echuca	Melbourne	Victoria
Individual Income			
1991	$200-299	$200-299	$200-299
2001	$300-399	$400-499	$300-399
Percent Change	+50.0	+100.0	+50.0
Family Income			
1991	$500-599	$700-799	$600-699
2001	$700-799	$1,000-1,199	$800-899
Percent Change	+40.0	+57.1	+33.3
Household Income			
1991	$400-499	$600-699	$500-599
2001	$600-699	$800-899	$800-899
Percent Change	+50.0	+33.3	+60.0

5.6 Housing

Over the 1991-2001 period, the number of Echuca residents who were living in non-private dwellings increased from 474 to 508 and the proportion they made up of the total population decreased from 5 to 4.7 percent. This fairly stable situation is due largely to the current national policy on aged persons which is designed to keep them 'at home not in a home'. Hence, home based services are reducing the rate at which older people are entering institutionalized accommodation. The bulk of Echuca residents however, live in private houses and Table 5.16 shows the dominance of detached, separate housing which is typical of Australian country towns.

Table 5.16: Echuca SLA: Changing Dwelling Structure 1991-2001
Source: ABS 1991 and 2001 Censuses

Structure of Housing	1991		2001		% Change
	No.	%	No.	%	
Separate House	3,006	80.2	3,621	79.0	+20.5
Semi Detached	385	10.3	170	3.7	-55.8
Flat/Unit	164	4.4	589	12.8	+259.1
Other Dwelling	186	5.0	175	3.8	+6.3
Not Stated	8	0.1	29	0.7	+262.5
Total	3,749	100.0	4,584	100.0	+22.3

Indeed while in Australia as a whole, detached housing has significantly decreased its share of housing, in Echuca over the last decade there has been only a small decrease. Semi detached and other higher density housing slightly increased its share of all dwellings from 14.7 to 16.5 percent. On the other hand, the proportion living in caravans, houseboats, improvised houses, etc. decreased.

There have been some small changes in the pattern of housing tenure over the 1991-2001 period as Table 5.11 indicates.

Table 5.17: Echuca SLA: Changing Housing Tenure 1991-2001
Source: ABS 1991 and 2001 Censuses

Tenure of Housing	1991		2001		% Change
	No.	%	No.	%	
Fully Owned	1,424	41.5	1,675	39.6	+17.6
Being Purchased	832	24.2	1,026	24.2	+23.3
Rent - Housing Authority	357	10.4	403	9.5	+12.9
- Other	671	19.6	870	20.6	+29.7
Other	148	4.3	257	6.1	+73.6
Total	3,432	100.0	4,231	100.0	+23.3

In common with other country towns there is a relatively high rate of renting due to the large number of 'floating population' assigned to schools, stock and station ages, etc. as described earlier. The proportion has remained stable around 30 percent, although private renting is increasing in significance and the relative availability of public rental housing is decreasing. The latter is an issue of concern in many country towns. The proportion of persons who own their own house in Echuca has declined over the last decade.

5.6 Conclusion

Populations of non-metropolitan communities are often characterised as being declining in number and static in composition. That this is a totally inaccurate representation is well illustrated by Echuca. Echuca is growing and is likely to continue to grow in at least the short term and its population is in a constant state of change. Natural increase will remain significant, especially since its fertility is well above that being experienced in Australia's major cities. It is also likely that there will continue to be a small net gain of immigrants over outmigrants. However the immigrants differ substantially from the outmigrants. While the former are young, with higher levels of education and income earning potential, the latter are older with higher levels of unemployment and low levels of workforce participation. Like the rest of Australia, its population is ageing but its population is more concentrated in older ages than is the case nationally and the outlook is for continued growth of Echuca's older population.

Like many country towns, Echuca's population has become more diversified over recent years. However it is less ethnically diverse than the Australian population as a whole and has been little influenced by immigration from Asia, which has substantially influenced the national population. However in terms of its workforce, education profile, household and family structure, the implications of these shifts for the economic and social dynamism of communities like Echuca is not yet clear but it must be realised that rural communities are changing significantly. This will present both challenges and opportunities to those communities as they confront the issues created by globalisation, shifts in the structure of the economy and environmental change.

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Chapter 6 Water Resources in the Shire of Campaspe

Teri Etchells

6.1 Introduction

The Shire of Campaspe presents an excellent case study for understanding the impacts of changing water regimes in Australia. This region, though relatively small, contains a wide range of water resources including aquifers, major rivers, streams, wetlands and lakes, and also has significant connections with surrounding regions through water transfers and flows.

The Shire has a long history of water resource development, with extensive storage and distribution infrastructure, and well-developed institutions and processes for managing water. Despite this, significant management challenges continue to emerge, particularly as environmental pressures and scarcity force changes for governments, managers, communities and individuals.

6.2 Physical Environment

The Campaspe Shire covers over 4500 square kilometres in the Central north of Victoria, 180 kilometres north of Melbourne (Figure 6.1). The Shire overlays parts of four catchments, the Campaspe, Goulburn, Victorian Murray and Loddon, which are all part of the Murray-Darling Basin. Significant water features bound the shire with the Goulburn River in the East, the Murray River in the north, the Campaspe River running through the middle and Kow Swamp in the west. The Shire has a warm temperate climate and lies in a moderate rainfall zone.

6.2.1 Surface Water

Available surface water in the Shire comes from runoff and incoming flows from three major river catchments, the Campaspe, Goulburn and Murray Rivers. Variability over seasons and years means that runoff needs to be stored to provide if there is to be a reliable supply that will permit use throughout the irrigation season (late Spring to early Autumn).

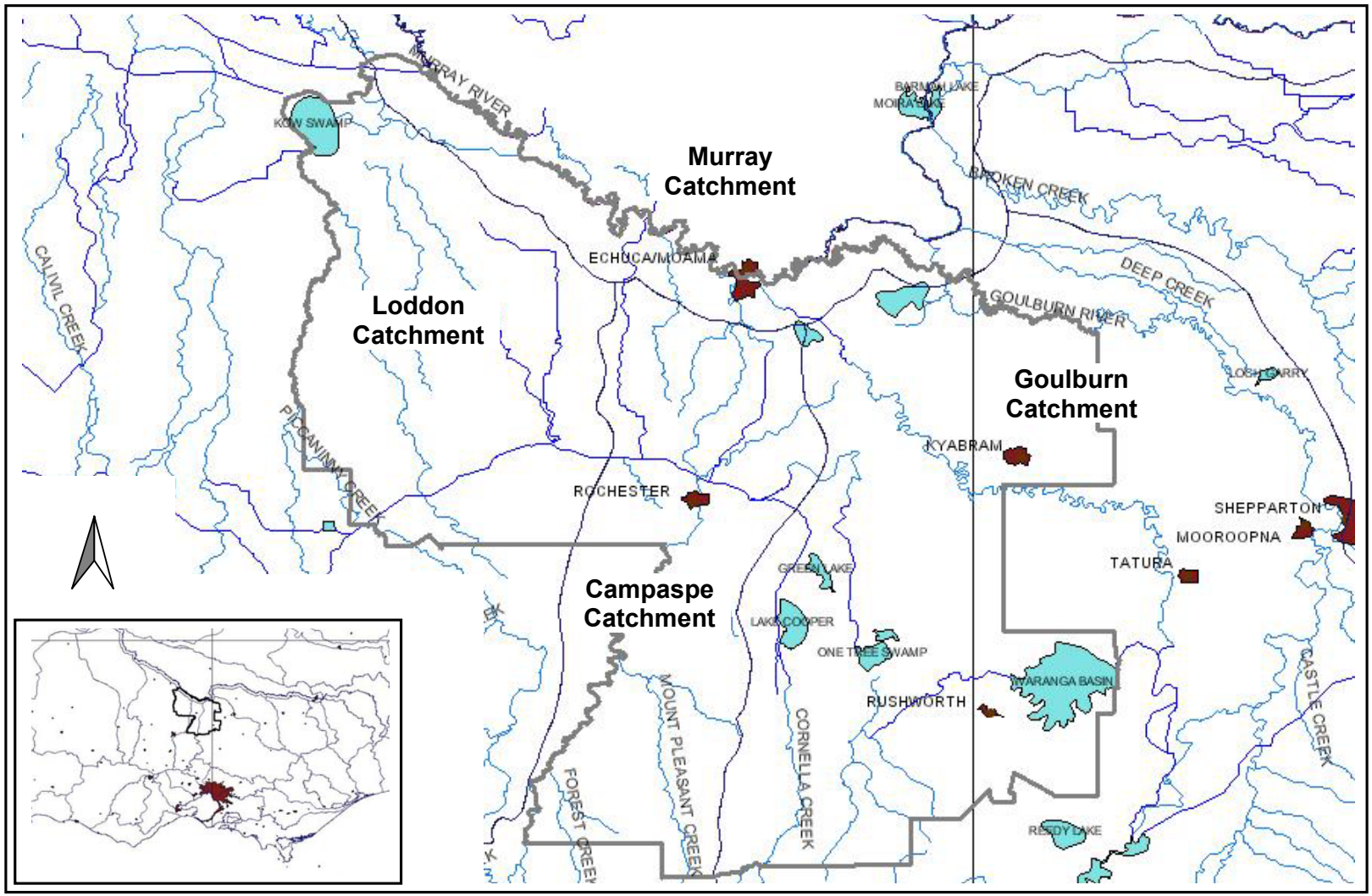

Figure 6.6: Map of Shire of Campaspe (© Commonwealth of Australia (Geoscience Australia) 2001)

The Murray is not a large river by world standards; the average annual flow of the Murray-Darling would pass through the Amazon River in less that a day (Young and Murray-Darling Basin Commission (Australia) 2001). The variability of streams in the Shire is similar to the world average for catchments of this size with the ratio of maximum annual discharge to average annual discharge being 2.2 for the Goulburn and 2.1 for the Campaspe (McMahon *et al*. 1992). These rivers are considerably more consistent than other Australian streams where ratios of 4.0 – 4.3 are observed in similar sized catchments.

The Goulburn River basin has an average annual discharge of 3187 gigalitres (GL) representing more than twelve times the average annual discharge of the Campaspe River (264 GL) (McMahon *et al.* 1992). The majority of the Goulburn's runoff is captured in the upstream reaches above Campaspe Shire and subsequently, substantial volumes of surface water are imported for irrigation. Additionally, some private diverters within the Shire have licenses to divert water from the Murray but most of that flow is committed for downstream use.

The Campaspe and Goulburn Rivers both flow into the River Murray where the river valley is characterised as an open floodplain. Areas such as Echuca and Rochester are most exposed to flooding where it presents a serious threat to farm viability and communities with the last major flood occurring almost 30 years ago in Echuca West. Although flooding in the Shire is less likely than for catchments in the north of Australia, the potential is for increasing frequency and extent as a result of changing land management from increased urban development, poor soil health, laser grading, higher water tables and reductions in perennial vegetation (North Central Catchment Management Authority 1999).

In addition to these rivers, a number of lakes and wetlands can be found in the Shire. Most notable is Kow Swamp, a wetland of national significance. These days Kow Swamp forms part of the irrigation storage and distribution network, but between 13,000 and 9,000 years ago it was an important Aboriginal burial site (Murray Darling Basin Commission). In 1994, the water level was lowered for maintenance purposes and more than 10,000 burials were revealed dating back between 3,000 and 4,000 years.

6.2.2 Groundwater

The Shire of Campaspe is located within the Murray Groundwater Basin, which extends for 297,000 square kilometres over most of the southern and southwestern Murray Darling Basin. Intermediate and local flow systems include Campaspe Deep Lead Aquifer, a confined aquifer system comprised of unconsolidated alluvial deposits, and the shallower unconfined aquifer, the Shepparton Region Groundwater Supply (Department of Natural Resources and Environment 2003).

The quality of water within the aquifer system varies but generally becomes more saline with the regional flows north toward Echuca and then northwest along the River Murray. Fresher groundwater is found in the southern part of the Shire, due to greater recharge, and also in the west, possibly due to recharge from deeper groundwater systems.

6.2.3 Geology and Soils

The River Murray and tributaries were formed around 700,000 years ago when an enormous inland lake drained and channels were carved from the accumulated limestone deposits (Burdon 2000). Over the last 300,000 years further geological upheavals have changed the course of the Murray and Goulburn Rivers, so much so, that between Echuca and Swan Hill, the Murray now flows over the ancient bed of the Goulburn. More recently, between 25,000 and 16,000 years ago an ice age brought dry conditions, causing lakes to evaporate and bring in salt-laden dust from the west. This salty dust settled in the soil and groundwater.

The Shire overlays deposits called the Shepparton Formation consisting primarily of sediments mainly derived from rivers and streams from the Quaternary period as well as some more calcareous windblown deposits. Soils in the Shire are generally medium to heavy soils with a high hazard of soil structure decline (slaking and dispersion) (Victoria. Environment Protection Authority *et al.* 1997). Also, nearly 50% of soil in the Campaspe catchment are either moderately, strongly or extremely acidic (North Central Catchment Management Authority 1999).

6.3 Water Resource Management

The water resources and their management in Northern Victoria today have evolved since the early 1800's in response to economic, social and political drivers. This evolution was predicated on a view by settlers in Australia that the country was only valuable once domesticated (Sinclair 1994). Leaders such as Sir Thomas Mitchell (1792-1855) and Alfred Deakin (1856-1919) legitimised the commodification of water, sharing 'a vision of an arid land transformed by water' (La Nauze 1965). The formation of these views coincided with a period where the Crown was encouraging an expanded population[9] and existing settlers were looking for new places to inhabit following the demise of the gold rush (Sinclair 1994).

Despite some small water supply projects being undertaken, the severe drought between 1877 and 1881 (Hallows *et al.* 1995) made settlement precarious and increased public pressure for irrigation (Sinclair 1994). Following a Royal Commission, Alfred Deakin, the then Minister of Water Supply, introduced Victoria's Irrigation Act in 1886, Australia's landmark water legislation. This Act instituted the system of centralised administrative allocation of water rights, which persisted until water transfers were encouraged almost one hundred years later (Tisdell *et al.* 2002).

[9] The Victorian population increased from 539 000 in 1861 to 862 000 in 1881. Macintyre, S. (1991). *A colonial liberalism : the lost world of three Victorian visionaries*, Oxford, South Melbourne.

6.3.1 Securing Reliable Supplies

As an adjunct of the pressures of settlement, steamships commenced operation on the River Murray in 1853 transporting supplies inland and delivering produce to market (Mackay and Eastburn 1990). This initial commercial use of the river was highly profitable and initial river regulation priorities focused on making the river permanently navigable. These works greatly benefited Echuca, which was, at its peak, the largest inland port in Australia (Murray-Darling Basin Commission 2003). In 1864, the railway line between Melbourne and Echuca was completed, thus reducing the importance of the river for navigation but also creating the potential for markets of perishable products such as dairy and fruit (Martin and Woodburn 1955). Then a succession of dry years from 1895 to 1902 increased acceptance that some drought protection was required to allow further development of the Murray Valley.

By 1874, practically all the land surrounding Shepparton had been selected for agricultural purposes. The strategy for providing secure water supplies to this area was debated vigorously, however, and it was Hugh McColl who advocated gravity distribution systems along the lines seen today. The River Goulburn Weir Act passed in 1886 and the weir completed in 1890. Interestingly, stream gauging only began in 1891 and the weir was designed with virtually no reliable data. As part of these works levee banks were built around the Waranga Swamp to form the Waranga Basin (completed in 1905) and the Waranga Channel was constructed through to the Campaspe. These early projects had significant problems with seepage preventing deliveries west of Waranga Basin, and the early failure of channels (with crayfish damage causing bank failure). These problems contributed to early financial failure of the project and severely curtailed the development of irrigation in the region (Martin and Woodburn 1955).

Conflicts between states over water use and development led to the development of the River Murray Waters Agreement and the River Murray Commission (now known as the Murray-Darling Basin Commission) in 1915, after thirteen years of negotiation between State and Commonwealth Governments (Mackay and Eastburn 1990). This agreement stated that flow at Albury would be shared equally between New South Wales and Victoria, with each state retaining downstream tributary inflows, and guaranteeing a minimum quantity of water to South Australia each year. Interestingly, these essential principles governing water sharing between the states are still largely intact, 88 years after the agreement was signed.

In addition to the water-sharing principles, the Agreement also provided for the construction of regulation infrastructure including Hume Reservoir, Lake Victoria and 23 other locks and weirs. Over the ensuing decades, other regulation works have been constructed including works on the Menindee Lakes, the Snowy Mountains Scheme, Dartmouth Dam and other smaller weirs and flow control structures (Mackay and Eastburn 1990).

Possibly the most important water storage for the Shire of Campaspe is Lake Eildon, located upstream on the Goulburn Weir and completed in 1927[10]. This reservoir can hold 3390 GL making it bigger than Lake Hume (3038 GL) and not much smaller than Victoria's largest storage, Dartmouth (4000 GL). Lake Eppalock, on the headwaters of the Campaspe and holding 312 GL, is much smaller, but is still Victoria's eighth largest storage.

An extensive channel infrastructure, based around an irrigation artery called the Waranga-Western Channel, has been constructed across the Goulburn, Campaspe and Loddon catchments creating a highly connected distribution network. This allows large volumes of water to be delivered reliably to irrigation districts within the Shire, including the Rochester irrigation district and a large part of the Central Goulburn irrigation district. Also within the Shire is the smaller Campaspe Irrigation District, supplied primarily by Lake Eppalock.

The Campaspe and Goulburn Rivers flow into the River Murray allowing water to be transferred over wide distances, including interstate movements. Additionally, a limited volume of water from the Campaspe Catchment can be pumped into the Waranga-Western channel to supply western districts in the Greater Goulburn, providing a great deal of flexibility in supplying users within the Shire.

Goulburn-Murray Water is the managing authority for the Greater Goulburn system and the Victorian Murray although significant coordination is required with River Murray Water who is responsible for managing infrastructure and releases upstream. The regulation for all water issues in Victoria Falls within the jurisdiction of the state Department for Sustainability and Environment and further regulation can be imposed by the Murray-Darling Basin Commission (however, all states must agree to Murray-Darling Basin Commission regulations). Goulburn Murray Water sells bulk water to Coliban Water for supply to towns including Echuca and Gunbower, and Goulburn Valley Water for supply to towns in the east of the shire such as Tongala and Rushworth. Major towns treat raw water for bacteria, pathogens, sediment, nutrients and pathogens to potable standard at local water treatment plants[11].

6.3.2 Usage and allocation

As reliable water supplies have become available, significant local enterprise and communities have developed. Overall water use in the shire is difficult to estimate since most usage is measured by catchment, groundwater area or management boundaries. However, Figure 6.2 shows the relative magnitude of various water use sectors within and around the Shire (e.g. a significant part of Central Goulburn Irrigation District and Shepparton Groundwater Area are located outside the Shire).

[10] Lake Eildon was expanded to its current capacity in 1955.
[11] Physical properties such as pH and turbidity may also be adjusted during the treatment process.

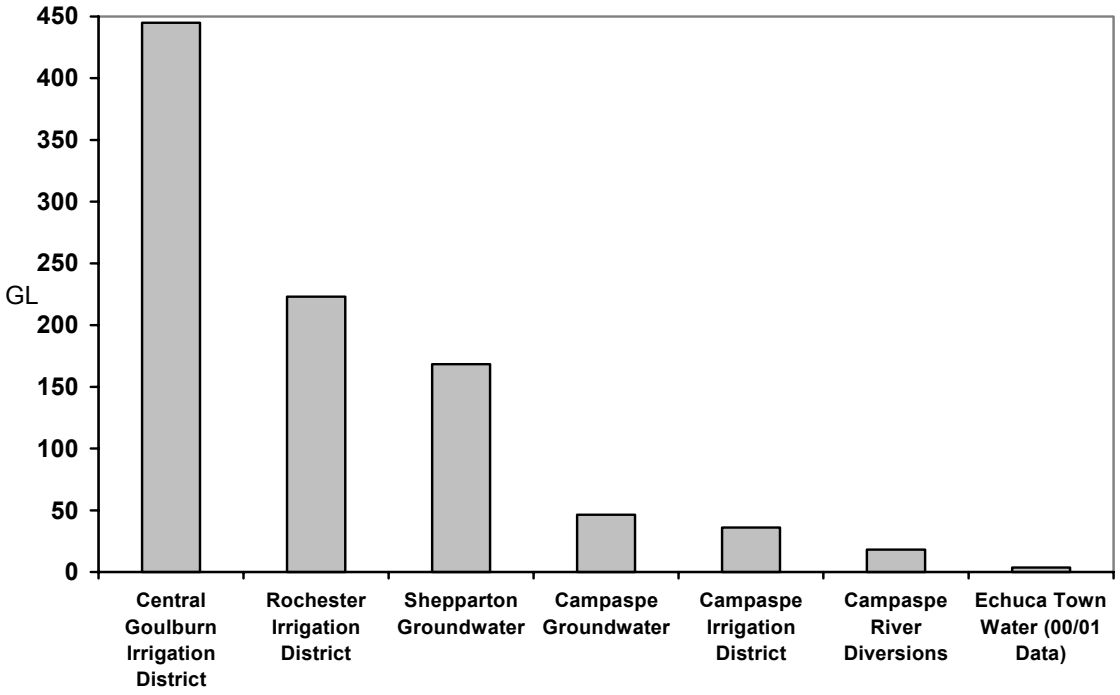

Figure 6.7: Water use in 2001/02 (GL) (Goulburn Murray Water Corporation 2002), (Coliban Water 2001)

Irrigation in the Shire forms over 90% of total surface water consumptive use (Victoria. Parliament. Environment and Natural Resources Committee, 2001). Across Victoria, irrigation comprises around 77% overall consumptive use, making the Shire relatively irrigation-intensive. The majority of irrigation in the northern region of Victoria supports annual and perennial pasture for the dairy industry (55% of use), while less than 5% is used for horticulture. The remaining volume is used for cropping and grazing (Victoria. Parliament. Environment and Natural Resources Committee, 2001).

Almost all (90%) irrigation in the region is undertaken using flood or furrow methods (Thomas *et al*. 1999). Laser grading, control systems and improved practice have all contributed to improvements in flood and furrow irrigation, but, given the enormous volumes of water being used, there is still enormous potential to improve water-use efficiency and economic development within the region.

Irrigators and private diverters in the Goulburn and Campaspe catchments must hold an entitlement to water, either through a permanent water right that they own or through a temporary right to water that they purchase. For irrigators on regulated systems, a permanent water right specifies a nominal volume in megalitres (ML), but does not represent the actual volume that can be ordered in any given season. The actual volume that can be ordered is governed by a percentage allocation, announced by the local

managing authority at the beginning of a season and based on available supplies. The amount of water the local authority has to allocate is called available water and is dictated by the climatic conditions, the infrastructure available, local allocation processes and any agreements with other authorities sharing that infrastructure.

In the case of the Goulburn system, allocations greater than 100%[12] have been available in 96% of years, and for the Campaspe system, in 99% of years. The allocation process applied by Goulburn-Murray water aims to smooth the level of allocations over years and thereby support types of irrigation requiring a high level of reliability such as dairy or horticulture. As discussed in the profile of the Echuca region, the dairy and horticultural sectors have underpinned major local processors such as Plumrose, Cedenco, Simplot and Nestle.

Apart from consumptive use of water resources, Echuca itself is highly dependent on non-consumptive uses and values. Echuca is a unique tourist destination with the wharf, river and trading history providing a focal point for tourists and locals, and hence underpinning a significant part of the local economy.

6.3.3 Future Development

The development of water resources within the region has resulted in a large percentage of potential runoff and groundwater being captured and consumed. In fact, the National Water Resources Assessment (2001) estimated that between 70% and 100% of the sustainable surface water flow regime is being diverted in the Campaspe and Goulburn catchments. Furthermore, as can be seen in Table 6.1, the local groundwater supplies have allocations and abstractions well in excess of the estimated sustainable yield[13]. This means that it is not feasible to build more diversion infrastructure, and that consumption needs to be reduced in some sectors.

Table 6.1: Level of groundwater extraction

	Sustainable Yield (GL)	Total Abstraction (GL)	Total Allocation (GL)
Campaspe Groundwater Supply Protection Area	20	31	39
Shepparton Groundwater Supply Protection Area	170	128	181

(Natural Heritage Trust (Australia) and National Land and Water Resources Audit. 2001)

[12] Any amount greater than 100% of water right is called 'Sales' water.

[13] Sustainable yield of groundwater refers to the maximum rate at which water can be extracted from an aquifer without reducing the volume of water in the aquifer. The yield estimated in Table 6.1 was calculated as a percentage of rainfall.

Historically, water has been allocated to various users as new storages or infrastructure was constructed. In the case of irrigators, water rights were allocated to a specific parcel of land according to formulae based on factors such as crop water requirements, the volume of water available and the area to be irrigated. These water allocation processes worked well while new infrastructure was being constructed, but in, the 1970's it became clear that there was not likely to be any more large-scale development in the region. Randall (paper presented in Australian Rural Adjustment Unit. 1982) argued that the Australian water economy had moved beyond an expansionary phase, where the rate of development was the major concern, and into a mature phase, where reallocation of existing supplies becomes a priority. Furthermore, there was a view that the state provision and development of water resources had resulted in an underpricing and overprovision of water in low-value uses (Tisdell *et al.* 2002).

Water allocation needed to shift from an expansionary phase into one where resources were used as efficiently as possible. To meet this need, legislation allowing temporary transfers, where irrigators can buy or sell a portion of their seasonal allocation, was passed in 1987-88 and permanent trading was introduced in the Water Act of 1989 (Simmons *et al.* 1991), allowing an irrigator to transfer a water right permanently to a different block of land.

The State and Federal governments introduced more flexibility as part of a national water reform agenda in the mid 1990s. Among other things[14], the water reform agenda emphasised the importance of moving water to its higher value use, and expansion of water markets as far as possible given hydrologic constraints and equity and sustainability considerations. The first critical step towards this objective was undertaken in 1995, when a legal Cap on diversions was established for each state in the Murray-Darling Basin. Once the Cap was created, and it was clear that water rights were a scarce commodity, the need for more effective reallocation processes was clear. Since then, temporary trading has become widely adopted with between 5% and 20% of total use being traded in any given season. Also, permanent water trading has increased steadily (Figure 6.3) although the level of trade is much smaller at less than 1% of total entitlements. So far, irrigation districts within the Shire, particularly Rochester have been net purchasers on the permanent market.

The water market has been extremely important over the most recent drought, allowing high value dairy and horticultural investments to survive. For instance, in 2002/2003 final allocations across the Greater Goulburn system were lower than ever before at only 55% of permanent water rights. Temporary trading was vigorous and prices were more than double previous levels at $500/ML.

[14] Such as an emphasis on full cost recovery and institutional reform.

Figure 6.8: Total volume of permanent water transacted by water district (includes water traded into, out of and within each district) (Lewis and Victoria. Department of Natural Resources and Environment. 2001)

6.4 Current Environment and Challenges

The development of water resources within the Shire has been a remarkable achievement, providing benefits not only for local communities, but also more generally for Victoria and Australia. However, this development has had broader impacts, altering the landscape, riparian[15] environments, aquifers and ecosystems.

6.4.1 Impacts on Instream Environments

Not surprisingly, increases in the volume of water stored and consumed have greatly reduced the volume of flows. River regulation has had an enormous impact on flows; particularly in the Goulburn and Campaspe Rivers where median flows are currently only 32% of natural (Figure 6.4).

[15] Riparian environment or zone refers the bank or edge of a waterway.

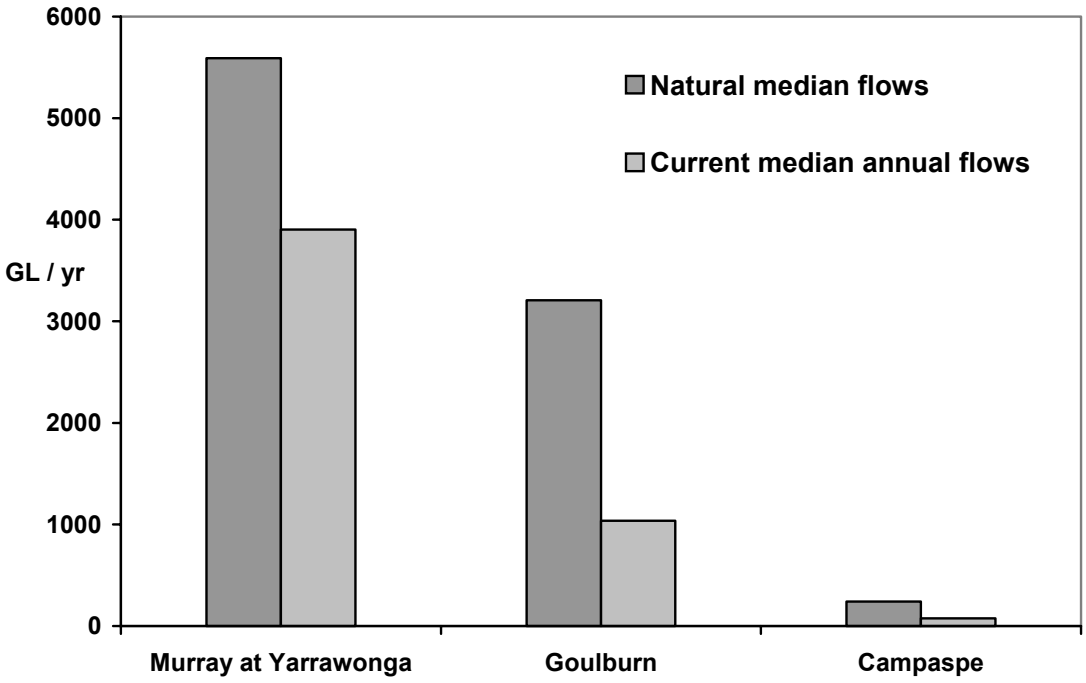

Figure 6.9: Changes to flow regime (Murray Darling Basin Commission 1995)

Regulation has not only changed the volume of flows in the river but also, as importantly, the flow regime: the timing and extent of high flow and low flow events. Prior to regulation, peak flows in these rivers occurred during spring, and flows were very low from late summer to autumn. The construction of large storages has allowed water to be captured during winter and spring and released when it is most useful for irrigation in the late spring to early autumn. For instance, on the Campaspe River, approximately half of the 200 GL annual flow is captured by Lake Eppalock to be released in the irrigation season (Humphries 1999). Prior to regulation this water would provide sustained high flows during winter providing food and habitat for native species.

Apart from the volume and timing of flows, instream water quality is an important element in protecting public health, aquatic ecosystems and economic productivity. The National Water Resources Assessment (2001) characterised water quality in the Campaspe and Goulburn catchments as having major nutrient and turbidity water quality issues compared with state guidelines. A high level of nutrients, in combination with low flows, increases the likelihood of algal blooms. Algal blooms can present problems for communities who rely on the water supply to for domestic or stock use from problems with odour, taste and toxin production. Also, after a bloom, the decaying algae may reduce the oxygen content of the water, killing fish and degrading the instream environment (Young and Murray-Darling Basin Commission (Australia) 2001). Over thirty blue-green algal booms have been recorded in major waterways and waterbodies throughout the Campaspe Catchment (North Central Catchment Management Authority 2001).

The National Water Resources Assessment (2001) also characterised water quality in the Campaspe and Goulburn catchments as having major salinity issues compared with state guidelines. The Campaspe River is considerably more salty than the Goulburn, with salt concentrations almost three times greater (Australian Water Resources Council. and Australia. Department of National Resources. 1976). Additionally, the Campaspe catchment is one of only seven catchments in the National Water Resources Assessment where pH was identified as a major issue.

The impacts on the instream environment of these changes in the flow regime and water quality, are difficult to separate from other changes in the river and catchment environments such as land use changes, fishing pressures, introduced species, riparian vegetation and large woody debris distribution (Fluvial Systems 2002). All of these factors contribute to changes in the biodiversity and processes within the rivers. However, despite the difficulty in linking specific causes to effects, it is clear that water resources development overall has had adverse impacts on the instream environment.

Water resources development, in combination other changes, has had a major impact on native fish with a serious reduction in many species. For instance, preliminary investigations as part of Campaspe Flow Manipulation Project showed that the fish fauna of the Campaspe River is highly degraded with carp making up around 70% of fish caught (Humphries 1999). On the Murray near Echuca, sampling of fish populations by Gehrke *et al*. (1995 as cited in Fluvial Systems 2002) found an abundance of alien fish, particularly carp, but also found the only remaining natural population of the endangered Trout Cod (Thoms *et al*. 2000).

6.4.2 Impacts on Riparian Environments

As with instream environments, changes to riparian environments come from a wide range of sources. Riparian vegetation in the region has been severely depleted, particularly due to weed invasion, flooding, excessive grazing, saline groundwater and instream flows and alteration of flow regimes. Now, it is estimated only 7% of the riparian environments are in good condition, 31% in moderate condition and 61% are in poor to very poor condition (North Central Catchment Management Authority 1999).

Water resources development has had a major impact on the frequency, duration and extent of flooding in the region, particularly mid-range winter and spring floods (Fluvial Systems 2002). Whilst flooding can be damaging to humans, stock and infrastructure, it plays a vital role in regenerating and sustaining riparian environments. Around Echuca, where the Murray flows through an unconfined floodplain, local vegetation has evolved to rely on inundation. Species such as the river red gum have much greater success in germination and establishment with the right flood conditions but have a limited tolerance to long periods of immersion. Unfortunately, the combination of reduced flooding in winter and inundation during peak summer deliveries has combined to stress red gum forests, with some dying due to waterlogging. The most recent drought has also had a major impact and there are reports that large numbers of red gums are dying from a lack of water (Martin and Rodway 2003).

Vegetation is extremely important in maintaining food supplies and habitat for invertebrate populations, birds, fish and mammals. Some riparian vegetation has responded positively with a reported increase (or movement) in rushlands in the Barmah Forest northeast of Echuca. However, grassland has decreased dramatically, with grassland area in the Barmah Forest decreasing from 13.5% in 1930 to 5.2% in 1979 (Fluvial Systems 2002).

Wetlands are also extremely important in maintaining a healthy environment; they provide food and habitat for many species, particularly during breeding times; the sustain a wide range of economic, cultural and recreational activities; and they play a vital role in ecosystem processes, particularly in removing nutrients and improving water quality. However, wetlands have also been adversely impacted with a 47% reduction in the extent of freshwater meadows, 66% of shallow freshwater marshes and 68% of deep freshwater marshes since European settlement. Overall, lakes and wetlands in the north of the region are becoming highly saline and temporary (North Central Catchment Management Authority 1999).

6.4.3 Impacts on Land

The impacts of water resources development are not just confined to the riparian and instream environments. Vast quantities of water are being applied to land for irrigation, and although a great deal of this water is consumed through evaporation or drains back into waterways, some water seeps into the water table.

Over a large part of the Shire of Campaspe the water table is less than three metres deep (Figure 6.5). Where the water table gets too close to the surface, ancient salts are brought to the surface and the productivity of the land drops dramatically. Salinity is not necessarily caused by irrigation; dryland salinity occurs where vegetation has been removed, insufficient water is taken up in the root zone by crops or pasture and a larger portion of rainwater seeps into groundwater. Approximately 1% of the Campaspe dryland area is salt affected now with a potential for 7% to become saline over the next forty years (North Central Catchment Management Authority 1999). Approximately 55,000 tonnes of salt is exported from the Campaspe Catchment each year into the Loddon Catchment and Murray River.

Irrigation can exacerbate increases in the water table by raising water tables and by bringing in more salt with the imported water. Campaspe Irrigation District and Rochester Irrigation Area are both net importers of salt since they import large quantities of water (North Central Catchment Management Authority 1999). Rochester already exports salt using surface and sub-surface drainage and the Campaspe Irrigation District will need to undertake similar action to become sustainable. Both have salt-disposal licenses to enable them to become sustainable from a salt perspective. Most salty water is disposed to Murray although some goes to the Campaspe River with an estimated impact of 8.1 EC[16].

[16] EC stands for Electrical Conductivity. Since a strong correlation is observed between conductivity and total dissolved salts (TDS), EC is one measure for instream salinity. EC limits for drinking water are 1,500 µS/cm demonstrating the small contribution of 8.5 EC from these schemes.

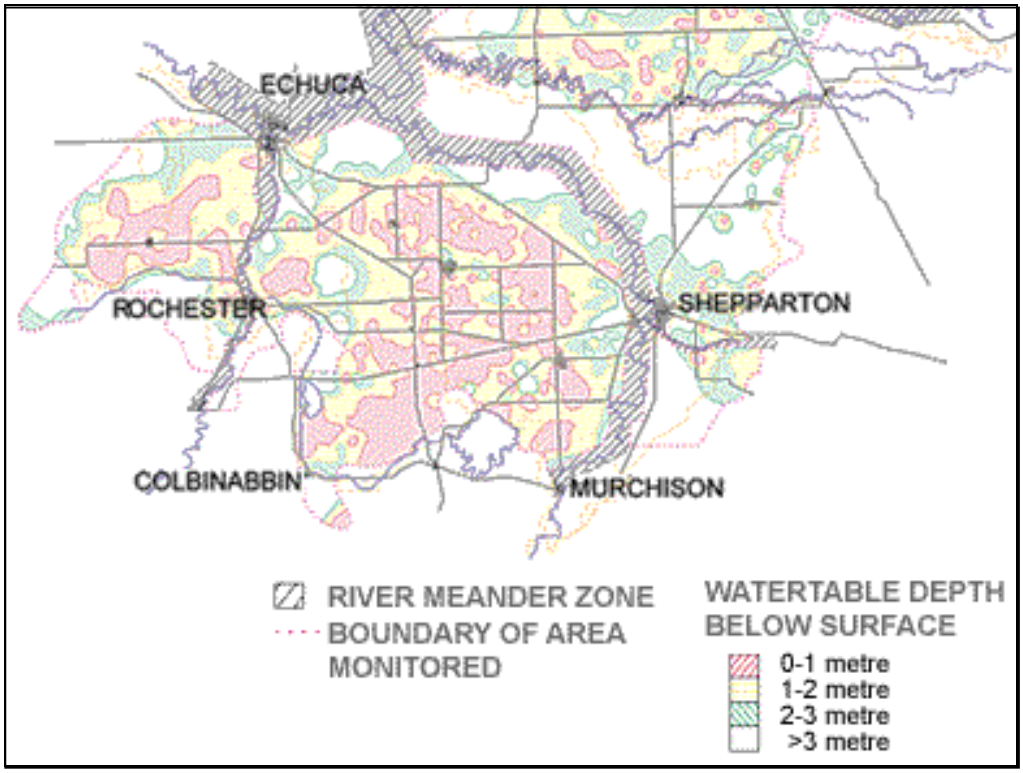

Figure 6.10: Watertable Contours for Shepparton and Campaspe West Irrigation Areas, August 1996 (Map reproduced with the permission of the Department of Sustainability and Environment, Victoria)

6.5 Towards Sustainable Development?

The evidence of environmental degradation shows that the management of water resources has shifted too far towards anthropocentric objectives and measures need to be taken to achieve sustainable use of resources. Unfortunately, no single solution exists to achieve more balance between environmental and human uses, and success will most likely come from a range of approaches addressing issues at all scales: overall water allocation, catchment management and local use.

6.5.1 Water Allocation

Water within the Campaspe Shire is overwhelmingly allocated to anthropocentric uses for irrigation, domestic, stock and industrial uses. Mechanisms are in place, through the water market, to ensure this water is used as efficiently as possible. Allocations for the environment are at a more rudimentary stage although there are some very positive examples of water being allocated for environmental purposes. For instance, the Barmah-Millewa forest northeast of Echuca has an allocation of 50 GL each year, which can be carried over to extend natural flooding periodically. The Campaspe River has a provision for environmental flows for the period May to October when 25 percent of flow into Lake Eppalock must be released downstream (Victoria. Parliament. Environment and Natural Resources Committee, 2001). On the Goulburn River, there is a requirement to release a passing flow of 120 – 250 ML each day as well as an 80,000 ML flush in November to provide water for wetlands adjacent to the

river. There is still considerable uncertainty surrounding environmental flows with regard to both the volume of flows that is appropriate as well as how those volumes can be used to most effectively influence river health.

The Murray-Darling Basin Commission recognises that better management of flows for environmental purposes are required along the Murray and is investigating the impacts of various environmental flow scenarios as part of the Living Murray Initiative. It is possible some reallocation may occur as a result of this process. Also, at the national level the Council of Australia Governments recently agreed to ensure ecosystem health by implementing regimes to protect environmental assets (Council of Australian Governments 2003). This agreement also stated that water rights would be recognised as full property rights to provide certainty and stimulate investment. There is still considerable uncertainty over how these objectives will be achieved, although it is quite likely water will be purchased for the environment on the water market by a government-appointed purchaser.

As well as reallocating water from existing uses, improving efficiency in the storage and distribution of water could provide additional water to allocate for the environment. In the Rochester irrigation district, conveyancing losses have been estimated at between 11% and 19% of total deliveries, while in the Central Goulburn district, losses have been estimated at around 30% of total deliveries ((Australian National Committee on Irrigation and Drainage 2000/01) as cited in (ACIL Tasman 2003)). It is hoped these losses can be reduced considerably by undertaking a range of initiatives including pipelining some channels, automation and flow optimisation in channels, and metering improvements. However, this 'lost' water is going somewhere, and it is important that inadvertent environmental benefits from seepage are not reduced as efficiency measures are undertaken.

6.5.2 Catchment Management

Many of the problems associated with water resources development are being addressed at a catchment or basin scale. For example, strategic initiatives are underway for specific problems including salinity (Murray-Darling Basin Salinity Management Strategy and the National Action Plan for Salinity and Water Quality where the Campaspe Catchment is one of the priority catchments), native fish populations (Native Fish Strategy), land use (Landcare), biodiversity (Mid-Murray Forest Management Plan) and water efficiency (the Victorian State Government is currently targeting a 25% increase in the efficiency of irrigation systems).

Each of these strategies aims to achieve positive outcomes across the basin, or at least reverse the decline. In some cases, the strategies include actions that can clearly be achieved such as providing fish ladders over weirs to improve migration opportunities for native fish. However, in most cases, the causes of problems are inextricably linked with human uses and improvements are likely to be gradual. For instance, carp are an abundant alien fish species that thrive in the regulated flow environment with large summer flows and regulated rivers. Ultimately, there is a choice between

releasing water in summer for irrigation and also providing ideal conditions for carp, and releasing it in winter / spring when it would fill wetlands and help native fish with spawning. Hopefully a combination of measures to reduce carp populations and to provide environmental flows for native fish spawning will help restore the balance. Similarly, sustainable management of other environmental challenges is likely to be achieved through a combination of measures and interventions that sustain ecosystems, but are unlikely to achieve natural conditions.

6.5.3 Local Initiatives

At the local scale, actions are also being undertaken to improve water resource management. In particular, there has been a large improvement in on-farm irrigation efficiency over the past ten to twenty years, although progress has slowed recently as future improvements have less of an impact and become more expensive. Past efficiency improvements have focussed particularly on laser-grading to improve the accuracy of flood irrigation, and improvements in determining watering requirements for crops and pasture. More recently, the improvements have focussed on reuse schemes. For instance, a 1997 Goulburn-Murray Water survey showed that over 50% of dairy farms had reuse systems with an estimated rate of adoption of around 5% per year (ACIL Tasman 2003). Also, there has been a wide uptake of groundwater pumping in the Rochester and Campaspe region as an efficient and effective means of controlling water tables (ACIL Tasman 2003). Improvements in irrigation are continuing in the region with investments being undertaken in automation and control systems and irrigation technology (e.g. trickle or drip systems).

Water trading underpins water efficiency improvements since it offers a mechanism for water to be voluntarily reallocated to a use where it is most highly valued. Water purchasers, understandably, tend to have the latest water-saving technology so they have to buy as little as possible (Lewis and Victoria. Department of Natural Resources and Environment, 2001). Additionally though, as water becomes more expensive, the incentives become greater for farmers to implement efficiency improvements so they can sell any excess.

Other local initiatives aim to improve the sustainability of water quality in the region. For instance, the Campaspe Nutrient Management Strategy aims to improve the health of the Campaspe Catchment by targeting nutrient management to improve water quality. When the Strategy is fully implemented the risk of blue-green algal blooms will almost be halved. Additionally, Campaspe West will be exporting salt as it aims to ensure a sustainable salt balance, but will be adding a freshwater dilution flow will be added to prevent net instream salinity increase (North Central Catchment Management Authority 1999). Finally, at the urban level, managing authorities such as Goulburn Valley Water and Coliban Water are continually increasing the portion of wastewater being reused. This not only increases the productivity from water but also reduces pollution from wastewater disposal, particularly nutrients.

6.6 Conclusion

A reliable water supply is one of the foundations for the success and development of the Shire of Campaspe. Over a century of effort has helped to create the infrastructure, institutions and processes to store and distribute water. However, this development has occurred at the expense of ecosystems and examples of degradation can be seen across instream, riparian and land environments.

Sustainable water resource management depends on determining the appropriate mix of actions to ensure the environment can sustain biodiversity and ecosystem processes, as well as for society to ensure a reliable water supply is available to sustain communities and economic production. The evidence of degradation shows that the balance has shifted too far towards anthropocentric objectives. Initiatives and trade-offs need to be made at the local and catchment scale to achieve sustainable use of water resources.

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Chapter 7 Science *versus* the Public: Water Matters

Ron Johnston

7.1 Introduction

A very traditional view of science holds that it provides a true, or 'nearest available to the truth' picture of the workings of the natural world. It explains the mysteries of the universe by identifying underlying structures and natural laws. Its methods of quality control are extremely rigorous, ensuring only the best 'candidates' for the status of scientific knowledge are accepted. Even then, this acceptance is contingent, and usually temporary, as other better explanations are developed.

A more tempered view, emerging from examination by historians, philosophers and sociologists over the past three decades, would acknowledge that scientific knowledge is socially constructed, but that these elaborate social processes generate knowledge which is highly reliable, and provides the best foundation available to understand and act upon the natural world.

On this basis, scientific knowledge and the views of appropriate scientific experts should provide the best guidance for decision-making whenever there is a substantial technical component involved. The general public, and politicians, being ignorant of the detailed knowledge systems of science and its underlying knowledge test procedures, should therefore leave all such decisions to the informed scientists. Moreover, given the rigorous and independent nature of science, they should feel comfortable in placing their trust in these scientists to arrive at the best decisions.

How then to explain the increasingly common rejection by members of the public of the scientific position with regard to many issues? To select just a few current (or very recent) examples, the safety of radioactive waste, the safety and impact of genetically modified organisms, the appropriateness of stem cell research, the consequences 'mad cow disease' for the safety of beef consumption, acceptable levels of contamination of drinking water, and the extent of water flow necessary to restore river systems to health.

Under the model outlined above, this can only be the consequence of public misunderstanding of the 'true' scientific facts. If they only understood the science, then they would concur with the rational decisions made by the scientists. Hence the need to invest in 'public understanding of science' programs to increase the public awareness of and comfort with science. This assumes that dissenters are of goodwill. If they are opposed for their own particular purposes, testing their views against rigorous scientific argument and data can expose this, and demonstrate where they are erroneous, biased, or based on false assumptions.

However assumptions about the reliability of scientific knowledge, particularly in addressing the increasing array of rapidly emerging, complex issues, the translation of this knowledge into decisions, the assumed ignorance of non-experts, and the basis for trust in such processes have been thrown into considerable question by a range of both theoretical developments and practical experience.[17]

These will be explored in the next section, followed by a number of case studies of disputes between scientists and stakeholders over decisions about water resources.

7.2 The Challenge to Scientific Authority

7.2.1 The Reliability of Scientific Knowledge

> The widespread recognition of the many successes of science which have created a demand for greater investment and returns, has, somewhat paradoxically it has been argued, lead to the displacement of the traditional model of knowledge generation and application, at least in part, by a new model.[18] (Gibbons *et al*. 1994)

In this model:

- problems are substantially set and solved in the context of application, rather than in that of the relevant research/academic community;
- instead of problems, research agendas and accepted solutions being determined within a disciplinary framework, they are based on and judged against trans-disciplinary approaches and resources;
- rather than a homogeneous community of discourse, heterogeneous skills and experience direct the knowledge production;
- the organisational form is weakly institutionalised, transient and heterarchical, in contrast with the relatively permanent, hierarchical character of universities and research institutions in the past; and
- quality control, instead of being based only on internal peer review, increasingly involves wider criteria based on efficacy of application, reflecting the wider social composition of the interested audience.[19]

It is apparent that these changes clearly mark a shift away from a relatively isolated community and practice of science, to a situation where they are far more embedded in the interests of wider elements of the community, and are judged in part on the way and extent to which they meet these needs.

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[17] There is a general movement in both Europe and the US, aimed at "democratising expertise" ie. reducing its privileged elite status, while at the same time developing mechanisms to more effectively interface between expertise and government "expertising democracy" (Liberatore and Funtowicz, 2003). However, this chapter addresses the more specific interplay between scientists and stakeholders over specific decisions.

[18] The inelegant labels of Mode 1 and Mode 2 will not be used in this paper.

[19] Paraphrased from Johnston, 1998.

As a consequence:

> the once clear lines of demarcation between government, industry and the universities, between science of the universities and the technology of industry, between basic research, applied research and product development, between careers in academe and those in industry seem no longer to apply. Instead, there is movement across established categories, greater permeability of institutional boundaries, greater blurring of professional identities…science has been invading, but also invaded by countless demands of society. (Gibbons, 2003, p.53)

Under these circumstances, the presumed separation between scientific experts and the general public, and even more so with regard to stakeholders with a legitimate interest, can be expected to have declined. Scientists have been involved in shaping, or pronouncing on, decisions of direct interest to the stakeholders, and the stakeholders have a keener interest in the framing of these decisions, and the adequacy of the information on which they are based.

A far more comprehensive model of this changed relationship, and its implications, proposes that not only have the conditions of production changed, but science itself has developed a new form:

> Whereas science was previously understood as steadily advancing in the certainty of our knowledge and control of the natural world, now science is seen as coping with many uncertainties in policy issues of risk and the environment. In response, new styles of scientific activity are being developed… The science appropriate to this new condition will be based on the assumptions of unpredictability, incomplete control, and a plurality of legitimate perspectives… The emerging science fosters a new methodology [in which] uncertainty is not banished but is managed, and values are not presupposed but are made explicit. The model for scientific argument is not a formalized deduction but an interactive dialogue. (Funtowicz and Ravetz 1993, pp.739-40)

These new policy issues have common features that distinguish them from traditional scientific problems:

> They are universal in their scale and long-term in their impact. Data on their effects, and even data from baselines of 'undisturbed' systems are radically inadequate. The phenomena, being novel, complex, and variable, are themselves not well understood. Science cannot provide well founded theories …but only mathematical models and computer simulations, which are essentially untestable. On the basis of such uncertain inputs, decisions must be made, under conditions of some urgency. Therefore policy cannot proceed on the basis of factual predictions, but only on policy forecasts. (Funtowicz, and Ravetz 1993, p.742)

Four distinct types of science are identified, against the axes of **knowledge**, or more specifically systematic uncertainties of knowledge, and **values**, as reflected in 'decision stakes' – the costs, benefits and value commitments involved through the various stakeholders:

(1) core science – *very low system uncertainties and decision stakes* – Kuhn's normal science in which epistemological uncertainty is low and application is incremental;
(2) applied science – *low system uncertainties and decision stakes* – mission-oriented, where there is a prescribed outcome which strongly shapes the knowledge generation; there may be multiple routes to the goal which will be assessed against multiple application criteria;
(3) 'professional consultancy' – *moderate system uncertainties and decision stakes* – client serving, commonly with ill-defined objectives, frequently involved with adapting generic knowledge and data to specific local conditions; not clearly reproducible, hence allowing for legitimate resort to 'second opinions';
(4) post-normal science – *high system uncertainties and decision stakes* – issue driven, uncertainties deeply epistemological and/or ethical, decision stakes reflect conflicting purposes among stakeholders; in these circumstances, knowledge is so limited, uncertainty so great, and interests of stakeholders so strong, that the approach to generating useful knowledge must fully involve stakeholders and build from their perspectives and local knowledge.

An example of post-normal science is provided by the current concerns and conflicts about global climate change and possible consequent sea-level rises. Knowledge is highly uncertain, possible implications are huge, lead-times to effective action are long (long before knowledge uncertainties can be substantially reduced), stakeholders are many, and policy options are all very costly. In addition, the approaches of, at one extreme 'she'll be right', or at the other full application of the precautionary principle, do not offer an effective basis for dynamically engaging in the knowledge development and uncertainty reduction necessary for better decision-making.

Returning to the four categories of science; the first category is thoroughly familiar. Categories 2 and 3 are largely familiar, and have reasonably well-developed procedures and quality control. But Category 4 is relatively new and our experiences are mainly of massive conflict, misunderstanding, dysfunctionality, and poor decision-making. This is where we need new capacity for engaging scientist with stakeholder, knowledge with action, and systematic knowledge with local knowledge.

7.2.2 Translation of Scientific Knowledge into Decisions

It has been demonstrated by many analyses over the past 25 years that application of general scientific knowledge to applications requires interpretation and local knowledge. The long history and contribution of the engineering disciplines, dedicated to the application of knowledge to achieve particular practical outcomes are in themselves abundant evidence.

Studies of particular interpretations, or 'translations' involved with major risk assessment exercises (eg. fluoride in drinking water, lead in petrol, animal and health effects of pesticides, human health effects of smoking, etc) have confirmed the extent of extra-scientific translation involved in bringing knowledge to bear on decision-making. In particular, in the domain of law, standards of evidence and proof and causality of connection, may be very different from that accepted I the world of science.

In simple terms, there is no simple heuristic for the translation of scientific knowledge into decisions and policies. The realms of interpretation are so large, and the inability of general knowledge to precisely pre-determine specific outcomes so great, that the translation process and domain is almost always open to different interpretation, and challenge.

7.2.3 The Presumed Ignorance of non-Experts

The traditional model outlined in the first section relies on a clear contrast between the specialist knowledge and understanding held by scientists, and the lack of that knowledge in the public. This perspective is challenged firstly by the increasing engagement by stakeholders of their own specialist scientific resources. But more fundamentally, the scientist often lacks the local knowledge held by stakeholders which provides a reasonable basis for very different interpretation of data and theory.

This situation is demonstrated with remarkable clarity and detail in Wynne's (1996) analysis of the interaction between Cumbrian hill sheep-farmers of the Lake District of Northern England with government scientists over the radioactive fallout from the 1986 Chernobyl nuclear reactor disaster in the Soviet Union.[20] In short, what this analysis shows only too clearly, allowing that much of it can be accounted for in the customary terms of interplay between government bureaucrat and citizen, is that the officials called on the authority of science to make large claims which quite evidently proved to be false, and that the detailed local knowledge of the farmers was systematically ignored or under-valued.

[20] Precise details are not relevant here, but the reader is urged to access this account as a fascinating and exemplary account of the interplay between officialdom and farmers, and between scientists and locally well-informed citizens.

Furthermore, Wynne makes the case that there is rarely a single 'one-size fits all' public. There are many publics, with many different, and at times, opposing perspectives. Hence the equation is not between science and the public, but many sciences, and many publics.

7.2.4 The Basis of Trust in Science – Community Relations

There have been calls at regular intervals for a re-negotiation of the social contract between science and society and the relations of trust that both sides will adhere to the agreement. In the post - World War II era, this was formulated in terms of the provision of economically and socially valuable knowledge, and well-educated graduates, in return for a substantial level of public funding, and minimal interference in its use.

But in the conditions outlined above, this separation is neither appropriate, nor does it, in practice, exist. Social demands enter the determination of what is an important problem to be addressed, what methods are available to examine it, who should be involved in each of these stages, and what processes should be used to insert the resultant knowledge into considerations.

Gibbons (2003) argues that what is required is no longer merely *reliable knowledge*, but *socially robuknowledge* – knowledge whose validity is based on being tested in a range of contexts.

Irwin and Wynne (1996, p.7) stress the need to move towards a *relational focus:*
that interprets both 'science' and the 'general public' as diverse, shifting and often diverging categories.

Wynne (1999) further develops these ideas in an exploration of the basis of trust between the public and experts, pointing out that in most situations the public have such limited access to information, let alone power, that they have little alternative but to express a provisional trust, and hope that things will work out alright. He extends this into a consideration of an issue gaining attention in a number of quarters – the extent and ways in which the boundary between expert knowledge and lay knowledge can be made more permeable, and lay knowledge and expertise be brought to engage more effectively with scientific expertise.

The four issues of the adequacy of traditional scientific knowledge to address many contemporary challenges, the translation of expert knowledge into effective, agreed decision-making, acknowledging and making effective use of lay knowledge, and establishing a basis of understanding of the value, roles and limitations of each type of knowledge within trust-based relationships, are being played out in a range of current problems. We will now seek to examine these issues in the Australian context of water resources.

7.3 Water Matters

> The water resources upon which human life depends are under increasing stress. Almost no country will be spared the threat. Over the next 30 years, more than 60% of the world's population will face severe water-related problems; ie. 4-7 billion people. (Annan, 1997)
>
> Current patterns of water use are often not sustainable. There is mounting evidence that the world faces a worsening series of local and regional water quality and quantity problems, largely as a result of poor resource management, including ill-adapted allocative mechanisms, wasteful use of the resource, unregulated effluent disposal, and weak institutional frameworks. (UN Economic and Social Council)

It has become widely accepted that there is a need for a new paradigm in water supply and management. The approach developed largely in the nineteenth century in Europe and the US, and followed in Australia, does not appear adequate to address the huge challenges that are emerging. While there is substantial room, and need for, incremental improvements, they alone will not be sufficient. Rather, approaches need to be based on the recognition of water as a precious and valuable resource, which needs to be used to maximum economic and social advantage. This requires the adoption and acceptance of demand, and integrated water resource, management.

7.4 Expert-Lay Disputes over Water Issues

Cullen (2003) provides a snapshot based on extensive personal experiences of disputes over water issues:

> I want to talk about the particular challenges that I have faced in the water area, in trying to take science to what is a pretty sceptical, and diffuse, community. The decisions we make with our water generally involves millions of dollars to some beneficiaries who get access to a public resource… In many cases the science underpinning the water decisions is highly contested, and contested with a passion, with resources and with commitment that you wouldn't believe.(p.2)

In the development of a knowledge strategy for the Lake Eyre Basin, recognising the need to engage the community and provide the opportunity for input of local knowledge, a process was adopted which involved:

- establishment of a scientific advisory panel;
- selection of members to ensure not only with knowledge of Lake Eyre, but from different disciplinary perspectives;
- identification of a range of stakeholders;
- preparation of a series of short, plain English, theme papers, distributed to the community for comment and input; and
- focusing their research on a limited number of aspects that can be influenced to make a significant difference.

While the process is still in train and the value of the advice offered is yet to be tested, it has produced the basis for a far more effective dialogue between scientists and lay stakeholders with strong personal and financial interests, and considerable local knowledge.

A second case involved a review of the science underpinning water allocations in the Lower Balonne south of St. George, commissioned by the Queensland Premier, to support a proposal to resume a large cotton irrigation farm. Key features of the review and its context were:

- a climate of strong, vocal and well-organised opposition by the irrigators to the Premier's plans, and distrust of any proposal offered by the Government;
- the scientific basis for the water management decisions was provided by a Queensland Government Department – the Department of Natural Resources;
- the commissioning by the irrigators of their own scientists, who challenged the Government position on a number of grounds;
- these included the health of the river channels, where the official information was based on sampling after a major flood, which may have provided an unrepresentative picture;
- another dispute was over the accuracy of water flow gauging and the modelling of water flows; as the objective announced had been to raise mean average flow from 47% to 53%, demonstration of inaccuracies in measurement cast doubt on the basis for the target;
- invitations for submissions from the general public and the scientific community;
- the establishment of a community reference group to oversee the review, composed of 15 community representatives with highly disparate views;
- public workshops;
- a strategy on the part of opponents to highlight uncertainties in the science, of which there are many, and on this basis no decisions should be made until all the uncertainties are resolved;
- evident difficulties in 'translating' the science into a sound basis for decision-making, particularly via politicians;
- strong media interest which sought to enhance adversarial stances.

This case study might be considered a classic of science-lay disputes. A hostile climate is established by a government decision which impacts heavily on some interests, which is fanned by the media and well-organised opponents. The process is almost entirely political. The science in this case is the vehicle for pursuit of political ends. The claim is made that the scientific information, produced by the Government themselves, is flawed, inaccurate and possibly biased. In the face of so much uncertainty (in the context of the view that the role of science is to remove uncertainty), no decisions should be made until there is a sounder basis for it. Little wonder that a model of rational decision-making does not apply.

A third case study, in which Cullen has been an active player, is associated with the 'Wentworth Group', in the context of the future health and viability of the Murray-Darling Basin, and more broadly managing the impact of drought on Australia. The Wentworth Group describe themselves as a:

> "group [eleven] of Australia's leading environmental scientists who are advocating radical and fundamental reform to halt further degradation of Australia's landscapes". (Wentworth Group, 2002)

The Blueprint advocates five key actions:

- clarify water property rights and obligations
- restore environmental flows to stressed rivers
- end broadscale clearing of remnant native vegetation
- pay farmers for environmental services beyond a reasonable duty of care
- incorporate into the cost of food, fibre and water the hidden subsidies currently borne by the environment.

Each of these five points has successfully become part of political and public debate in its own right. Many are involved in considerable controversy. However it is the second issue that has produced a controversy between these scientists and certain stakeholders, mainly those representing irrigation issues.

In a follow-up report focusing just on water (Wentworth Group, 2003), they argued:

> There is an emerging view in the scientific community that if we remove more than two thirds of the natural flow [of rivers] we will cause obvious and significant damage to river health. Flow regimes of less than half-natural will mean that it is highly unlikely that a river will be capable of remaining healthy in the long-term. (p.7)

As a consequence, they argue that the environmental needs of Australia's rivers should have a guaranteed first priority call on water required to keep them healthy. In the particular context of the River Murray, this translates into "at least an additional 100 gigalitres (GL) per year. Indeed:

> The best available science suggests that achieving a healthy River Murray System will require between 2000GL and 4000GL of new environmental flows, and profound changes in river management, to have a moderate-to-high chance of achieving success. (p.9)

This view has been met with considerable opposition from irrigation groups, on a number of grounds[21]:

- the emphasis on increased flows would divert attention from important non-flow issues;
- an apparent strong bias of some members of the scientific community against irrigation;
- significant biases in the science underlying the arguments;
- unfounded claims that non-flow initiatives could not be traded off against flow initiatives;
- little attempt to quantify improvements which can be made through initiatives which are not related to flow;
- absence of new research;
- need for "real data, not just based on best guesses and opinions;
- need for more research into new agricultural and industry opportunities;
- salt interception schemes and future engineering works should take preference over increased flows.

MIL has lobbied to ensure the scientific report being prepared for the Murray Darling Basin Commission's Living Murray initiative is released to stakeholders, in order to allow their own scientists to examine the basis of the arguments.

As in the previous game, it can be seen that the science cannot be separated from the political processes involved. Moreover, the 'arms-length pronouncements of official scientists evidently carry only limited authority. The model of active engagement of the community and their lay knowledge recommended in the theoretical arguments above, and practised in the first case study, would appear to offer the prospect of more satisfactory outcomes. However, where interests are threatened, and the possibility of bringing influence to bear available, it would be naïve to suggest that even these processes would change the fundamental struggle for power.

7.5 Conclusions

The model of science as an independent, authoritative and arms-length contributor to, and determinant of, public decision-making is no longer valid. The limited capacity of traditional scientific knowledge to address many contemporary challenges, the importance of local lay knowledge, and the problems of translating scientific knowledge into decision-making, all have reduced the authority that science commanded in a previous age.

[21] Drawn from press releases of Murray Irrigation Ltd: http://www.murrayirrigation.com.au accessed 5 November 2003.

Science can no longer be considered as above or beyond politics. As the case studies above show, science is being used as a tool in the political process in a number of distinct ways: challenging of the accuracy of the science claimed to support a position, alleging bias because of the affiliations or values of the scientists involved, drawing on another field of science to support alternative possibilities, and in a paradoxical appeal to the authority of science, arguing for no action until scientific uncertainties are resolved.

Issues of water supply, access, management and quality engage so many legitimately (and sometimes illegitimately) interested parties, and carries such deep connotations and value associations, that political processes are likely to always dominate decision-making. Only political processes, designed to address irreconcilably opposed positions, are likely to be effective.

Finally, lessons may be learnt from developments in public participation and engagement overseas. In the Scandinavian countries, and the Netherlands, the mechanism of a 'consensus conference' is in regular use to allow public input. These rely not on engaging stakeholders, but a random selection of citizens (akin to jury duty) in becoming informed about a topic, listening to and questioning experts, and preparing a consensus report of their opinions.

> The European Commission, as part of a Directive to establish a framework for Community action in water policy released in 2000, have mandated the adoption of processes that provide for information supply, consultation and active involvement. Models of procedures appropriate to stakeholders and the community are offered. (EC, 2002)

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Chapter 8 Conclusion

8.1 Explaining the differences in the two 'Perspectives'

8.1.1 Other perspectives

Before saying anything about the two perspectives covered by Chapters 2 and 3, mention needs to be made of other groups of influential people (stakeholders) whose perspectives have not been considered so far. One such group is agribusiness and transnational corporation dealing with agricultural commodities and resources including money. This group's perspective will be referred to as the 'corporations' perspective', and even casual observation of the operation of agriculture and the food industry would suggest that corporations have a major influence. Practitioners refer to this influence frequently, and in doing so cite the inexorable advance in globalisation. There is, of course, a substantial literature on the many different points of view that can exist and be justified. McIntyre-Mills suggested that "the closest we get to 'truth' is through trying to see the point of view of all the stakeholders within specific socio-cultural, political and economic contexts". She indicates "A realisation that perhaps there is more than one way of seeing leads to an understanding that when doing problem-solving at any level, local, national or international, there may be more than one answer." (McIntyre-Mills, J.J., 2001, *Global Citizenship and Social Movements*, Harwood, Amsterdam Cited in Romm 2002)

This proving study tries to capture the essence of the perspectives from two stakeholder groups. It recognised that there is a third (the corporations) that should be included in a full study. It also recognises that sustainable development ideas although not associated with any existing group, represent a fourth perspective promoted by the UN acting on behalf of humanity.

8.1.2 The Two Perspectives

As a generalisation, the practitioners' perspective is how they view life in its totality. Only a part of their perspective concerns farming business. Farming is the main income source for most practitioners and helps farming families survive, grow, prosper and participate in modern styles of living. For these farmers, their farm is also their residence and because farms occupy space, their farms isolate them geographically, thus influencing what activities are feasible.

The specialist perspective is quite different. They do not view the totality of life but view farming as an economic activity that facilitates the national economy and focus on the need for efficient resource use. Higgins and Lockie seem to support this view in their review of the National Landcare (NLP) and National Heritage Trust programs (NHT). "While the NLP and NHT incorporate concerns about social responsibility, they define these in terms of *capacity* of individuals to respond to changing economic circumstances. This effectively defines land managers as socially and ecologically responsible only to the extent that they have the managerial capacity to pursue economically 'rational' practices" (Higgins and Lockie 2002, p.419 their emphasis).

The view of an individual specialist is influenced by their role in this industry and the available resources. Specialists are human but that they execute a specific role and do not consider the total picture. That role relates to control. The execution of power provides them with a living. They have to meet their other needs (protection, affection, understanding, creation, participation, identity, leisure and freedom) through other activities, which, however, play little part in their perspectives as specialists.

Both practitioners' and specialists' perspectives have developed over a very long time, and appear absolutely normal to them. Neither perspective is focused on the objectives of sustainable development. The practitioners' perspective has an individual welfare focus. The specialists' perspective is part of the control system that is focused on the economic welfare of the nation, global customers and, (increasingly in the last decade or so), environmental sustainability.

The control mechanisms available to specialists are normative (education, scientific research, general understandings, literature) and coercion (laws, rules and regulation as well as public sentiment, public relations, media and advertising), and the like (DiMaggio *et al*. 1991). Specialists copy their successful peers which reinforces successful approaches (mimetic isomorphism). This reduces the risk of the undertaking (for example, see, benchmarking, sustainable practices, Cary *et al.* 2002, current recommended practices, Sinclair Knights Merz 2001). The specialists' and the corporations' perspectives have been very influential over the decades in establishing the systems in which the practitioners have to operate in order to meet the need they have. The specialists' perspective is not uniquely Australian but is greatly influenced by the same mechanisms, normative (international understanding and world-recognised sciences) and coercion (international laws, courts, trade agreements and common trade rules - GATT, WTO). Mimetic processes include copying useful or successful arrangements from other countries.

In addition, specialists, corporations and practitioners have interacted to generate systems that work. Even though these systems may be in constant tension because of the changing power positions amongst the agents they still work in the sense that resources are used, national economies grow, specialist occupations expand, corporations grow and farmers mainly survive. In spite of these perspectives being very different, they do actually mesh together. However, they do not head towards achieving sustainable development ideas.

8.1.3 Thinking Ahead: Relief for Farmers

The active power in the system is with the specialists not the practitioners.[22] The specialists can educate and so persuade the practitioners, and they can coerce the practitioners through policies, rules and laws. The passive power in the system is with the practitioners. Certain kinds of problems are politically sensitive in Australia such as drought, flood, and storm damage and farming families can get relief from (only) these Exceptional Circumstances (Commonwealth of Australia 1992, 1996). In many western countries agricultural life styles are politically sensitive and are therefore supported through a wide variety of subsidies. Political lobbying for 'relief for farmers' such as, production subsidies, stewardship payments, eco-service fees and biodiversity maintenance payments from government, is a future option. This option does not need any adjustments to the current perspectives. It just involves expanding the delivery of 'needs', especially subsistence and protection needs, to practitioner by adding transfer payments from governments.

A number of practitioners talked about wanting better leadership in agriculture and needing more political power. A few practitioners referred to the aggressive tactics of European farmers, especially French farmers, in getting political power and suggested that Victorian farmers should do the same. However, Australian farmers have lost political power over the decades and this trend seems to be continuing (Halpin and Martin 1999, Herbert-Cheshire 2000). There are suggestions in 'Victoria's Food and Agriculture Sector in 2020' that many farmers will go out of business in the coming two decades because of competitive pressures. This might be prevented through the use of transfer payments and eco-system services aimed at supporting farmers in efforts to protect biodiversity. The Victorian Government has started a bush tender scheme as a vehicle for making these kinds of payments (Kefford 2002) as a mechanism for future relief for farmers.

Because the specialists' perspective is so different from the practitioners', farmers most likely will use their own means to meet the needs of their families. This seems a futile attempt to reverse the trends in political power but may be practical with the help of other specialists.

8.1.4 Thinking Ahead: Adjusting the perspectives

The likelihood of adjusting the perspectives seems to be extremely small. Practitioners' perspectives come from their desire to meet their family's fundamental human needs. While they may be mistaken about those needs and how to meet them (Max-Neef 1992, explains some of these difficulties), the desire to try seems to be part of human nature. The idea that a particular group of human beings (farming practitioners) would collectively and happily agree to forgo one or more fundamental human needs seems hard to accept. We expect that people will find more effective ways of meeting their needs and this is an urgent task (see Siegel 1999 on the limits of human needs).

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[22] Corporations with the backdrop of international trade arrangements, influence the rules under which agriculture operates, help set the exporting goals for Australia and help maintain the worldview that requires the efficient development of all resources. The agenda for Australian practitioners and natural resource specialists seems to be set outside Australia.

Second best will be to change practices so that practitioners relinquish needs incrementally. When circumstances change making meeting a need impossible, many practitioners may rationalise the loss and keep on working (only weaklings need leisure!). Some needs may be more vulnerable than others. Practitioners' freedom need (defined as the freedom to plan and implement their plans) may be vulnerable. The corporations' perspective may be driving corporations to more market power and the specialist's perspectives to more invasive, coercive, controls to save the nation's farm resources. Farmers may find that between these two forces their freedom need is increasing unrealisable. Those who can give up having this need will stay but the rest will leave. Interestingly, Kefford's vision of 2020 sees corporations in charge of food production. "A handful of cooperatives and corporations are responsible for the vast majority of food production from large scale, internationally competitive, cost effective systems" (Kefford 2002). Perhaps in terms of running a farm the following needs may be vulnerable:

1. Protection – declining farm capital value
2. Understanding – marketing done by corporations and use of patented technologies
3. Participation – less control on what happens on the farm
4. Leisure – smaller margins, so more work less time and less disposable income
5. Identity – less room for individuality
6. Freedom – less scope for individual planning and achieving those plans.

The perspective of specialists comes from a very long tradition. This perspective probably reflects western scientific tradition and so can be considered sacrosanct. The utilitarian ethic seems to be universal in government. However, the content of the natural resource specialists' perspectives are not so precious that some details cannot be changed. Specialists get paid for helping to provide guidance and control functions, not exactly for the content. Instead of focusing on (1) environmental sustainability of natural resource management and (2) production, specialists might research the impacts of policies on the welfare and wellbeing of farming families (as a prelude to considering equity). As an information collection activity, this would still be within their current perspectives. Their actions would be slightly different but their control and power (and so income) would be the same. Professors would still get paid but teach differently. However, specialists would have no incentive to change because they still draw income to meet their subsistence needs (and parts of other needs such as identity, protection and so on). Adding a new goal to their perspective, such as equity would move specialists into caring ethics and would represent a huge change[23] and might turn them from specialists into lobbyists.

The natural resource specialists' perspective is thus very unlikely to change and will continue focusing on achieving the goal of nationally efficient resource use. Of the two perspectives, (practitioners and specialists), there is more possibility for the perspective of specialists to change than for the perspective of the practitioners to change. Unfortunately there is no obvious big political incentive for specialists to change but there may be some small internal incentives (from within specialist groups) and external incentives (from areas or groups outside specialists groups).

[23] See Peterson (2001) for interesting ideas on caring ethics.

An external incentive to change the specialists' perspective might come from the practitioners. Some practitioners, particularly the ones with small businesses who suffer from the implementation of the specialists' perspective, may rise in revolt. However, as these are the economically weakest practitioners they are likely to also be the most ineffective lobbyists. Farmers are already a weak political force. It is also possible that increasing environmental problems will cause specialists to adopt more and more coercive solutions (more invasive solutions according to Blackmore 2001, p.7) that will eventually shock the general population into action. However, this may never happen, because specialists use a range of public participation programs to provide them with feedback on the politically acceptability of options and thus enable them to avoid such shock solutions. Ross *et al.* (2002) provides a typology of public participation.

There is one other element of external pressure. This is the very existence of sustainable development ideas. Sustainable development ideas are not controllable by Australian specialists (including governments) but provide a global benchmark on how to evaluate behaviour. In terms of human rights (which are part of sustainable development ideas[24]), Fiss noted that: "Viewing human rights as social ideals, transcending any existing legal order, enables us to use those rights as an independent standard by which to judge all social practices, including the law" (Fiss 1999, p.267). Fiss pointed out that "the rights named and enforced by a given state do not exhaust what individuals may claim as their due"(Fiss 1999, p.273). The same could be said to apply to all sustainable development ideas but it may take decades for this to happen just as human rights are still very much disputed.

Perhaps if there were an internal incentive to change the specialist's perspective, it might come from a change in the dominant ethic from the utilitarian approach to a more caring or Kantian ethic (that is, adding an equity objective, categorical imperative). This might change the focus from protecting the economy through efficient resource use, to a duel focus including equity, protecting the needs of the weakest in society. There is no obvious way for infusing people with a caring ethic.

8.1.5 Thinking ahead: Value in this work

The specialist perspective is aimed at improving the economic outcomes of agriculture in terms of the national economy and improving the efficiency of the use of natural resources (resource sustainability, principally of soil and water). The practitioner's perspective is aimed at meeting family fundamental needs. The conclusion is that the perspectives of these and other groups (corporations for instance) will govern the future for agriculture. If the current perspectives persist, then this means the objectives of sustainable development ideas are unlikely to be met.

[24] See Galtung (1994), for a discussion of human rights and human needs, and Wronka (1998) for the relevance of the UN Universal Declaration of Human Rights to social policy.

The value of work using the conceptual framework (comparing the perspectives) lies in three areas:

1 The first explores ways of facilitating the ability of farming families to meet their needs without having to adjust the perspectives of specialists. There are many things that practitioners, working together, might be able to achieve that would facilitate their ability to get their families' needs satisfied over a lifetime. These cooperative actions may not prevent the erosion of the ability of practitioners to get their need fulfilled directly via agricultural business (as discussed above) but the focus on fundamental needs may highlight these difficulties and stimulate further investigation.

The interviews with practitioners raised a number of issues for each of the nine fundamental human needs that could be ameliorated should practitioners decide to cooperate in addressing these issues. These issues could be referred to as candidate issues for cooperative solutions.

Approximately 24 candidate issues have been identified but others could be added.

To take this further, each candidate issue could be assessed against the specialist's perspective to see whether there is a beneficial outcome for the 'candidate issue' that is in line with the specialists' perspective. Should it line up then that specialist could be asked to help in favourably resolving the candidate issue. It is likely that very few candidate issues would be of interest to natural resource management specialists but many candidate issues may be of interest to other specialists. As an example, education is a candidate issue of little interest to natural resource specialists that would interest other specialists because it is an important national political issue.

Candidate issues could be reviewed in the following manner. Retirement income is a candidate issue; because farming families have a protection need in terms of retirement income. The actions of specialists and corporations tend to perpetuate the declining value of farming land, on which many farming families rely as their superannuation nest egg. Over a working life, the value of a farm as superannuation is eroded.[25] By working co-operatively, practitioners may be able to develop programs to provide for their retirement incomes and so meet this protection need. This may also help natural resource specialists wanting to expedite the departure of non-intensive farming businesses enabling productivity and global competitiveness to be improved. This provides practitioners and natural resource specialists reasons to support a universal superannuation scheme for farmers. Such a scheme would (1) facilitate farmer retirement (reason for practitioners' support) and (2) facilitate productivity improvements (reason for natural resource specialists' support).

[25] Farms in high amenity areas (close to cities, scenically attractive, close to recreation areas such as the coast or mountains) may command higher prices when sold as life style properties rather than as commercial farms.

Every aspect of the practitioners' nine fundamental needs could be investigated in this way on a local or regional scale, leading to small but useful programs that help farming families meet their needs.

Unless a clear advantage could be demonstrated for specialists, practitioners would have to take the lead role in working on candidate issues. This still may not directly ameliorate problems in fulfilling their subsistence need but by increasing the opportunity for farming families to meet their other needs, they would improve the overall quality of their lives.

2 Specialists: Work using the conceptual framework may encourage some specialists to then appreciate that there may be more angles to agricultural development and consequently more solutions.[26] It could also indicate alternatives to the expected future domination of agriculture and food production by corporations, by finding avenues that provide benefit to Australian farming businesses. It may also encourage some specialists to move away from concepts like community responsibility, or cogs in the system, towards investigating the decisions of all stakeholders and understanding what outcomes these stakeholders are trying to achieve. The limited focus of environmental sustainability could still stay with natural resource specialists, but others may be encouraged to investigate how comfortably this narrow focus sits with the wider package of sustainable development ideas.

3 The public: Work using the conceptual framework may continue to raise the ideas in sustainable development. This would improve the debate as to whether sustainable development ideas provide both the appropriate process and the appropriate objectives for Australian policy in agriculture and food production.

8.2 Update

8.2.1 Government

Since the joint Academies' study was conceived, and while it was underway, the water regimes continued to change. Many cities and districts experienced water shortages and conversations began to include questions like 'are you on Stage 2 or Stage 3?' In agricultural areas, there simply was not enough water to go enable irrigators to receive their agreed quotas. Serious attention has been paid to the south western part of Western Australia, where a changed pattern of rainfall has persisted for over twenty years and scientists and farmers speak knowledgably about climate change.

[26] Perhaps countering Shiva's TINA syndrome (There Is No Alternative) see Shiva 1993.

Partly because of the restrictions in urban areas, and partly because concern for water resources brought forth responsible behaviour, our personal consumption of water was greatly reduced. Newspapers have published frequent information about the levels of reservoirs and in a presentation by Mr Brian Bayley, CEO of Melbourne Water (Bayley, 2003), he commented that the surveys had shown a high level of knowledge in the community of these levels, proving that the message was getting through.

In October 2003, an interim report entitled Ecological Assessment of Environmental Flow Reference Points for the River Murray System was released for public comment and for use by the Murray Darling Basin Ministerial Council which met shortly after to consider the next steps in the Living Murray Initiative. The report was prepared by the Scientific Reference Panel (assembled by the Cooperative Research Centre for Freshwater Ecology) for the Murray-Darling Basin Commission.

The Ministerial Council nominated three environmental flow regimes for assessment, involving total flow in the river of 350, 750 or 1500 GL/yr. For each flow regime, three scenarios of water distribution were examined using the Murray Flow Assessment Tool (MFAT), which was a modified version of CSIRO's late-1990s Environmental Flows Decision Support System (EFDSS). The study region was divided into zones, and Echuca is included in two of these – Zone C (Yarrawonga Weir to the Wakool Junction), and Zone I (Goulburn River).

The Ministerial Council also nominated five significant ecological assets, which the writers of the interim report called 'icon sites', one of which was the Barmah-Millewa Forest. This forest, covering approximately 60,000 ha, is just upstream of Echuca and is a wetland of international importance which is named in the Ramsar Convention. 'The forest', says the interim report, 'provides major breeding sites for waterbirds, provides habitat and food sources for native fish, has diverse plant associations and supports rare and threatened plant species'.

Assessment of the impacts on waterbirds and vegetation indicates that the 1500 GL/y options provide the most benefit, but attention was drawn to the marked differences between plant species. For example, for spiny mudgrass (Moira grass) to remain as a dominant species in its habitats, there is a need for 'water regimes that discourage the encroachment of Giant Rush and Red Gum from the wetter and drier extremes, respectively'. In addition, while the report noted that medium level floods (greater than 40,000 ML/day) have become much less frequent with the river in its present tightly managed condition, 'the frequency and duration of the large floods required to inundate these areas has not greatly altered since the regulation of the river'.

At their meeting on Friday 14 November, the Ministers agreed to increase flows by 500 GL/year and to apply the extra water to six of the valuable assets (Hattah Lakes having been added to the previous five at the request of the Victorian Minister). Volumes will be built up over five years, stemming from water saving techniques and engineering works. Some water might also be purchased from current licence holders, and a recent report from the Australian Bureau of Agriculture and Resource Economics suggests that such a course would be better economics than investment in expensive interviews with farming families in the Echuca area, conducted by Quentin Farmar-Bowers following development of the conceptual framework, revealed that planning for the family and planning for the farming business went hand in hand, and that these took priority over environmental or sustainability issues. The perspective of the specialists or experts was closer to sustainability ideals, and increasingly so in recent years. They are also the 'active power in the system', taking on the responsibility of persuading or coercing the practitioners, whose power is of a more passive nature but nonetheless considerable. The allocation for the Barmah-Millewa Forest, near Echuca, is an extra 80 GL/year.

8.2.2 Other studies

Of course the Academies were not the only institutions in which there was interest in the changing water regimes and their social impact. It is impossible here to provide coverage of the work of others in Australia, but mention needs to be made of two leading scholars who have published work in this area. The first is Associate Professor John Rolfe, of central Queensland University in Rockhampton, and reference is made to significant studies by his group (Rolfe and Bennet 2004). The other scholar whose contributions are notable is Dr Henning Bjornland, Senior Research fellow in the School of International Business at the University of South Australia, whose studies were supported by an ARC-SPIRT grant (Bjornland 2004).

8.2.3 Signing off

In the end, it was clear that this preliminary study and especially the development of the conceptual framework had set the scene for more detailed work in other locations and with other communities. An important group that were omitted from the present study because of limitations of time and funding were corporations (especially those processing agricultural produce), and another would probably be the professional and retail services that are so much part of the practitioners' lives. More complete studies would need to bring in such groups. While the framework and the analysis of life in terms of Max-Neef's nine human needs seemed very general, it would be well to test in quite different communities – coastal, tropical or sub-tropical – and in centers further from the south-eastern population axis.

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