

4. Irrigation landscapes

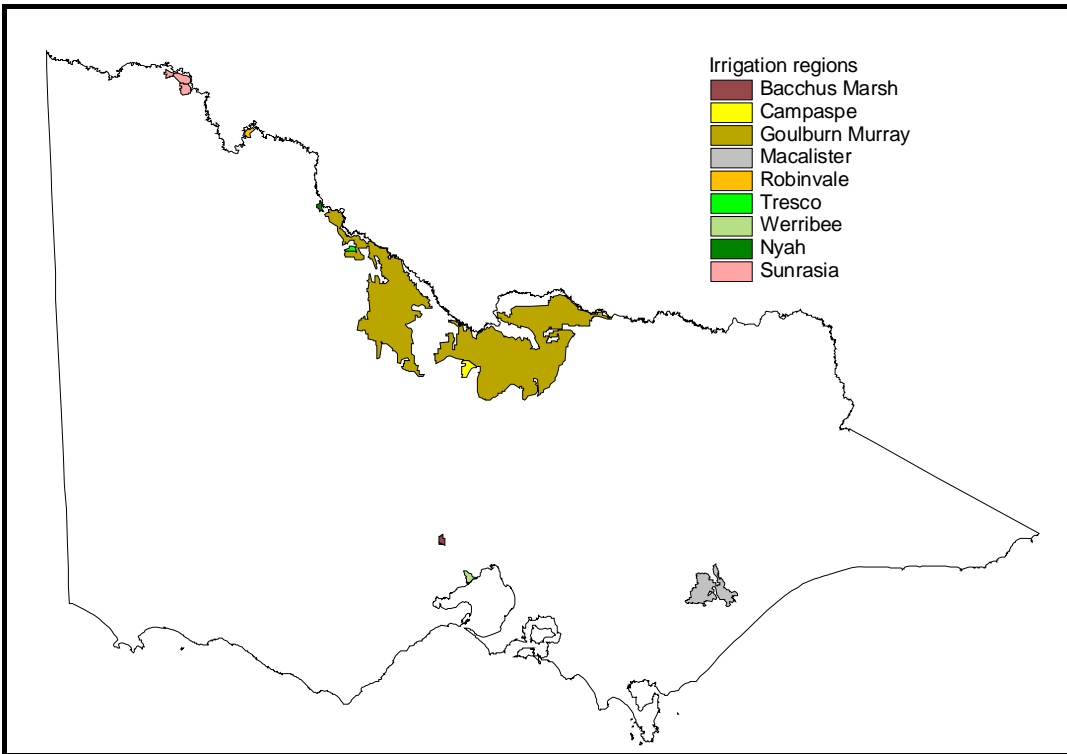


Figure 1 Victoria's irrigation districts

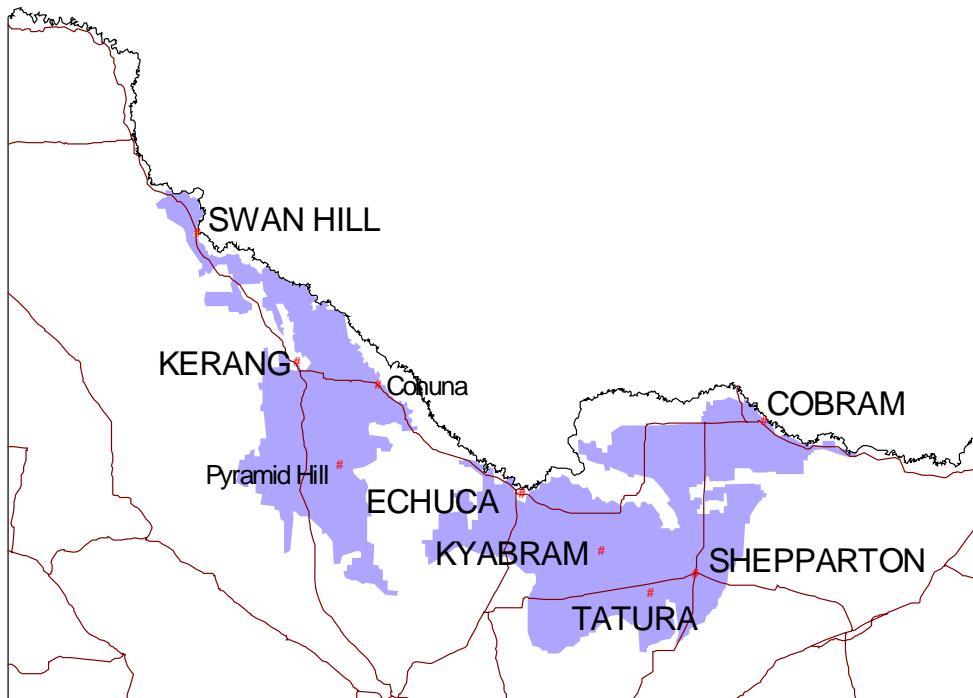


Figure 2 Goulburn Murray irrigation region

One of the indirect social impacts of increasing agricultural productivity is a gradual change in social values as the population urbanises and becomes less connected to rural lifestyles and culture. Increasing agricultural productivity is one of the long term drivers of urbanisation. Urban communities develop cultures that differ in important respects from rural community cultures. One aspect of this cultural difference is the relative importance of environmental and production uses of natural resources. Water is shaping a key focus of this cultural debate between city and country. In this chapter we explore the impact of changing community concern over the environment on the irrigation community of northern Victoria, and in particular, the irrigated dairy industry. Unlike the beef industry which faces competition for land, the dairy industry faces increasing competition for water. Initially this competition is from other agricultural producers, given an opportunity to compete in the new water market.. But in the future the competition may increasingly come from the wider community and its concern for the health of riverine environments.

The environment as a commodity

Personal income and environmental preferences

In the second chapter we examined the changing composition of Victoria's population, and observed the increasing ratio of urban residents to farms in the state. In 1935 there were approximately 25 Victorians per farm. By 2001 this ratio had risen to 150, and we anticipate this could rise to 350 by 2031. Urbanisation has occurred in conjunction with increasing community wealth over the same period. Increased wealth and urbanisation lead to changing social preferences other than the preference for landscape amenity that we discussed in Chapter 2.

In the ecological economics literature there is an ongoing debate over the 'environmental Kuznets curve' theory. This theory argues that there is a bell-shaped relationship between per capita income and pollution (Grossman & Krueger 1991). Initial industrial development will lead to increased levels of pollution, but eventually per capita income will reach a level where public demand for environmental goods will lead to decreasing levels of pollution. This theory was developed as an argument in favour of the North American Free Trade Agreement. Critics of the agreement argued that it would encourage a race by American industry to the lowest available environmental standards in Mexico. However, Grossman and Krueger argued that increased living standards in Mexico would lead to political pressure for greater environmental controls. Their initial paper stimulated further research into the theory and its application to other environmental issues other than pollution, including forest reservation and protection, and irrigation development. Researchers have demonstrated a strong relationship between economic development, reforestation and ecosystem protection (Bimonte 2002; Pasche 2002; Rothman 1998; Rutel 1998) A similar relationship has been confirmed for irrigation development (Bhattarai 2004). Recent research suggests these preferences also require a functioning democracy that allows these interests to be articulated against the interests of those who derive income or wealth from resource exploitation (Bimonte 2002).

The current debate over the environmental Kuznets curve focuses on whether it reflects a reduced environmental impact or the capacity of the developed world to use environmental power to transfer environmental costs elsewhere in the world (Lindmark 2002; Rothman 1998; Suri & Chapman 1998; Unruh & Moomaw 1998; Vincent 1997).

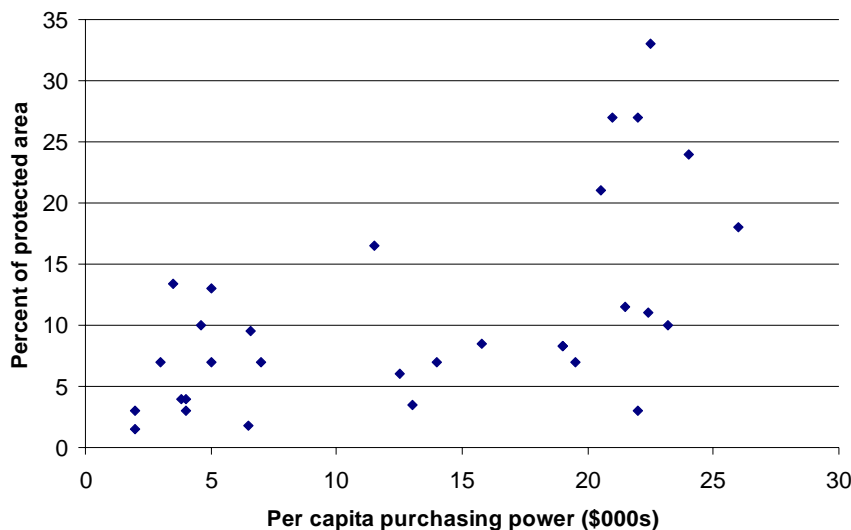


Figure 3 Relationship between land reserved for conservation purposes and per capita purchasing power for European countries (Bimonte 2002)

What does the community want from the countryside?

For previous generations of Australians the answer to this question was simple and, in one sense, uncontested. The countryside was there for economic exploitation. The debate was over who would undertake and benefit from that exploitation. With increased income and urbanisation we are seeing a gradual escalation of public demand for 'multi-

functionality' from agricultural land and water resources within Australia. Multiple functions extend beyond the traditional economic outcomes and now include better protection of environmental habitat, improvements in the quality and quantity of water supply, animal welfare and health of riverine habitats, 'clean' food and landscape amenity (Cocks 1999; Ellyard 1998).

As agriculture has become more efficient and transport more reliable, our expectations of, and our concerns about, food have changed. Fears about its reliability of supply and price are reducing for many of us as we have become used to expecting the steady supply of cheap and out-of-season fresh food on supermarket shelves. Food is increasingly being marketed with 'credence qualities' which rely on the consumer trusting the claims of the producer. These include animal welfare, environmental responsibility and social equity.

The changes in expression of public demand for environmental goods are not always gradual: They are often crisis driven. In recent years major ecological events have triggered changes in public policy in a relatively short time. The dust storm over Melbourne in 1983 led to renewed public policy commitment to soil erosion and dryland salinity. An enormous algal bloom along the Darling River catalysed the development of policy targeted at nutrient pollution in waterways. A crisis in the transporting of live sheep to Saudi Arabia highlighted the issue of farm animal welfare. Social and cultural forces that extend beyond the state or even this country sometimes drive shifts in public opinion over environmental issues. An example of such a shift happened in late 1988 and early 1989 (Figure 4). Possible causes for this were the inclusion of the environmental issues into the party political agenda, the subsequent enormous media exposure given to environmental issues during that year and publicity visits and television programs by high profile international environmentalists including David Suzuki (Crook & Pakulski 1995). The subsequent drop in concern for environmental issues was likely to be related to the rising unemployment rates in Australia during the early 1990s. Our environmental concern seems to be greater when we are confident of our own economic security. This is another way of stating the environmental Kuznets curve hypothesis.

These crises and community opinion responses lead to a growing cultural divide between urban and rural opinions. Sometimes the resulting debate can lay bare fundamental disagreements over moral values. More often the debate is focussed on the relative knowledge of both sides of the debate and the pragmatism of proponents (Geno & Urcuhart 2001). The rural proponents tend to see their adversaries as being both ill-informed and impractical. This may be true, but pointing this out is seldom likely to win the debate. Politics and the court of public opinion is increasingly swayed by simplicity and attention grabbing headlines. The farm sector finds it much harder to sell the message that inflexible regulation has a real impact on profitability and sometimes unintended consequences on the environment (Davidson & Elliston 2005).

Currently, the prolonged span of seasons with below average rainfall in Victoria has shifted water scarcity to the attention of the Victorian electorate. We have seen renewed interest in water law reform; this follows the precedent set after previous major droughts.

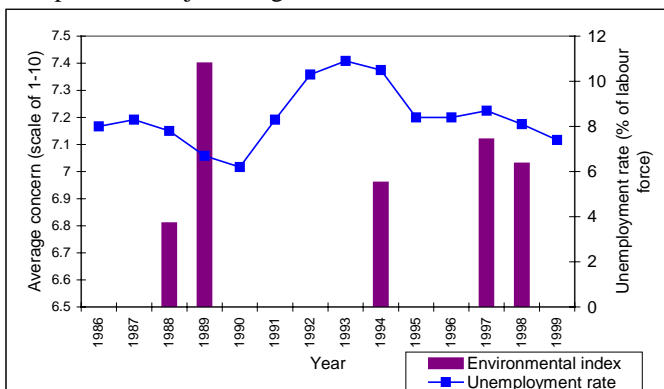


Figure 4 Unemployment rate and the index of environmental concern (on a scale of 1-10) (Australian Bureau of Statistics 1986–99; unpublished data)

Irrigation, rivers and the environment

Historians describe Victoria's water policy as passing through three phases. In the development phase the state controlled rivers and built dams and irrigation systems. The objective of this phase was regional economic development, leavened by concern for social stability following depressions and war. This phase started with the attempts to save failing selection schemes in the 1890s. It was pushed along by two waves of soldier settlement. The development phase continued until quite recently, with a flurry of dam building in Victoria through the 1950s, 1960s and 1970s. Big Eildon was completed in 1955. Lakes Mokoan and Nilhacootie were completed in the 1960s, and Lakes William Hovell and Dartmouth in the 1970s.

The completion of Lake Dartmouth in 1979 signalled the end of the development phase. The supremacy of the neo-liberal agenda in public policy in the 1980s ensured future water developments would be required to provide a positive economic return on the state's investment in water infrastructure. Irrigation charges were progressively increased to full cost recovery. In the 1990s two major policy changes were introduced: water rights held by irrigators were made tradeable on a temporary or permanent basis, and irrigation water supply authorities were corporatised. Three outcomes of this stand out in retrospect:

- the sale by auction of water rights made available by the completion of Dartmouth dam
- the financial pressure placed on irrigation authorities to maintain their budgetary position by maximising the volume of water sold
- the activation of previously unused sleeper water entitlements by their conversion into tradeable commodities.

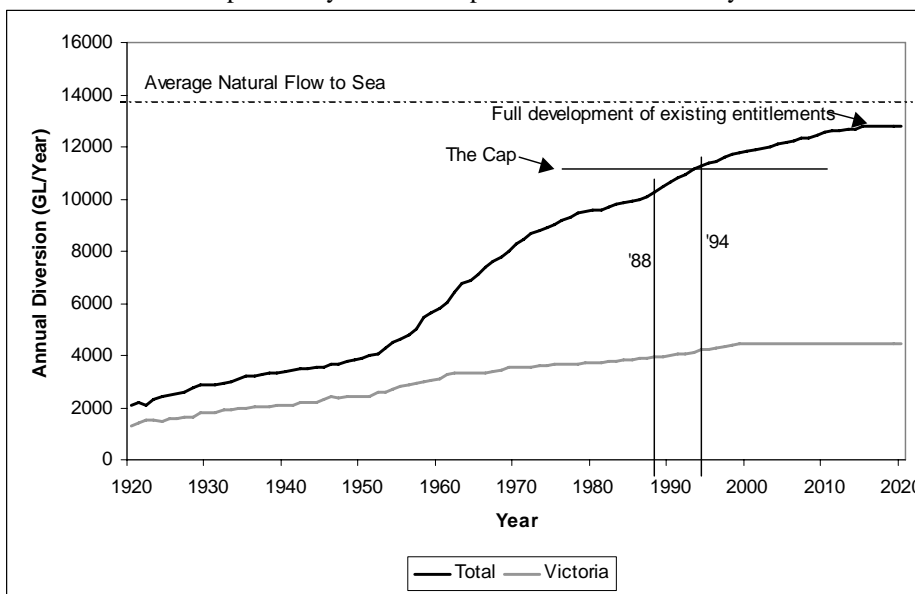


Figure 5 Annual diversions from the Murray Darling system by year 1920–2020 with and without the cap on extractions (Murray Darling Basin Commission 1998)

Each of these outcomes encouraged increased consumption of water. Within a decade a new phase of water policy, driven by drought and changing environmental preferences, had arrived. In 1995 the Murray Darling Basin Commission published an audit of water resources in the basin (Murray Darling Basin Commission 1998). The audit showed that in the previous six years basin-wide diversion had increased by 8%, driven in part by the application of new water policies. There was massive scope for further increases in diversions with only 63% of water entitlements being used. The response was to attempt to cap extractions for each state at 1994 levels of development. Then, in 2002, the Murray Darling Basin Commission commenced the 'Living Murray' consultation process aimed at reducing diversion and increasing environmental flows. In 2004 the Council of Australian Governments made a commitment to return 500 gigalitres of diversions to the Murray as a 'first step'. Victoria's response has been to release a green and then white paper detailing how the state will meet these commitments.

The white paper includes many proposals, such as plans to reduce the availability of low security water to irrigators and to decommission Lake Mokoan in north east Victoria. In the space of 10 years water policy has changed dramatically. We have moved from auctioning off water from a recently completed reservoir to reducing the volume committed to irrigation and decommissioning a reservoir completed only 40 years ago.

Australia is not alone in reducing the allocation of its water to irrigation as it has become more wealthy. In a study of 66 tropical nations researchers at the International Institute for Water Management have discovered a Kuznets curve relationship between per capita income and environmental development (Bhattarai 2004). It appears that in Victoria we have just passed over the development peak in the irrigation Kuznets curve. The theory tells us that the likely way forward is for further reductions in diversions for irrigation.

In this chapter we examine the implications of this trajectory for the dairy industry of northern Victoria. The dairy industry is now the major consumer of irrigation water in northern Victoria. The dairy processing industry is an

important employer in the region. We start this by first trying to understand the way men and women in the dairy industry have adapted to change in the past 40 years..

The dairy industry

The hardship of the 1970s

In the first chapter we explored the importance of innovation to agriculture and set out the choice between innovating to keep up with the terms of trade or accepting an inexorable decline in viability. We also made the observation that, although innovation in agriculture may improve agricultural productivity, it will often be socially disruptive, creating clear winners and losers in farming or in regions. This is because innovations will often favour some business structures or regional locations and disadvantage others. In the 1960s many Victorian dairy farmers experienced the structural discrimination of an innovation.

In 1961 the Australian dairy industry was composed of many small farms milking 50 or fewer cows. This was the year that the number of milking cows in Australia peaked at just under 3.5 million (Australian Bureau of Statistics 2004). In the following decade the industry converted to a bulk milk supply system to factories. Prior to the introduction of bulk supply, the majority of producers separated cream and milk on-farm. Milk was supplied to the factory in cream cans for butter production. Skim milk was used on-farm to feed pigs. With bulk supply, whole milk was instead stored on-farm in refrigerated vats until collection by milk tankers. This saved labour and transport costs for the processors and improved milk quality.

Bulk supply arrangements required milk producers to convert their dairy sheds to stainless steel based milking and storage systems. Many producers were incapable of funding this investment. This difficulty was compounded by an announcement at the close of the decade that the United Kingdom was joining the European Economic Community in 1974. When this happened, Australia could no longer export butter to the UK. These two changes initiated a massive decline in the number of dairy cattle in Australia that only bottomed out in 1991. Of course, the number of dairy farmers dropped as well.

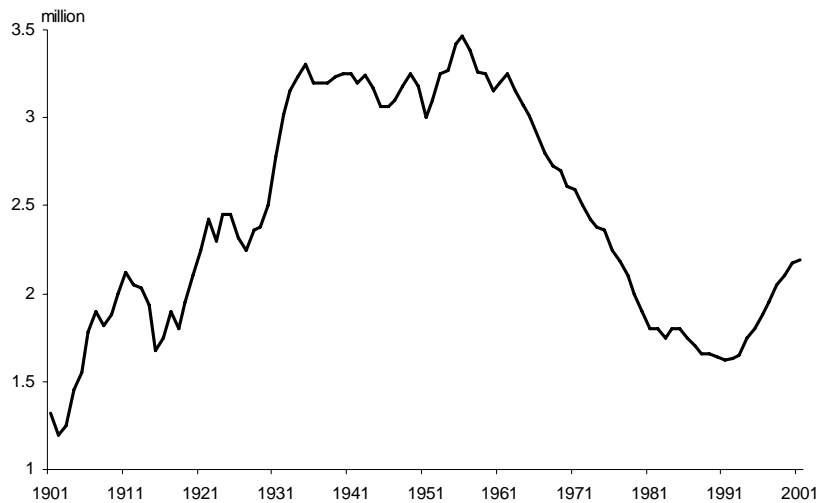


Figure 6 Number of milk cattle in Australia 1902–2001 (Australian Bureau of Statistics 2004)

One way of looking at the response to these two shocks to the industry is to applaud the massive changes in productivity that resulted from the shakeout. Australian Bureau of Agriculture and Resource Economics (ABARE) describes the industry as achieving a productivity growth of 2.1% per annum in the 1980s. It was probably even higher in the 1970s. The major reason for this high rate of productivity growth was identified as a dramatic increase in farm size and the exit of many farmers from the industry through the 1970s and 1980s (Martin 1995).

The simple figure of a 2.1% per annum increase in productivity may, from a historical perspective, merit celebration about the success of the industry. But it fails to describe the massive upheaval this increasing productivity meant for many dairy farm families. The human face of this decline was a prolonged period of low incomes and massive adjustment in the industry. A large number of families operating small dairy farms found their businesses unable to generate income sufficient to meet even the most basic of family needs. A series of surveys in the mid-seventies of Victorian dairy farm families revealed widespread poverty, hardship and psychological stress (Cary & Weston 1978; Salmon et al. 1977). Within Victoria, dairying disappeared from whole regions of the state.

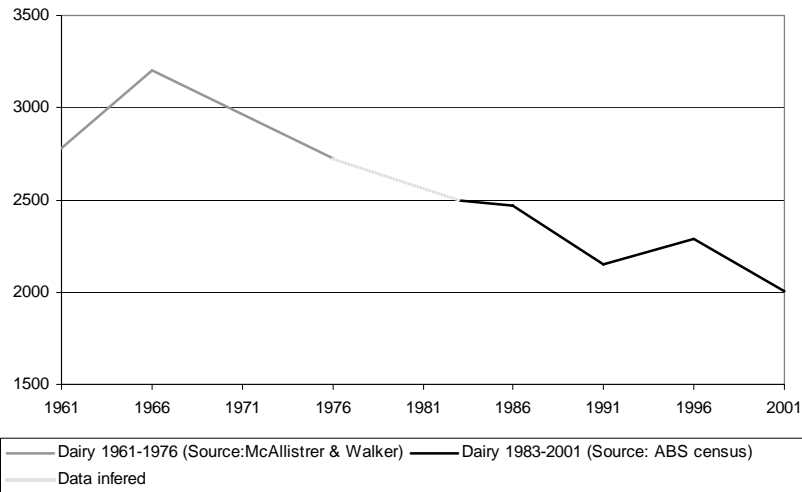


Figure 7 Count of Victorian dairy farm establishments 1961–2001 (Australian Bureau of Statistics 2001)(McAllister & Walker 1980)

Expansion in the 1990s

In reading the thoughts of dairy farmers in the 1970s, one is struck by their pessimism for their own farms and for the industry as a whole (Salmon, Bock, Turnbull, & Trethewie 1977; Salmon, Fountain, & Hawkins 1973). Social researchers studying the industry were regularly told there was no future and that this was the end of the road for the industry. Despite this pessimism, there was a future. After the catastrophic loss of market access in the 1970s, during the 1980s and 1990s the terms of trade for milk production declined by only 1.1% per annum. The number of dairy farms continued to decline, not through conversion to beef farming as was often the case in the 1970s, but through dairy farm aggregation. Some dairy farmers were doing well enough to buy out their neighbours.

By the 1990s the decline in the number of dairy farms and dairy farmers slowed and almost halted. At first glance this might suggest that the process of farm aggregation that drove earlier productivity improvements had slowed. ABARE reports that dairy industry productivity growth fell to 1.1%. The major factor contributing to this productivity growth was increased levels of production achieved by increasing inputs into the production system – feed supplements, water, capital – instead of farm aggregation (Hogan, Shaw, & Berry 2005; Martin 2002). This strategy has been sufficient to allow the industry to just keep pace with the terms of trade until a recent drop in the price of milk.

However, aggregation has not ceased, merely slowed. Dairy farm aggregation continued in traditional dairy farm areas through this period. This increase was partially offset by the expansion of the industry in new or previously abandoned locations such as south-west or north-east Victoria. Even in good years, it appears dairy farmers leave the industry.

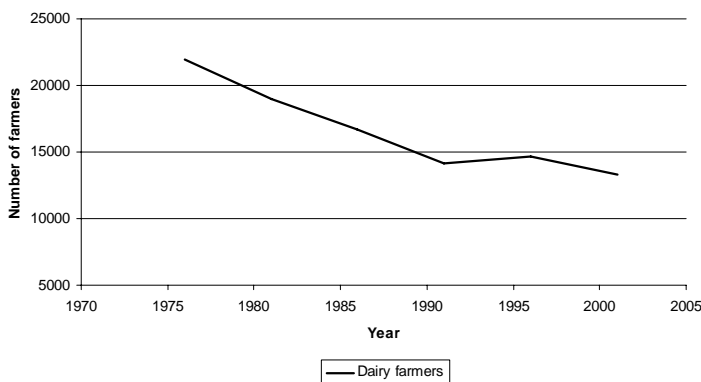


Figure 8 Count of Victorian dairy farmers 1986–2001 (Australian Bureau of Statistics 2004)

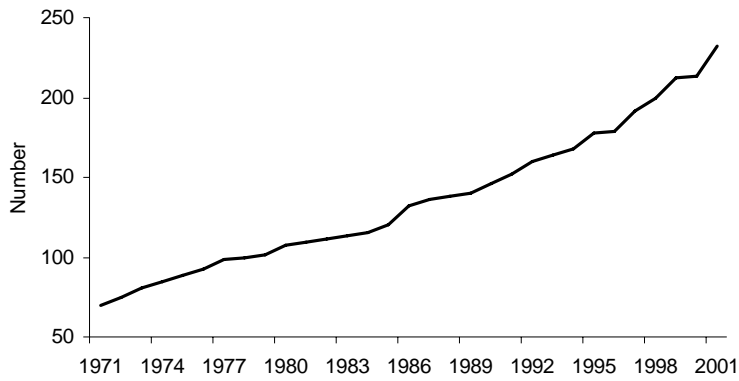


Figure 9 Average Australian dairy herd size 1971–2001 (Australian Bureau of Statistics 2004)

Victoria's dairy farms today

Victoria's dairy industry is much less extensive than the industry of the 1960s. It is comprised of three major and two minor regions. The major regions are in the south-west, south Gippsland, and the Goulburn–Murray region. The first two are regions based on rain fed pasture production. Production in the Goulburn–Murray is based on irrigated pastures. The two minor regions are the Macalister Irrigation District near Maffra in central Gippsland, and the rainfall pasture dairy system in the mountain valleys of north-east Victoria. The north-east industry is a remnant of a once much larger industry that collapsed with the introduction of bulk supply and the loss of preferential access to the British butter market.

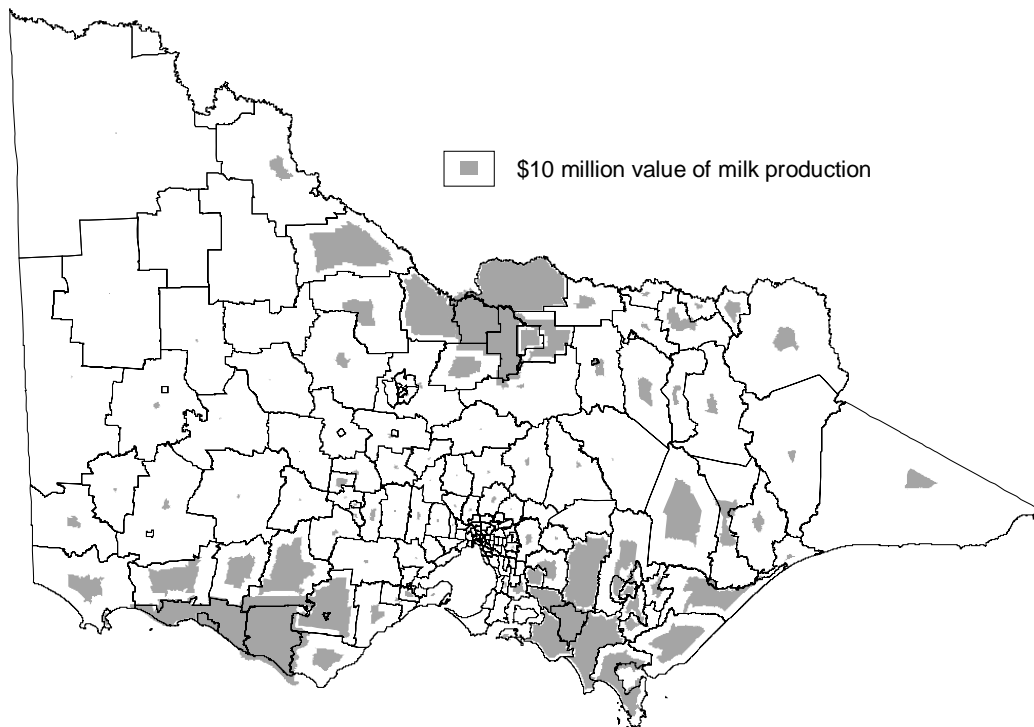


Figure 10 Cartographic representation of the value of milk production by SLA in 2001 (Australian Bureau of Statistics 2001)

Dairy farms are not hobby farms

When compared to the beef industry there are few small dairy farms in Victoria. Most Victorian beef farms have a turnover of less than \$100 000, and many are managed part time. Eighty-five per cent of dairy farms have a turnover greater than \$100 000, and few are managed part time. This is because the labour intensity of managing a dairy farm makes it difficult to combine milk production with a significant commitment to off-farm work. This characteristic of dairy farming has ensured that the adjustment patterns of this industry are quite different to that of the beef (or wool) industries.

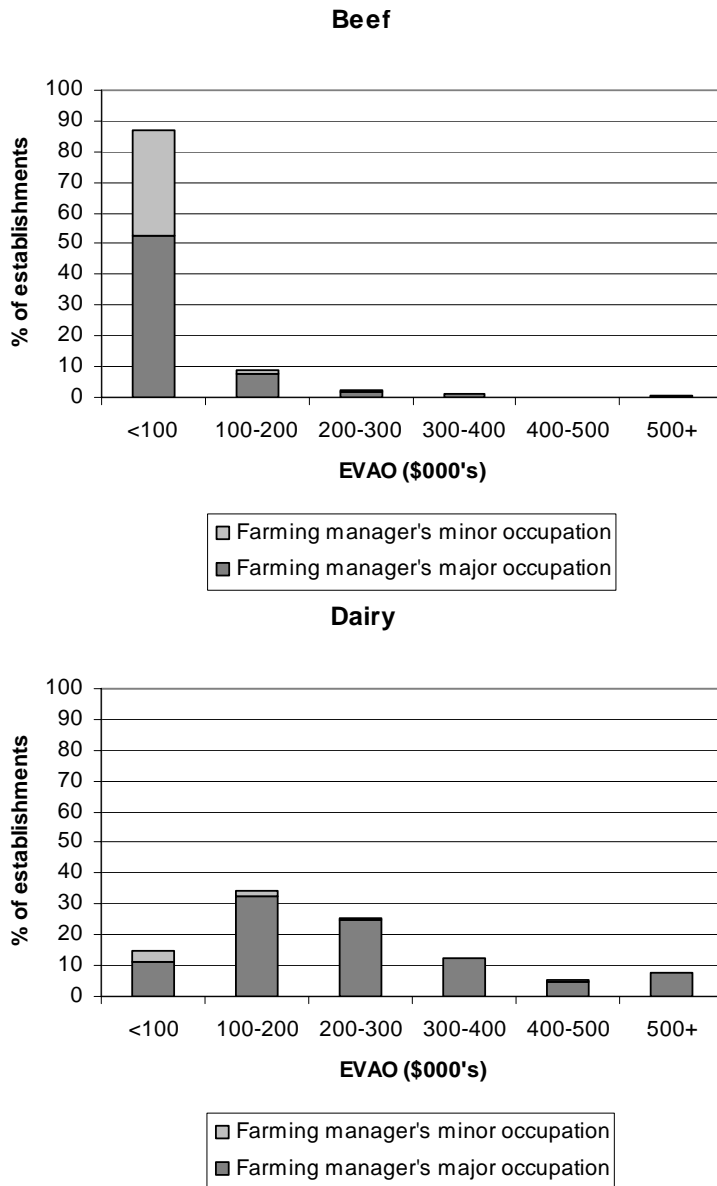


Figure 11 Farm size (measured by EVAO) and farmer occupational status for Victorian dairy and beef industries in 2001 (Australian Bureau of Statistics 2001)

Dairy farming is a business, not a way of life

As a group, dairy farmers are different to other Victorian farmers. They do not follow the common career path of treating farming as a career for life. They are more likely to leave farming than other farmers. A beef producer once explained to us why this was so. He believed dairy farming was effectively a twice a day term of penal servitude for the term of one's working life. While this jaundiced observation might seem harsh, it is true that the average dairy farmer is more willing to plan for retirement rather than assume he or she will be carried out in a box. In a study of dairy farmers conducted in 2002, one third of Australia's dairy farmers planned to retire in the next six years (DRDC 2003). With the exception of the period 1991–96, the exit rate from dairy farming has averaged between 6 and 7% per annum. This is 50% higher than the exit rate of sheep farmers or beef farmers.

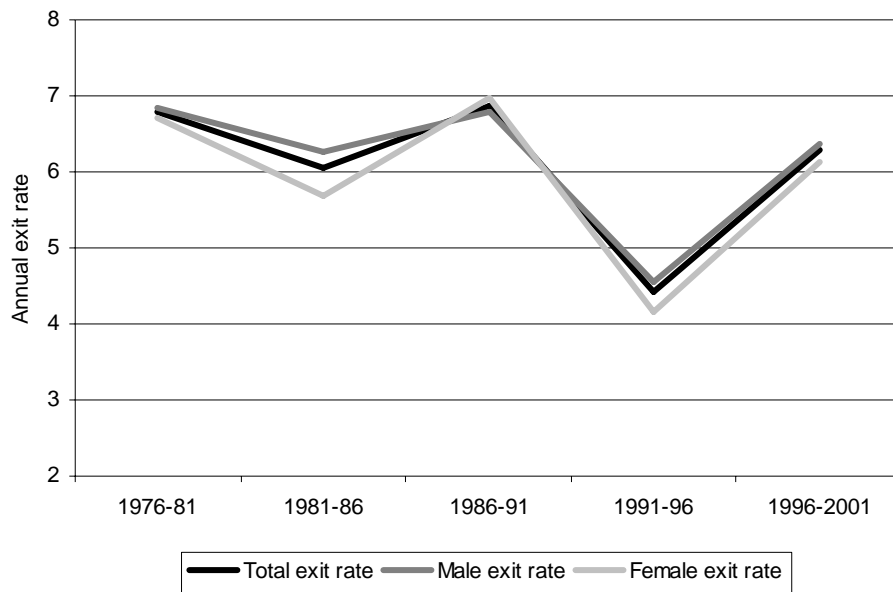


Figure 12 Rate of exit from dairy farming by year and sex 1976–2001

Age has less and less to do with quitting the industry

In 1981 the decision to leave dairy farming was a decision likely to be made by a dairy farmer as he or she reached and passed the age of 55. By 2001 there had been a significant shift in this pattern. The relationship between age and exiting the industry was much more muted; younger persons were the ones most likely to have left. In contrast, those who passed the age of 55 were half as likely to leave the industry as was the case 15 years ago. This is a fundamental shift in the pattern of retirement in the industry, and it cannot be linked to recent declines in milk prices. Data from this most recent period is not yet reflected in these statistics.

This finding places an interesting interpretation on the Dairy Research and Development Corporation's (DRDC) 2003 finding that one in three dairy farmers intended to leave the industry in the next six years. This large number might be a result of retirement being delayed through the 1990s in response to relatively buoyant conditions in the industry. We return to the implications of this delayed retirement in our examination of the impact of drought on the dairy industry.

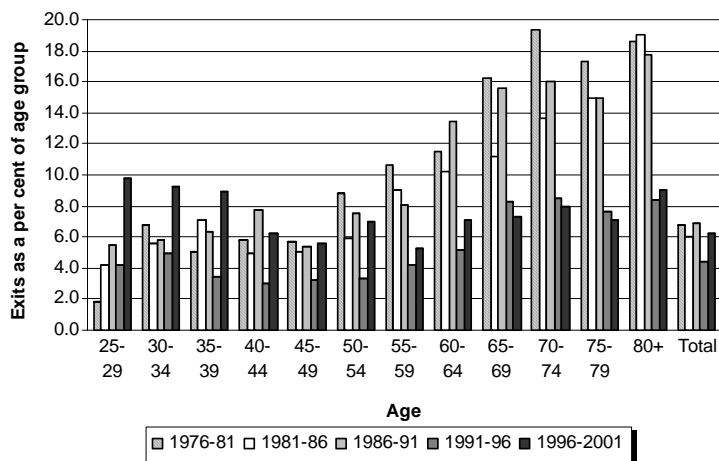


Figure 13 Rate of exit from dairy farming in Victoria by age 1981–2001

The young still want to enter the dairy farm

The fact that dairying is a career, not a lifestyle, is further highlighted by the pattern of entry to the industry. Unlike the beef industry, entering dairy farming remains a decision made predominantly by men and women in their late twenties and thirties. And unlike the cropping industry, there has been a moderate rather than a precipitate decline in the numbers of younger persons entering the industry. The young, both male and female, are still entering dairy farming but, if it is not to their liking, they will also leave.

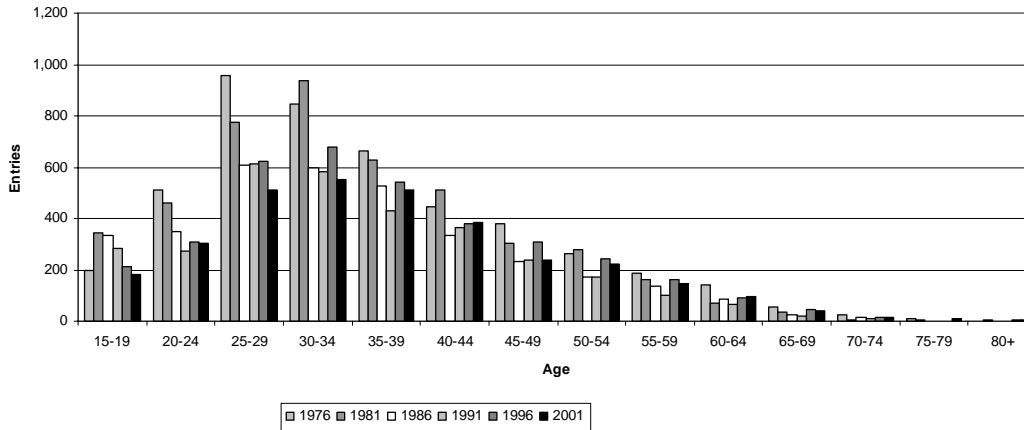


Figure 14 Entry to Victorian dairy farming by age 1976–2001

Dairying: the young agricultural industry

The greater willingness of dairy farmers to leave the industry, and the continued interest in entry, means that their age profile is much younger than that of other agricultural industries.

There is evidence of a demographic age shift working through the dairy farmer population. The number of dairy farmers in age groups older than 45 has changed little since 1976, but the number aged under 45 has declined by half. As a result, the median age of dairy farmers has been rising gradually since 1991. The average age of the dairy farmer population is increasing, but not as fast nor as far as is the case in other industries. The average age started to rise soon after the shock of the entry of Britain to the common market.

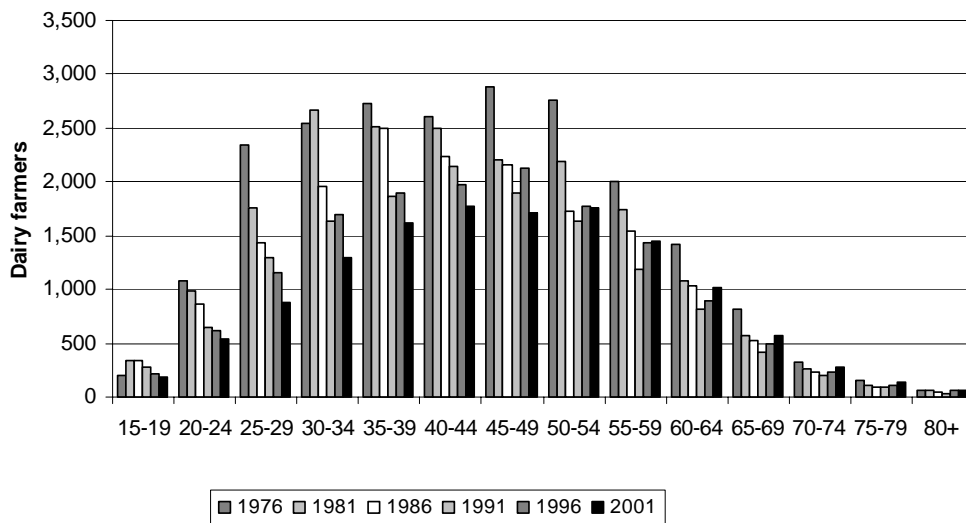


Figure 15 Count of Victorian dairy farmers by age 1976–2001 (Australian Bureau of Statistics 2001)

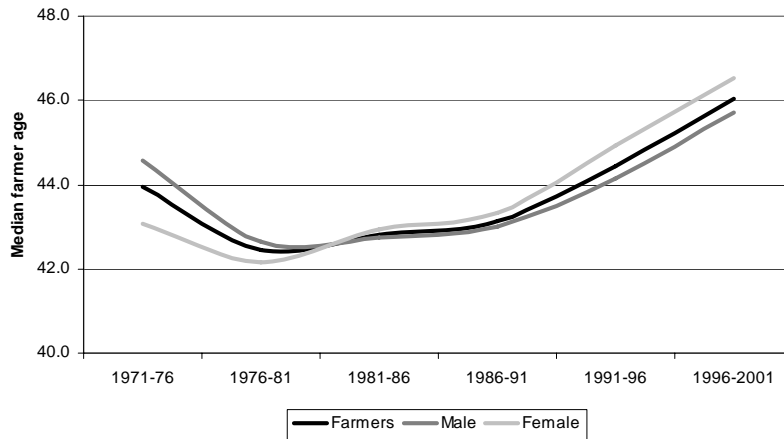


Figure 16 Median age of Victorian dairy farmers 1976–2001

The future for the dairy industry

The dairy industry has experienced an average 1.1% decline in the terms of trade per year over the past 20 years (Martin 2002). This is a much slower decline than in the cropping sector and reflects the greater potential for increased market demand for milk products from rising standards of living in both the domestic Australian market and, more importantly, in our overseas markets.

In the domestic Australian market there has been a shift from the consumption of butter to margarine, and then from margarine to cheese as incomes have risen, domestic market support for butter has reduced and health concerns have become more sophisticated (Figure 17).

The Australian dairy industry cannot rely on the local Australian market to consume all that it produces. With the loss of access to European markets, the Australian dairy industry turned its marketing attention to Asia. While the population of many European countries is stable or even declining, the population of many Asian countries is still rising. Incomes are also rising much faster than in Europe. This is creating rapid growth in the middle class population of countries in the Middle East and South East Asia. This ensures there is a long-term future for the international trade in dairy products. What is less clear is where those products will come from, or who will export them.

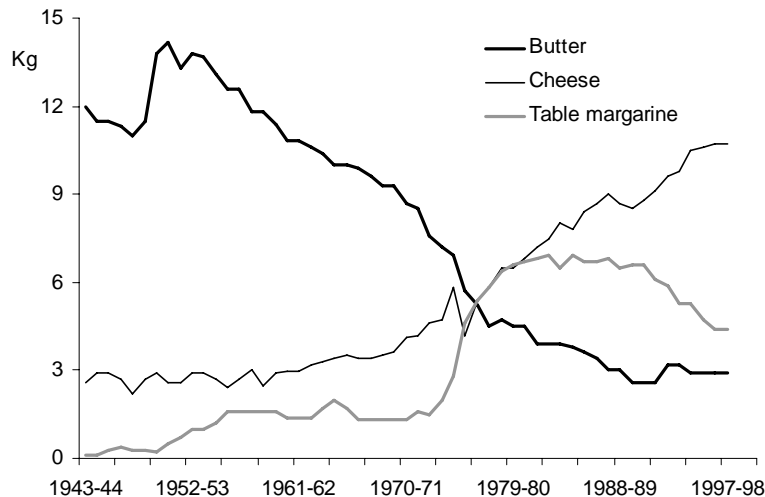


Figure 17 Trends in Australian consumption of butter, margarine and cheese 1943–98 (Australian Bureau of Statistics 2004)

Irrigation and water reform: The Goulburn–Murray system

Community aspirations for environmental water

In the previous two chapters we saw how the balance of competition between agricultural and amenity land purchasers can determine the agricultural future for a region. In the Mallee and Wimmera farm businesses face little amenity competition in the land market, and have been winning the race against the declining terms of trade. Until recently, irrigation farmers in the Goulburn–Murray irrigation region have faced little competition from amenity land purchasers. The landscape is flat and relatively featureless. Amenity interest in land has been focussed on the margins, along the few rivers in the region (Murray, Goulburn and Campaspe), around bodies of water (Kangaroo Lake) and close to the

major towns of Shepparton and Echuca. Outside these areas, existing or aspiring irrigation farmers have generally been the purchasers of irrigation farms. This has allowed the dairy industry in the region to follow a path of productivity improvements by increasing the scale of their farm enterprise.

This situation is now changing, not because of increasing amenity demand for land from urbanised Australians, but because of rising concern for the fate of river ecosystems, particularly the Murray. For irrigation farmers it is water, not land, that is the key resource for their production system. In future, irrigation farmers will not be competing with urban Australians for land, but for water. Initially this competition is driven by the environmental benefits that may come from diverting water from irrigation to environmental flows. Many believe that within the foreseeable future, government or environmental groups will enter the water market to purchase water for rivers. There is also a strong likelihood that urban demand for water consumption in towns like Bendigo will be an additional factor in the competition for water. And there is already competition for water for amenity and reservoir recreation.

Just as demand for landscape amenity from non-farmers constrains the efforts of some dryland farmers to increase farm size, it looks increasingly likely that non-farm demand for improved water quality and river ecosystems will see irrigation farmers facing non-farm competition in the water market. This will likewise constrain their ability to keep pace with the terms of trade. This is a novel situation for the irrigation industry. The tool for this competition is the creation of a market for water.

Water as a right

The irrigation areas of northern Victoria were created with the policy objectives of economic growth, social order and equity. The government control of irrigation in Victoria had its origins in the drought of 1895–1902. This ‘Federation’ drought followed the economic collapse of the 1890s, a collapse more severe than the famous Great Depression of the 1930s. Unemployment, homelessness and injustice catalysed a renewed public interest in rural settlement schemes and supporting them through irrigation development. Initial private developments were financially destroyed by the drought and farmer reluctance to use the water in every season it was available. The first government irrigation authority – State Rivers and Water Supply Commission (SRWSC) – was created in 1906 to rescue the collapsed private irrigation schemes and stimulate further closer settlement.

The new SRWSC created a system of water rights that endured until the 1980s. As new dams were built, water was allocated to land titles according to a formula that emphasised equity over productivity. If a farm was deemed to be within an irrigation district, and it was ‘commanded’ by the irrigation supply infrastructure, then the owner of the land had a right to an equal share of the available water based on the commandable area of the farm. In areas close to water supply in the Goulburn Valley, farmers may have received a right of up to one ‘acre foot’ of water per acre. Further to the west in the Loddon, they may have received only one acre foot for every five acres.

The water ‘right’ was set at a rate which provided a reasonably secure supply. Farmers were expected to pay for the supply of this water right every year, whether they used the water or not. This ensured a regular revenue stream to the irrigation authority and forced irrigation farmers to use the available water right. As additional dams were built, additional water rights were allocated to farmers. These reallocations continued until the auction of unallocated Dartmouth water in 1988.

The security of the water right was protected by a policy of trying to keep two years supply of water right within the reservoir. If additional water was available above this two-year supply level, this was made available for those who wished to use it as ‘sales water’. This was only paid for if one chose to utilise this additional supply.

The link between land and water was strong. If the land was sold, the water was sold with the land. Farmers could not transfer water to a neighbour, even as a loan or a gift to help out with a failing crop.

From rights to markets

By the 1970s the economic worth of government irrigation investment was under scrutiny from a number of directions. Economists questioned the negative financial returns on irrigation investments and the use of water on low value crops. Environmentalists campaigned against the building of new dams.

After many years with little change in water policy, new developments came quickly:

- 1987: temporary trading of water rights began for the first time
- 1988: 2000 megalitres (ML) of ‘new’ water made available by the building of Dartmouth Dam was auctioned to the highest bidder, rather than being allocated according to a formula
- 1989: a new Water Act made possible the permanent sale of water rights
- 1995: temporary interstate trade enabled
- 1998: permanent interstate trade allowed.

The initial public response of the irrigation community to these changes was not positive. The abandonment of equity and adoption of the market was seen as a threat to the viability of irrigation communities. In 1988 some irrigators attempted to disrupt the auction of ‘new’ water. There were fears of water being quickly traded from some areas, leaving little income generating capacity. In response to this concern, a 2% cap was placed on the volume of water that could be traded out of an irrigation district in any one year.

The players in the market in 1990

Within the Goulburn–Murray region horticultural industries accounted for only 5% of the water used by irrigation farmers, but generated a much greater proportion of the wealth deriving from irrigation. Some analysts estimated that in

1990 an average horticultural irrigation business was generating over \$2000 in gross margin from each megalitre of irrigation water. The traditional irrigation horticulture property was the 'block' that was the mainstay of the closer settlement schemes of the Mildura, Sunraysia, Robinvale, Swan Hill and Shepparton districts. These blocks were a byword for hard work and had been managed by successive waves of migrants growing dried fruit, grapes, oranges and stone fruit. The irrigation and cadastral layout of these farms was created many decades ago. They were generally unattractive for farm aggregation and development. Investors were attracted to the potential of irrigation horticulture development to produce wine grapes, but not in the existing settlements. The creation of a water market made it possible for these investors to buy water to develop new 'greenfields' projects unconstrained by historic infrastructure. These new businesses were often corporate, quite unlike the family business structures in the block developments. Both the existing 'blockies' and the new greenfields businesses needed very reliable water supplies to protect their large investment in orchards and vineyards.

The dairy industry used approximately half of the irrigation water supply. The industry was generally composed of family farms. It was in the midst of a period of relative prosperity with some estimating that a megalitre of water in this industry was producing a gross margin of \$200 to \$300. The industry was undergoing solid aggregation, with farms getting larger. For many dairy farmers, the simplest strategy to increase production was to use all the sales water made available to them by Goulburn–Murray Water. In the eastern Murray system, many dairy farms built production systems based on the assumption of an additional sales water supply equal to 80% of water right. In the less reliable Goulburn system, dairy farms often relied on 50% of water right through sales water.

Forty per cent of the water in the Goulburn–Murray system was being used by 'mixed farmers', generally producing prime lambs from annual irrigated pastures or growing irrigated crops. Gross margin returns per megalitre were much lower for these industries than for dairying. Most mixed farmers followed a strategy of using only their water right allowance. Few utilised sales water, leaving their share of the available pool of this resource to be shared by dairy farmers. Mixed farms were spread throughout the irrigation district, but were particularly concentrated in the Pyramid Hill and Kerang districts.

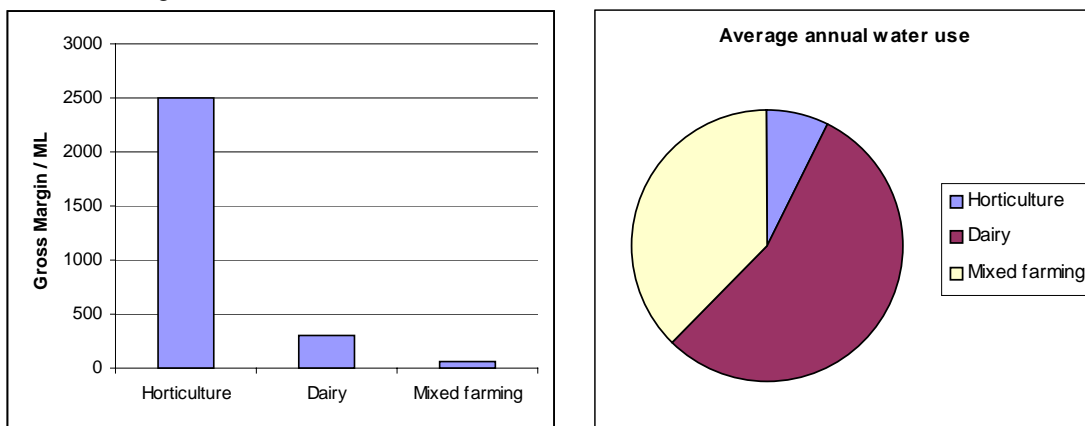


Figure 18 Some comparisons of the dairy, mixed farming and horticulture sectors on the Loddon–Torrumbarry region in the 1990s

A gentle introduction to trading: 1987–95

Irrigators began to operate in the new market in only small volumes. Trading opportunities were limited to within irrigation supply areas and for the first seven years from 1987 to 1993 the volume of water traded temporarily did not exceed 1% of the water used (Natural Resources and Environment 2003). Even when allowed, permanent trade was far less common than temporary trade.

The slow rate of transfer of water from the low value mixed farming industry to the dairy and horticulture industry was disappointing to those who expected a rapid readjustment of water to higher value industries. Water availability was high, meaning there was limited demand from the dairy industry. There were also limits on the trade of water between districts. And the selling of water separate from the farm land was not attractive to many mixed farmers. Low returns for mixed farmers did not encourage large numbers of families to quit the industry. Those on smaller farms generally supported themselves through off-farm work and those on larger farms were generating sufficient income for their family and business needs. Those who left were often on mid-sized farms. With the permanent sale of a megalitre of water generally bringing less than \$300, these farmers found that they could recoup more by selling the farm as a whole to a new entrant to farming. The key to this was the value of a farm house and the fixed investments on the farm. Without water, these were worth very little. Mixed farmers generally estimated they required between \$700 and \$1000 per megalitre to compensate for the sunk cost of the house and fixed improvements (Barr 1999).

Those mixed farmers who did sell water alone generally did so as a response to financial pressure or because they were increasingly dependent on off-farm work and no longer needed the water (Bjornlund & McKay 1999). Most sales of water were temporary and most water that changed ownership did so attached to land.

Tightening supply and downstream competition: 1995–2002

The pattern of trade shifted markedly in the 1994–95 season. Trading was allowed between irrigation districts, bringing downstream horticulturalists into the market. Dry seasons led to a tightening of the supply and a reduction in the volume available for sales water. Dairy farmers geared for a high level of sales water availability found themselves forced to either buy supplementary feed or purchase water from mixed farmers. In one season the volume of water traded temporarily jumped ninefold to 250 000 ML. In the following six years water supply remained tight and the volume of temporary trade fluctuated between 100 000 and 250 000ML, up to 8% of water use.

Horticulturalists reacted more slowly, but by 1997–98 they were strongly in the market for permanent water right. In that year the volume of permanent trade doubled to 1% of total water use. By 2001, 6% of permanent entitlement had been transferred. Major purchases were made to transfer water allocation to greenfields developments. These included a number of large vineyards and the world's largest olive plantation established by OliveCorp at Boort.

As before, most water traded was sold by the owners of irrigation mixed farms. Some mixed farmers shifted their water use from water right to sales water by gradually selling water right, often to reduce debt. Water was most likely to be removed from irrigation of land in high salinity risk areas. This pattern of water trading was a continuation of the long-term trend of declining farm numbers while increasing production and productivity. Higher value uses of irrigation water in the local region accelerated regional economic growth and provided increased employment opportunities, to a degree ameliorating local concerns over the social impacts of the water market. While the transfer of water between regions was of concern to some communities that were net exporters of water, the rate of change was comparatively gentle. The existing cap on regional water exports of 2% per annum was not activated by the pattern of trade.

Figure 19 maps the shift in water right between 1993 and 1996. Few parishes have a loss of water right greater than 2.5%. The exceptions included, notably, some of the most salt threatened regions: near Pyramid Hill and the country between Kerang and Swan Hill. Temporary trade in particular precipitated some major shifts in water use, with some of these localities trading away up to 40% of their water in some seasons.

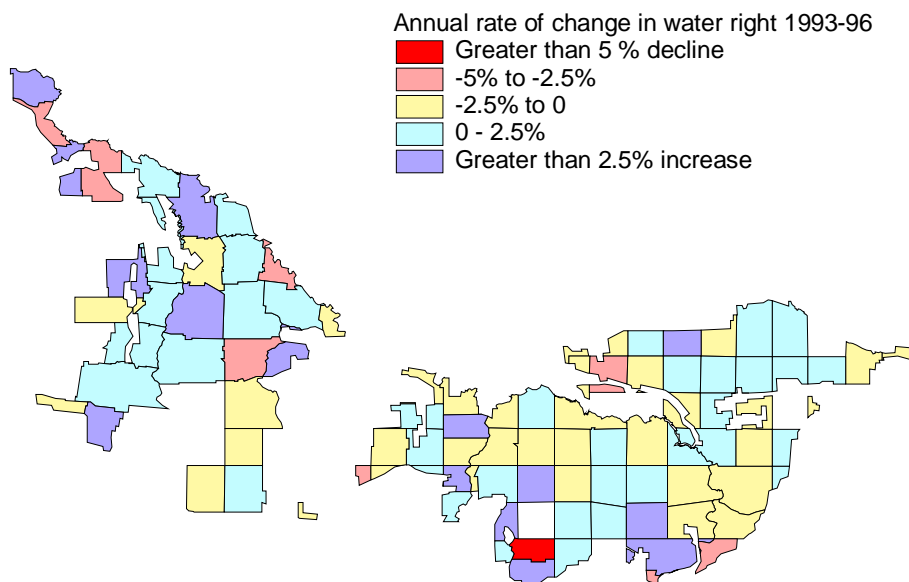


Figure 19 Annual rate of change in water right ownership by parish in the Goulburn, Murray and Loddon irrigation regions 1993–96 (Barr 2001)

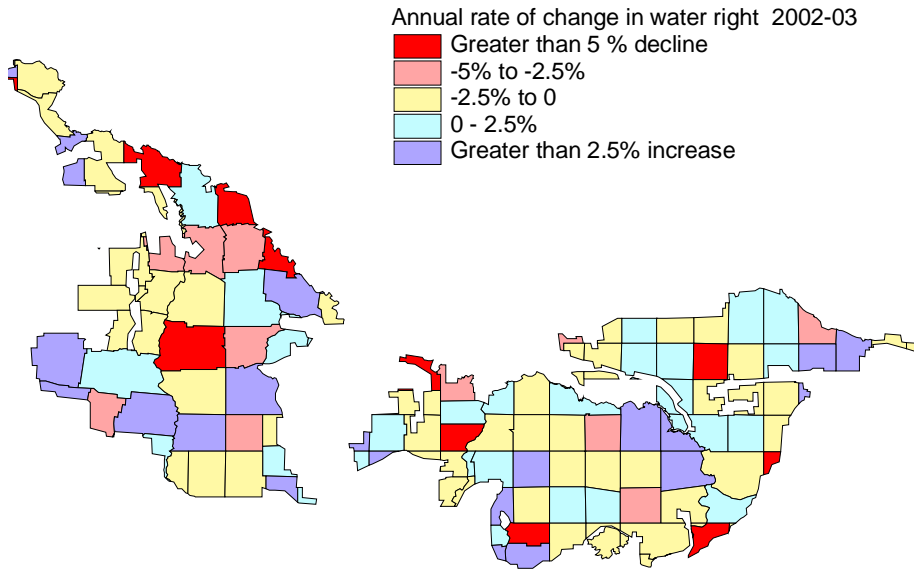


Figure 20 Annual rate of change in water right ownership by parish in the Goulburn, Murray and Loddon irrigation regions 2002–03 (unpublished data)

The year of cow parking: 2003

The situation of irrigated farming in the Goulburn–Murray changed dramatically in 2003. A number of changes in the environment converged on the dairy industry:

- The recent deregulation of the industry had encouraged a significant number of dairy farms to increase debt and invest in production expansion.
- An unprecedented period of low rainfall within the upper catchment led to decreased water allocations, culminating in an allocation of only 56% in the Goulburn system in 2002–03 and 100% in the Murray system in 2003–04 (Murray irrigators were used to allocations substantially higher than 100% of water right). This was outside the experience of any living farmer.
- There was a period of instability and uncertainty within the milk processing sector with some major milk purchasers experiencing significant financial difficulties.
- A rapid rise in the value of the Australian dollar compounded a weakening market for milk products leading to significant falls in the farm gate price for milk.

Horticulturalists acted quickly to secure water to protect their trees and vines. The traded price of permanently transferred water rose quickly reaching \$1200 a megalitre.

Many mixed farmers sold water temporarily or permanently. The price of \$1200 per megalitre was more than enough to compensate for the value of stranded farm infrastructure and housing. Those who were considering retirement had an opportunity that might not return. Those who planned to stay could temporarily sell their water and make a greater income than they could by continuing their normal farm operations. Those who did decide to continue to farm could take advantage of high prices for prime lamb.

For dairy farmers the low water availability was a serious shock. None had experienced this situation before. On top of this, milk prices began to fall. Most dairy farmers had to choose between three options. They could:

- continue to produce milk by purchasing water. The price of temporary water rapidly approached \$300 a megalitre, far greater than a dairy farmer could make from the purchase. The advantage of this option was that it maintained both the herd and also the pastures leaving the farm system ready to respond quickly if water was available the following season. The downside was increased debt that would need to be repaid.
- continue to produce milk by purchasing feed substitutes. However, feed prices were high with dryland farmers also competing for the low reserves of fodder across the state. This strategy retained the herd ready for production in the following season. Perennial pastures would die. This option also increased debt, to a lesser extent, but at the cost of a slower return to full production when water availability increased.
- cease production at least temporarily, and lend or lease the most valuable cows to dairy farmers in southern Victoria or Tasmania. This became known as cow parking. Not all cows would be available next season, but a nucleus of a herd would be there from which to rebuild production. At the end of the season this left the business with lower debts than the previous two options, but with a much slower pace of rebuilding production.

In making the choice between these options, the farmer was making a gamble about the following year's water allocation. If the allocation was more generous, then the first option would enable the business to bounce back to normal levels of production quickly, but with a large debt to repay. The cow parking option would leave the business at low levels of production, requiring several years of rebuilding. If the allocation was again low, those who followed the first two options might find increased debt load forcing them into bankruptcy. Those who parked their cows would have a lower debt and a greater chance of surviving. For those dairy farms with a high debt load, whether due to newly entering the industry or a recent investment in a rotary milking shed, none of these options might save the business. These crisis situations are not new to the farming industry. Historically what has happened is that farmers find they are unable to sell their farm because no one wants to buy into a depressed industry unless the price of land falls dramatically. But the sale of the farm is equivalent to cashing in the family superannuation policy early at a reduced value. Rather than take a large cut in their superannuation, farm families will hang on as best they can until the situation improves. Some will then sell, and many others will decide to remain, caught up in renewed optimism. Such was the behaviour of the land market after the collapse of the wool price in the early 1990s (Barr, Wilkinson, & Karunaratne 2003). The number of property sales fell dramatically, although the price of land fell much less, and much more slowly. The number of sales rose after the price of wool began to recover.

Dairy farmers on the Goulburn system did not follow this traditional strategy for a number of reasons:

- The average debt level in the dairy industry is much higher than in broadacre cropping or grazing. For many families, pulling in the belt will not solve the problem of high debt repayments.
- Many dairy farmers treat their occupation more as a business than a way of life. There is not the same desire to stay in the industry until old age.
- Whatever strategy the farm business followed, the recovery period (either to rebuild production or pay off debt) was estimated to be five years. This was at the end of a period when dairy farmers had been delaying retirement and a third expected to retire within five years. If it was possible to sell the business for a reasonable price then this would be a far more attractive option than working another five years to tread water.
- With the downstream horticultural industry purchasing water at previously unheard of prices, there was a market for the dairy farmers' water right, and the price might well be comparable to what the whole farm might have bought three years earlier. This option was not available to dairy farmers upstream of the Barmah Forest due to water supply constraints in the Murray River.

While many dairy farmers opted to stay, quite a few did sell their water downstream, a previously unthinkable outcome for a community that expected dairy farmers to always be water purchasers. The selling peaked in the winter months after the 56% allocation season. With the next allocation uncertain the market for permanent water went wild. Water purchases quickly passed the 2% export limit in a number of districts well before monitoring processes detected the threshold had been breached. And when it had been breached, temporary arrangements substituted for permanent sales. Figure 21 shows the dramatic shift in the pattern of water trade when compared with Figure 20. A number of dairy farming parishes, as well mixed farming areas, were exporting water.

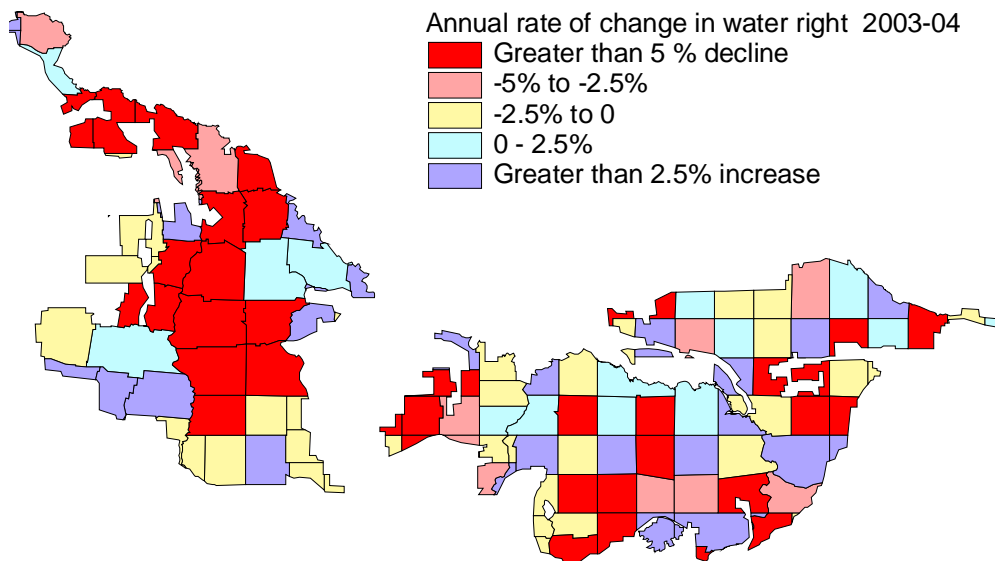


Figure 21 Annualised rate of change in water right by parish for the first six months of the 2003–04 season (Data source: Goulburn-Murray Water)

The weather, the rivers and fear

What the previous section has shown is that the creation of a market in water changed the rules of agricultural adjustment in the irrigation sector. On balance, the ability of farmers to trade water during the past two years has had positive and negative social impacts. Individual farm families have had the capacity to exit the industry during a period of financial difficulty. The impact of these quick decisions to sell water has been to secure the horticultural sector, but at the cost of a potentially permanent reduction in the size of the dairy industry within the region. The new patterns of behaviour may have important implications for regional economies that 'lose' water under the operation of the market. The six years of low water availability leading up to the debate over environmental flow allocations have not been conducive to gentle discussion of the issues. This is unfortunate, but it is no coincidence. The circumstances that have shaken the confidence of the dairy industry are also those that have generated the concern over environmental state of the Murray River.

The first stage of the recent debate over environmental flows was led by the Murray–Darling Basin Commission (MDBC) and its 'Living Murray' process. Much of the debate focussed on market purchase of water by government. Many irrigators feared that state intervention in the water market would raise the price of water, making it harder for dairy farmers to purchase water, hence limiting their ability to maintain their competitiveness. In making this argument, farm supporters are implicitly asserting a moral hierarchy of water use with environmental use being a less legitimate use. Some environmental supporters have publicly asserted the reverse view.

The proposal that emerged from Victoria's white paper process was for the state to achieve much of its share of the Council of Australian Governments (COAG) First Step by a 20% reduction in the size of the sales water pool. This is to be compensated for by a \$93 million investment in irrigation infrastructure and clear property rights for the remaining 80% of sales water used by farmers. This proposal has been well received by key interest groups. For the Victorian Farmers Federation, it slows and reduces government entry into the water market, removes uncertainty over farmers' right to sales water and delivers increased investment into ageing irrigation infrastructure. For the ACF, the proposal delivers a clear first instalment of environmental water. For the government, the water is obtained with minimal transaction costs. The major interest group upset by the proposal is Murray Valley dairy farmers who have generally received higher sales water allocations than their Goulburn Valley neighbours and feel they are to bear a disproportionate share of the loss of water access. Given the potential for conflict, the white paper negotiations would have to be considered a success.

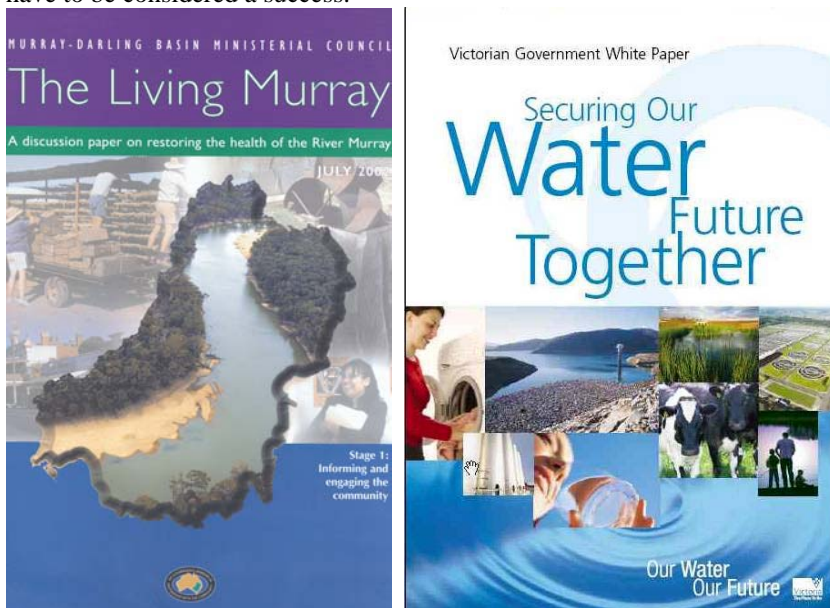


Figure 22 *The Living Murray* discussion paper and the Victorian white paper on water

Breaking the last vestige of the equity era

The White Paper is more than a proposal to obtain environmental water. It also proposes fundamental changes to the nature of water property rights in Victoria. These changes can be expected to have profound implications for the irrigated dairy and mixed farming industries over the next 15 years. For many years the pattern of water use in the Goulburn–Murray irrigation district has been economically perverse because:

- most available low security water has been used to maintain perennial pastures on dairy farms
- most annual pasture has been irrigated with high security water.

This is contrary to what would be expected in a rational allocation system. It is a direct result of tying the availability of sales water to the ownership of water right. The white paper proposes to break this nexus, with ownership of each form of water being independent of the other. There will also be separate rights for the delivery of water through constrained supply systems and rights to apply water (aimed at preventing increased recharge of water tables).

The breaking of the link between sales water (now referred to as medium security water) and water right (high security water) will have different impacts on the three irrigation industries of the area:

- Mixed farmers have not in the past used their full sales water entitlement. The separation of the two water rights will enable mixed farmers to take one of two strategies. Some may choose to activate what have been ‘sleeper’ pools entitlements and sell these. Others may choose to sell some or all of their more valuable sales right and instead farm with increased use of the less reliable sales allocation. Either option will significantly increase participation in the sales pool, reducing the size of the allocation available to traditional users in the dairy industry.
- The dairy industry will experience greater competition for sales water, with 20% transferred to the environment and a further component being activated by other industry sectors. In the past few years the industry has adjusted to low or non-existent sales water allocations. When reservoir levels return to normal, sales allocations will never again reach the percentage of water right in the previous decade. Dairy farmers will not be able to follow the past strategy of increasing production by fully using increasing sales allocations. Some may choose to top up their sales allocation to return to previous production structures. But the most likely long-term strategy may be to purchase high security water right entitlements, possibly even selling low security allocations.
- The changing population structure of Victoria suggests that future governments may be interested in allocating further water to the environment. The current COAG agreement is titled ‘The First Step’. The current efforts to enhance environmental flows for the Snowy and Murray rivers are focussed upon water savings through infrastructure and a trade-off between water title security and low reliability entitlement volumes. If any future government were to decide to further increase environmental flows to the Murray, the least expensive solution would probably be to purchase irrigation water from irrigation farmers. Environmental flows are most likely to be released during periods of high flow in the river to increase the scale of flooding of red gum flood plains. The new medium security water right is ideally suited to this environmental use. Low security water is available when rivers are more likely to be running at high levels. It can be used to push flood flows higher, maximising environmental benefits that cannot be achieved during years of low flow and low availability. Medium security water will be cheaper than high security water right.
- Horticulturalists within the Goulburn-Murray irrigation region have not utilised lower security water and will be the least impacted by the new water ownership structure. With increased downstream trading, the pool of sales water rights owned by Sunraysia horticulturalists will grow substantially. Will these be traded back upstream, sold for the environment or somehow converted into a more reliable allocation?

The interaction of these four segments of the water market may dramatically reshape the irrigation landscape.

Social sustainability and future irrigation landscapes

The changes of the last decade and the foreseeable administrative developments suggest the future irrigation settlements along the Murray and its tributaries will be quite different within a decade:

- Dairy production systems will probably slowly convert from lower to higher security allocation mixes. Higher security water will be purchased from the mixed farming sector.
- Horticultural development will continue to occur on greenfield sites beyond the reach of existing irrigation settlements and supply systems. The developers avoid the legacy problems of old infrastructure and over-capitalisation in housing stock in existing settlements. The location of these greenfields sites needs to be designed to minimise environmental impacts. The rate of new development will be mediated by the market outlook for various horticultural products, the interest of superannuation investors and the structure of tax laws. The removal of the 2 per cent per annum cap on the permanent sale of entitlements from an irrigation district will provide an opportunity to increase the rate of development of new horticultural enterprises in the Sunraysia. At the time of writing investment interest has shifted from wine grapes to almonds. Superannuation investment is fuelling a dramatic expansion of almond plantations along the Murray downstream of Robinvale. The managers of these plantations are major purchasers of permanent water entitlement, and will need to purchase much more in the coming years. The loss of the economic benefits of irrigation water to the communities around Shepparton and Kerang is an economic gain to the communities of Mildura and Robinvale. Presumably, there is an overall benefit to the State as a whole.
- The commercial mixed farming sector will probably gradually convert to production systems based on medium security water. This will only be economically feasible on larger mixed dryland and irrigation farms. Small mixed farms will continue the conversion to hobby farm status close to town or amenity features. Elsewhere they will sell their water and the land will be purchased by dryland farming businesses. In a decade there may be far fewer mixed farms and those that exist will be much larger.
- Any future government or environmental organisation’s purchase of water for the environment would probably be targeted at the new medium security water entitlement. Initially there would be opportunities to purchase these allocations from dairy farms converting to higher security allocation mixes. Eventually, much of the medium security water will be held by mixed farmers and any future purchases would be made from them.
- The mixed farm sector will continue to shrink. This will be primarily driven by the development of the horticultural sector. Predominantly mixed farming irrigation districts will gradually convert to dryland farming structures. This will place pressure on irrigation authorities to rationalise irrigation infrastructure.
- In some amenity locations near permanent water bodies existing housing stock may be converted to rural residential and hobby farmer use. Water supply authorities will be left with the costly problem of supplying a stock and domestic water supply through a massive channel infrastructure designed for flood irrigation.

- Rationalising of irrigation infrastructure will lead to further plans for decommissioning of minor dams. The White Paper has already proposed the decommissioning of Lake Mokoan to supply water to the Snowy. This has catalysed opposition, in part based on loss of amenity and recreational opportunity. In the Kerang area discussions over the future fate of Kangaroo Lake have catalysed similar amenity-driven community concern. The amenity of bodies of water will provide some major challenges for planners in local government and water supply authorities.

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