

## CHAPTER 5

### THE SELECTION PERIOD (1860s-1880s)

#### 5.1 Introduction

The successors to the squatters were the 'selectors' - yeoman farmers who settled in the Goulburn Valley, and elsewhere in Victoria, in large numbers during the 1870s and 1880s and transformed the region within a few years into a patchwork of small agricultural holdings. Land reform of this kind had been the desire of the Victorian Government since it was first constituted (in 1851), but within a decade it was apparent that 'selection' - equated in this chapter with close agricultural settlement - was not likely to succeed in the longer term. This was due in large part to the financial circumstances of the settlers, although continuing erroneous perceptions of the biophysical environment at the official level, attributable to cognitive failures on the part of the Victorian Government, appear to have been a major cause of systemic dysfunction, and contributed to the extensive, and largely detrimental, environmental changes that occurred in the Goulburn Valley during this period.

#### 5.2 Environmental perceptions and settlement activities

##### *5.2.1 The persistence of the yeoman ideal*

In 1854, legislative control of Victorian lands was ceded by the Colonial Office in London to the newly constituted Victorian Government in Melbourne. Also passed on to the Colony was the ideology of agrarianism, described by Goodman (1988, pp. 21-22) as the deeply held conviction that "real wealth came from the soil, that the destiny of the colony was agricultural, that there was an almost moral responsibility to cultivate the soil of so beneficent an environment, and that the small cultivator was liable to be among the most virtuous and useful of citizens." These beliefs proved remarkably persistent, and in 1850s Victoria also served as a manifesto for ending squatter domination of the land, as the agrarian vision also resounded with the growing political and social demands of the Colony. The Victorian population had increased rapidly during the 1850s (from 76,000 people at the beginning of the decade, to over half a million by 1860)(*Victorian Year Book* 1996, p. 275) as a result of an unprecedented influx of gold-seeking immigrants. As the gold rushes subsided, displaced diggers demanded with ever increasing fervour that land be made available for settlement. This culminated in 1860 with the storming of Parliament House in Melbourne by an angry crowd demanding "a vote, a rifle and a farm" (cited by Powell 1976, p. 82). The campaign for land reform was also supported by the urban press, in particular the *Melbourne Age*, which argued for the throwing open of the lands "in order to create a little England in Australia" (cited by Forth 1985, p. 36).

Needs were growing in the meantime for basic services in the Colony. At the very least, roads and bridges were needed to support the goldfields communities, and railroads and other "suitable means of communication" were necessary for the presumed agricultural development of distant areas like the Goulburn Valley (Chauncy 1855, p. 99). It quickly became apparent to the new Government that continued pastoralism would generate only limited revenue for infrastructure purposes, as well as tying up much of the land to the exclusion of other uses (Firth 1985).

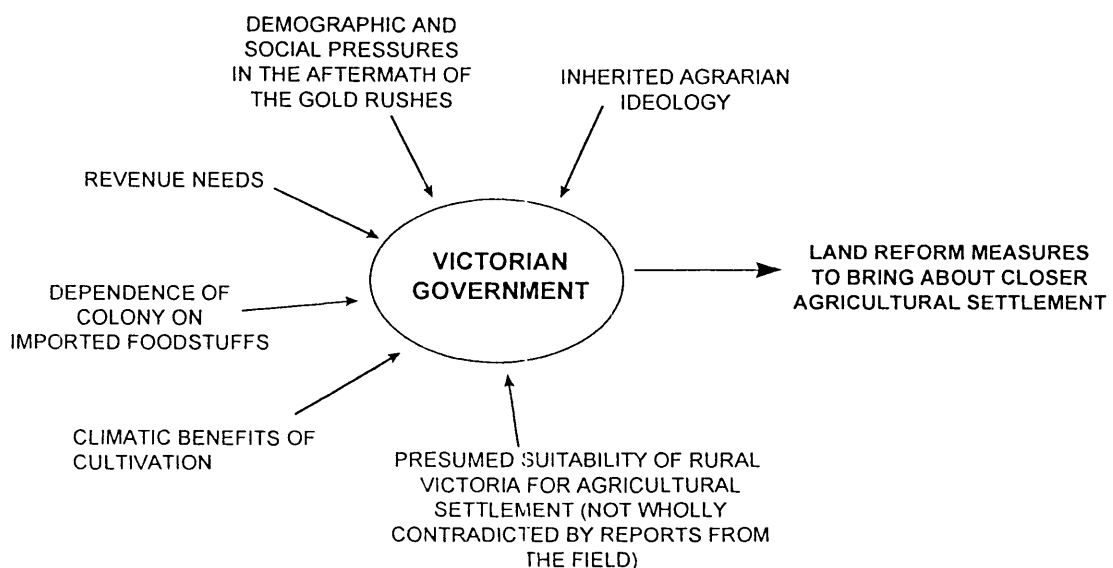
A further, economic urgency was expounded by Chauncy (1855, p. 29):

The natural resources of this country are as yet wholly undeveloped, and yet we continue from year to year to import articles, the produce of distant lands, which might readily be produced at a lower price, and of better quality, from our own soil...

Chauncy added that cultivation, by lessening the radiation of heat from the land, should also reduce the incidence of hot winds, thereby inducing "a more equable state of weather" in the Colony (Chauncy 1855, p. 118).

The agrarian ideal was thus widely endorsed, as the new politicians of the Colony praised the moral virtues of yeoman farmers, and the press and public at large, in the cities and on the goldfields, saw land reform as a means to economic independence, social justice and (perhaps) climatic amelioration. The abundant resource of Victorian land was appraised accordingly by the Government in Melbourne on the basis of its perceived usefulness, and it was assumed as a matter of course that if a small acreage wasn't at first capable of producing sufficient wine, oil, vegetables, milk or poultry as to render a settler almost self-sufficient, it could soon be made to do so merely with adequate cultivation and enterprise (Chauncy 1855; Powell 1989, p. 40) (Figure 5.1).

**Figure 5.1: Situational interpretation of the Victorian Government regarding the use of rural lands in Victoria, 1850s-1860s.**



### **5.2.2 'Objective' appraisals of land capability**

Evidence was growing in the meantime that much of the land in Victoria was less than capable of supporting intense agricultural settlement.

Water was one crucial limitation. The "curiously variable and eccentric" patterns of rainfall in Australia had been recognised by the 1850s at a scientific level (Perry 1966). The publication, *How to Settle in Victoria* (Chauncy 1855), also acknowledged in passing that lack of water was a "drawback" for colonial farmers. This same booklet proclaimed with greater enthusiasm, however, that the average rainfall in England agreed "in a remarkable degree with the fall of rain in Victoria" (Chauncy 1855, p. 116). This would have been reassuring to potential settlers, and it was not until a decade later that attention was drawn to the "enormous spontaneous evaporation" that occurs in Australia during spring and summer and greatly reduces the effective rainfall (Ellery 1866).

The squatting fraternity was certainly familiar with the nature of Victorian climate and had long argued, on the basis of direct experience, that most of the Colony was simply not suitable for farming, or that good land within reasonable reach of markets had already been sold (Forth 1985). The northern districts, in particular, were too dry even for sheep in some years, and Lands Commissioner Evelyn Pitfield Sturt told the Victorian Governor, Charles La Trobe, in 1853, that he thought it "absurd," for this reason, that the northern plains could ever become an agricultural country (Bride 1969, p. 370). The new colonial Parliaments generally dismissed the squatters' claims, however, as "special pleading" (Dingle 1984, p. 63).

Land capability information of a supposedly more objective nature was amassed after the commencement of a major Geodetic Survey of Victoria in 1858. As Powell (1970b, p. 50) observed "the very business of laying out the subdivisions in the field constituted an appraisal of local land quality." The Government also called for land appraisals and agricultural reports from various officials throughout the state, which added to the accumulating body of information available to the legislators formulating the Land Acts (Powell 1967). However, such information was often ambiguous, or was couched in optimistic language so as to assuage the politicians of the time. The Collector of Agricultural Statistics for the vast Pastoral District of the Murray reported in 1862, for example, that farmers' prospects in Avenel and Longwood, immediately south of the Goulburn Valley, were "not very cheering" as the soils were generally poor for agriculture and were rapidly exhausted by frequent cropping. The north-eastern parts of the District were more promising, however, and the Collector felt able to conclude on this basis that farming overall was on the increase "and that period is not far distant when the Murray District, as regards agriculture, will be second to none in Victoria" (Miller 1862).

Another potentially significant report on the Lands of Victoria, which was presented to Parliament by the

Government Surveyor, A.J. Skene, in 1858, was effectively emasculated. Skene toured various districts to observe the progress of the Geodetic Survey, but also to determine the quality of land being made available for sale and the character of the large areas of Crown land yet to be surveyed. This included the Goulburn Valley and the broader northern plains between the Loddon and Ovens Rivers. Most of this land was considered by Skene to comprise largely second or third class pastoral land. Only one-sixth was assessed as being suitable for cultivation - that is, "land which would, for a series of years, yield under cultivation, without manure, not less than 20 bushels of wheat per acre [1.8 tonnes per hectare]" (Skene 1858).

Powell (1970a, p. 52) attests to Skene's credentials, but the surveyor's low estimates of the amounts of agricultural land in northern Victoria were rejected by his superiors of the time. The Surveyor-General, Charles W. Ligar, noted that surveyors were not exempt from errors of judgement and that "it is everyday occurring that land which was at one time thought valueless is turning out profitable for cultivation" (Ligar 1858). The Deputy Surveyor-General, Clement Hodgkinson, argued similarly in a letter to Parliament that Skene relied too much on vegetation analysis and too little on geology in his assessments of soil quality; that he assumed too high a standard of excellence for agricultural land; and that he placed too much emphasis on the existing state of society in the colony (Hodgkinson 1858).

Hodgkinson (1858) added that one of the portions of the colony in which Skene's estimates were most "palpably erroneous" was the region between the Loddon and Ovens Rivers. Hodgkinson himself had visited this extensive tract of country (1.4 million hectares, including the Goulburn Valley) only two years previously, and had concluded at that time that although the land between the Ovens and Goulburn Rivers should remain a grazing district for the time being, "*with the aid of irrigation*", it had the potential to become good farmland (Hodgkinson's italics; Hodgkinson 1856, p. 7). He reiterated the point in his 1858 letter, noting that although the climate was too dry in summer, the soils of the region were otherwise highly suitable for growing cereals, vines, lucerne and other products of southern Europe (Hodgkinson 1858).

Skene subsequently qualified his report so that it was more agreeable to his superiors. He allowed that first and second class pastoral lands could be considered to include "a considerable portion of land which may be made available for cultivation under a system of irrigation in some cases; in others of drainage; and in others of subsoil ploughing...and also manuring" (Report from the Select Committee upon Unalienated Land 1858, pp. 12-13).

Powell (1970a, p. 53) notes that Skene's report did have some small influence on land reform policy, in that it provided a scheme for prioritising the sale of better agricultural lands. However, into the 1860s, survey work failed to keep pace with the large areas being opened up for settlement, and by 1869 the Government totally ceded its role as arbiter of land capability by making all remaining Crown lands available for agricultural selection at that time (Powell 1989, p. 64).

### 5.2.3 Attempts at small farming

As the fledgling Victorian Government sought ways to implement land reforms to fulfill its agrarian aims, land appraisals of a direct nature were being carried out by members of the population who were determined, on their own initiative, to become farmers in the colony.

Small farming had been growing steadily of its own accord in Victoria since the beginning of settlement, although mostly around Melbourne and close to the lucrative goldfields markets, where land proved to be "the truest goldmine" (Howitt 1972, p. 180). A number of successful miners and immigrant families managed to purchase land for farming, and as Powell (1970a, p. 67) notes, the reports of Government collectors of agricultural statistics show that by the early 1860s, farming was well-established in the moist central and south-western part of the colony. It was also being attempted elsewhere, including various well-watered parts of the Goulburn Valley, although on a much more limited basis (Tables 5.1, 5.2). Land along the Goulburn River had first been taken up for agricultural settlement near Seymour in 1855 (Martindale 1958, p. 69), but the general pace of settlement in the region was slow, and into the mid-1860s the area of crop land in the Goulburn Valley comprised less than one per cent of the total cultivated lands in Victoria (Table 5.1).

**Table 5.1: Agricultural settlement in the Goulburn Valley (County of Rodney), 1856-69.**

Year (ending March 31st)	RODNEY			VICTORIA TOTAL	
	No. holdings	Area cultivated (hectares)	Total area occupied (hectares)	No. holdings	Area cultivated (hectares)
1856	26	323	n.a.	4,326	46,594
1857	32	347	3,291	7,523	72,838
1858	48	461	6,199	10,259	96,208
1859	41	721	5,416	11,573	110,870
1860	46	874	9,383	13,175	145,175
1861	52	932	15,939	13,653	169,721
1862	64	1,120	18,461	14,960	178,023
1863	78	1,369	22,225	16,416	188,357
1864	107	1,711	24,214	17,679	205,503
1865	125	1,747	28,278	19,355	194,036
1866	146	1,728	32,499	20,063	214,567
1867	206	2,699	46,019	22,698	239,949
1868	264	3,557	53,961	25,828	255,446
1869	400	5,697	56,185	29,218	288,493

Source: Agricultural statistics, *Victorian Parliamentary Papers*, 1856-57 to 1869.

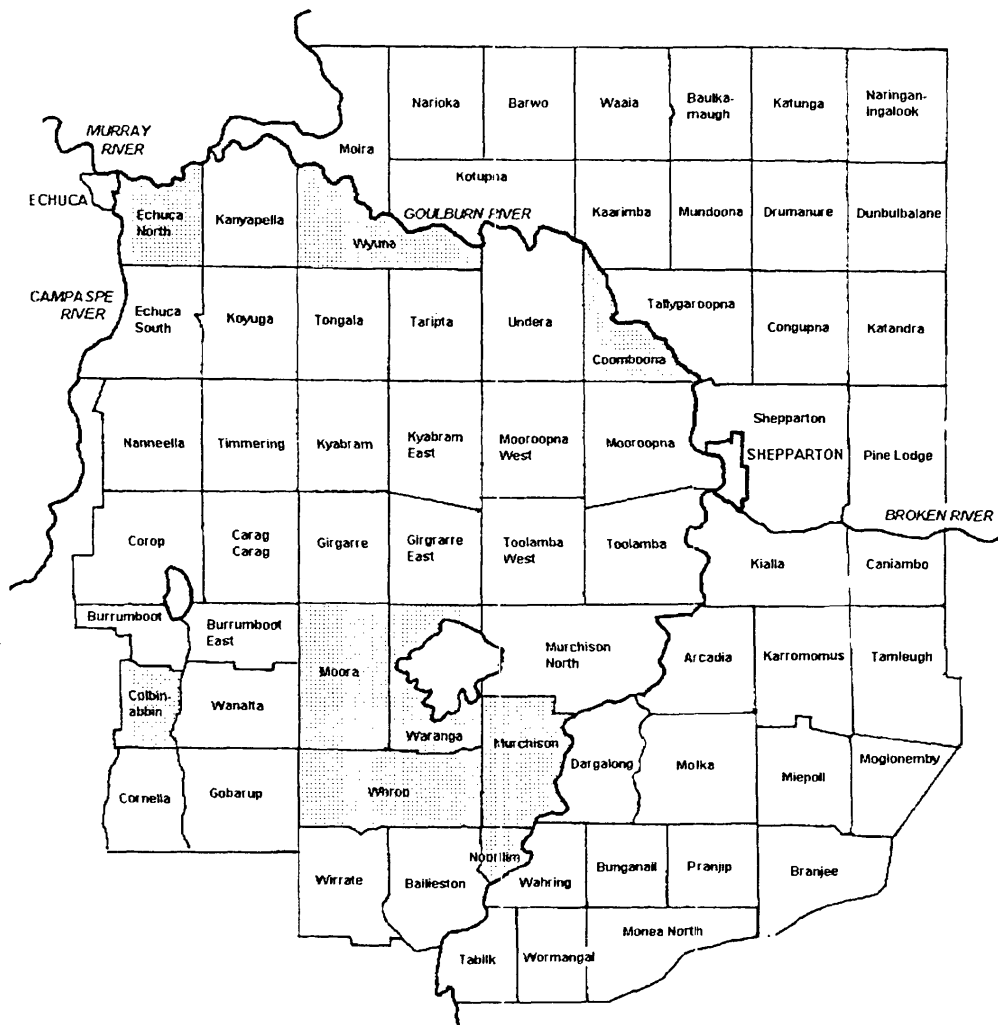
\* Crown land purchased or rented for other than pastoral purposes.

**Table 5.2: Agricultural settlement in selected Goulburn Valley locations, 1866.**

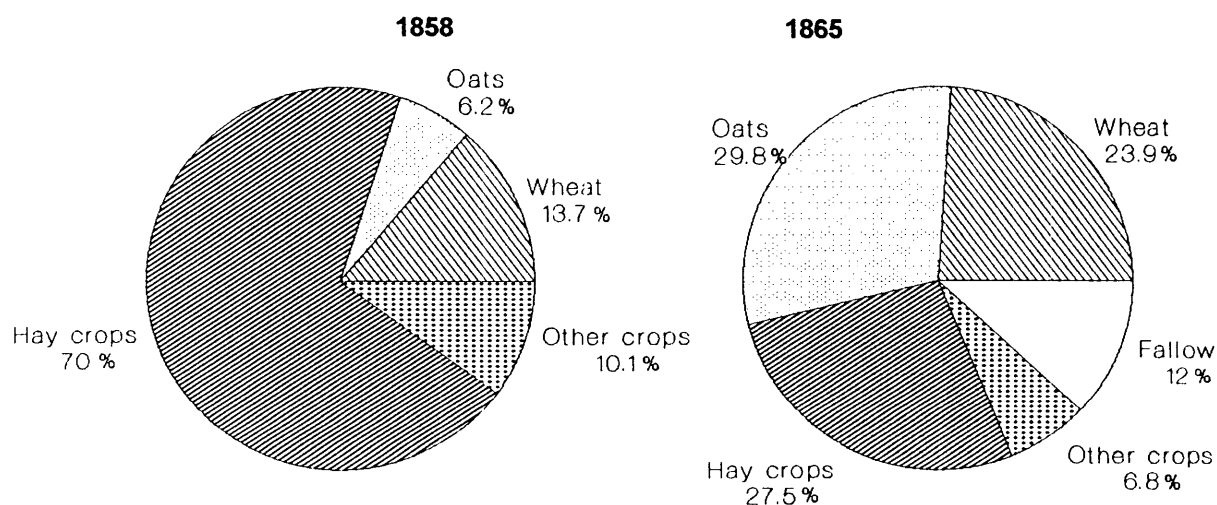
District or parish	No. holdings	Area cultivated (hectares)
Ardpatrick (Coomboona)	1	1
Colbinabbin	6	244
Echuca	6	15
Moora	4	4
Murchison	25	297
Noorilim	5	110
Waranga	1	6
Whroo	1	6
Wyuna	6	6
<b>RODNEY TOTAL</b>	<b>146</b>	<b>1,747</b>

Source: Agricultural statistics, *Victorian Parliamentary Papers* 1867, vol. 3.

**Figure 5.2: Parishes of the Goulburn Valley.**



**Figure 5.3: Crop type as a percentage of cultivated land in the County of Rodney, 1858 and 1865.**



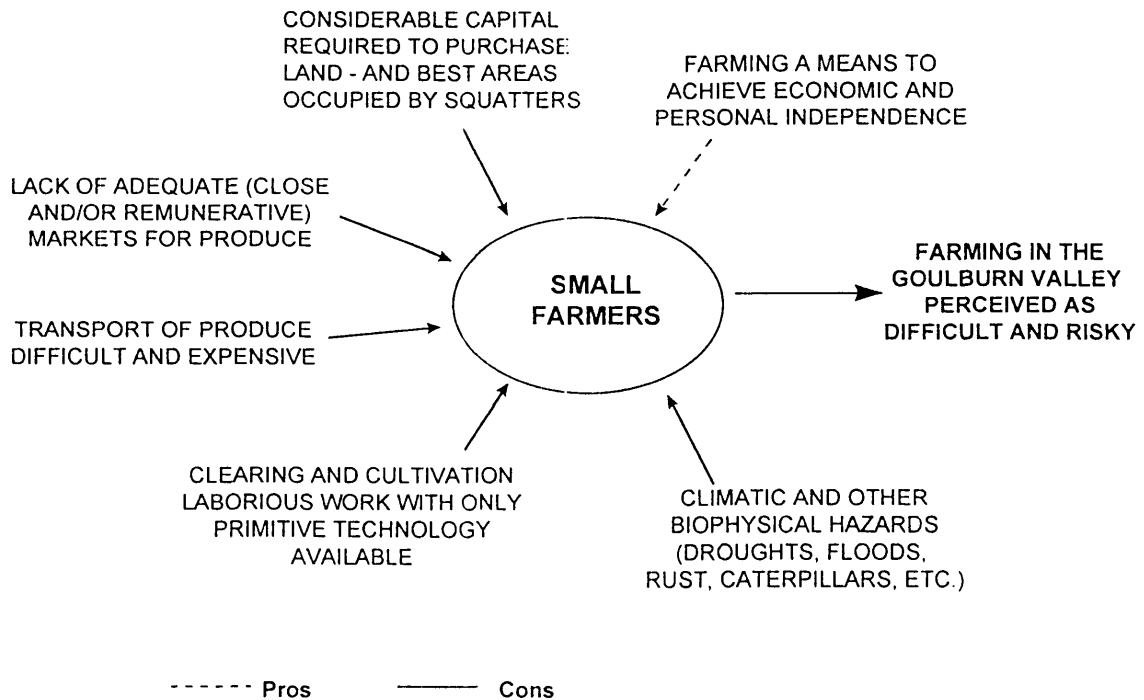
Source: Agricultural statistics, *Victorian Parliamentary Papers*, 1858-59 and 1866. Other crops included barley, maize, peas, green vegetable crops (potatoes, turnips, etc.), also vines and orchard fruits.

Vineyards were established from the late 1850s on the river banks on the Tabilk pastoral run (Parris 1950), but most of the early Goulburn Valley farmers grew cash crops of wheat, oats or fodder, hoping to supply local demand (Figure 5.3). Otherwise, as Chauncy (1855, p. 13) pointed out, it "seldom [paid] to cultivate land of indifferent quality, particularly when situated at a distance from town". In the Goulburn Valley, there were few towns to serve as markets for agricultural produce, and most roads were little more than barely formed tracks so that carting grain was tedious and difficult (Forster 1964). An early Toolamba settler wrote in 1867 of carting wheat "to Heathcote where there were two mills, subsequently we took oats to Bendigo and Echuca; all five day trips then" (cited by Morvell 1983, p. 121). The Victorian Government was slow to address the problem: a railway to Echuca was opened in 1864, but the line to Seymour was not completed until 1872, and it was not continued to Shepparton until 1879 (e.g., Morvell 1983, p. 65). Farmers who sent their grain to Melbourne faced the additional problem that their wheat was less competitive than that from South Australia, which could be shipped to Melbourne cheaply by sea (Dingle 1984, p. 66).

Goulburn Valley farmers also found that they were highly susceptible to the vagaries of the local climate. The 1861-62 season, for example, was one of widespread drought, followed by floods in 1862-63, rust and caterpillar problems in 1864, and further a prolonged drought in 1866-67 (Fitzpatrick 1864; Heyneman 1867; Powell 1968a;). Agronomic problems were exacerbated by the late-maturing British cereal cultivars, which ripened in mid-summer and were ill-suited to the Mediterranean climate of northern Victoria. The settlers' difficulties were compounded by primitive and labour-intensive farming methods, and by logistical and marketing problems. Single-furrow ploughs were used in the earliest days, crops were generally sown and harvested by hand, and because of the difficulty of preparing new ground the

same land was cropped repeatedly, so that yields dropped after the first few years (Fitzpatrick 1864; Martindale 1958, p. 67; Miller 1862). The perceptions of landholders (actual and potential) in the region at this time may thus be summarised as follows (Figure 5.4):

**Figure 5.4: Situational interpretation of small farmers in the Goulburn Valley, 1850s-1860s.**



#### **5.2.4 Land Acts of the early 1860s**

If the limitations to farming were readily apparent to its practitioners in the Goulburn Valley, the pace of agricultural settlement throughout Victoria as a whole was perceived at the political level as being too slow. A series of legislative measures were introduced in the 1860s by successive Lands Ministers to hasten the progress by enhancing opportunities for would-be yeomen to acquire small parcels of land for farming purposes.

By the Victorian Government's reckoning, the first three Land Acts (enacted in 1860, 1862 and 1865, respectively) were less than successful, as legislative loopholes resulted in much land being purchased by squatters. This was particularly the case in the Western District, where large areas were offered for auction under 'Nicholson's Act' of 1860. (The Act required that an upset price of £1 per acre be paid on at least half of the land selected, while the remainder could be leased at 1 shilling per acre for up to seven years)(e.g., Powell 1970a, p. 76). There were also land openings to the east of the Goulburn River, where some 53,000 hectares of "forest country with good agricultural land along the rivers and creeks" between Murchison and Euroa were made available for 'selection' at this time (Bushfield 1860, p. 15). However,



this region was generally considered to be remote and unsuited for cultivation, and almost none of the land was taken up under the 1860 Act (e.g., Hibbins 1978, p. 55).

Some Goulburn Valley land was alienated under the succeeding 'Duffy Act' of 1862, including 8,000 hectares in the parish of North Murchison. However, this was purchased by a family of squatters, the Winters, and was the only large land acquisition in the district at that time (Bossence 1963, p. 22; Forster 1965, p. 39; Martin 1955, p. 12). The Duffy Act retained the requirement that at least half of the land selected be purchased outright, and small farmers remained generally disinclined to settle in the region (Table 5.1, page 84).

An amending Land Act ('Grant's Act'), which was passed in 1865, contained much more liberal land lease provisions and imposed requirements pertaining to land occupancy and improvements. Settlers were allowed to lease surveyed blocks of up to 640 acres (260 hectares) for seven years at 2 shillings per acre per year, after which the land was available for purchase at £1 per acre. The right of purchase was contingent upon the selector being resident on the land for the first three years, and having undertaken improvements to the value of £1 per acre during that time. Because of the lease provisions, the 1865 Act proved to be more effective than its predecessors in fostering agricultural settlement, and particularly in the Goulburn Valley (see Table 5.1). Squatters still took advantage of this Act, however, in part because the regulations concerning improvements were interpreted to mean that the value of improvements was merely to be representative of the size of their aggregate holdings. The Winter brothers, whose holdings (leased and freehold) by the mid-1860s amounted to over 13,000 hectares thus devoted considerable amounts of money to building mansions, while much of their purchased land remained entirely unimproved (Bossence 1969, p. 3; Morvell 1983, p. 21).

### **5.2.5 The Land Act 1869**

The agrarian goals of the colonial leaders remained steadfast at the end of the 1860s, but the passing of Grant's second Land Act in 1869 significantly changed the perceptions of the general public as to the feasibility of making a living off the land. This new Act further liberalised the financial terms by which land could be acquired, while more stringent residency provisions prevented the squatters from amassing further estates. There were also more railways in some parts of Victoria (although not yet to the Goulburn Valley) by this time, facilitating the cheap transport of grain to Melbourne and lessening the logistical obstacles to the growth of agricultural settlement (Dingle 1984, p. 79).

The 1869 Act introduced a system of deferred payments, which for the first time allowed people with little or no capital to acquire land. The price of £1 per acre was retained in principle, but would-be farmers could be issued licences to select allotments of up to 320 acres (130 hectares) on a probationary basis for

three years (at a rental of 2s per acre per year), after which the land could be either purchased outright or leased for a further seven years until a total of £1 per acre had been paid (e.g., Powell 1970a, p. 153).

Selection was encouraged further by two other major provisions in the 1869 Act. The first was 'selection before survey', which was deemed necessary because agricultural settlement appeared to have been hindered by the requirement under the previous Acts that land had to be surveyed before being made available for sale. Selection before survey meant, however, that land quality was no longer a consideration in settlement policy. The second important provision, which stemmed from the first, was the opening up of all licensed pastoral areas for free selection, which had been essentially precluded in the previous Acts (Martin 1955, p. 13). Pastoralists were also thwarted by more extensive provisions to defeat the notorious practice of 'dummying' (the transfer of land titles from selectors to squatters). A selector was now required to live on his allotment for two and a half years of the first three years, during which time the land was to be fenced, ten per cent of it was to be brought under cultivation, and other improvements, including fencing, clearing of timber and the erection of buildings, were to be undertaken to the value of £1 per acre.

With these provisions, it appeared that the limitations to agricultural settlement had been finally overcome. They are also evidence, however, that the Government had absorbed little of the available information about the biophysical environment of Victoria that had been amassed during the previous decade. Cultivation was still espoused as the ultimate test of a settler's *bona fides*:

Let a man take his 320 acres, at a shilling a year if you like, but let him remain on the land; make him cultivate it, because if he does not cultivate it, it may be very reasonably assumed that he does not want it... (Everard 1869).

All selectors were required to cultivate their holdings, regardless of land quality. Land was also valued across the State at the uniform rate of £1 per acre, and all new selections were to be of a maximum size of 320 acres (130 hectares). This was half of the area permitted under the previous Acts, and much of the best land had already been selected, but it was crucial to the yeoman ideal that farms should not be so large that outside labour was required to work them (Dingle 1984, p. 63; Powell 1970a, p. 154). Attention was also drawn to the success of small farms close to the goldfields. These districts offered remunerative markets for produce and supplementary labouring work was available in the towns, but the failure of larger farms further away from the diggings was seen by the Government, nevertheless, as a further justification for limiting farm size to 320 acres (Barr & Cary 1992, p. 123; Powell 1970a, p. 154).

None of these factors concerned the selectors, however, and the practical difficulties of farming (for those who were aware of them) paled into insignificance before the apparent prospect of all-but-free land ownership. Settlers raced to select land available in the Goulburn Valley, the northern plains, the Wimmera, and Gippsland after the new Act came into force in 1870 (Dingle 1984, p. 103). Unlike in the Western District, where squatters had acquired extensive freehold rights during the 1860s, most of the

land in these areas was still held under pastoral leases, and was thus open to selection.

### **5.2.6 Selection in the Goulburn Valley**

The Goulburn Valley was particularly favoured by selectors. It was more lightly timbered than areas such as Gippsland, less arid and more fertile than the districts to the west, and once cleared it was deemed suitable for wheat growing and horticulture. The region passed up by the early graziers for being too dry for grazing (Brodrigg 1978; Hawdon 1952; Walker 1965), or for agricultural pursuits without irrigation (Hodgkinson 1856), was now considered to be one of the most desirable parts of the state in which to farm, and land was taken up at an ever-increasing rate (Figure 5.5).

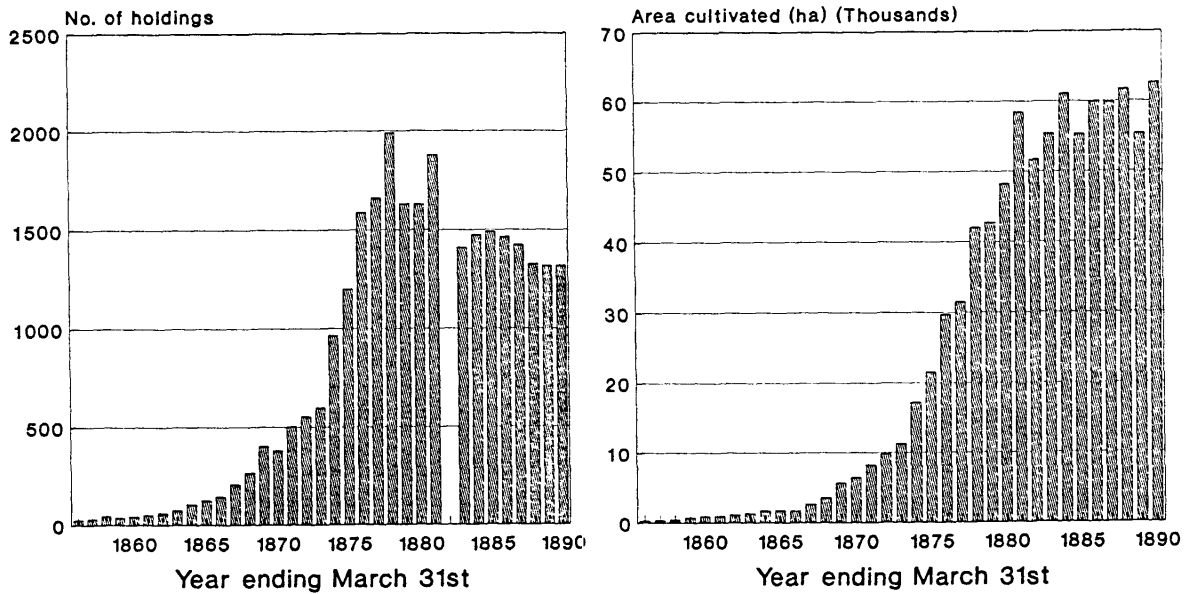
In 1873, the Land Officer in Echuca reported that the Land Act 1869 had been a "great success" in terms of getting people on the land, and that selection in his district amounted to a rush:

Under this Act settlement is going on at an unprecedented pace up the Goulburn River; at Cooma [Ardpatrick], Maroopna, Toolambro (sic), and North Murchison, nearly all the land is taken up with bona fide class of men... (Casey 1873).

The pattern of settlement, as the report suggests, approximately matched the pattern of land occupation during the squatting era: selection proceeded initially northwards along the Goulburn River and then spread onto the plains along the smaller watercourses. The greener southern parts of the region had been settled during the previous decade, as had parts of the Murchison district under the 1865 Act, and the remaining land in these districts was rapidly selected in the wake of the 1869 Act (Figure 5.6). Further north, most of the Mooropna parish was taken up between 1870 and 1873, and by 1873 there were several settlers in the Kyabram district (Figure 5.6) (Bossence 1963, p. 37). The Victorian Secretary of Agriculture, who toured the Goulburn Valley in 1873, reported to Parliament that from Avenel northwards "cultivation paddocks were general", and he proclaimed the region to be "one of the most extensive and best agricultural districts of the colony" (Wallis 1873).

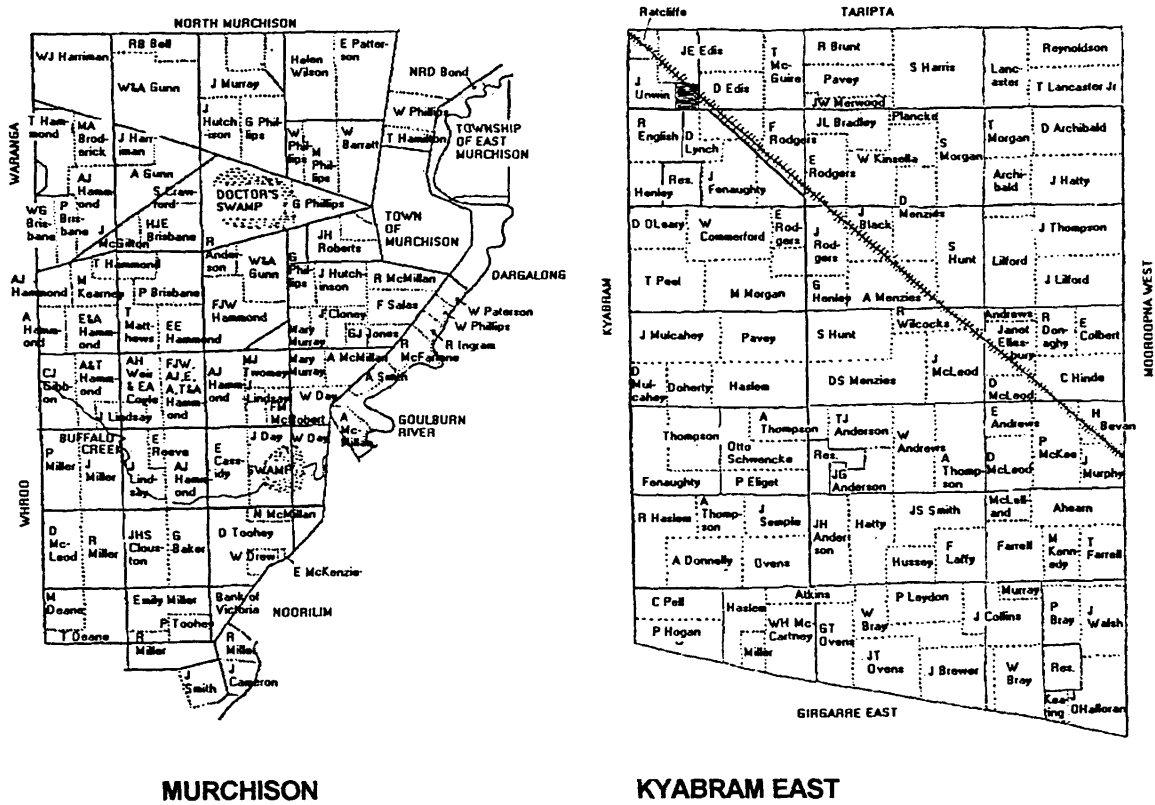
This perception was reinforced by unusually favourable growing conditions during the first half of the 1870s, which the Land Officer in Echuca all but attributed to the passing of the Land Act (Casey 1873). (It may also have fueled the myth among settlers that "rain follows the plough") (Powell 1976, p. 87; Tyrrell 1999, p. 90). In actuality, spectacular flooding along the Goulburn River in 1870 had left the subsoils of the northern plains saturated to an unusual degree (Frost 1982, p. 65), and rainfall in the years immediately following was also fortuitously above average (Figure 5.7; see also Appendix 1). The first crops thus yielded well on the virgin soils, encouraging settlement to proceed towards the Murray River and onto the dry western plains (Forster 1965, p. 48).

Figure 5.5: The progress of 'selection' in the County of Rodney, 1856-1890 (Source: Agricultural statistics, *Victorian Parliamentary Papers*, 1856 to 1890).



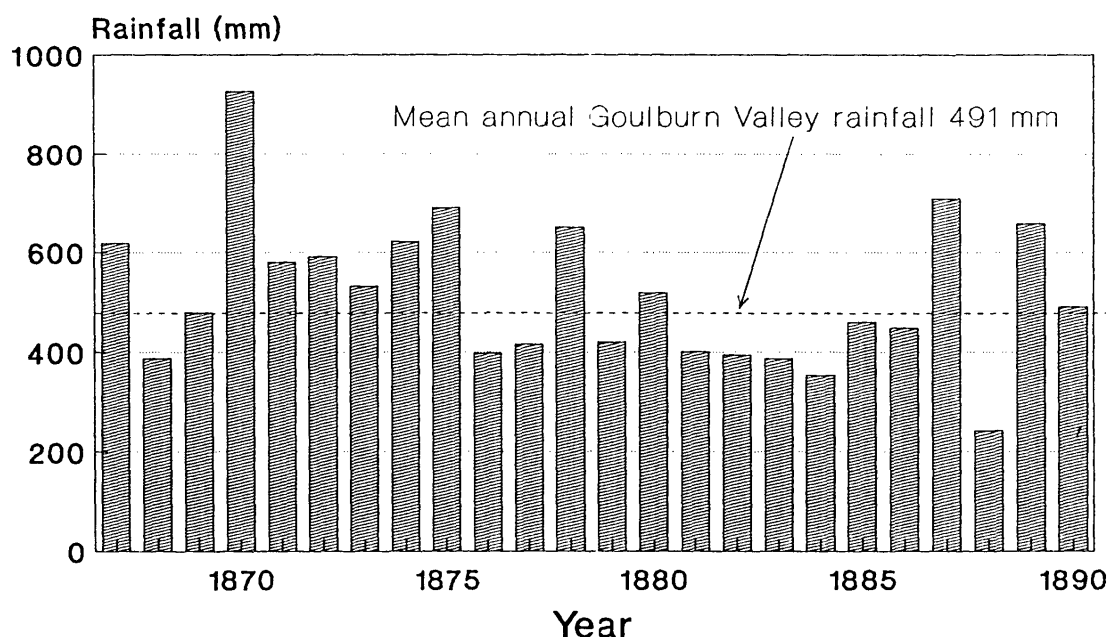
\* No data available for 1882.

Figure 5.6: Original selections in the parishes of Murchison and Kyabram East (after Bossence 1963, 1965).



\* Railroad constructed mid-1880s.

Figure 5.7: Annual rainfall in the Goulburn Valley, 1867-1890.



The outcome of this activity was that by the mid-1870s, the Goulburn Valley was the third-highest grain-producing region in Victoria (Statistical Register of Victoria, 1874). Wheat prices were good, seasons were favourable, and farmers were being rewarded with high yields (Martin 1955, p. 16). Selection in the Goulburn Valley was further encouraged by the construction of railways into the region in the later 1870s, and a number of towns came into being at this time to service the new farming areas. Tatura and Toolamba were established in 1874, for example, and Kyabram in 1876 (Table 5.3) (Forster 1965, p. 54).

The progress of selection was slower on the east side of the Goulburn River because of the dense scrub and forest lands. In 1872, the district had not even been surveyed into parishes (Hibbins 1978, p. 69), and there was reportedly no agricultural settlement on that side of the river between the tiny hamlet of Shepparton and the Murray (James 1938, p. 17). The demand for land was such, however, that with the help of an enterprising surveyor, Shepparton was "a rapidly rising township" and the purported centre of "the rich agricultural district known as the Goulburn Valley" by the end of the decade (Whitworth 1879, p. 426).

Table 5.3: Populations of selected Goulburn Valley towns, 1871-1881.

	1871	1879	1881
Shepparton	33	(almost 500)	771
Murchison	235	350	464
Mooroopna	146	500	812
Tatura	-	60	196

Sources: Martin (1955, p. 17); West (1962, p. 78).

Such glowing reports generally belied the problems of the settlers. The 'free selection' provisions of the Land Act 1869 meant that blocks could be taken up without prior survey, but few selectors had any initial practical knowledge of the land. Locals were willing to act as guides (for a fee), but choosing a block was often difficult. Dingle (1984, p. 64) cites the example of settlers in the Numurkah district who rejected land at the beginning of their search, "only to claim it was the best they had seen when approaching it from another direction many weary hours later." It was at least recognised that access to water was essential, and land along creeks and watercourses was the first to be taken up (e.g., McLennan 1936, p. 22). Open country was also preferred because it obviated the need for tree clearing. Soil quality was judged only by texture and the vegetation present, and as Dingle (1984, p. 64) suggests, poor land would have looked deceptively productive during the wet seasons of the early 1870s. As a result, a great many blocks were selected which were not fit for cultivation, and this occurred increasingly as more land was selected (Casey 1873, 1875).

The selectors were also under great financial pressure, as few had much capital to invest in their farms. Although they were not required to purchase their land outright before taking possession of it, they were obligated under the terms of their licences to make £320 worth of improvements within the first three years, and cultivate at least 32 acres (13 hectares). Considerable starting capital (at least £600) was required in order to meet these costs at the outset, as little return could be expected in the initial years of pioneering. Optimistic selectors thought, however, that "if [they] could pay the first year's rent [£32], and had a good pair of horses, and a plough and a dray, and perhaps £20 or £30 capital, [they] would be able to get through with it" (cited by Dingle 1984, p. 66).

Life on the plains was, in addition, only a little less primitive at the outset than it had been for the early squatters. As Martindale (1958, p. 67) points out, the country may no longer have been an unknown wilderness, but general living conditions were much the same. Roads and amenities were poor or non-existent, and inexperience, the vagaries of the climate and the dangers of flood or fire were ever-present problems. Selectors were dependent on their own labour, or that of their families, to work their land and most would have had few tools beyond a single-furrow plough, an axe, and a horse or ox with which to turn their bush selection into a farm. As a result, many were slow to undertake the improvements required under the 1869 Act, and in some areas of marginal land they clearly had no intentions of growing crops and planned only to graze stock. They were then in danger of forfeiting their land on the grounds of 'dummying', so that the required "one acre in ten" was usually cultivated, if only to comply with the land laws (Casey 1873). Little official sympathy was felt for those who failed to meet the occupancy requirements. It was considered "no hardship for a man to be compelled to put improvements on his land to the value of £1 per acre, and the man who won't do that ought not to have land" (Casey 1873).

### **5.3 Land use during the Selection period**

As with the squatters, the selectors' physical interactions with the land reflected some measure of understanding (usually gained with experience) of the biophysical conditions on their holdings, but as noted above, their farming activities were also influenced by the technology at their disposal, economic factors (market opportunities and individual financial circumstances), and the regulatory constraints of the Land Act 1969.

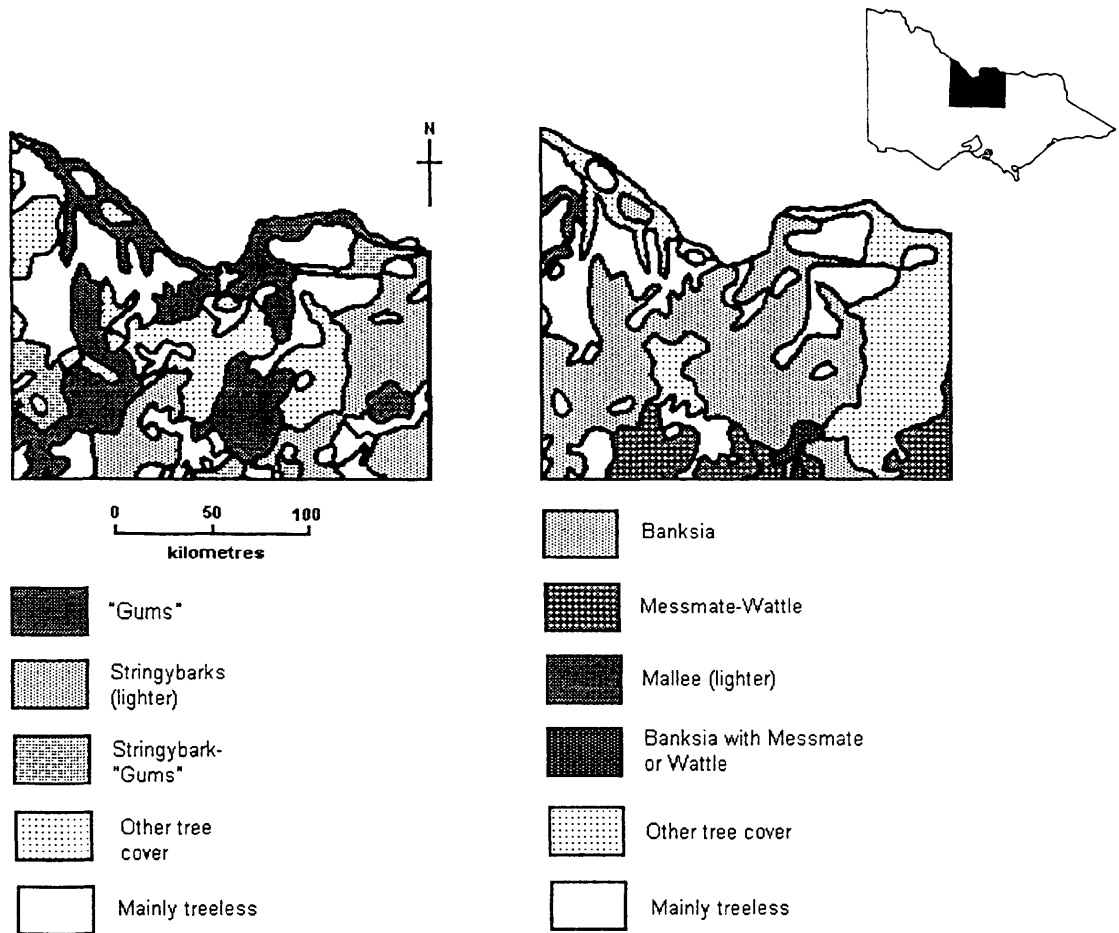
#### **5.3.1 Clearing the land**

Before it could be cultivated, the land had to be cleared of existing vegetation. To the selectors, the Goulburn Valley was highly favourable in this respect as it had fewer trees than in some other, more heavily forested parts of Victoria. The squatters had made little impact on the tree cover of the region, however, so that a considerable amount of clearing was still required. At the beginning of the Selection era the Goulburn Valley was still primarily characterised by savannah woodlands on the plains and denser forests in the hill country and to the east of the river (Figure 5.8), and even in 1873 the country north of Murchison was still "clothed with boxwood timber" (Wallis 1873).

The physical process of clearing involved "axe, saw, forest 'devil' and plenty of hard work" (Morvell 1983, p. 28). The task included the laborious work of grubbing out stumps (undertaken with axes, chains and oxen), as well as removing the intervening scrub and dealing with the constantly regenerating suckers of the eucalypts (Williams 1988). Some of the wood was used for construction purposes - houses and outbuildings, for example, were usually built of chock-and-log and covered in bark stripped from grey box trees (e.g., Bossence 1979, p. 51). Fences also consumed much timber, although in the less heavily timbered districts wire was used for fencing as less wood was required than for post-and-rail fences, and cheap wire fencing materials had been available since the 1860s (Bolton 1981, p. 82). Forster (1965, p. 52) notes that by the end of 1873 much of the western Goulburn Valley (close to the railway line to Echuca) had all been selected and fenced, principally with wire, and wire-enclosed paddocks were to dominate the regional landscape thereafter (Davidson 1976, p. 67).

Ringbarking was also a widely used method of clearing. The largest trees, or those not used for fences and construction were, "sapped" or ring-barked to kill them where they stood, so they could be felled later and eventually burnt. Selectors grew their first crops in the cleared areas between the trunks of ring-barked trees and continued the clearing work year by year. Bossence (1979, p. 92) cites as typical the example of Henry Twitt at Kaarimba, north of Shepparton, who had space for only 12 hectares of wheat in his first year (1874), but increased this to 42 hectares by 1877. The presence of stumps and dead trees added to the difficulties of ploughing and harvesting crops - particularly until the introduction of the stump-jump plough in 1876 - but so much effort was required to remove them that as late as 1885 a traveller who

Figure 5.8: Woodland cover in north-central Victoria in 1869 (after Powell 1967).



A map of the Distribution of Forest Trees in Victoria was first compiled in 1866 from extensive field survey notes, and was published in revised form in 1869 by Arthur Everett. This map depicted twelve classes of forest that had been thoroughly reviewed by the then-Government Botanist, Baron Ferdinand von Mueller. The above maps are based on those of Powell (1967), who re-drew the Everett Map with a revised interpretation of woodland classes and boundaries.

passed through the Numurkah district observed that "the majority of trees, though killed, are still standing" (cited by Bossence 1979, p. 92).

Ringbarking was also undertaken to improve stock carrying capacity, as grass growth increased significantly in the absence of shading and competition for moisture from trees. One family who arrived in Toolamba in March 1871, "immediately ring-barked about 60 acres", and was rewarded six months later with a lush growth of spring grass (Bossence 1969, p. 7). Davidson (1976, p. 69) notes that stocking rates in areas of savannah woodlands, such as the lands west of the Goulburn River, could be raised by clearing from two hectares per sheep to more than two sheep per hectare on the best land.



### 5.3.2 Commercial forestry activities

Many of the trees felled in the Goulburn Valley during the Selection era were merely obstacles to farming, but a significant amount of timber was also cut for commercial purposes during this time. Demand was high in Victoria and elsewhere for fence posts, railway sleepers, firewood and timber for construction purposes, and the industry was favoured by low capital costs and minimal regulation. As Carron (1985, p. 179) notes, the Victorian Government of the time viewed wood as "something that should be available at next-to-nothing cost for the large number of people battling to make a subsistence living from the earth." Annual licences were required, but these were of nominal cost and imposed no restrictions on the species, size or quantities of timber which could be cut. Nor were there any incentives to reduce the general wastefulness of the cutting process (Land Conservation Council 1983, p. 189; Williams 1988).

Sawmills for cutting red gum sleepers were established along the Murray and Goulburn Rivers from the mid-1860s, and other mills soon followed, particularly as paddle-steamers began to ply the rivers in the 1870s, providing a ready means of transporting the timber<sup>1</sup> (Hibbins 1978, p. 60; Land Conservation Council 1983, p. 29; McLennan 1936, p. 27; Morvell 1983, pp. 69-70). Selectors in heavily wooded (usually foothill) areas also cut timber as a form of income supplement (e.g., Martindale 1958, p. 77), while in the northern districts the initially abundant Murray (white cypress) pine was harvested as a popular construction material (Hibbins 1978, p. 75).

Red gum timber was particularly valuable, as it resisted decay and was used for everything from wharf piles, mine timbers, road paving blocks and fence posts. The sawmills along the Murray and lower Goulburn Rivers also provided most of the railway sleepers throughout Australia, and sleepers were exported from the region to New Zealand and India (Bossence 1979, p. 42; Hibbins 1978, p. 89). As a result, by the late 1870s, the red gum forests on both sides of the Goulburn had all been "partly worked," and "a very large quantity of timber [had] been cut on this river" (Wallis 1878). New mills were still being proposed for the Goulburn Valley at that time, but it was becoming apparent that the red gum supplies were not inexhaustible. Government foresters reported to the Secretary of Agriculture, A.R. Wallis, that if consumption were to continue at existing rates, and without measures to conserve young stock, the red gum forests of the Murray and Goulburn Rivers would last as little as four to six years (Wallis 1878).

Popular concerns over the exploitation of Victoria's forest resources had already been raised more than a decade earlier, following the publication in 1864 of G.P. Marsh's book, *Man and Nature* (Marsh 1965; see

---

<sup>1</sup> The Goulburn River was not initially navigable, so timber from mills at Mooroopna and Toolamba was first hauled by bullock and jinker. By 1875, sufficient snags (downed trees and branches) had been removed to enable paddle steamers and barges to reach Shepparton and Murchison. Navigation on the Goulburn was a "precarious business", however, and most of the river trade was taken over by the railway after the line to Shepparton was completed in 1879 (Morvell 1983, pp. 69-70).

page 1). Among other issues, the book discussed the ecological (and, it was thought, climatic) consequences of deforestation, and drew attention in Victoria to the mining districts, where tree-felling and bark stripping were notoriously excessive and wasteful (Powell 1976, p. 77). Subsequent editorials in Melbourne newspapers spoke in favour of forest preservation, and there were public campaigns for the proclamation of woodland and forest reserves, as well as the regulation of timber harvesting (Powell 1989, p. 71). The Government response was to appoint a Royal Commission in 1871, which called for "prompt and decisive action", although milling operations continued to remain largely unrestricted, and a measure introduced in 1874 to reduce wastage by charging for each tree felled in fact encouraged further felling in wooded areas, as selectors cashed in by selling their trees (Powell 1976, p. 76, p. 79).

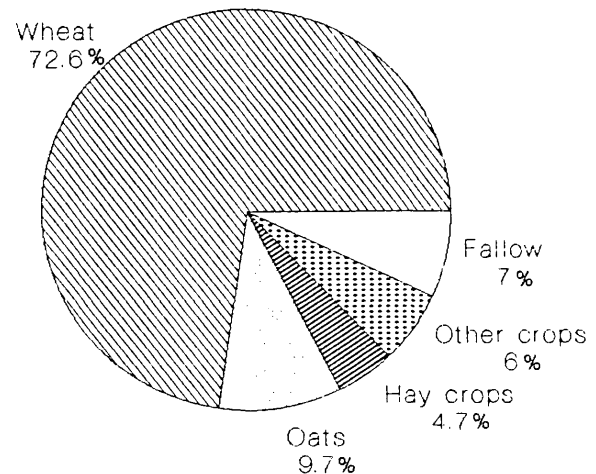
Some legislative measures helped nevertheless to protect the dwindling red gum timber supplies along the Murray and Goulburn Rivers. In 1877, an export duty on red gum was announced, while mill owners were restricted to areas of four hundred hectares, and could not apply for a new licence until the specified area was completely cut out (Hibbins 1978, p. 89). These regulations curtailed the millers' activities and several mills closed or changed hands (Bossence 1979, p. 43). In general, however, most other Government attempts at applied forestry failed, as mill owners lobbied successfully to protect their presumed rights to the timber resource (Powell 1976, p. 77). Carron (1985, p. 180) notes accordingly that although a number of Bills specifically for forest legislation were introduced from the later 1870s (in 1879, 1881, 1887 and 1892), none of them was enacted. The opposition to regulation remained strong, and forest laws continued to be inadequate until the end of the century.

### **5.3.3 Cultivation practices**

Cultivation was required under the Land Act 1869, and although the official expectation was that the selectors would strive for self-sufficiency (raising a few stock, growing vegetables, and experimenting with tree crops)(Wallis 1873), most of the region's selectors had little choice but to grow cash crops, such as wheat, oats or grasses for hay, in order to earn rent money and finance the required improvements on their blocks (Figure 5.9).

The farming processes involved were primitive, at least in the beginning, as implements were crude and most selectors had little practical knowledge of cropping techniques. Land was prepared with a single-furrow plough at the rate of a hectare every five to seven days, and often it was merely scratched over (Burroughs 1967, p. 116). In the Goulburn Valley, where the soils were initially easy to work, most farmers felt it necessary to plough their paddocks only every second year, and made do with scarifying to work the soil in the intervening period (Frost 1982, pp. 58-59). Sowing was done by hand, and there was little preparation of the seedbed. Some seed would have been harrowed, although one farmer is reported to have broadcast the seed for his crop while his wife "followed him pulling a branch behind her to cover the

**Figure 5.9: Crop type as a percentage of cultivated land in the County of Rodney, 1874.** (Source: Agricultural statistics, *Victorian Parliamentary Papers*, 1874. Other crops included barley, maize and other cereals, also green vegetables, vines and orchard fruits).



seed" (cited by Bossence 1979, p. 51). More thorough and extensive cultivation was encouraged by the introduction of new farm machinery, including double-furrow ploughs (which halved cultivation time) in 1874, and the stump-jump plough in 1876 (Forster 1865, p. 43; Wheelhouse 1966).

The initial results of these farming activities were greatly encouraging and the Goulburn Valley was proclaimed in 1873 by the touring Secretary of Agriculture to be "admirably suited" to grain production (Wallis 1873). He and other observers expressed concern, however, that the same land was being repeatedly cropped, year after year, "evidently without a thought for the deleterious consequences" (Wallis 1873, p. 48). Wallis expressed particular concern over the "wilful waste" of straw, which in most instances was burnt after harvest - "a most suicidal practice" - when it might instead have been composted and spread back over the land, or ploughed back in to the soil. He also proposed a rotational system involving green fodder crops and stock-rearing between crop phases as a means of restoring fertility to the soil (Wallis 1873, p. 48). However, these suggestions, based on the English systems of intensive farming, disregarded the realities of Victorian farming: deep-ploughing was difficult and labour-intensive, farms were too small to raise sufficient numbers of stock to generate much manure, and the economics of farming were such that selectors were obliged in any case to sow whatever cleared land was available into grain crops (Dingle 1984, p. 66).

Artificial manures, including guano and bone dust, coffee and tobacco manures, and superphosphate of lime, were available for purchase in the Goulburn Valley in 1870s, but at £6 to £9 a tonne they were prohibitively expensive for most selectors (Forster 1965, p. 53). They were also a risky investment in a region where rainfall was unreliable and any additional expenditure on crops, whether in the form of deep ploughing or manuring, was better avoided (Barr & Cary 1992, p. 128; Frost 1982, p. 125). Manure, in any case, was viewed by farmers with suspicion, as crops in dry seasons appeared scorched and shriveled after topdressing, or growth was stimulated too early in the season and soil moisture reserves were depleted before the grain-filling period in summer. Manuring also seemed to be unnecessary in seasons of good rainfall, as the crops derived adequate nutrients from their roots penetrating the subsoil.

## **5.4 Environmental impacts**

Like the squatters and the Aborigines before them, the selectors were responsible for significant environmental changes in the Goulburn Valley. They were much more numerous than their predecessors, however, and were both determined and legally obligated to subdue the wild nature of the land. The changes that ensued in the region during their period of occupancy were, as a consequence, more profound and far-reaching than ever before.

### **5.4.1. Vegetation removal and dryland salinity**

The most obvious change to have occurred during the selection era would have been in the appearance of the regional landscape associated with the widespread removal of trees. Powell (1967) mused that the Everett map of 1869 (Figure 5.8) recorded "the end of an era", as the selection process, accompanied by widespread clearing, commenced almost immediately after the map was published. In the Goulburn Valley, A.R. Wallis observed that the selectors "recklessly" cut down whatever trees stood on their allotments (Wallis 1873, p. 48), and the Goulburn Advertiser reported in 1876 that "everywhere the sound of the axe can be heard from early morn till the shades of evening set in" (cited by Bossence 1969, p. 5). Powell (1967) suggests that few "well-timbered" paddocks would have remained after a few years, while the squatter Edward Curr remarked of the Goulburn Valley landscape in the 1880s that "fences and tree-ringing [had] not improved the scene" (Curr 1883, p. 81).

Selectors and graziers alike viewed the removal of trees as a beneficial process, and in some areas there was even an "unexpected advantage", in that stream flows improved in the wake of widespread ringbarking (Abbott 1880, p. 100). At the time, it was thought that this could be explained in two possible ways: that the decaying roots of the trees might facilitate subsoil drainage, or, more probably, "that when timber is dead the large proportion of the rainfall which was formerly taken up by the roots of the growing trees and evaporated from their leaves is allowed to find its way to the creeks and rivers" (Abbott 1880, p. 101).

The latter explanation indeed proved to be correct, but Abbott's prescience did not extend to the salinity problems that developed across much of Victoria, including the Goulburn Valley, in the twentieth century as a consequence of the altered hydrological regimes. In addition to increased stream flows, the widespread removal of trees and other native perennial species caused increased amounts of rainfall to percolate into the soil. This in turn caused watertables to rise, and low-lying areas became saline discharge sites as natural salts were brought to the soil surface and concentrated by evaporative processes (e.g., Macumber 1991; Peck 1978). The overall process was slow and insidious, (e.g., dryland salting in the Goulburn-Broken catchment area was first observed around Dookie in 1949)(Downes 1959),

but a hundred years after the Selection period, the problem was considered serious enough throughout much of Victoria to warrant mitigative action on the part of both landholders and the State Government, and it is also expected to worsen considerably into the future (see Chapter 8).

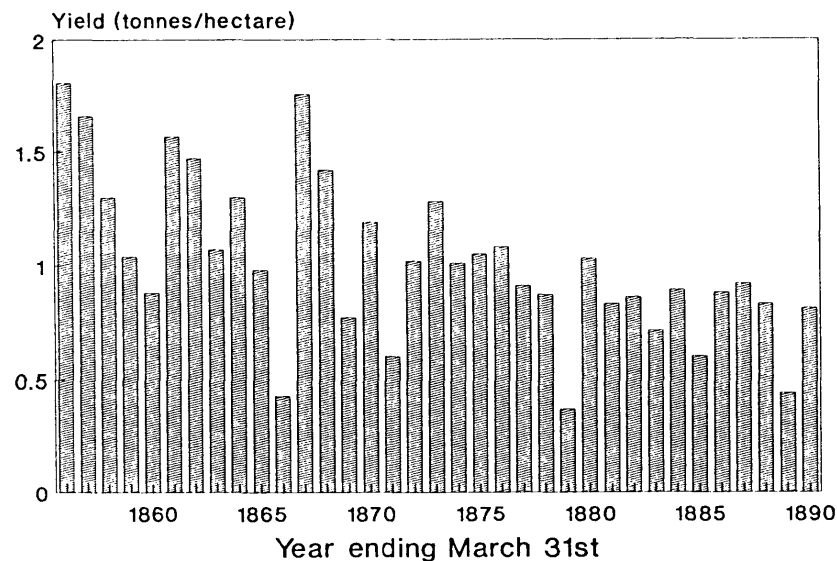
The selectors of the 1870s and 1880s could not have foreseen such outcomes as they cut down or ringbarked their trees and cleared away the intervening scrub. The nature of the salinisation process meant that it was beyond their range of perception in both space and time, while the immediate results were that croplands were beneficially free of vegetative obstacles and pasture growth was increased. It is possible in any case that even if hydrological changes had been widely observed, the selectors may not have believed the paradoxical fact that in an environment in which crops often failed for want of adequate rainfall, land could be degraded through an excess of water.

#### 5.4.2 Effects on the soil

The environmental impacts of selection in the Goulburn Valley inevitably extended to the soils of the region, which were unable to withstand the effects of the prevailing methods of cultivation and caused significant problems for the selectors.

As the Secretary of Agriculture, A.R. Wallis, had predicted, the land was "sure one day to become exhausted if grain crops [were] repeatedly and without intermission taken off it" (Wallis 1873, p. 48). Production levels fluctuated in response to seasonal rainfall conditions, but the overall trend - both in the Goulburn Valley and across Victoria as a whole - was of declining yields (Figure 5.10), even as new areas of virgin soil were being added to the area under cultivation.

**Figure 5.10: Average wheat yields in the County of Rodney, 1856-1890 (Source: Agricultural statistics, *Victorian Parliamentary Papers*).**



Agronomically, this decline could be explained in terms of depleted soil nutrients and the build-up of weeds and wheat diseases in the soil. It could also be attributed in part to soil structural decline associated with the physical effects of cultivation. The process of ploughing, for example, pulverises soil aggregates and mixes the upper soil layers, accelerating the loss of organic matter and reducing soil porosity. The physical pressures exerted on the soil also cause bulk densities to increase, which decreases soil permeability as well as contributing to the formation of plough pans and subsoil hardpans, and reducing overall water and nutrient uptake by crops (e.g., Conacher & Conacher 1995, pp. 100-101).

In the Goulburn Valley, the red-brown earth soils which predominate in the region (see Chapter 2) were particularly prone to the development of hard-setting surface characteristics after cultivation, which added to the selectors' general difficulties in preparing land for cropping. The problem was made worse by dry seasons in the late 1870s and early 1880s (Figure 5.7), which baked the soil surface to a hard crust. In the absence of softening autumn rains, seed beds were often merely harrowed prior to sowing (Frost 1982, p. 26). This meant that crops were established in soil worked to minimal depths, and only if sufficient rain fell would their root systems be able to penetrate the subsoil to obtain adequate moisture and nutrients, such that reasonable yields might ensue.

#### ***5.4.3 Faunal impacts and introduced species***

The general alteration of the environment associated with the influx of people into the Goulburn Valley during the Selection period is presumed to have had profound impacts on the native fauna of the region. Little substantive documentary evidence on the subject appears to be available, and as Powell (1996) points out, research on the impacts of settlement expansion on the native fauna of Australia has so far been inadequate. Morvell (1983) writes, nevertheless, that in the Toolamba district, bird and animal life was apparently plentiful when the first settlers arrived in the 1860s. Koalas were especially prominent, inhabiting the red gum forests along the Goulburn River, as well as trees on the plains (Morvell 1983, p. 29; Parris 1948). Ringbarking and commercial timber harvesting are presumed accordingly to have taken a considerable toll on the koala population, which would have continued to decline as settlement intensified, and as koala shooters were encouraged by the price of 1s per skin (Chambers 1985, p. 219; Morvell 1983, p. 29).

Kangaroos had been abundant also when the first settlers arrived, and were considered a particular pest as they grazed on the selectors' crops (Bossence 1963, p. 49). As clearing, fencing and cultivation became more extensive, however, the kangaroos reportedly disappeared (as did roaming mobs of wild horses) (Bossence 1979, p. 92). Along with ducks, quail and snipe, kangaroos were also shot for sport, and for many selectors they were a major source of dietary protein (Bossence 1963, p. 40, 1965, p. 21; Morvell 1983, p. 29). Morvell (1983, p. 29) adds that there was a 'scattering' of emu throughout the region.

These were generally left alone by the early settlers, however, who observed that the large birds never appeared to nest before a drought, and were thus reliable as 'weather prophets.' Brolga were treated with less sympathy, as they uprooted young crops and pugged the soil, and were generally regarded as a pest (Morvell 1983, p. 30).

As the populations of native fauna generally declined in the region, introduced species gained in prominence. In part, this was attributable to the efforts of the Victorian Acclimatisation Society, which was established in 1861 (with the approval of the Government) to assist with the subjugation of the bush through the replacement of native animal and plant species with more familiar, useful and aesthetically pleasing European types (Barr & Cary 1992, p. 24; Tyrrell 1999, pp. 26-27). Tyrrell suggests that in Victoria, acclimatisation was underpinned by the agrarian ideology of the time, but there were also economic motivations, as the Victorian Society concerned itself particularly with the provision of new "intensive farming" activities to counteract the declining importance of gold in the Colony's economy.

Some of the faunal species deliberately introduced into Victoria (e.g., foxes, deer, trout) reflected the sporting interests of the acclimatisers. Another introduction was the sparrow, which, it was hoped, would eliminate caterpillar pests in cereal crops, although in actuality the birds destroyed grain and also attacked fruit crops. In the 1880s, they were declared an official menace, and in the Goulburn Valley in 1888 a bounty of a shilling a dozen was placed on the birds and their eggs (Morvell 1983, p. 122; Tyrrell 1999, p. 32).

An even more notorious introduction was the rabbit. Domesticated examples of this species had been in Australia since the arrival of the First Fleet, but it did not acquire pest status (other than in Tasmania) until the wild type was released by a sportsman, Thomas Austin, near Geelong in 1859. Rabbits then spread prolifically, creating problems for selectors and pastoralists on the northern plains from the middle of the 1880s, as they competed effectively with stock for pasture resources, destroyed crops, and ate out saplings and other vegetation, thereby reducing stock carrying capacities and contributing to widespread erosion (e.g., Bolton 1981, pp. 90-95; Dixon 1892; Price 1966). Flannery (1994, p. 161) equates the ecological success of the rabbit in Australia with that of the European colonists, who demonstrated a similar capacity to monopolise natural resources previously utilised by a much more diverse range of species, and brought about dramatic environmental changes in the process.

By 1880, the rabbit problem was sufficiently serious in Victoria that the Colonial Government passed a Rabbit Destruction Act, and paid a bounty for scalps. However, what were vermin to most landholders were a source of income (and, indeed, dietary subsistence) to many others, and were also the basis for a thriving export industry. In the mid-1890s, rabbit carcasses and skins were being shipped to Britain by the millions, with the Goulburn Valley as the prime source of supply (Bossence 1979, p. 117; James 1938, p. 30). Debates raged accordingly as to whether the economic advantages of the rabbit outweighed its

destructiveness, and the vested interests of the rabbit industry served for some time to limit the legal rabbit control methods to trapping and poisoning, while more effective practices such as fumigation were disallowed (Chambers 1985, p. 219, p. 312; Price 1966). The bounty on rabbit scalps was also removed by political pressure, and landholders who wished to rid their land of the pest were advised in the mid-1890s to fence them out with wire netting<sup>2</sup> (Chambers 1985, p. 178, p. 219)

## 5.5 The problem of water

Water, or lack of it, emerged as yet another persistent problem on the northern plains. Few of the blocks selected in the 1870s had river frontage, and most other watercourses flowed seasonally and could not be relied upon. The Goulburn River itself was merely "a string of waterholes" at times, as in 1866, when no rain fell for ten months (Bossence 1965, p. 102). In drought years, the selectors thus had to contend not only with crop failures, but with the problem of obtaining sufficient drinking water both for their stock and for themselves. This had been a concern for the squatters as well (see page 67), but as Martin (1955, p. 19) observes, the pastoralists had much greater flexibility as they could range stock over their vast runs, find agistment in more favourable areas, and, if necessary, sell their flocks if drought conditions grew particularly serious. The selectors, by contrast, were tied to their blocks and could not move in the event of a drought.

Even when rainfall was adequate for crop growth, water could be in seasonally short supply. Dams and other storages for drinking water were an obvious necessity, although one that added to the debt burden of many selectors (Morvell 1983; Powell 1989, p. 64). On some blocks, winter runoff filled natural depressions to provide supplies of water for stock, but in flatter country the selectors were required to construct dams by ploughing and scooping out an area of earth to form embankments. The enterprising Winter brothers reportedly excavated dams with a cutting machine in 1875 (Morvell 1983, p. 23), but most dams were dug with a pick and shovel (Bossence 1979, p. 51).

A.R. Wallis (1873) had observed that groundwater was also available throughout much of the Goulburn Valley, at depths of between 20 and 35 metres. Few bores were sunk by selectors, however, as this operation required the timbering of shafts (as in deep-lead mining), which required both expertise and capital, and the water produced was often brackish or saline (Frost 1982, p. 65; Hibbins 1978, p. 95).

---

<sup>2</sup> The subjugation of the rabbit in Australia was eventually brought about in the early 1950s through a more successful example of acclimatisation - *myxomatosis*. Rabbit populations were decimated by this virus (the natural host of which is a South American rodent), but resistant strains soon emerged, and in the Goulburn Valley and elsewhere rabbits continued to be, and still are, a significant pest (Landcare Victoria 1993).



The inadequacy of the available water supplies became particularly apparent as the run of good seasons in the first half of the 1870s came to an end (Figure 5.7). The year 1877 was sufficiently dry that many Goulburn Valley farmers found themselves carting water (Hibbins 1978, p. 123). The following year was wet again, but 1879 saw another drought, which continued into the 1880s. More bores were sunk as earthen dams and tanks dried up, and selectors and townspeople again carted water, either from public wells or from the Goulburn River. For some it was a daily journey of some miles, with their stock and a cask or iron tank for drinking water mounted on a dray or sled (Bossence 1963, p. 43).

The provision of water supplies became a priority for the various local governments of the region also, and was one of the earliest concerns of the councillors of the new Shire of Shepparton, which had ceded from the greater Shire of Echuca in 1874. At this time, Shepparton township was listed in the Victorian Gazetteer as having a population of 500 people, and the soil of the district was described as being suitable for the cultivation of "cereals, vines, olives and fruits." It was noted, however, that the supply of water was derived principally from "dams, wells and tanks, the creeks in dry summers lasting only a few months" (Whitworth 1879, p. 426). According to Bossence (1979, p. 156), the former Echuca Shire council had failed to provide adequate public services as roads and water supplies in many areas, not for lack of intent but because the original Shire had been so extensive that only token attention could be given to any part of it. To rectify the water situation, the new Shepparton council provided pumps for water-carriers at strategic points along the creeks, and sank wells in the drier parts of the Shire or bought pre-existing wells from squatters who had no further need of them. Shire dams were also dug by the Waranga Shire council, and at Tatura a water reserve was proclaimed around a deep well that had been built as a sheep watering point by the squatter James Winter (Bossence 1969, pp. 6-9). These provisions were inadequate, nevertheless, and in 1881 drought conditions were so severe that the Colonial Government in Melbourne began sending water trains to the region. These were promised on a daily basis in the summer of 1884-85 also, although according to Bossence (1969, p. 23) they were not very satisfactory and farmers often waited in vain for their appearance.

Too much water was also an occasional problem, as in 1870, when four floods were experienced in five months, causing a great deal of damage to property and stock (James 1938, p. 25; Morvell 1983, p. 10). The *Waranga Chronicle* (cited by Morvell 1983, p. 10) reported that during this time the Goulburn River was eleven kilometres wide on the plains between Nagambie and Murchison. Further, more localised flooding occurred in the wet years of 1875 and 1878 (e.g., Hibbins 1978, p. 87), while the wet seasons also brought 'rust' (i.e., fungal outbreaks), which rendered grain crops valueless and added to the selectors' woes (McLennan 1936, p. 29).

## 5.6 Re-appraisals and legislative amendments

For all the soil and water problems faced by the selectors, the most pressing concern for the great majority was "pecuniary embarrassment" (Crown Lands Commission of Inquiry 1878). Those who were undercapitalised had only "increasing debt and mortgaged holdings" to show for their first three years' work (Dingle 1984, p. 66), so that after fulfilling their probationary licence obligations few were in a position to apply for freehold ownership of their land. The alternative was to apply for a seven-year lease and work at any job that would help to pay the rent (e.g., Hibbins 1978, p. 87). Droughts and declining yields exacerbated the selectors' financial difficulties, and in the late 1870s, wheat prices also began to fall, as overall production increased beyond the capacity of the limited Victorian market, and New South Wales and Queensland imported competing grain from South Australia. Surplus Victorian wheat was shipped to Britain from 1877, but competition was strong in that market also, providing little price relief (Frost 1982, p. 26).

Most selectors chose initially to persevere, but those on poorer quality land, or in areas removed from the towns and railways lines, resorted to grazing small flocks of sheep on their blocks, keeping their cultivated areas to the legal minimum (Casey 1875). Others saw that the most sensible solution to their financial problems was to move, since new land was still available on relatively easy terms. Some followed new rail lines into the New South Wales Riverina or west to the Mallee (which became the focus of selection in the 1880s) and selected new blocks of virgin land. This ran counter to the agrarian ideal of a sturdy, settled yeomanry, but for the selectors, land was less a legacy to be safeguarded than an exploitable resource that could be expended if necessary (Dingle 1984, p. 74; Powell 1976, p. 83).

If they could afford it, some of the selectors who remained on their blocks became 'boss cockies', buying up their neighbours' exhausted land and turning it back to grazing. In the Shepparton district, the Crown Lands bailiff reported in 1878 that "18 or 20 proprietors [held] freehold areas over 2000 acres [800 hectares] all obtained by the purchase of original blocks of 320 acres from selectors" (cited by Powell 1973, p. 100). A local grazier predicted in the same year that selections in the region would ultimately be amalgamated into large holdings (Powell 1973, p. 101). Such properties were both more profitable and less risky, as they allowed for a combination of grazing and cropping enterprises (Dingle 1984, p. 73). This meant that the dependence on wheat could be lessened, soils could be rested, and newly developed types of machinery (e.g., the McKay stripper-harvester, introduced in 1884) could be used more efficiently on larger acreages of crops. Bossence (1979, p. 59) adds that there was also room for agronomic experimentation.

To Victorian Government, however, boss cockies were merely squatters in a new guise, while those selectors who surmounted their debt problems appeared not so much to be yeomen settlers as investment farmers, exploiting the fertility of the soil without emotional attachments to either land or

community (Barr & Cary 1992, p. 126). The "wise and beneficent" agrarian policy of the State thus appeared to be headed for failure, and there was particular concern that large areas of land on the northern plains would revert to the condition of a "pastoral wilderness" if steps were not taken to keep it in the hands of the selectors (Crown Lands Commission of Inquiry 1878, p. 5).

A Royal Commission was established accordingly, in 1878, to investigate "the permanency or otherwise" of settlement under the provisions of the Land Act 1869. The inquiry involved exhaustive questioning of both landholders and regional officials to determine why Selection did not appear to be succeeding, and as Powell (1970a, p. xxii, p. 173) suggests, it thus constituted a rare example of direct 'dialogue' between the policy-makers and the users of the land resource in the Colony.

The Goulburn Valley served as one regional focus of attention in the inquiry, and from the answers obtained the Commissioners were obliged to concede that "it often happens from the nature of the soil, or the character of the climate, that pasture will pay where tillage will not." Acknowledgement was made of the "burthensome (sic) character" of the conditions of settlement imposed by the Land Act, and it was recommended that selectors should be allowed to act on their own judgement as to whether they should cultivate the land, or otherwise improve its grazing capacity without breaking the surface of the soil (Crown Lands Commission of Inquiry 1878). Consideration was also given to densely wooded or forest areas, and it was suggested that non-resident selectors could be permitted to furnish capital and employment for resident selectors. It was hoped that such a measure would facilitate the speedy clearing and reclamation of heavily timbered country, "which otherwise it would take generations to subdue to man's use" (Crown Lands Commission of Inquiry 1878, p. 5).

In this form, acknowledgement was finally made at the official level that certain environmental obstacles posed hindrances to agricultural settlement in Victoria (although there seemed little doubt that Nature would inevitably succumb to continued settlement pressures). The primary cause of the selectors' problems was not perceived by the Commissioners to be environmental, nevertheless, but "the very limited capital - sometimes the absence of capital - with which selectors enter upon their holdings" (Crown Lands Commission of Inquiry 1878, p. 4). The drought of the previous two seasons, although fatal to crops and livestock, was considered accordingly to be less of an indication of the true climatic limitations of the country than an obstacle to debt repayment, as the selectors earned insufficient (if any) return from the land to meet their liabilities (Crown Lands Commission of Inquiry 1878).

The Government thus sought to ease the selectors' financial burdens, and the primary outcome of the 1878 Royal Commission was an Amending Land Act in that year that halved land rents and doubled the periods of land licence and lease. Transport infrastructure was also targetted for improvement, and in the Goulburn Valley, railway branch lines were extended from Toolamba to Tatura in 1880, and from Shepparton to Numurkah in 1881, with further extensions during the later 1880s (e.g., Martin 1955, p. 18).

These measures provided some immediate relief for the selectors, but little ultimate security, as the biophysical hazards of the Goulburn Valley still remained. Some selectors struggled on through the 1880s, but almost half of those in the County of Rodney ultimately left their selections, and by the beginning of the 1890s barely one in ten of the original settlers in the northern parishes remained (Barr & Cary 1992, p. 210; McColl 1917).

### **5.7 Discussion: 'Farmers by Act of Parliament'<sup>3</sup>**

The period of history discussed in this chapter did not commence at any defining moment (as, for example, with the arrival of the first pastoralists in the Goulburn Valley in 1838, which marked the beginning of the Squatting period), but arose during the late 1850s and early 1860s as the first agricultural settlers moved into the region and attempted to farm the land. By the 1870s, this new resource use system had all but replaced the existing pastoral-based system, although it retained the same hierarchical structural pattern of a collective of land users operating within a regulatory framework imposed by the Victorian Government (i.e., the official or policy-making component of the system).

The transition from the Squatting to the Selection system could be said to have occurred as the agrarian attractor that had influenced earlier land use policy decisions (i.e., those made by the Colonial Office), and hence system functioning, gained in strength at both the official and popular levels with the development of Victoria as a Colony. Although rooted in ideology, the prevailing agrarian philosophy was reinforced by the changing socio-political circumstances in Victoria in the wake of the gold rushes, and by the perceived economic (and climatic) imperatives to develop an agricultural base for the Colony.

As Goodman (1988) observes, however, agricultural society did not arise spontaneously in Victoria, but had to be created by Acts of Parliament. To some degree, this was because the lack of transport infrastructure and marketing opportunities for agricultural produce throughout much of the Colony, which severely constrained the decision space of potential farmers (Hollick 1990; see Figure 4.8). Equally limiting, however, were the profound biophysical constraints to farming, including the highly variable climatic conditions and, on the northern plains, the general scarcity and unreliability of water supplies. This was recognised by the surveyors (Hodgkinson, Skene) and other officials in the bush, as well as by farmers, so that the small amount of land acquired by farmers in Victoria during the 1860s may have been a reasonable reflection of the actual demand at the time (Powell 1968a).

At the government level, however, as land reform and related measures (e.g., railways, trade) dominated the agenda of the new Victorian Parliament, the environmental limitations to agricultural settlement

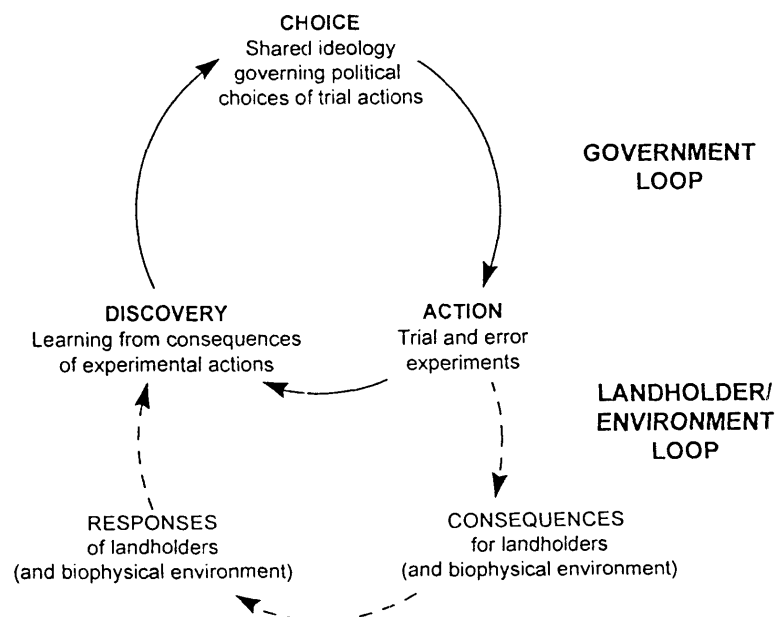
---

<sup>3</sup> Goodman (1988, p. 37)

appeared inconsequential. Powell (1996) notes that the various Lands Ministers (Duffy, Nicholson, Grant) were deeply committed to the ideal of agrarian settlement, and were prominent and highly influential individuals within both the Government and Victorian society. As with the policy-makers in the Squatting period, however, they had little direct knowledge of the territories for which they were responsible. Melbourne was closer to the rural districts than London, but in a logistical sense the northern plains were still somewhat remote from the seat of Government, prompting the squatting fraternity to proclaim (in 1856) that the politicians' "knowledge of land and ideal of a country... [were] formed in the culture of a cabbage garden or the flower pot of a city suburb" (cited by Powell 1970a, p. 67). This appears to have been a valid complaint, as the secondary nature of the land capability information available to the Government lessened its cognitive impact, and the agrarian goals inherited from the Colonial Office remained unquestioned into the 1860s.

The Selection period proceeded accordingly with the drafting of the various Land Acts. Powell (1976, p. 86) mused that this was a learning process for the Government, as each new version of the legislation brought the Government marginally closer towards its ultimate goal of land reform. In systems terms, it could be equated with 'logical incrementalism' - that is, a feedback process in which the choices made by an organisation are based on the vision or values of its leaders, and progress (in the form of structural adjustments) is made by trial and error until the system approaches its intended goal (Figure 5.11)(Parker & Stacey 1995, p. 40). In the case of land reform, high levels of uncertainty (due to legislative inexperience on the part of the new Government, as well as incomplete knowledge of the land) made it difficult to determine how the vision of agrarian settlement was to be realised. This necessitated repeated revisions and amendments to the land reform legislation until, with the passing of the Land Act 1869, the goal of close agricultural settlement in the Colony appeared to have been achieved.

**Figure 5.11: Logical incrementalism (after Parker & Stacey 1995).**



According to this model, the drafting of each new Land Act constituted an act of cognition on the part of the Government, as the terms of settlement were progressively altered in response to feedback on land acquisitions. Land capability issues remained unaddressed, but as discussed previously, not all of the information originating from the operating environment of a system becomes 'knowledge' and triggers structural adjustments (Capra 1996, p. 219; see pages 11, 75). How and what is discovered about the outcomes of trial and error experiments depends upon the visions, or mental models, held by the leading decision-makers within the system. If these models are sufficiently strong, the leaders may not be receptive to the contradictions (i.e., dissonance) between their perceptions and reality - in which case, they continue to act in the same manner as before, without the vision being questioned (Mitchell 1979, p. 130; Parker & Stacey 1995, p. 41). This helps to explain the actions of the Victorian Government in the drafting of the Land Acts. The outcomes of each new Act were different from what was intended, but the primary problem in each instance was assumed to be faulty legislation, which enabled squatters rather than farmers to purchase most of the available land (Powell 1968a). Some blame was also placed on the selectors themselves, many of whom transferred their titles to squatters under the early Acts, and were accused by Lands Minister Gavin Duffy of having "sold their inheritance for a paltry bribe" (cited by Powell 1970a, p. 111).

The culmination of the land reform process was the Land Act 1869, which finally provided a basis for the desired transformation of the Goulburn Valley (and other parts of rural Victoria) from a landscape of extensive pastoral runs into a dense patchwork of small farms. The passing of 1869 Act may be viewed accordingly as a bifurcation point in the evolution of the regional socio-agricultural system, reflecting the dramatic changes in system characteristics that occurred immediately after that time. Unlike the previous bifurcation (i.e., the transformation from the Aboriginal to the Squatting system), which occurred as a result of an external systemic shock (the arrival of the Europeans), the bifurcation in 1869 appears to have resulted from changes to certain internal parameters of the system. The settlement aims of the Government remained unchanged, as did the practical constraints of farming, but a change in land ownership regulations under the 1869 Act - including the provision that people without capital could now acquire farms - was sufficient to induce a major change in perception on the part of potential settlers. The change in land ownership regulations thus appeared as a new attractor to the collective of potential land users, which destabilised the previous 'squatting structure' of this sub-system, and a new pattern of systemic order based on small farming emerged thereafter.

A new sense of order was also imposed on the land itself. On the northern plains, this manifested itself in the square boundary lines and regular sizes of the subdivisions (Figures 5.2, 5.6), reflecting the apparent lack of irregularities in the land surface, and encouraging the perception that Nature could be 'domesticated' (Worster 1979, p. 143). This attitude was also reflected by the acclimatisers, whose activities appear "dangerously simple-minded" from a modern ecological perspective (White 1980, p. 36), but who were convinced on basis of nineteenth century logic that the majority of introduced species, as

"children of civilisation", could not help but improve the country (Hamilton 1892, p. 223). Ironically, among the introductions that failed to flourish were the crop species grown by the selectors. Firey (1960, p. 25) suggests that a useful criterion for determining whether a particular resource use process (in this case, cereal farming) is compatible with the natural environment is the concept of 'anthropogenic climax' - in ecological terms, a stable point at which plant and animal associations are capable of self-perpetuation in a habitat characterised by a particular type of land use. In the Goulburn Valley during the Selection period, this point of stability was never reached. The crops persisted only as long as the selectors laboured to maintain them, and even then their existence was precarious. The varieties grown were adapted to European environments and farming systems rather than to the northern plains of Victoria and the crude methods of the selectors, and under the circumstances an anthropogenic climax was not readily attainable.

To the Victorian Government, in any case, it was apparent within a decade that the new 'Selection system' was structurally unstable. The perceived sources of this instability were not environmental, however, but the regulatory and financial constraints faced by the selectors, which limited their flexibility to respond to such changes in their operating environment as falling grain prices. Little could be done to influence external market conditions, but the internal system constraints could be relaxed to some extent by structural adjustments, as manifested in the Land Act 1878, which eased some of the regulatory conditions associated with Selection and offered the selectors more choice in their land use options (Hollick 1990; see Figure 4.8, page 76).

The more fundamental problem remained, however, that because of inoperative feedback processes arising from the overwhelming dominance of ideological and socio-political factors in policy-making processes, the Selection system was poorly adapted to the biophysical environment in which it operated. This was not initially apparent to the Government, as the unusually favourable climatic conditions of the early 1870s appeared to vindicate the belief that the destiny of the Colony lay in agricultural settlement. The rapid onset of 'grain sickness' in many areas also appeared to be less of an inherent soil limitation than the fault of the selectors, whose cropping processes were observed by A.R. Wallis, among others, to be unsustainably 'linear' (i.e., the soil resource was being transformed into grain and exported from the ecosystem without any form of replenishment).

The exploitative nature of the cropping process was also readily apparent to the selectors themselves. When asked if he could earn a living from his selection, one Goulburn Valley farmer explained, "it is right enough for the first four or five years, not after that; when the land is worked out it is very little good" (cited by Dingle 1984, p. 75). Most selectors continued to sow crops in the same fashion every autumn, nevertheless, because the returns in good years generally compensated for the losses in bad ones. The land was a resource to be used, and the selectors' concerns were not with achieving 'optimal' productivity in balance with soil conservation over the long term, but with meeting their immediate financial obligations.

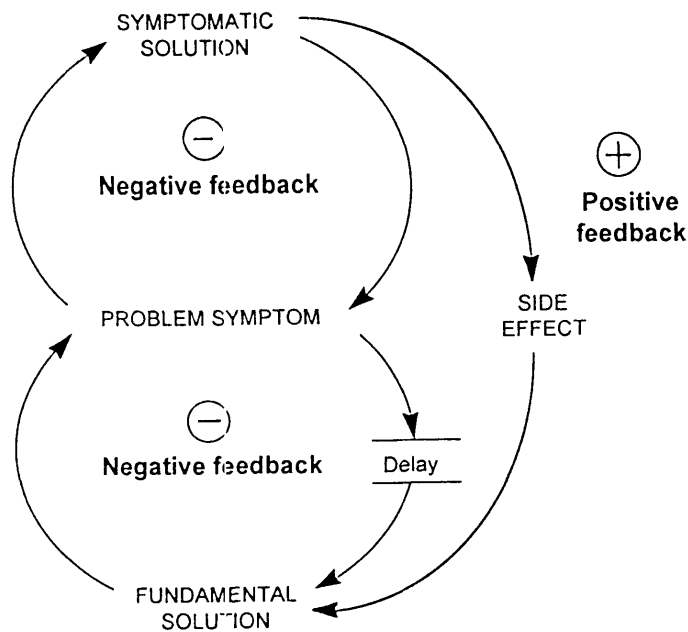
Cognisance of the environmental hazard of declining soil fertility was countermanded accordingly by what Simon (1969) described as 'satisficing' (i.e., satisfying + sufficing) behaviour that would meet the selectors' most pressing needs.

Such a system obviously could not be maintained over the long term. As Firey (1960, p. 22) observed, "there can only be brief interludes during which man's resource processes may exceed the inexorable limits imposed by nature", and selection, although adoptable for the cultural reasons that rendered squatting unviable, was not an ecologically sustainable use of the land. This was a possibility that the Victorian Government was not prepared to embrace, although the 1878 Royal Commission, as a channel for direct feedback from landholders, at least exposed some of the environmental obstacles that impeded the selectors' success. The structural adjustments that were instituted in response (i.e., revised payment terms and new railways) did not address these issues, however, but merely reinforced the existing, increasingly precarious European system of farming that exhausted the soil and could not withstand the variability of the northern Victorian climate.

The Amending Land Act 1878 may be viewed accordingly as a mere 'shifting of the burden' of fundamental systemic problems to other, apparently easier and more efficient, solutions (Figure 5.12). Senge (1990, p. 104) observes that such behaviour typically occurs when underlying systemic problems generate symptoms that require attention, but are difficult to address directly, either because they are obscure or costly to confront, or (in the case of Selection) because of cognitive dissonance. In such situations, attention becomes instead on alternative solutions which, like the 1878 Act, may ameliorate the symptoms, but fail to address the fundamental problem. This may also result in 'compensating feedback' - a syndrome in which well-intentioned actions produce responses that offset the benefits of the action (Senge 1990, p. 58). The Government's efforts to foster agricultural settlement by liberalising the terms of land occupation for selectors thus required that ever more financial concessions be offered in order for settlement to be maintained. Senge (1990, p. 104) points out accordingly that compensating feedback can become increasingly stressful (or expensive), and may also have an obfuscating effect, as it is assumed that the obstacles can be overcome by more of the solution, although the solution may actually be exacerbating the problem. Under such circumstances, the typical human reaction is to "glorify the suffering that ensues" (Senge 1990, p. 59). The Goulburn Valley selectors have been hailed accordingly as heroes for doing "such valuable national reclamatory work without assistance or complaint under the most trying and enervating conditions" (John Callender 1942, cited by Bossence 1979, p. 60).

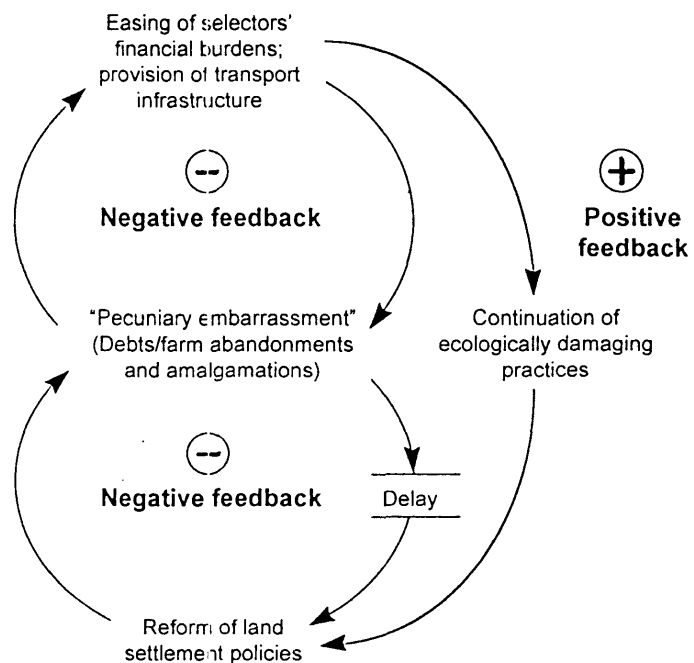


Figure 5.12: 'Shifting the burden' (after Senge 1990).



As explained by Senge (1990, p. 106), the systems archetype of 'shifting the burden' consists structurally of two balancing or negative feedback processes, both trying to ameliorate the same problem symptom. The symptomatic (or compensating feedback) solution is a 'quick fix' which brings about an apparent improvement, obviating any perceived need for a more fundamental solution. The fundamental solution generally takes longer before its effects become apparent, but it may be the only enduring way to deal with the problem. In some instances, an additional reinforcing (or positive) feedback process appears as a 'side effect' of the symptomatic solution, which may make the evocation of a fundamental solution even more difficult.

Applied to the Selection system of the late 1870s, the diagram appears as follows:



## 5.8 The need for a new paradigm

For the selectors, the Amending Land Act of 1878 was merely a symptomatic solution to the greater underlying problem of unsustainable land use practices, and was of little real help. According to Epps (1894, pp. 80-81), across Victoria as a whole, only a third of the selectors of 1874 were still on the land in 1891, and it was noted with alarm that the number of primary producers had barely increased at all in the ten years from 1881, while the population of Victoria as a whole had increased by nearly 270,000 in that time. There were, by that time, virtually no new areas of virgin land for selectors to move on to and it seemed to the Government that agricultural settlement had reached its limits.

Further legislative remedies (i.e., internal systemic adjustments) were thus no longer applicable, and if the Government was to maintain its hopes of closer settlement in rural Victoria, a new paradigm was required. This required acknowledgement of the true nature of the biophysical environment and its limitations to agriculture, and the application of technology to bring about its purposeful alteration. In many areas, including the Goulburn Valley, this was achieved by landholders in the new century through the progressive adoption of new, more 'scientific' methods of farming, based on subterranean clover, superphosphate and fallowing (e.g., Barr & Cary 1992; Dunsdorfs 1956). These techniques pertain primarily to dryland farming areas, however, and are not discussed in this thesis. The remaining chapters focus instead on the dramatic transformations that ensued in the Goulburn Valley after the Victorian Government decided, in the 1880s, to foster permanent close agricultural settlement in the region through the introduction of an even more revolutionary technology – that of irrigation.

## CHAPTER 6

### IRRIGATION - BEGINNINGS (1880 to 1905).

#### 6.1 Introduction

From the very beginning of the European occupation of the Goulburn Valley, settlers were challenged by problems of water supply. Squatters sought river frontages for their runs and ranged their stock over large areas in response to seasonal conditions. The selectors who came in their wake installed rainwater cisterns for their domestic needs, scooped out dams for their stock, and hoped that each year's rainfall might be sufficient to permit them to harvest a crop. In the early 1870s, seasonal conditions were unusually favourable, but 1877 was a drought year, and as dry conditions continued into the 1880s it became apparent to the Victorian Government that permanent agricultural settlement in the region was contingent upon the provision of artificial water supplies. From 1880, steps were taken towards a program of water conservation utilising the flows of the Goulburn River. However, as discussed in this chapter, the ensuing two decades were characterised by a disparity between Government decision-makers and landholders in terms of the perceived uses of the available water. Opinions also differed within the Government itself as to the extent to which the water supply system should be developed, and the decision to proceed with large-scale irrigation works was primarily due to the efforts of visionary individuals who perceived irrigation as the key to the future economic prosperity of the northern plains, and of the State as a whole. Cognitive factors were also important during this period, as both the social and biophysical capacities of the Goulburn Valley to support such development were essentially overlooked, as were the potential negative consequences of artificially applying water to the land, in spite of the cautionary advice proffered by experienced irrigation engineers of the time.

#### 6.2 Official perceptions of the water supply issue

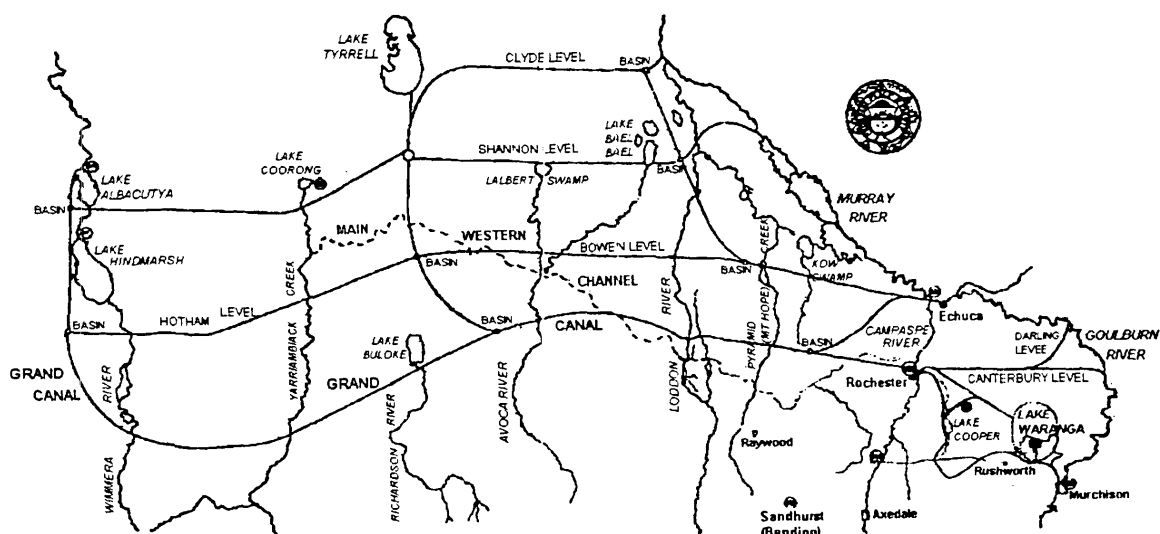
##### 6.2.1 *Early water conservation proposals*

In the Goulburn Valley, thoughts of conserving and redistributing the seasonally abundant waters of the Goulburn River had arisen at various times - usually during droughts - since Europeans first arrived in the region. Major Mitchell himself had mused that 'canals' might facilitate the better distribution of water over the northern plains (Mitchell 1839, p. 158), and a number of schemes were proposed in subsequent decades to utilise the waters of the river for supplying the Waranga goldfields and irrigating the surrounding areas (Table 6.1). However, the plains had always been too sparsely populated for such expensive proposals to be given serious consideration by the Victorian Government.

**Table 6.1: Early proposals relating to water conservation and irrigation in the Goulburn Valley.**

<b>Year</b>	<b>Proposal</b>	<b>Source</b>
1836	Explorer Major Mitchell muses that 'canals' might facilitate the better distribution of water over the northern plains.	Mitchell (1839, p. 158)
1850s	Squatters attempt to increase sheep carrying capacity by constructing small weirs and dams on the available watercourses and dredging the 'chains of ponds' (the most pronounced natural features of the plains).	Powell (1976, p. 127)
1856	Ex Rushworth miner R.H. Home advocates use of Waranga lagoon (Gunn's Swamp) as storage for Goulburn River water, with canals for water transport and irrigation, as campaign platform in 1856 Rodney elections.	Bossence (1965, p. 103); Forster (1965, p. 73); Parris (1950)
1856	Surveyor Clement Hodgkinson suggests to Parliament that irrigation would increase the productive potential of the otherwise arid region between the Goulburn and Ovens Rivers (although a great increase in regional population would first be required).	Hodgkinson (1856)
1860	Frederick Acheson, C.E., submits prize-winning essay to Royal Society of Victoria proposing diversion of resources of more reliable rivers via zig-zag channels across the northern plains; includes diversion of Goulburn River at Seymour to supply Waranga goldfields and irrigate 250,000 hectares of country north to the Murray.	Forster (1965, p. 73); Powell (1989, p. 85)
1865	Drought-year motion put to Legislative Assembly for Victorian Government to initiate scheme to utilise waters of Goulburn River to prevent depopulation of (still sparsely inhabited) plains west of river.	Martin (1955, p. 22)
1871	Business Benjamin Dods founds Grand Victoria North-Western Canal, Irrigation, Traffic & Motor Power Company; proposes construction of channel from Murchison to Portland to irrigate 6 million hectares of northern plains, drain land in winter, and provide transport conduit for ensuing produce.	Martin (1955, p. 23); McColl (1917); Powell (1976, p. 127, 1989, p. 87)

Figure 6.1: Plan of the proposed Grand North-Western Canal project, 1871, (after McColl 1917).



The most ambitious water supply scheme of all, the £5 million Grand Canal scheme proposed in 1871 by Benjamin Dods (Table 6.1; Figure 6.1), was more timely, given the rise in the regional population in the wake of the Land Act 1869. However, the scheme ran counter to the prevailing colonial policy of local government development of water supply and infrastructure projects (Martin 1955, p. 22). Dods also required the provision of 1.2 million hectares of Crown land, which was considered by the Victorian Government to be too much of a concession, and the technical details of his scheme were derided by a visiting irrigation engineer from India (Forster 1965, p. 74; McColl 1917). The scheme was viewed, in any case, to be unnecessary, as farmers in the northern regions were benefiting at that time from the run of good seasons and were not in any apparent need of additional water (Powell 1976, p. 127).

Local interest in the Grand Canal scheme was revived in the wake of the 1877 drought, and a survey by Dods of the northern plains in 1878 showed that the proposal was technically feasible, at least "so far as the configuration of the country was concerned" (McColl 1917, p. 156). By this it was meant that the plains were relatively flat, and the numerous braided streams offered natural channels for the distribution of water by gravity, minimising construction needs (McColl 1883; Rutherford 1974).

By the time of Dods' survey, drought had emerged as a serious political issue facing the Victorian Government. The intensified settlement of the northern plains, and the fact that farmers, rather than squatters, were being affected by adverse seasonal conditions meant that the impact of the 1877 drought extended to all sectors of Victorian society. As Rutherford (1974) observes, progress and development in the Colony were directly linked with the surrounding countryside, and the Government was forced to acknowledge, as dry weather continued into the early 1880s, that the liberal economic provisions of the Land Act 1878 were not sufficient to keep the selectors on the land. Water was the limiting factor, and reliable supplies were required for agricultural settlement on the northern plains to become permanent.

The environment was thus no longer a benign factor in the decision-making framework of the Victorian Government. The "fertile flats" (Wallis 1873) of the northern plains became the "arid districts" (e.g., Murray 1885), and as recurring dry conditions were officially recognised as a hazard to settlement it was evident that some form of action was required if their effects were to be minimised. One option, never actively considered, was to permit settlement to be scaled back to meet the existing climatic limitations. In the Goulburn Valley, this had already begun to occur of its own accord, as the blocks of failed selectors were bought up by 'boss cockies' and amalgamated into large mixed grazing and cropping enterprises (see page 105). To the Victorian Government, however, this trend threatened to undermine its agrarian settlement aims, and the Land Act 1878 was introduced as a countermeasure. The Act proved insufficient in itself to solve the selectors' problems, but by the beginning of the 1880s, an alternative response was perceived to be both feasible and necessary: Nature was to be subject to the control of engineers.

As Mitchell (1979, p. 218) notes, devising technological solutions to environmental problems is a favoured recourse of industrial societies, and although not industrial in itself, Victoria shared in the technological progress of Europe and America. This included the re-invention of irrigation, which had been transformed by British engineers in India in the 1840s from an ancient technology into a modern system that could transform deserts into farmlands of astounding productivity (e.g., Clemings 1996). It was also being practised in America, where irrigators were setting about remaking the environment of the arid West. News of the progress in California had been the inspiration for the Grand Canal scheme of Benjamin Dods, and as circumstances for the selectors continued to worsen at the end of the 1870s, the Victorian Government became increasingly receptive to the idea of utilising the 'untamed' flows of the Goulburn River to water the northern plains (e.g., McColl 1883). Not only was this a progressive 'scientific' solution to the problem of the Colony's unreliable climate, but as Tyrrell (1999, p. 103) suggests, it also, importantly, reinforced the Government's increasingly shaky agrarian vision, and gave it a new, verdant strength.

### **6.2.2 The Water Conservancy Board**

In 1880, the Victorian Government appointed an advisory Water Conservancy Board to "inquire and report as to the feasibility of providing at a reasonable expense a supply of water for the northern plains" (McColl 1917, p. 157). The Board comprised the Chief Advisory Engineer of Water Supply, George Gordon, who had experience of irrigation in India, and the Assistant Surveyor-General, Alexander Black.

With an initial focus on water supplies for stock and domestic purposes, the Board presented twelve reports to Parliament by September 1881 (Gordon & Black 1881). The essential recommendations contained within them were that:

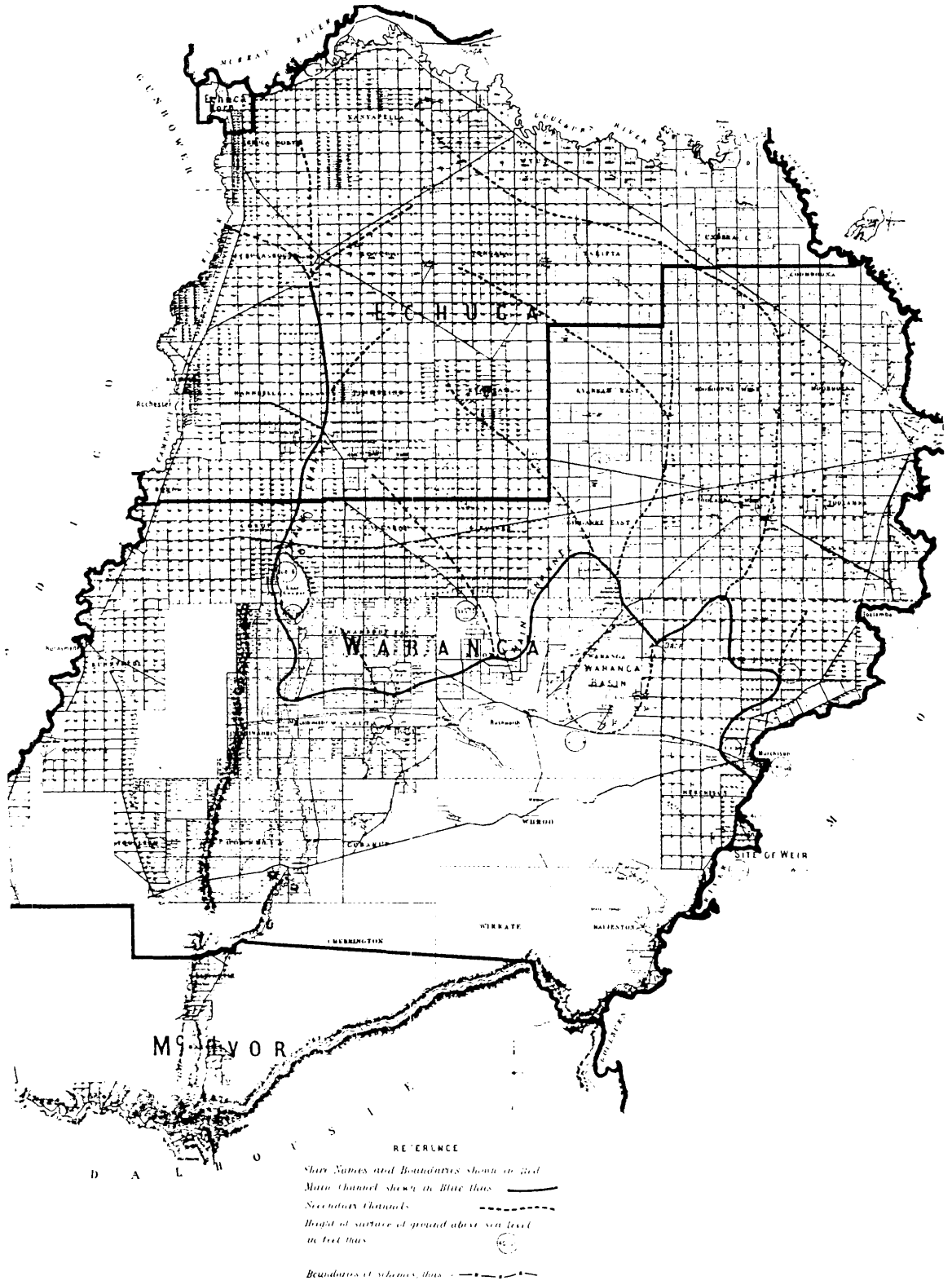
- \* The waters of each river should be utilised within its own catchment.
- \* Modest engineering works (weirs and dams) should be constructed in creeks and watercourses to conserve winter flows for summer use.
- \* Urban and rural waterworks trusts (comprising land users, shire councillors and one member appointed by the Government) should be set up with the authority to finance and operate water supply projects.
- \* Farmers should be responsible for diverting water from the creeks or low-level channels onto their properties.
- \* Accurate gauging of rivers should be undertaken before any development schemes were initiated.

The recommendations reflected both the financial conservatism of the Water Conservancy Board, and the belief that the responsibility and management of water supply undertakings should be in the hands of the people who would directly benefit from them (Gordon & Black 1881). This principle was upheld in the resultant *Water Conservation and Distribution Act 1881*, which provided the legislative framework to enable rural districts to obtain reliable water supplies for stock and domestic purposes. Twenty-three local waterworks trusts were constituted under the Act within the next five years, each with the authority to borrow from the Government to finance their proposed works and levy rates on water users to cover operating costs and interest on loans (e.g., Dingle 1984, p. 120).

The first and largest of the trusts was the United Echuca and Waranga Waterworks Trust (UEWWT). This was formed in 1882 on the joint application of the Shires of Echuca and Waranga, and encompassed a district between the Goulburn and Campaspe Rivers of some 245,000 hectares. The constituted purpose of the UEWWT was to carry out the 'Goulburn Scheme' outlined by Gordon and Black in their Fourth Report (Gordon & Black 1881). This proposed that the winter flows of the Goulburn River be utilised to supply water for stock and domestic purposes to the northern part of the County of Rodney (Figure 6.2). A main channel would extend as far west as the Campaspe River, thus allowing for drainage, while a network of smaller distribution channels based on natural watercourses would bring water "within easy reach of every holding" (Gordon & Black 1881, p. 11). The scheme also allowed for the possibility of using the Waranga Swamp as a future storage.

Districts east of the Goulburn River were also considered by Gordon and Black. The Twelfth Report of the Water Conservancy Board (Gordon & Black 1881) detailed a scheme for supplying water for stock and domestic purposes to Shepparton and adjacent districts utilising natural watercourses north of the Broken

Figure 6.2: The proposed 'Goulburn Scheme' for supplying water to the northern plains (from Gordon & Black 1881).



reprinted at the Department of Lands and Survey Melbourne by J. K. ...



River. A weir was subsequently built on Pine Lodge Creek, but it failed within a month of its completion in April 1884. Work on the remainder of the scheme was delayed as a consequence, and more extensive water supply development ultimately did not progress east of the Goulburn until after the turn of the century (Martin 1955).

The investigations of the Water Conservancy Board continued in the meantime, and in September 1882, a First Report on Irrigation was presented to the Victorian Parliament (Gordon & Black 1883). This took the form of a general review of the subject and argued that the feasibility and profitability of irrigation depended on:

\* *The quantity of water required and available:* In other countries where irrigation was practised (Italy, India, Western America), the rivers were fed in summer by melting snows or monsoon rains at their sources. In Victoria, only the Murray and Goulburn Rivers contained enough water in all seasons to allow for occasional irrigation. All other northern rivers were at their lowest ebb when the water was most required.

\* *The cost of utilising the water:* Where irrigation was practised in southern Europe and India, population densities were much greater and the cost of labour many times lower than in Victoria. Costs would be also incurred in the provision of drainage, but Gordon and Black was stressed that such expenditure was essential as irrigated land tended to become "sour" if undrained.

\**The increased crop yields that would result:* It was assumed that, without manuring, the yields of irrigated crops would correspond to those currently obtained during the most favourable seasons. It was noted additionally that irrigation without manure had been found in Europe to be unremunerative.

Gordon and Black added that there appeared to be a general "misapprehension" as to the extent of irrigation that could be physically carried out by the existing population of Victoria. The entire irrigated area of Spain (200,000 hectares) could be encompassed by the northern part of the County of Rodney included in the 'Goulburn Scheme', while all of the irrigated lands in India amounted to no more than the area of the Mallee. Gordon and Black ultimately concluded that "too sanguine views of [the] profitableness [of irrigation] are often entertained from an under-estimate of the cost and an overestimate of the results, arising from a want of information or due consideration of the conditions essential to success" (Gordon & Black 1883, p. 11).

A second Irrigation Report focused in detail on the Goulburn Valley, and provided the technical outline for the irrigation system that was subsequently developed in Rodney after 1886, including the construction of a weir on the Goulburn River. This Report also anticipated, however, that the cost of the required works

would be excessive, that problems would arise from "unskilful use of water and lack of development for years until the population should increase," and that marketing the resultant irrigated produce might be difficult (Water Conservancy Board Second Report on Irrigation, cited by Martin 1955, p. 35). Gordon and Black's overall recommendation was, accordingly, that a technically realistic, fiscally responsible approach should be taken towards water conservation in northern Victoria. This appears to have been a reflection of their professional pragmatism and experience, although Powell (1989, p. 102) suggests that their modest engineering proposals were also approved of by farmers on the northern plains, who primarily sought a supply of water for their homesteads and stock to enable them to subsist through future seasons of drought.

### **6.2.3 The 'irrigationist' perspective**

Elsewhere in the regional community, and at other (higher) levels of Government, attitudes towards water conservation were somewhat different. The recommendations of the Water Conservancy Board were seen as a minimal solution to the water supply problem, whereas the irrigation technology outlined in their reports offered the possibility of new and more ambitious developmental goals for northern Victoria. Irrigation could provide the basis for new agricultural enterprises, thereby furthering the creation of the desired agrarian (and indeed, 'garden') landscape, and helping to diversify the rural economy (Tyrrell 1999, p. 7). The argument was reinforced by improvements in transport and the introduction of refrigeration and new dairy technologies in the 1870s, which suggested that export opportunities might be created for perishable products, while the economic dependence of the colony on wool and wheat (the price of which was still falling) could be reduced. Politicians who looked even further ahead towards the possibility of Federation argued that the "only way for Victoria to hold her own in the race of progress with the other [larger] colonies [was] by irrigating her territory..." (Madden 1884, cited by Frost 1982, p. 74). Irrigation was heralded accordingly as the key to the future economic stability, progress and prosperity of the State (Martin 1955, p. 55).

The irrigationist view was promoted by two prominent members of the Victorian Parliament, Hugh McColl and Alfred Deakin. McColl was a former Bendigo newspaperman who had campaigned for the provision of water supplies to the goldfields and was subsequently influenced by news of the irrigation movement in California. Believing that similar schemes should be undertaken in Victoria, he became secretary to the Grand Victoria North-Western Canal Company in 1874, and in 1880 secured a seat in the Victorian Parliament, where "in season and out of season he preached the gospel of water for the north" (McColl 1917, p. 157). Alfred Deakin (who was later to become Australia's second Prime Minister) had been appointed Victoria's Minister for Water Supply and Public Works after a change of Government in 1882, and he actively shared McColl's vision of utilising the rivers to transform the "arid north" into a green and productive land. His biographer remarks that irrigation was "the first large practical enthusiasm of Deakin's

political life" (La Nauze 1965, p. 84), and it was largely his efforts that convinced the Victorian public that irrigation might well be a practical ideal.

In response to the Water Conservancy Board reports, McColl drew attention to the fact that the 'Goulburn Scheme' offered far fewer development possibilities than that proposed in the previous decade by Benjamin Dods. In 1883, he presented to Parliament a 'Memorial on Surface Canals' in which he strenuously reiterated the point that water in the northern rivers was going to waste, while thousands of farmers on the adjacent plains were being "starved off their holdings... for want of water and for no other reasons" (McColl 1883, p. 2). McColl reminded the House that the "almost flat conformation" of the northern plains rendered them particularly suitable for irrigation, and there were no insuperable engineering obstacles to the construction of a water distribution network. McColl finally pointed to the "long and rapid strides" being made by irrigationists in California, while his own Government had been "hesitating, doubting, and... at most issuing obstructive reports couched in meaningless generalities" (McColl 1883, p. 3).

Alfred Deakin was at that time preparing an amendment to the 1881 Water Conservation Act that would enable rural waterworks trusts to undertake irrigation works. Although impressed by McColl's self-described "laborious pertinacity" (McColl 1883, p. 2), he was constrained by the need to limit public expenditure. The Government had taken out substantial loans to finance the railways (Frost 1982, p. 74), and the existing waterworks trusts (which were run primarily by landholders) were already proving more costly to support than original estimates had suggested (Powell 1976, p. 129). Deakin's amending Act of 1883 thus embodied the cautious ideas of Gordon and Black rather than McColl. It permitted the establishment of local irrigation trusts (which could amalgamate with existing waterworks trusts), but these were obliged to raise their own funds and any proposed irrigation schemes required Ministerial approval (Martin 1955, p. 33). The 1883 Act advised overall that "the utmost care and caution" should be taken in the framing of irrigation schemes, and only one small irrigation trust near Kerang was ultimately formed under its provisions (Powell 1989, p. 102).

Dry seasons continued in the meantime. In Shepparton, annual rainfall barely rose above 400 millimetres in each of the years 1881, 1882 and 1883, and in 1884 it was only 350 millimetres (Martin 1955, p. 55; see Figure 5.7, page 92). The Land Officer in Echuca reported in 1883 that his locality was too dry for profitable agriculture, and that some landholders had been compelled to sell out and leave the district, while most others had resorted to grazing. He added that several successful experiments had been undertaken in irrigation, and that the results had "exceeded expectations" (Reports of Land Officers 1883, p. 13). Farmers elsewhere in Victoria were also attempting to irrigate small areas by pumping water from adjacent streams, and their successes received wide publicity, both in the press and on public platforms as irrigationists fuelled interest in the issue. The Anglican Bishop of Melbourne, Dr Moorhouse, a fervent supporter of the cause, told selectors in an 1883 lecture in Mooroopna that the key to their eventual

success lay in 'work, manure and water' (Forster 1965, p. 79). Martin (1955, p. 31) adds that the fact that irrigation was being practised by farmers in diverse localities contributed to "extravagant visions of the whole colony becoming an 'irrigated garden'".

By the fourth consecutive year of drought (i.e., 1884), public and parliamentary pressure for more determined action on water supply was such that Duncan Gillies, the Premier of Victoria (and Member for Rodney), adopted Hugh McColl's suggestion to appoint a Royal Commission to investigate the matter further. Ensuring that the conclusions would favour irrigation, Alfred Deakin resigned from the Water Ministry to become Commission Chairman, with eleven other MPs and engineers as supporting members (Barr & Cary 1992, p. 212; Martin 1955, p. 34; Powell 1976, p. 131). This step is generally considered to constitute the "real beginning of irrigation in Australia" (Rutherford 1974, p. 120), as the four major reports produced by the Royal Commission formed the basis of subsequent legislation in which all previous caution concerning the adoption of irrigation and other water conservation measures in northern Victoria was cast aside.

#### **6.2.4 The Royal Commission on Water Supply**

##### *6.2.4.1 The First Progress Report*

Deakin's first task as Chairman of the Royal Commission was to supplement the limited amount of technical information available locally on the subject of water supply. In December 1884, he embarked on a tour of irrigation areas in the western United States, and returned five months later much impressed by the rapid progress of irrigation development in America and the apparent historical, social and environmental parallels between California and Victoria. In June 1885, he presented to Parliament the Commission's First Progress Report, a comprehensive document that expressed great optimism, on the basis of the American experience, as to both the engineering possibilities and the potential economic and social opportunities presented by irrigation development in Victoria (Deakin 1885).

The report acknowledged from the outset that Victoria did not share all of the natural advantages of the western United States in terms of water supply, and that a comparatively larger outlay for the provision of water storages and supply channels would be required. Large scale irrigation development would obviously be costly, but Deakin argued that water should be utilised over as great an area as possible, as the greater the undertaking the lower the costs per acre in terms of construction and maintenance, and the lower the water rates that would have to be paid in turn by irrigators.

Some cost savings could be effected through the avoidance of 'unnecessary' expenditure on drainage provisions (Deakin 1885, p. 51). Although the need for drains had been strenuously advocated by Gordon

and Black and other prominent Victorian engineers (e.g., Christy 1863; Smyth 1979), Deakin observed that American canal owners had simply allowed surplus water to find its own way into low-lying natural watercourses, and "with a deep subsoil or a good fall it seems as if drainage may always be unnecessary" (Deakin 1885, p. 30). After visiting the waterlogged Fresno district, Deakin conceded that some drainage provisions might ultimately be required on flatter lands, but hoped that in Victoria these would be required only in certain areas, and that "even there they need only be gradually constructed some years after irrigation on an extensive scale shall have been in operation" (Deakin 1885, p. 31).

In terms of products, Deakin observed in California that "nothing can be grown without irrigation, [but] anything can be grown with irrigation" (Deakin 1885, p. 38). Given Victoria's similar climate, as well as the experience of the early 1870s, when almost all types of crops grown in the Goulburn Valley succeeded in the moist conditions, there was no apparent limit to the type of produce that might be cultivated. All that was needed was "the small capital or persistent energy of the settlers upon 20-acre lots" (Deakin 1885, p. 50).

As Powell (1989, p. 110) observes, Deakin had thus revived the faded yeoman imagery. Where cropping and pastoralism had impoverished the Victorian landscape (and, to some extent, society, as numerous selectors were succeeded by fewer 'boss cockies'), irrigation offered the means for reclaiming the agrarian vision (Tyrrell 1999, p. 136). This possibility was further encouraged by the fact that the population of California had doubled in the fifteen years since the widespread commencement of irrigation in that State. In Victoria, it seemed equally possible that "a prosperous and an intelligent class of farming citizens nearly as large as the whole population of the colony at the present time" might become established on the northern plains (Deakin 1885, p. 54). Such settlement would help to defray the costs of the engineering works, and Deakin could find no "irremovable obstacles" to the duplication of the Californian achievements in Victoria. A certain skill (involving patience and attention, rather than activity) was required in successful water management, but Deakin argued that training could be provided for young irrigators, and incentives and bonuses offered for good irrigation practice and innovative uses of water (Deakin 1885, p. 55).

Deakin ultimately concluded that irrigation, "employed with foresight and skill in the raising of a variety of products" (Deakin 1885, p. 53), offered the best possible insurance for Victoria's agriculturalists, and removed the element of risk which robbed farming in its bad seasons of most of its charms. More resoundingly, he proclaimed that irrigation was essential if Victoria was to continue settling people in the arid districts and make full use of its abundant land resources. Whether private enterprise or the State was to undertake the actual construction remained to be determined, but to Deakin it was clear that the works ought to be constructed, and that "no price [was] too high for such a promise of progress" (Deakin 1885, p. 56).

#### 6.2.4.2 Additional Reports of the Royal Commission

A drier, more technically detailed Further Progress Report was prepared by J.D. Derry, who travelled with Deakin and studied the engineering aspects of irrigation in America (Derry 1885). According to Haskew (1996, p. 54), Derry's function was to provide "professionally objective advice", and his comments revealed considerable understanding of the practical difficulties of irrigation, including those associated with soil variability, and the excessive seepage losses that occur when limited supplies of water are conveyed long distances in earthen channels. The report thus devoted considerable attention to pipes and conduits, as well as dam technology and excavating equipment employed in California. Like Deakin, Derry was greatly impressed by the irrigation-related achievements in that State, but he noted that the water supply conditions Victoria were "palpably unfavorable" by comparison, and that careful study was required before any irrigation schemes were undertaken. His concluding remarks in fact echoed those of Gordon and Black, as he advised that "too sanguine hopes should not be entertained" with respect to the prospects of irrigation in Victoria (Derry 1885, p. 45).

The third ('Further') Progress Report of the Royal Commission detailed the existing water supply situation in Victoria, as well as legislative and administrative recommendations for future irrigation development. The principles of local self-government and self-reliance embodied in the existing system of waterworks trusts were upheld in the Report, which recommended that the provision of water supplies for stock and domestic use remain a priority. It was also recommended, however, that where feasible, irrigation schemes should be supported by State loans, while major construction projects (such as the proposed Goulburn Weir) should be also undertaken by the State and paid off later from water rates levied by the trusts whose districts benefited from the works (Martin 1955, p. 37; Royal Commission on Water Supply 1885).

Yet another (Fourth) Progress Report concerned Deakin's observations of irrigation in Egypt and Italy, and placed stronger emphasis on the need for drainage (Deakin 1887, pp. 30-31). However, this report was presented to the Victorian Parliament a year after Deakin's landmark Irrigation Act 1886 had already been passed, and it made substantially less of an impact on irrigation development than his First Report.

Further minor reports outlining specific proposals for irrigation schemes in Victoria were prepared under the auspices of the Royal Commission by UEWWT engineer Stuart Murray, who served as Commission secretary. Presented in May 1886, the principal report concerned the 'Goulburn District' and was based on the Water Conservancy Board's Rodney report of 1884 (Martin 1955, p. 37). The new report recommended a site 10 kilometres upstream from Murchison for the proposed Goulburn Weir, and also reiterated the need for drainage provisions in association with the distributive works. The weir itself was upgraded in Murray's report from the modest timber design proposed by Gordon and Black to a more

substantial masonry structure, and in 1886 it was declared to be a 'national work', to be constructed with government funds.

### **6.2.5 The Irrigation Act 1886**

On the basis of the Royal Commission's findings, a watershed Irrigation Act was passed by the Victorian Parliament in December 1886, providing the legislative basis for large-scale irrigation development in the State. Drafted by Alfred Deakin, this Act essentially comprised the recommendations contained within the first and third reports of the Royal Commission on Water Supply. Little account was taken of the opposing technical advice, either because Deakin had chosen to investigate technical matters himself and was satisfied by his own conclusions, or else, as Haskew (1996, p. 57) suggests, Deakin did not understand the full import of Derry's (and others') arguments (Figure 6.3).

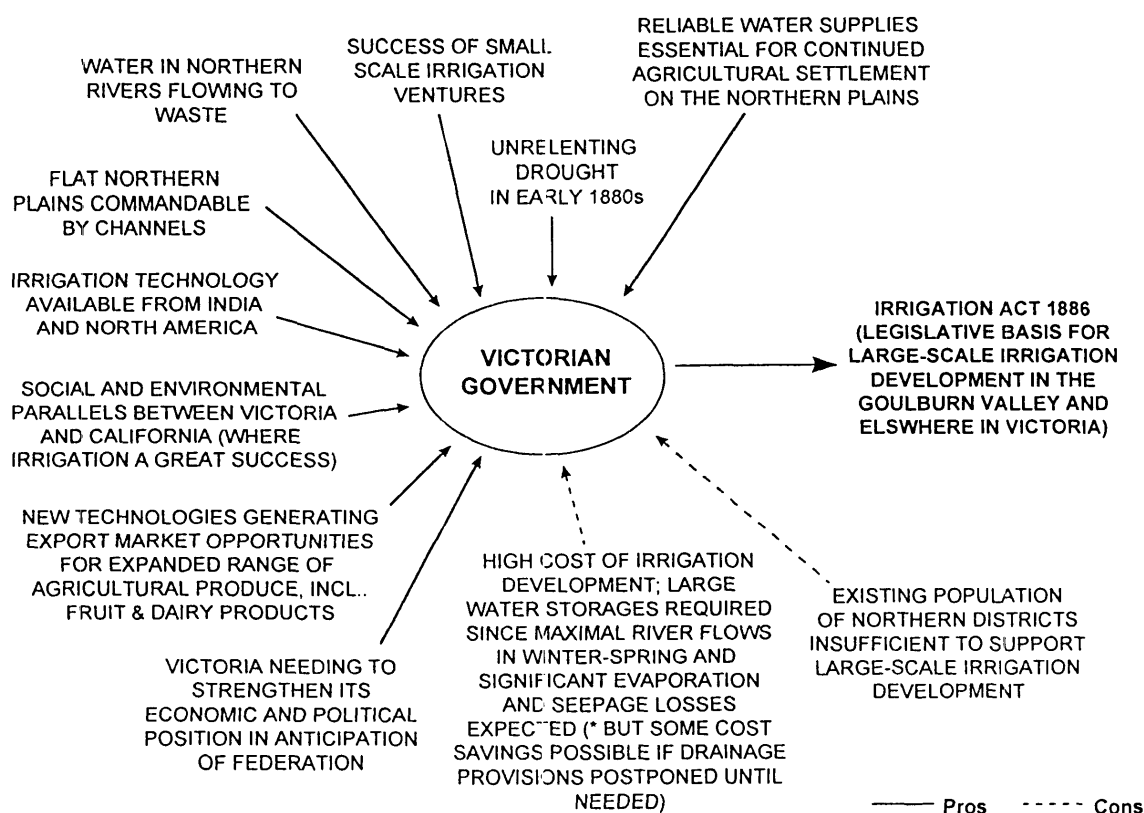
The principle embodied by the Act was of local control with State aid. Elected trusts would be granted government loans for the construction of local irrigation works, while the Government itself would construct major works, such as the Goulburn Weir, that served more than one trust district. Expenditures in either case were to be recovered through charges to water users, which were to be levied by the irrigation trusts at rates reflecting the cost of supplying the water once the capital works were completed and the water was actually flowing in the channels (Haskew 1996, p. 63). The water itself remained the property of the State until it reached the end-user, Deakin's argument being that Victoria's scarce water resources should be controlled by the central Government in order to achieve maximum utilisation (Dingle 1984, p. 121; La Nauze p. 86; Powell 1976, p. 132; Tyrrell 1999, p. 125).

Rutherford (1974, p. 122) observes that the 1886 Act was "vital in shaping the geography of irrigation in Victoria", as it resulted in the creation of 21 irrigation trusts, as well as numerous rural waterworks trusts. Most of these were concentrated along the Murray River<sup>1</sup>, but the Goulburn Valley also served as a major focus for irrigation development in the State, beginning with the construction of the Goulburn Weir (completed in 1891). The Act could thus be said to represent the structural means by which the

---

<sup>1</sup> While the Irrigation Act 1886 was widely supported in Victoria, more controversy surrounded the concurrent provision allowing for private enterprise involvement in irrigation. This came in the form of the Waterworks Construction Encouragement Act, known popularly as the Chaffey Act, which permitted the establishment of a Murray River irrigation settlement under the direction of two brothers, George and William Chaffey, whom Deakin had met in America. The Chaffeys had experimented successfully with large scale irrigation projects in California, and Deakin believed that they would bring both foreign capital and much-needed expertise to Victoria. The Act provided the Chaffeys with 100,000 hectares of land at Mildura, in the northern Mallee, for the establishment of an experimental irrigation scheme (e.g., Powell 1989). Despite major financial setbacks and numerous practical difficulties faced by its early settlers, the Mildura development appeared as oasis in an arid and remote part of the country, and helped to stimulate similar, intensive irrigation developments elsewhere in Victoria, New South Wales and South Australia in the early twentieth century (Rutherford 1974).

**Figure 6.3: Situational interpretation of the Victorian Government regarding water conservation and irrigation development on the northern plains, 1880s.**



transformation of the Goulburn Valley from a nondescript agricultural district to the veritable 'Garden of Australia' (McLennan 1936, p. 31) was initiated

### 6.3 Landholder perceptions and land use in response to irrigation development

It had long been suspected that, given adequate water, the Goulburn Valley would prove suitable for horticultural enterprises (e.g., Hodgkinson 1856). Extensive vineyards were established along the Goulburn River on the Tabilk pastoral run in the late 1850s, and along creeks in the Nathalia district in the 1860s, and fruit trees planted by selectors generally grew well, although it was generally understood that fruit-growing in the region could never become a widespread commercial proposition without an assured supply of water (Hibbins 1978, p. 129; Morvell 1983, p. 132; Parris 1950).

The first irrigated vineyard and orchard in the region was established in 1884, near Shepparton. Within two years, twenty-eight hectares of peaches, pears, plums and citrus trees had been planted and were being irrigated with water pumped from the Goulburn River. According to Martin (1955, p. 57), the venture had been inspired by reports of the Chaffey brothers' experiments in California, as well as by Deakin's



report on irrigation in America, and it served as an early showpiece for the Victorian Government (James 1938, p. 30). However, for some years it remained the only irrigated land east of the river, as irrigation was generally viewed in the Shepparton district as a financially dubious proposition, the increased yields being barely worth the costs involved in procuring the water (Martin 1955, p. 72).

West of the river, irrigation had been attempted to a slightly greater extent prior to the passing of Irrigation Act 1886. In 1884, there were 100 hectares of vineyards in the Mooroopna district (McLennan 1936, p. 99; West 1962, p. 94), and two years later a horticultural syndicate moved to establish an irrigation settlement at nearby Ardmona. McLennan (1936, p. 31) considered this the beginning of a gradual change in land use in the district, as the syndicate purchased 300 hectares of farmland and subdivided it into small (3 to 12 hectare) blocks to be watered from the newly constructed UEWWT main diversion channel. One block was established by John West, an experienced horticulturalist and newspaperman, as a nursery for the provision of commercial stocks of vines and fruit trees to other settlers. West also advocated the advantages of irrigated fruit-growing in his newspaper, the Goulburn Valley Yeoman, and in 1890 he was sent by the Victorian Government to study methods of irrigation employed in fruit-growing in America. On his return to Victoria he lectured at Mooroopna, Rushworth, Murchison and elsewhere on the progress of irrigated horticulture in California and reportedly encouraged a number of early orchardists to take up blocks at Ardmona (Forster 1965, p. 83; McLennan 1936, p. 102). From 1885, horticultural development was also facilitated in the Mooroopna and Ardmona districts by the commencement of an interim pumping operation from the Goulburn River, with the prospect of additional supplies to be available after the completion of the proposed Goulburn Weir. A small number of other landholders in other Goulburn Valley locations were also using private pumps by the end of the decade to obtain irrigation water for the production of fruits, vines, lucerne and grain crops (Martin 1955, p. 57; Morvell 1983, p. 128; Murray 1892, p. 504).

To encourage further horticultural plantings, the Government provided bonuses of £2 per acre (0.4 hectares) for vines and £3 per acre for fruit trees. These were offered following a Royal Commission on Vegetable Products in 1887, which reported that Victoria required more diversified primary production in order to offset the effects of falling wheat prices and the decline in fertility associated with continuous cropping (Martin 1955, p. 60). Dairying had also emerged as a potentially viable form of land use following the advent, in the 1870s, of refrigeration technology and factory methods for the testing and separation of cream and butterfat. To the Victorian Government, dairying (and other forms of intensive stock-raising, including lamb-raising on lucerne pastures, and beef, mutton and pork production) was "a highly suitable addition to the limited repertoire of the small 'yeoman' farmer" (Powell 1976, p. 107), and it was pointed out that with irrigation, stocking rates could be increased to four times that of dryland enterprises (Martin 1955, pp. 84-85). As there were also prospects for butter exports to Great Britain, Government support was provided for the establishment of co-operative butter factories in Mooroopna and other Goulburn Valley locations from 1888, and in the following year the Department of Agriculture reported optimistically

that the future of the dairy industry in the region, "given irrigation", appeared "excellent" (cited by Martin 1955, p. 60).

As Mitchell (1979, p. 133) observes, however, resource policy-makers often do not accurately perceive the preferences of resource users, and in the Goulburn Valley the change from dryland to irrigated farming did not progress at the rapid rate envisioned by the Government. It had been assumed that once water was flowing in the distributive channels, and with adequate publicity, encouragement and financial incentives, all farmers with access to water would prepare their land to make optimum use of it (Forster 1965, p. 83; Martin 1955, p. 60; McLennan 1936, p. 102). However, dairying was slow to take off, and horticultural activity remained concentrated in the Mooroopna and Ardmona districts, where it was undertaken primarily by new settlers - many of them immigrants or former city-dwellers (Dingle 1984, p. 122; Martin 1955, p. 63; McLennan 1936, p. 103). In 1894, after three years of the bonus system, little more than 1200 hectares of Victoria's 24,000 hectares orchards and vines were in the Goulburn Valley, and of those only 800 hectares were under irrigation (Table 6.2)(Martin 1955, p. 78). Otherwise, the farms served by the UEWWT's delivery channels were selectors' holdings of 130 hectares or more, on which broadacre cropping continued to be the dominant agricultural enterprise, and the available irrigation water was required only occasionally (Table 6.2; Martin 1955, p. 63).

Despite the local enthusiasm of John West and other Mooroopna orchardists, most established Shepparton and Rodney district farmers and pastoralists of the 1880s and 1890s continued to debate

**Table 6.2: Irrigation in the Rodney district, 1889-1895.**

Year	Area irrigated (hectares)				Total RODNEY	Total VICTORIA
	Grain crops	Hay & fodder	Pasture	Vines, orchards, gardens		
1889	-	-	43	12	55	9,945
1890	-	-	4	13	17	n.a.
1891	-	70	123	53	246	7,538
1892	-	164	405	185	754	10,278
1893	11	503	30	550	1,095	19,053
1894	6	673	34	808	1,522	18,607
1895**	1,332	1,736	722	1,159	4,948	48,837

Source: Statistical Register of Victoria, *Victorian Parliamentary Papers* (1889, 1891); Royal Commission on Water Supply (1896, p. 205).

\* Total area of Rodney Irrigation Trust 112,667 hectares

\*\* Drought year

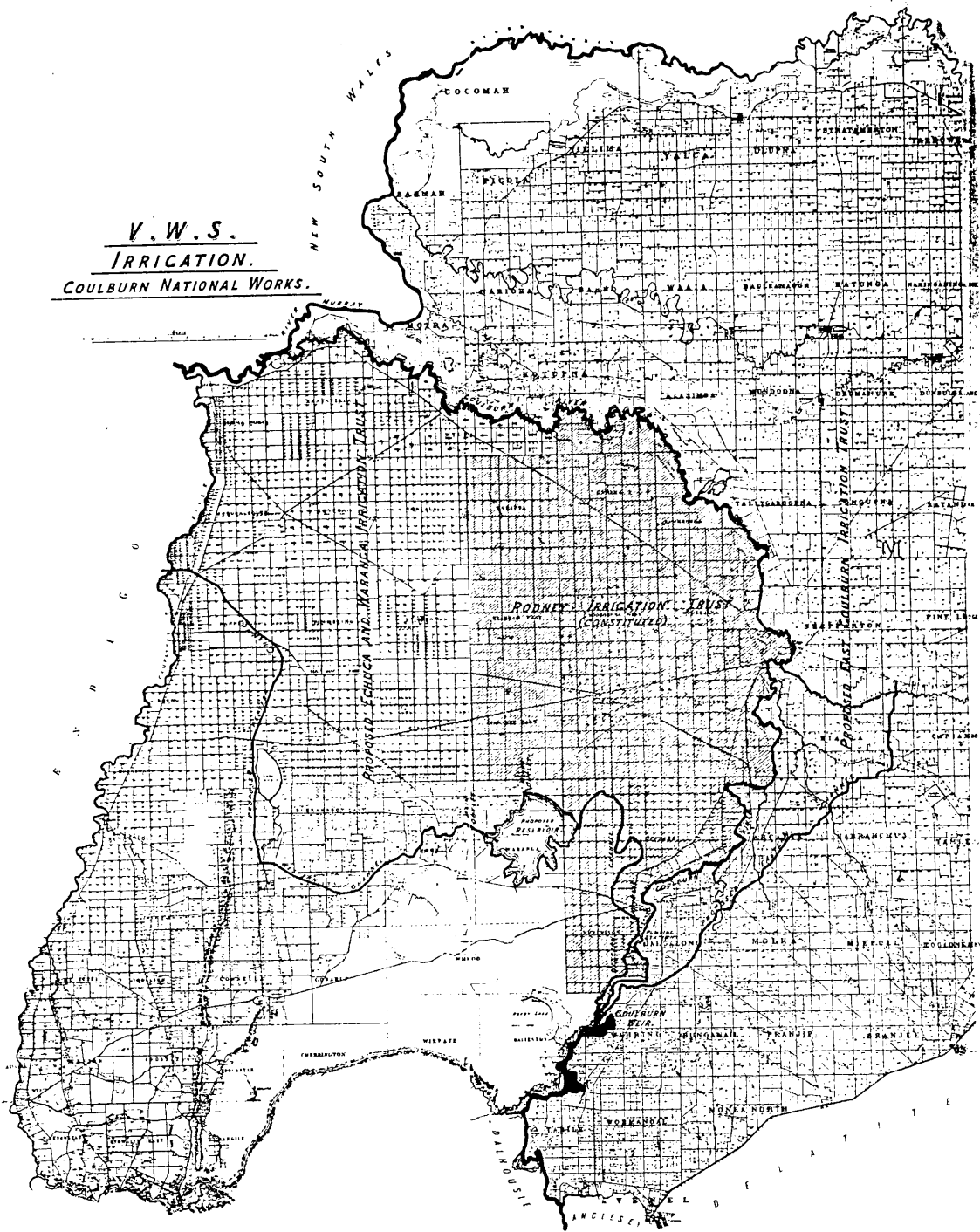
whether the returns from irrigation justified the expense and effort involved in land preparation and bringing the water to their blocks (Royal Commission on Water Supply 1896). They viewed the waterworks primarily as a form of drought insurance, and certainly not a reason for their large holdings to be subdivided. A substantial cultural barrier also existed to the adoption of irrigation, since to wheat growers and pastoralists, the tending of fruit trees or vines or the growing of vegetables were forms of cultivation that were more suggestive of 'gardening' or 'Chinaman's work' than real (i.e., broadacre) farming or grazing (Bossence 1979, p. 336; Dingle 1984, p. 122; Mead 1920).

Would-be irrigators otherwise faced numerous practical problems. The most notable of these was the unreliability of water deliveries. When pumping from the Goulburn River commenced in 1885, it was immediately apparent that too little allowance had been made for water losses due to evaporation and seepage. Breaks also occurred in the channels due to yabbie (freshwater crayfish) holes, which caused localised flooding in a number of places and required the UEWWT to make expensive repairs before the water even reached its users (Forster 1965, p. 80; Martin 1955, p. 50). Until the completion of the Goulburn Weir in 1891 there was barely enough water in dry seasons to supply stock and domestic needs, and in the more westerly parts of the Goulburn Valley, irrigation was essentially precluded until the Waranga Basin storage was constructed in the early 1900s (Martin 1955, p. 58).

Dissatisfied with the service of the UEWWT, the Mooroopna orchardists who expected to obtain irrigation water from the Trust lobbied for the formation of a separate trust. With Alfred Deakin's support, the Rodney Irrigation and Water Supply Trust was constituted in 1889 and an area of approximately 112,000 hectares including 93,000 'irrigable' hectares, was excised from the UEWWT (Figure 6.4)(Martin 1955, pp. 58-59). With the Goulburn Weir nearing completion, the Rodney Trust immediately set about enlarging the stock and domestic channels built by the UEWWT and began providing water for irrigation from 1891 (Horsfall 1965; Martin 1955, p. 64; Murray 1892, p. 503). Even after the weir was completed, however, irrigation deliveries in Rodney were still irregular for some years, as channels silted up, distribution systems remained incomplete for lack of funds, and the available water storage facilities were too small to overcome variations in river flow (Frost 1982, p. 96; Royal Commission on Water Supply 1896).

Aside from the problem of water supplies, the adoption of irrigated culture required new skills and "far-reaching changes in work patterns" (Pigram 1972). The preparation of land for irrigation was expensive, and it was soon apparent to landholders (as Deakin had observed in his 1885 Report) that a certain amount of effort and perseverance were required for the changeover to be worthwhile. Most Trust channels followed low-lying natural watercourses, so that the water had to be pumped out of them with steam engines. Feeder channels and check banks also had to be constructed, and much land which looked flat actually required careful grading and levelling, as well as deep ploughing to prevent water stagnating on the soil surface. These were difficult tasks with horse-drawn implements and few farmers

Figure 6.4: The Rodney Irrigation Trust district (from Victorian Water Supply 1891).



considered the effort worthwhile (Inter-State Royal Commission on the River Murray 1903; Royal Commission on Water Supply 1896).

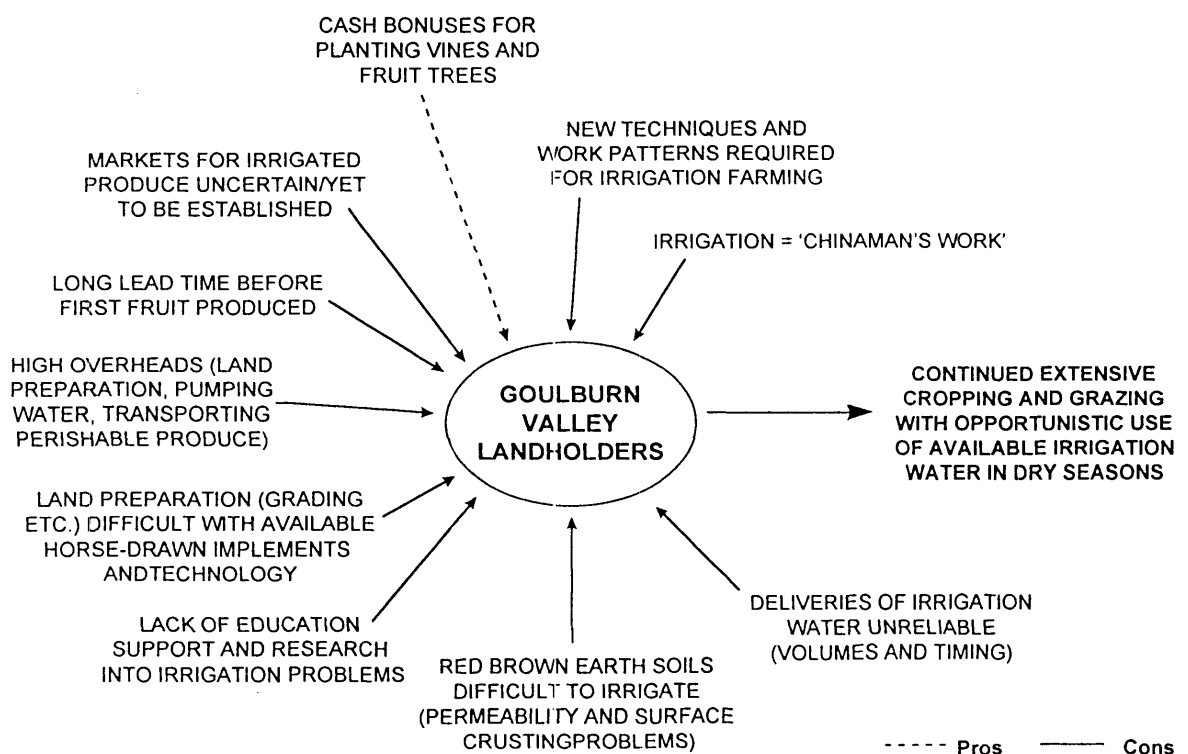
If the water was used, the simplest and most widely practised method of application was 'wild flooding' (Royal Commission on Water Supply 1896). This involved digging holes in a branch channel and allowing water to flow at will across a paddock. Given uncertainty over the timing of water deliveries, irrigators also tended to pond water in their paddocks as opportunities arose, although the dangers of applying excess water to crops were apparently well known (Deakin 1960; Powell 1993, p. 39). Alfred Deakin reminded irrigators in 1890 that it was the "quantity of intelligence" applied to irrigating a crop rather than the quantity of water which determines the result (Deakin 1960, p. 173). However, neither trust officials nor farmers appeared to have "the vaguest notions" as to the quantities of water used, and some farmers were reported as irrigating with such carelessness that they turned water onto the lowest parts of their land instead of the highest (Inter-State Royal Commission on the River Murray 1903, pp. 16-17).

The addition of water did not in itself guarantee an abundance of produce. It was a problem in some areas that the finer-textured Goulburn Valley soils tended to set hard after wetting, particularly if they had been repeatedly cultivated. Some farmers tried to remedy this situation by ploughing in any emergent weeds after the first irrigation of the season, thus converting the green growth to humus (Bossence 1963, p. 41). Poor subsoil permeability was also a characteristic of most of the region's soils and resulted in the shallow penetration of irrigation water, so that irrigated crops often suffered from water stress in summer, as well as surface waterlogging in wet seasons (Skene & Poutsma 1962). Fruit trees were small and "unthrifty" where the soils were poorly drained, prompting one early Goulburn Valley orchardist to experiment (unsuccessfully) with the use of explosives to loosen the hard subsoil layer that trapped water and restricted the growth of his trees (Bossence 1969, p. 110).

As Gordon and Black had foreseen, marketing the resultant produce was also difficult. Melbourne was adequately supplied with fruit, so any excess would have to be exported. As Martin (1955, p. 78) notes, however, not only were new orchardists still learning their trade, but the techniques of refrigeration, drying, canning, packing, shipping and selling were all experimental also. Quality control was made more difficult by the fact that orchardists, believing that security lay in diversity, planted numerous varieties of each type of fruit. Crops were also damaged in the 1890s by insect and fungal pests, and there were as yet no research or experimental stations to help overcome such problems (Martin 1955, p. 90). Overhead costs were also extremely high, and rail costs were sometimes higher than the value of the fruit being transported (Bossence 1963, p. 111). It was a further disincentive that most horticultural enterprises entailed a lead-time of several years before the first produce could be harvested (Martin 1955, p. 62). Initial fruit exports from the Goulburn Valley were extremely limited as a result, and until the turn of the century most were merely novelty shipments to European exhibitions (Martin 1955, p. 79).

For all of the above reasons (Figure 6.5), the mere provision of the waterworks did not immediately transform the Goulburn Valley into an irrigation region. The availability of water in dry seasons resulted in increased land values and general prosperity, at least in Rodney Shire, but little irrigation was actually practised, and there was no substantial increase in population to make any further intense cultivation of the land a possibility. A drought in 1895 saw a significant increase in the area of irrigated crops and pastures but the acreages used for 'permanent' high-value irrigation (i.e., orchards and vineyards) remained only a fraction of the total (Table 6.2). Farms were becoming larger and more diversified in the meantime, and with the establishment of local butter factories and creameries and water available for stock, many farmers used their land to graze dairy herds. By 1895, the most significant form of irrigated land use was the flooding of dairy pastures during dry spells (Frost 1982, p. 97), and in 1899, ten years after the formation of the Rodney Trust, the acreage of land receiving regular applications of water was still only ten per cent of the proclaimed irrigable area within the district (Martin 1955, p. 77).

**Figure 6.5: Situational interpretation of Goulburn Valley landholders regarding the adoption of irrigation, 1880s and 1890s.**



## 6.4 Environmental impacts

In this early period of irrigation, the environmental changes that occurred in the Goulburn Valley were relatively minor compared to what came later. As Rutherford (1974) observed, irrigation in the region prior to 1905 was undertaken primarily to ensure the stability of extensive forms of land use, such as cropping and grazing, that otherwise relied on rainfall. Few farmers utilised the available water, so the resultant environmental changes were minimal. They were not inconsequential, however, as they marked the beginning of more substantial changes that occurred in the twentieth century as irrigation was more widely practised, more water storages were built and more intensive settlement and land and water use gradually ensued, with widespread repercussions for hydrology and soil conditions throughout the region (see Chapter 8).

In the 1880s and 1890s, the most obvious environmental changes would have included the appearance of irrigation channels across the landscape. By 1888, the UEWWT had constructed 600 kilometres of channels, including the main channel, 140 kilometres in length from the pumping station near Murchison to Cornelia Creek, near the Campaspe River. This channel was carried on a four kilometre embankment across the Waranga Swamp, and across several creeks, with secondary channels taking off at various points along the way (e.g., Forster 1965, p. 75). Further channels were constructed after the formation of the Rodney Trust and the completion of the Goulburn Weir, including a 40 kilometre main channel (subsequently known as the Stuart Murray Canal) to Waranga, with three take-offs en route to supply the eastern portion of the Rodney district. Bossence (1965, p. 106) notes that the main channel crossed five natural watercourses in the first eleven miles of its routes, necessitating the construction of wooden flumes to carry the water.

Branching off from the main channels, the smaller distributive channels followed the courses of prior stream beds (see Chapter 2). Natural drainage lines were thus utilised to deliver water, rather than remove it from an area, although they were also expected to function as drains beyond the end points of the channels (Martin 1955, p. 70). Most farm channels were constructed similarly as ditches below ground level, so that it was difficult for water to drain away at the end of each irrigation (Mehanni 1978,). Excess water thus remained on the surface, and in wetter-than-average seasons it contributed both to surface waterlogging on heavier clay soils and to perched water tables in lighter-textured soils, before it ultimately percolated down to the groundwater (Bakker 1978). The channels themselves were also a major source of groundwater accessions, as the prior stream courses were characterised by highly permeable 'meander floodplains' soils (see Chapter 2). According to a 1908 estimate, approximately 25 per cent of water supplied was lost through seepage from the main channels, with a further 10 per cent lost from smaller distributive channels (SRWSC 1908).

Drainage problems were exacerbated by inadequate land preparation and the 'wild flooding' that was

practised on all but the smallest holdings. This resulted in patches of over-watered ground in low-lying areas while other, higher areas did not receive enough. In the Rodney district, it was reported in 1896 that in almost every lucerne paddock there were bare patches where water had lain (Royal Commission on Water Supply 1896, p. 193). Although there were demonstrable benefits from land-grading and the use of check banks, most farmers remained disinclined to bother with these practices, and for want of drainage the excess water resulting from careless irrigation would eventually have found its way into the groundwater.

Soil permeability also deteriorated as a result of repeated cultivation and careless watering. As explained by Skene and Poutsma (1962), these actions destroy soil organic matter and cause the deterioration of soil aggregates, so that soil particles tend to run together when wetted, and overall permeability gradually decreases. This was a particular problem with Goulburn Valley soils, and it was eventually learned, after several decades of experience, that the best soils for horticultural crops or lucerne pastures (which were subjected to the most intensive irrigation), were the well-drained, coarser-textured 'meander floodplain' soils that followed the courses of prior streams. The heavier clay soils on the plains proved to be more suitable for annual pastures, which required only irregular watering, or else for dryland farming (e.g., Trehwella & Webster 1978). This was not apparent initially, however, and although the Victorian Government was aware by 1896 that large areas existed in most districts that were "quite unsuited" to irrigation (Royal Commission on Water Supply 1896, p. 189), this was perhaps the least of their concerns.

## **6.5 Financial problems and closer settlement initiatives**

As the twentieth century approached, Alfred Deakin's grand vision for irrigation in Victoria was far from being realised. The State Government had invested over £2 million on irrigation works, yet most farmers within areas served by channels were still reluctant to make anything other than opportunistic use of the water available to them. Irrigation and waterworks trusts thus earned minimal income from water rates, and many were unable to finance even the interest charges on the works in their districts. In the Rodney Trust area, where the population was only 5,000, only one-fifth of landholders paid water rates on a regular basis, and the remainder required water only in dry years when supplies and works were barely sufficient to meet demand (Davidson 1969, p. 58; Martin 1955, p. 68). As a result, the Rodney Irrigation Trust was more than £300,000 in debt by 1896, and irrigation works in the region were still to be completed, with many supply channels posing a flood risk as they had yet to reach their planned 'drainage points' (Martin 1955, p. 68). An additional £70,000 was advanced accordingly to the Rodney Trust for the completion of its distribution system, but an 1896 Royal Commission otherwise concluded that expenditure on rural waterworks throughout the State during the previous fifteen years had been excessive and recklessly wasteful, and that the "eminently practical" suggestions of the Water Conservancy Board for the gradual development of irrigation had been entirely overlooked (Royal



Commission on Water Supply 1896, p. 185).

The Government's response to the Royal Commission findings came in the form of the Water Supply Advances Relief Act 1899, which led to the cancellation of 75 per cent of all existing liabilities incurred by irrigation and waterworks trusts throughout Victoria (Martin 1955, p. 67, p. 70; Rutherford 1974). In the wake of this legislation, the Rodney Trust was still unable to cover its interest charges, but water rates in the district were kept low to encourage water usage (Martin 1955, p. 70), and to some degree this strategy was successful. By 1903, after a year of unprecedented drought following on from several dry seasons, the area of irrigated land in the district had risen to over 20,000 hectares (Table 6.3), and the Rodney Trust was proclaimed to be the most successful in Victoria, and "one of the most prosperous areas in the Murray Basin" (Inter-State Royal Commission on the River Murray 1903, p. 17, p. 359). Farmers in the non-irrigated districts east of the Goulburn River viewed the oasis-like developments to the west with envy, and newspapers editorialised about water continuing to flow to waste in the Murray-Darling and Goulburn Rivers. This precipitated the commencement of work by the UEWWT on the long-proposed Waranga Basin reservoir, as well as broader community calls for the construction of more water storages (Bossence 1979, p. 336; Powell 1976, p. 140; Rutherford 1974).

The Victorian Government, in the meantime, had revived the concept of closer (i.e., yeoman) agricultural settlement in the rural areas. This had been attempted earlier (with little success) during a severe economic depression in the early 1890s, when a number of 'village settlements' had been established to provide relief for the unemployed city workers. Rooted in agrarian idealism, this scheme made available small allotments (up to 8 hectares) in rural areas for a nominal rental, with the expectation that settlers would cultivate the land and earn supplementary incomes from manual labour on other holdings (e.g., Powell 1973b). The northern irrigation areas seemed an obvious focus for the settlements, and a number

**Table 6.3: Irrigation in the Rodney district, 1902-1905\*.**

Year	Area irrigated (hectares)				RODNEY Total	VICTORIA Total
	Grain	Hay & fodder	Pasture	Vines, orchards		
1902	n.a.	n.a.	n.a.	n.a.	20,154	111,696
1903	3,350	6,049	3,882	1,942	15,080	60,505
1904	n.a.	n.a.	n.a.	n.a.	9,911	63,749
1905	n.a.	n.a.	n.a.	n.a.	16,034	67,040
Area capable of irrigation (approx.)					96,000	650,000

Sources: Statistical Register of Victoria, *Victorian Parliamentary Papers* 1904, 1906; Inter-State Royal Commission on the River Murray 1903.

\* No irrigation data available for the years 1896-1901.

were located in the Goulburn Valley, including one of 27 hectares established at Toolamba in 1893, and a larger one (200 hectares) just north of Shepparton. The latter endured in a fashion for twenty years, but most other village settlements in the region collapsed within a few years as they were too far from transport, or lacked access to irrigation water, or the blocks were too small to be viable holdings (Hibbins 1978, p. 119; Martin 1955, p. 75). Many settlers also failed to "adapt [themselves] to agriculture", despite the persistent belief that it was "the natural occupation of man" (*Victorian Parliamentary Debates* 1892-93, cited by Powell 1973b, p. 139).

At the turn of the century, the renewed impetus for closer settlement was generated by the perceived need for Victoria to boost its population in order to compete both economically and politically in the newly federated Commonwealth of Australia. Agriculturalists were preferred as they would contribute to the economy, and could also supply produce that could be carried by Victoria's extensive (and expensive) railway network, thereby helping it to achieve profitability (Dingle 1984, p. 124). Agriculture was also considered to be Australia's 'first line of defence' against the risk of invasion by Asian countries to the north - a significant source of anxiety, as the nation as a whole perceived itself at that time to be underpopulated, under-utilised and under-cultivated compared to the prosperous nations of Europe and North America (Broome 1984, p. 131). At the Federal level, assisted passage was made available to British settlers willing to farm in Australia, and in Victoria two Closer Settlement Acts were passed, in 1898 and 1904 respectively, which provided for the acquisition and subdivision of land throughout the State - including a number of large Goulburn Valley estates (Bossence 1963, p. 98; Forster 1965, pp. 99-100; Rutherford 1974). As in the Selection period, it was hoped that by this means rural populations might be increased and the settlement of small, independent yeomen farmers encouraged.

Once again, closer settlement did not prove to be a great success, however. As in the 1860s, and again during the period of 'village settlements', blocks were taken up close to markets and railways but elsewhere much of the available land failed to attract settlers. In dryland areas, new farmers attempted to grow crops and graze stock on native pastures, but their blocks were too small to be profitable, and too dry and infertile for more intensive enterprises such as dairying. Rabbits, inexperience and dry seasons exacerbated their difficulties, and only twenty per cent of the early dryland settlements were ultimately considered successful (Forster 1965, p. 100). Established farmers, by contrast, continued to prosper through extensive farming methods and the amalgamation of properties (Dingle 1984, p. 125), as well as the adoption from the early 1900s of new 'scientific' dryland farming practices (e.g., Barr & Cary 1992; Dunsdorfs 1956).

Closer settlement in the irrigation areas seemed to offer more promise, particularly as land prices in areas with good rainfall had risen beyond the purchasing capacity of the Government (e.g., Tyrrell 1999, p. 154). Most farmers in areas commanded by channels continued to practice extensive forms of cropping and grazing on large holdings (in excess of 60 hectares), but it was considered that closer settlement could

succeed if it was based on irrigated dairying, as this enterprise enabled a farmer to make a living from less than 40 hectares, and the market for Victorian dairy produce was by that time well-established (Cherry 1905; *Journal of Agriculture, Victoria* 1906, p. 192; Rutherford 1974; SRWSC 1909).

As the 1904 Closer Settlement Act was passed, however, the State's existing irrigation system was on the verge of collapse (e.g., Martin 1955, p. 90). After nearly two decades of development and an outlay of £2.4 million in works, less than ten per cent of the State's irrigable lands were being regularly watered (Table 6.3). The irrigation trusts also remained totally dependent upon Government funding for their operation and construction activities, and continued to be criticised for incompetent management and evading their financial responsibilities (Martin 1955, p. 88). The system was also failing in practical terms. Only 40 per cent of the water estimated to be available for irrigation was reaching end-users, while various proposed storage facilities had yet to be constructed and many channels remained unfilled. In the Goulburn Valley, the existing system of capital works was incapable of meeting the growing demands for water, and many of the channels were already in need of repair (Martin 1955, p. 90). There was also a continuing lack of technical support. Although Deakin had stressed in his influential First Report that irrigation required both skill and care, no formal provisions had yet been made for the education and supervision of irrigators, and nor was any useful research being undertaken into irrigation techniques or soil science (Martin 1955, p. 90).

At the beginning of the new century, the irrigation works in the Goulburn Valley were thus in danger of becoming an expensive 'white elephant'. and Alfred Deakin felt obliged to conclude, in 1903, that his vision had failed (La Nauze 1965, p. 86).

## **6.6 Discussion: The systemic influence of individuals**

The encouragement of irrigation development and associated large-scale water conservation activities in the Goulburn Valley in the 1880s is indicative of a paradigm shift in the perception of the Victorian Government of environmental (primarily climatic) conditions in the State's northern districts. Keating (1992 p. 6, p. 51) notes that denial of drought as a permanently recurring hazard has long been a feature of Australian life, and that in 1880s Victoria drought was still referred to euphemistically as 'water famine', at least in official circles. Nevertheless, the appointment of the Water Conservancy Board amounted to a formal acknowledgement on the part of the State Government that water - or lack of it - was a serious problem for selectors on the northern plains, and that some form of systemic adjustment was required if agricultural settlement in the region was to continue.

In the evolutionary progress of the European Goulburn Valley, this could be said to constitute another bifurcation point, as the previous structure of the land use system was recognised by the Government as

being untenable, and a new evolutionary direction was taken with water conservation as the emergent attractor. In the ongoing regional 'dialogue' between humans and the environment, it also marked the point at which environmental obstacles to settlement in Victoria were confronted at the official level for the first time with (perceived) practical rather than legislative responses. Through the application of technology, an artificial environment was to be created in which humans would be the masters of the system, and farmers could manipulate the growing conditions of their crops (e.g., Pigram 1977).

The structure of the new land (and water) use system was not immediately apparent, however, as opinions within the Government were divided as to whether water should be conserved merely to support existing settlement on the northern plains, or for the pursuit of more ambitious goals - that is, irrigation. The debate was subsequently won by the irrigationists, largely as an outcome of the efforts of Hugh McColl and Alfred Deakin. Deakin himself attributed the initiation of irrigation in Victoria to McColl's "unbounded enthusiasm, untiring energy and indomitable faith" (Deakin 1959, p. 205), but it was Deakin who transformed the vision into reality, as a highly ambitious, but also erudite, eloquent and persuasive political figure. That Deakin succeeded in convincing his parliamentary colleagues to proceed with large scale irrigation development, in spite of the quite rational arguments against it, testifies to both the power of his rhetoric in reviving the old agrarian imagery in Victoria, and the perceived competence of his Royal Commission investigations (Haskew 1996, pp. 29-30; Tyrrell 1999, p. 137). As Haskew suggests, Deakin's reports were impressively thorough, and less knowledgeable politicians (i.e., the majority of parliamentarians) would have been reluctant to question his conclusions. Tyrrell (1999, p. 140) adds that Deakin was also supported by other sources of influence and information, including the Mooroopna orchardist, John West, and other prominent community members, such as the President of the Central Irrigation League, the Reverend E.C. De Garis, who proclaimed vociferously that irrigation would benefit all sectors of the Victorian populace (Frost 1982, p. 80; McLennan 1936, p. 102). Receptive to such arguments, and desperate to be seen as doing something about the ongoing drought, even Opposition MPs declared themselves, by 1886, to be "all irrigationists" (*Victorian Parliamentary Debates* 1886, cited by Martin 1955, p. 38), and resoundingly endorsed Deakin's vision.

Deakin's biographer notes that the resultant Irrigation Act 1886 was "very much Deakin's own measure" (La Nauze 1965, p. 83), and Deakin and, to a lesser extent, McColl, serve to illustrate how the actions of visionary individuals can lead to large and unforeseen changes within socially-based systems. In conceptual terms, this process operates as proponents of new perspectives or paradigms (such as a shift in goals from water conservation to irrigation) form coalitions of like-minded individuals, invoking positive feedback to amplify their views throughout the system (Parker & Stacey 1995, p. 44; Radzicki 1990, p. 67). This provides a mechanism by which structural coupling can occur to improve the adaptive fit between the system and its operating environment. However, it can also lead to unintended and unexpected results if not all system variables are considered in the decision-making process. This occurred in the Goulburn Valley as large-scale - and highly expensive - irrigation works were embarked

upon largely as an outcome of McColl's and, more particularly, Deakin's enthusiasm, but insufficient attention was given to the conditions under which landholders might choose to make use of the available water.

As Pigram (1977) observed, the character of agricultural systems is ultimately dependent upon the human component - that is, farmers and their behavioural responses - which depends in turn upon the operating framework within which their decisions are made. This includes the institutional setting, but also the (perceived) biophysical environment, and various economic and cultural constraints, all of which impose limitations on decision-making (Hollick 1990). In the Goulburn Valley, the market conditions, reliability of water supplies, and expertise in irrigation management that were assumed to be available when the engineering works were completed, did not eventuate. The region's soils were also difficult to irrigate, and rainfall was often adequate for farming to continue without the need for supplementary watering. Other than new settlers, who viewed irrigation from a less culturally-entrenched perspective (Pigram 1977), most of the region's established farmers thus preferred to continue their extensive cropping and grazing operations as before, and opted to use the water merely on an opportunistic (and 'satisficing') basis, thereby rendering the system financially unviable. Macinko (1963) reports a similar example from the Columbia Basin, in the United States, where irrigation was introduced in the 1940s as part of a large-scale development that was intended to be a model of planned land use. As in Victoria, the scheme was a failure (at least initially), and serves to illustrate the futility of expecting farmers to adopt politically (or 'scientifically') desirable land use practices if these are financially unsound or unworkable in practice.

Other factors that received little, if any, consideration from the Victorian Government in the decision-making processes concerned with irrigation were of a biophysical nature. These included variations in soil hydrological characteristics, the slightness of the gradients across the northern plains (although perceived as a virtue, the flat nature of the landscape prevented the efficient distribution of water), and the ultimate fate of both drainage waters and the substantial volumes lost through channel seepage and deep percolation on farms (e.g., Haskew 1996). The failure of the early irrigationists to consider the latter factors was particularly important, since the issues of drainage and groundwater accessions continued to be inadequately addressed well into the twentieth century, in part for want of a decisive precedent, which undoubtedly contributed to the widespread high watertable and irrigation-related salinity problems that have emerged in the Goulburn Valley in recent decades (see Chapter 8).

As Haskew (1996, p. *viii*, p. 26) observes, irrigation development was initiated in Victoria at a time when such schemes were thought to require little more than a source of water, commandable land, and surveys to determine the layout of distribution channels. Engineers including George Gordon also knew from their experience in India that drainage was necessary to prevent waterlogging and the consequent 'souring' of the land, and that irrigation "should not be allowed in places where the soil is impregnated with salts or where the subsoil drainage is defective" (McKinney 1893, p. 399). McKinney (a pro-irrigation engineer

with experience in the Punjab, who served as an irrigation adviser in New South Wales) also pointed to the dangers of 'canal percolation' under such conditions, as the saturation of the subsoil and the continued effects of evaporation and capillary action would bring about the gradual accumulation of soluble salts at the soil surface. In India, this had resulted in the salinisation of extensive tracts of "injudiciously" irrigated country, where crops either grew badly or not at all (McKinney 1883, 1893). However, the possibility of such an outcome was evidently not considered in Victoria, as Gordon and Black's concerns about channel seepage appear to have been limited to the problem of designing delivery channels to carry sufficient water over long distances to allow for seepage losses, while still meeting the demands of the end-users (Gordon & Black 1881). As Haskew (1996, p. 9) points out, the cumulative effects of these losses were not discussed in any of their reports.

Deakin himself believed that he understood the drainage/deep percolation issue on the basis of his observations in California and (later) Italy and Egypt. However, his conclusion that drains might not be required in all instances appears to have been based on the effects of surface waterlogging on flat lands, and his knowledge of sub-surface hydrology was incomplete. Deakin had observed, for example, that substantial seepage occurred from supply channels in California, but he thought it largely beneficial, as it meant that progressively less irrigation water needed to be applied with time. Limited supplies of water would go further than initial calculations suggested, and "where seepage occurs at any moderate depth irrigation may be altogether abandoned on certain crops after the first year or two" (Deakin 1885, p. 32). Deakin had also observed, in the Fresno area of California, that excessive seepage after fifteen years of irrigation had resulted in patches of "artificial mcrass". It did not occur to him, however, that Fresno was anything but an anomaly, and that other irrigation districts would, in time, face similar problems - particularly if no provisions were made for drainage. The Americans themselves failed to consider such eventualities, although waterlogging and salinity had accompanied irrigation development in India, and a prominent American soil scientist, Eugene Hilgard (whom Deakin mentions in his 1885 report), was writing about "the rise of alkali" in California from the early 1880s, and advised that the desirability of irrigation needed to be studied in each particularly locality (Tyrrell 1999, p. 106; Worster 1985, p. 153). Although blaming irrigation for emergent salinity problems, Hilgard had no solutions to offer, however, other than the application of more water to leach the salt away or the installation of expensive tile drains, and his work remained largely unheeded (Worster 1985, p. 153).

As with the dryland salinity problems that developed as a consequence of tree-clearing during the Selection period, irrigation-related environmental problems such as salinity remained beyond the temporal range of perception of most of the actors involved, both in Victoria and in California, where irrigation in the 1880s was still in its relative infancy. Haskew (1996, p. 35) adds that Deakin's investigations were also before their time, in that the lack of appropriate scientific understanding meant that the manner in which irrigation development proceeded in northern Victoria was based almost entirely on non-technical considerations. Groundwaters in throughout northern Victoria were known to be saline in many instances

(which was one reason that Deakin discounted the use of artesian water for irrigation purposes in Victoria)(Tyrrell 1999, p. 125), but the marine origins of much of the underlying geological strata were unknown at that time, and in the Goulburn Valley the soils had no observable salt content. Soil science was still emerging as a field of academic study, so that little attention was paid to soil characteristics in terms of either the siting of channels, or their suitability for irrigation. Deakin had observed the problem of "caking" of surface soils and hard-pan formation in irrigation areas of California (Deakin 1885, p. 28), but the engineer Stuart Murray believed that in the Goulburn Valley, all of the soils throughout the irrigable districts were good and "adapted by physical character and quality for irrigation" (Murray 1892, p. 504). There were no soil surveys to indicate otherwise (Martin 1955, p. 90), and it appears to have been generally presumed that the poor drainage characteristics of the Goulburn Valley soils were a consequence of poor irrigation management, rather than an inherent biophysical characteristic. The Department of Water Supply thus did not consider it necessary, even in the 1890s, to employ anyone with practical experience on the land (Royal Commission on Water Supply 1896, p. 188).

While scientific (or technical) ignorance thus played a role in irrigation-related decision-making in Victoria, it may also be argued that 'cognitive dissonance' was an equally significant factor (Mitchell 1979, p. 130; see page 76). To Alfred Deakin and his fellow irrigationists, irrigation was the epitome of scientific agriculture - a practical means by which climatic obstacles to their agrarian vision could be overcome. The possibility of negative outcomes, such as waterlogging and salinity, significantly detracted from the idea of irrigation as the key to the productive transformation of the landscape, and thus would have represented unwelcome information to which the irrigationists were less than receptive. Criticism was directed accordingly at engineers, including George Gordon and J.D. Derry and others who were imported to Victoria to supervise the construction of works, but who cautioned that the success of irrigation in the State could not be assured (Haskew 1996, p. 15).

Cognitive failures also appear to have been a factor in the Government's renewed attempts in the 1890s and 1900s to revive the closer settlement ideal. The notion evidently persisted that Victoria's rural lands could, and should, support farming families, as it was argued in Parliament in the lead up to the village settlement Act of 1893 that "millions of acres of magnificent lands in the country districts are lying unimproved and unproductive" (*Victorian Parliamentary Debates* 1892-93, cited by Powell 1973b, p. 139). Echoes of Selection era rhetoric were also heard in 1904, as large Goulburn Valley estates that been amalgamated from selectors' holdings were once again subdivided for the stated purpose of enabling "a thrifty settler under average conditions to meet his payments, effect his improvements, and maintain his family in reasonable comfort" (cited by Forster 1965, p. 99). In both instances, irrigation and the opportunities created by new farming and processing technologies (such as those associated with the dairy industry) were an obvious cause for the Government's renewed optimism, but in the Goulburn Valley in the 1890s, all but the Toolamba village settlement were beyond the reach of irrigation water, and many of the new subdivisions created under the subsequent Closer Settlement Acts were also in dryland areas.

Transport, marketing and soil problems also remained in the irrigation areas, but the lessons of the Selection era were barely heeded, as the political imperatives for closer settlement were such that the arguments against it seemed inconsequential by comparison.

As in the Selection era, cognitive failures arising from inoperative feedback processes thus appear, yet again, have been a factor in the Victorian Government's decision to proceed in the Goulburn Valley (and elsewhere in Victoria) with systems of land use which, although politically desirable, were not necessarily a good adaptive fit with the biophysical environment. As will be seen in the next chapter, this continued to be a characteristic of irrigation development into the twentieth century, as scientific knowledge in the fields of hydrology and soil science increased and the dangers associated with irrigation became steadily apparent, but the socio-political imperatives for closer settlement and continued irrigation development remained the predominant considerations in policy-making processes.

## **6.7 A new beginning**

By 1903, the choice for Victoria concerning irrigation seemed to be either to abandon the system entirely, or else to proceed with further irrigation development on a much greater scale. Abandonment, however, according to Martin (1955, p. 90) was not considered "even for a moment". Instead, it was proposed by the newly incumbent Minister for Water Supply, George Swinburne (after a comprehensive review of the system by Stuart Murray), that the existing arrangements based on local (Trust) control be replaced with a centralised, statewide irrigation authority, and that further irrigation works and storages be constructed and utilised to their full capacity. Swinburne, a pragmatic engineer and businessman, recognised that these investments in further system capacity would not become self-financing for many years, but the Victorian Government continued to believe that closer settlement was the key to the future economic and social development of Victoria (e.g., Rutherford 1974), and irrigation was the means to that end.

The period described in this chapter thus amounts to one of transition, as an irrigation system was effectively "grafted" onto the existing extensive patterns of agricultural and pastoral land use in the Goulburn Valley (Tyrrell 1999, p. 142). This phase was brought to a close in 1905 with the passing of a new Water Act, which, as will be seen in the next chapter, provided the basis for the general expansion of irrigation in Victoria, in association with closer settlement, that transformed the Goulburn Valley landscape in ways that Alfred Deakin could not possibly have imagined.