

STATE ADMINISTRATION VERSES PRIVATE INNOVATION: THE EVOLUTION OF PROPERTY RIGHTS TO WATER IN VICTORIA AUSTRALIA

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Introduction

Historically, securing adequate water supply has been one of the fundamental issues confronting every generation of Australians since European colonisation. Cyclical, crippling drought is a permanent feature of the continent that has remained a continuous theme throughout the years. From the squatters adapting land use patterns to limit the effects of water supply variability in the 1830s to the current emphasis on changing urban consumptive habits the question of water supply security is never far from the surface of public debate and intellectual musing. Recent reforms have signalled an historical, atypical willingness on the part of the government and users to move toward a more sustainable uses of a resource Australians have long taken for granted. Gone are the days of water shortages being tackled through engineering feats of brilliance with attention now being turned to the institutional framework within which water exploitation takes place with a corollary emphasis on pricing. As a result, reform has seen many states introduce water markets as a way to restructure water thirsty industries such as irrigation. Markets will provide a means by which structural adjustment can take place away from low valued output on marginal lands to higher valued production in more suitable areas. In effect, this may well mean the shrinking of some of major industries but it can also provide the opportunity for the growth of a more appropriate industrial structure in some regions, states, and, indeed the country as a whole. It is the current reforms that are the first, decisive step toward establishing an institutional framework that will provide for sustainable water use.

In light of recent reforms it must be recognised that a crucial prerequisite for the successful creation and maintenance of water markets is the establishment of property rights to water. Property rights are either social or legal institutions that provide an individual or group of individuals with authority over a particular asset

allowing them exclusive access to the stream of rents created by ownership as well as the right to exclude others from accessing these rents. Markets provide a mechanism by which the owners of rents can transfer these rights of access and exclusion to other individuals or groups. In this way, when the cost of market contracting and exchange is relatively low, markets will encourage economic growth as individuals strive, through exchange, to accumulate a bundle of property rights to maximise their wealth. This, in turn, maximises societal wealth. However, for the market to function in such a way property rights must be defined, defensible, and transferable. In the absence of any or all of these characteristics, the positive impacts of market institutions on economic growth will be foregone.

Historical examination of the evolution of property rights institutions provides an understanding of both the impacts of this evolution on current levels of growth as well as providing a deeper appreciation for significant events that may limit future institutional choices. In this way, in light of the current water reform agenda, it is crucial for policy makers, scholars, and stakeholders to recognise the impacts of past institutional decisions on the current and future reform agenda. Among the most significant questions requiring clarification are: what is the nature of property rights to water in Australia and how did these evolve over time; have property rights to water evolved to create rights that are well defined, defensible, and transferable thus displaying the characteristics that will successfully support the move toward fully functioning water markets; and, most importantly, how do these historical factors impact on the reform agenda? It is these three questions this chapter will attempt to answer.

In answering these questions this chapter will focus on the evolution of water rights in the state of Victoria with a particular focus rural areas, especially those in the northern areas of the state. Victoria has been chosen because it was the first state in Australia to acknowledge the significance and extent of rainfall variation in the continent that produced constant rainfall deficiencies in many

regions. It was also the first state to introduce irrigation, a move that forever altered the path of evolution for water rights within Australia as this model of irrigation was adopted in other irrigating states specifically New South Wales (NSW) and South Australia (SA). Such an examination will allow for considerable depth of analysis. From very early in Victoria's history, the evolution of property rights to water played a crucial role in economic development. In turn, economic development was considered the primary responsibility of government initiative. Generally, successive governments played active roles in the pursuit of policies that were aimed at harnessing the vast natural resources of this new land, including water, in their attempt to promote economic development the philosophical basis for which belied their historical laissez faire British heritage.

As a result, the evolution of property rights to water in Victoria's rural north was dominated by successive government intervention preventing private entrepreneurial responses to promote institutional change. This evolution can be broken up into three distinct phases. First, during the early years of settlement between approximately 1830 and 1877 water rights were dominated by the British common law doctrine of riparian rights. Second, the abolition of riparian rights and the rise of decentralisation with the introduction of irrigation trusts' from 1878 to 1904. Third, between 1905 and 1984 control of water rights was centralised under the auspices of the State Rivers and Water Supply Commission (SRWSC). Leaving aside the period of riparian rights, the following two phases, spanning just over a century, were dominated primarily by the role of government administration in defining rights and allocating water to the rural areas of the state. Successive government intervention that promoted redistribution of water rights resulted in the evolution of inefficient institutional arrangements stemming from the fact that policy makers did not have to bear the full cost of their decision making over time.

I: The Nature of Property Rights

Property rights are evolutionary in nature and can be defined, reorganised, or redistributed.¹ Definition occurs when property rights are absent, while reorganisation and redistribution will occur when rights already exist. Property rights definition, reorganisation and redistribution is determined by one key factor: the increasing value of a good that encourages users to either create property rights, reorganise existing rights or lobby for a redistribution as ownership becomes more valuable. Goods become more valuable as scarcity increases. In creating property right to increasingly scarce goods owners are able to exclude non-owners from use and extract rents associated with ownership of a unique asset. In this way, the creation of property rights prevents over-use of resources thereby avoiding the tragedy of the commons. This tragedy occurs when no one owns a resource and competition is characterised by a race as users act to exploit as much of the good as possible before others.² In this way, racing replaces co-operation as users have no guarantee that the amount of resource available today will be available to them tomorrow. This race leads to over investment in the exploitation activity and makes over use unavoidable. However, collective action can prevent the tragedy from occurring as groups of individuals band together to prevent over use and ensure efficient levels of exploitation take place through the creation of property rights defining ownership and rules of use. These groups tend to use a combination of both formal rules and socialisation to create property rights.

Ostrom has undertaken extensive analysis of the social institutional characteristics that typify a collective action approach.³ In these cases, a combination of formal rules, social norms, and moral conduct were the primary mechanisms via which delineation of property was achieved. With compliance being assured through the operation of mutual monitoring and enforcement. Evidence from Spanish irrigation systems reproduced by Glick supports this

¹ Anderson, T. L. and Hill, P. J., (2004), *The not so Wild, Wild, West*

² Hardin, G., (1968), 'The Tragedy of the Commons', *Science*, 3855 (162), December

³ Ostrom, E., (1990), *Governing the Commons*

contention by showing that while punishment did exist, it was generally fairly nominal in nature.⁴ This stemmed from the fact that extreme punishment of an individual who usually followed the rules would encourage resentment that could potentially result in the collapse of the common property system which societies existence fundamentally relied upon. In addition, it was often the case that individuals who did err and subsequently broke the rules of the common property arrangement knew they would be caught because of the effects of mutual monitoring. In turn, the system itself reinforced compliance. Nevertheless, in cases where individuals behaviour resulted in extreme contravention of the rules, the punishment would be considerable often leading to the individual being ostracised from the community the likely result of which was death.

These societal groups had a higher ability to ensure overuse was avoided because of their ability to organise at a relatively low cost. Such low cost organisation was a direct function of the relatively small size of the group, their geographical proximity to each other resulting in ease of observation of other members' actions, and their homogeneity. Hence, in smaller groups organisation was simpler because the transaction costs associated with collective action were lower than for larger groups. Small groups are also better able to overcome the free rider problem that characterises group action due to the fact that the contribution of each member is more easily monitored. Organisation of larger groups have higher transaction costs because the negotiation and enforcement of agreed rules is more complex when a larger number of individuals need to concur and cheating is less easily observed. In larger groups free riders will exploit benefits of being a member of the group without contributing the costs of the goods creation because their lack of contribution is less visible. Smaller groups thereby have an advantage over larger groups because negotiation is less costly and actions of each individual are more easily observed.

⁴ Glick in Ostrom, *ibid*

However, when socialisation and formalisation are not sufficient to ensure compliance due to larger, heterogenous groups being spread across geographically wider areas violence can play a big role in the establishment and maintenance of property rights systems. The use of violence typically increases the likelihood of rule compliance. Using evidence from California during the gold rush of the late 1840s Umbeck provides support for this idea by demonstrating that while California mining was unregulated by legislation during the gold rush, miners were able to put in maximum productive effort to mining their claims.⁵ In the absence of law, Umbeck argued that stable property rights to mining which allowed maximisation of productive efforts was a direct result of the potential for violence by all individuals via the possession of fire arms by all miners and their willingness to use them. This equalised their violence potential and permitted a stable property rights system to gold to evolve.

The redistribution of property rights can result in the wasteful exploitation of resources as entrepreneurs attempt to force a change of ownership through theft or lobbying.⁶ Such theft or lobbying requires another individual or group to defend their property against hostile acquisition. For example, the introduction of land selection in Victoria during the 1860s required squatters to spend time and resources defending their holdings against government-sanctioned reallocation through using dummy selectors and peacocking their runs. This was a negative-sum-game where defence of property rights against government reorganisation attempts channelled squatters' efforts away from productive activities, such as sheep grazing, into non-productive pursuits such as bribery. Economists typically refer to this process as rent seeking where entrepreneurs seek rents that are already owned by others.⁷

Reorganisation of property rights occurs through self-interested individuals buying and selling their rights in an attempt to maximise wealth. Exchange takes

⁵ Umbeck, J. R., (1981), *A Theory of Property Rights: with application to the Californian gold rush*

⁶ Anderson, T. L. and Hill, P. J., (2004), *op.cit.*, p.22

⁷ *loc.cit*

place when one individual believes a certain asset could be put to a higher valued use and will therefore contract through the market mechanism to obtain this asset from its current owner. A crucial requirement for wealth generating exchange to occur is the existence of well-defined and defensible property rights. A corollary requirement is that this exchange can take place at a cost low enough to remain profitable.⁸ Market exchange provides that such transactions take place via a series of spot contracts that are characterised by once off interaction by parties. The cost of market exchange remains low when goods are widely available and information asymmetries are limited. However, costs of market transactions can increase if the good or asset required is not widely available and information asymmetries regarding its availability and quality abound. This creates a mutual dependence between the buyer and seller that can lead to agency and hold-up problems thereby increasing the cost of market transactions. In this situation it is likely that market contracting will be replaced in favour of internal organisation of assets under a firm where principle-agent and hold-up problems can be avoided. In this way, the firm replaces the market and becomes a nexus of contracts that are relatively flexible. Firms may also be created so that specialist individual knowledge or scale economies can be exploited. However, organisation under the umbrella of a firm is not without costs. Primarily, these are monitoring and coordination costs that increase proportionately with the size of the firm.

In choosing between the market or the firm individuals seek to maximise efficiency in contracting. In Victoria, irrigation began with a reliance on individual experimentation that rapidly resulted in the creation of small firms to exploit economies of scale in the construction of infrastructure. In these cases, each member of the firm was given a share of the main canal with the contribution of labour being determined by the size of land ownership. For instance, for members of the Meering and Leaghur Irrigation Company formed in 1883 an owner of 320 acres had to construct about 20 chains (approximately 600 metres)

⁸ *ibid.*, p.19

of the main channel while the building of all other infrastructure such as dams and bridges required all owners to send one man a day until the construction was completed.⁹ In addition, members of firms generally owned all the land through which construction was required. As a result, right-of-way and hold-up problems were avoided.

As mentioned above, one of the key requirements for contracting via the market mechanism is the existence of defined, defensible, and tradable property rights. Traditionally, economists have argued that for many natural resources property rights are unable to be allocated because these goods are unable to be broken up into units that can be bought and sold. Water is one natural resource that has been subject to this argument. Traditional economists claim that property rights cannot be allocated to water due to the fact that it is an impure public good. As a result, it is rivalrous but non-excludable thereby preventing exclusivity of ownership via enforcement. Therefore, property rights are unable to be established for water which leads to market failure and in turn require government administration to provide certainty of allocation and price. However, this argument tends to ignore the evolutionary nature of property rights and their associated institutions because it fails to recognise that the absence of rights simply signals that scarcity has not yet become an issue.¹⁰

II: The evolution of water rights in Victoria: Riparian rights, 1800 to 1877

Settlement expansion into the Port Phillip District increased after rapidly after 1830 following two distinct routes: the Major's line and from Portland in the east fanning outward.¹¹ Settlers found life in Australian colonies particularly harsh and

⁹ Agricultural Reporter, (1885), 'Among the Irrigators', *The Australasian*, 39 (1041), September 5, p. 422

¹⁰ Anderson, T. L. and Leal, D. R. (2001), *Free Market Environmentalism: Revisited*

¹¹ The Port Phillip District was the name given to the geographical boundaries that define modern day Victoria. This district became known as Victoria on its separation from New South Wales in 1851. The Major's line was the path established by Major John Mitchell's successful expedition over the Great Dividing Range in 1836 and became the controlling access for pastoral expansion in Victoria becoming a kind of internal boundary for the colony (Roberts, Sir, S., (1924), *History of Australian Land Settlement*, p.175). Squatters runs were defined according to their location in

hazardous due to the extreme environmental uncertainty resulting from a significant divergence in climate, topography, soil type, flora, and fauna from that experienced in their homelands. The most significant environmental risk posed was rainfall variation. In this way, the nature of settlement and the type of economic activity adopted during the expansion years (1830 to approximately 1855) reflected a relatively high degree of institutional adaptation by settlers in order to manage the environmental uncertainties characteristic of this new land.

Hence, squatting became the dominant form of land ownership during these early years.¹² Squatting had numerous advantages over more permanent forms of land settlement in that they were highly mobile. Mobility was achieved by squatters distributing land ownership over a wide area thereby allowing flexibility in production location. This crucial aspect of squatting permitted these settlers to move quite large distances should they face extreme water shortages at any location. The predominate form of economic activity that evolved, that is sheep grazing, also reflected the vital need for mobility. Dominance of sheep grazing over more permanent forms of agriculture was also reinforced by the increasing value of Australian wool on British markets during the period (refer to Appendix 1 for value of wool exports).

However, unlike the history of population expansion in the United States where collective action responses to ensure efficiency and protection characterised the movement of pioneers on wagon trains to the frontier, Australian squatters were typically individualistic in their exploration of new frontiers being bound only by the camaraderie of the pioneer.¹³ And, while property rights to runs were protected through some vague notion that squatters had the right to run stock over all land within three miles of a home-station at best this was only a

relation to this line for example, a run of 1841 was described as being “situated on the Major’s Line about 70 miles from Melbourne” (*ibid.*, p.175).

¹² Squatters were those who resided outside the boundaries of settlement without an occupation licence.

¹³ For further details on the nature of collective action in the United States during the pioneer period refer to Anderson, T. L. and Hill, P. J., (2004), *op.cit.*, chapter 7

gentleman's agreement.¹⁴ Property boundaries became marked by natural features such as tree stumps, marked rocks, and water sources with the average squatter caring little about the legal technicalities of their occupation because, "he [*sic*] had his [*sic*] ground and, unless he [*sic*] were the discoverer, would come to some kind of an uncertain agreement with his [*sic*] neighbours."¹⁵

Land selection by squatters focused primarily on the acquisition of water frontages or land in close proximity to water supplies. Rainfall variation made these blocks the most highly valued by settlers.¹⁶ Maps of the period (refer to Appendix 2 for the most accurate squatting map of Victoria of the era produced in 1851) reinforce this argument clearly indicating the location of most homesteads close to water supplies. However, while the importance of accumulation of water frontage properties was undeniable, the issue of the institutional arrangement that delineated rights to water during this period is a much more contentious issue. While it is argued here that water rights during this period were dominated by the British common law of riparian rights, the extent to which this institution existed is disputed in the literature.¹⁷ This contention is due to the absence of case law indicating whether a Victorian court would apply the riparian doctrine until 1887 (*Newstead v. Flannery*).¹⁸

¹⁴ Roberts, Sir S., *op.cit.*, p.179

¹⁵ *ibid.*, p.180

¹⁶ Powell, J. M., (1989), *Watering the Garden State*, p.44-46. This statement is also supported by evidence from newspapers later in the nineteenth century for example, a letter relating to experimental irrigation by R. Officer in Swan Hill during the 1880s published in *The Australasian* has the author stating quite clearly that Officer claimed, "I would rather have 2,000 acres on the banks of a river at a fair price...than I would have 14,000 acres for nothing out back" (Anon, 'Letter to the Editor', *The Australasian*, Dec., 2, 1882, 33(870), p. 731).

¹⁷ Davis, P. N., (1971), *Australian Irrigation Law and Administration*; Clark, S. D., (1971), 'The River Murray Question: Part I – Colonial Days', *Melbourne University Law Review*, 8, June; Powell, J. M., *ibid.*

¹⁸ While the judgements of courts in other British colonies such as, Canada (*Miner v. Gilmour* (1858) and New South Wales (*Lord v. Commissioners of the City of Sydney*, 1859), indicated they would apply the riparian doctrine in the absence of relevant case law in Victoria, these findings did not imply that a Victorian court would apply this doctrine (Harris E., (2002), *Treading Water: An Analysis of Institutions and Natural Resource Sustainability, the case of the Murray River*, Unpublished Ph.D. Thesis, The University of Melbourne, p.76).

And while it is claimed riparian rights did indeed exist in Victoria prior to the judgement handed down in *Newstead v. Flannery*, exactly how the doctrine operated in practice is unclear. Theoretically, riparian rights tied water use to land resulting in only those who owned land coming into contact with the water source acquiring such rights. The rights conferred on a riparian owner were usufructuary in nature that is, riparians had rights of use but not rights of ownership. This stemmed from the fact that water “is a moveable, wandering thing...[hence, one] can only have a temporary transient, usufructuary property therein.”¹⁹

Riparian rights provided holders with an entitlement to put water to ordinary use that is, for culinary, cleansing, feeding and suppling “an ordinary quantity of cattle”²⁰ during which they were unencumbered by restrictions under this doctrine. Nonetheless, in any other uses the effects of a riparian owner’s activities on downstream riparians would be considered by a court in determining reasonableness.

In this way, riparian rights implied an inter-relationship of owners along a stream referred to as the ‘community of the river.’ In this respect owners were equal in both right and responsibility.²¹ Riparians were also entitled to licence or contract their right to water to non-riparians allowing access via riparian property.²² However, at no time did non-riparians become privilege to the community of the river, nor were they protected from any negative effects of upstream riparians use under the doctrine. In practice, given the vagaries of land ownership delineation as explained above, the difficulty in understanding the practical operation of riparian rights is not surprising. Evidence suggests that the answer lies in the nature of the supply of water verses competing demand. Specifically,

¹⁹ Blackstone in Kinney, C. S., (1912), *A Treatise on the Law of Irrigation and Water Rights and the Arid Region Doctrine of Appropriation of Water*, Volume 1, p. 770

²⁰ Clark, S. D. and Renard, I. A., *Law of Allocation of Water for Private Use: Framework of Australian Water Legislation and Private Rights*, Volume 1, p. 71

²¹ Scott, A. and Coustalin, G., (1995), ‘The Evolution of Water Rights’, *Natural Resource Journal*, Volume 35, Fall, p. 959 and 935

²² Harris, E., (2002), *op.cit.*, p. 82

it can be argued that supply of water during this period was relatively abundant compared with the demand for its use. This was primarily due to low population numbers (refer to table 1, below).

Table 1: Population of Victoria 1836-1860²³

Year	Population
1836	224
1837	1,264
1838	3,511
1839	5,822
1840	10,291
1841	20,416
1842	23,799
1843	24,103
1844	26,734
1845	31,280
1846	38,334
1847	42,936
1848	51,390
1849	66,220
1850	76,162
1851	97,489
1852	168,321
1853	222,436
1854	312,307
1855	364,324

Nevertheless, due to the vagaries of property boundaries, the seizure of water holes was a common occurrence during this period.²⁴ While this supports the argument that securing water supply was foremost in squatters' minds when claiming land, it also points to a high level of uncertainty that pervaded the early years of land settlement. Indeed Roberts states unequivocally that with the establishment of these relatively arbitrary boundaries, "it is no wonder that range fights were a normal part of pastoral life" going on to claim that as squatter settlement accelerated after the 1830s the rush for good land led to guerrilla warfare until the government appointed a District Commissioner for Crown Lands

²³ Hayter, H. H., (1875), *Victorian Year Book*, Statistical Appendix 1

²⁴ Roberts, Sir, S, (1924), *op.cit.*, p.179

who subsequently did nothing to relive the uncertainty of land ownership owing to the fact that while the Commissioner's word was law, this law was determined without principle.²⁵ Hence, violence must have played an important role in land rights enforcement during the early years of colonial settlement in the Port Phillip District. From this evidence, it is logical to assume that this was also the case with water rights.

Unlike the western frontier of the United States where water supply variability led to the replacement of the riparian doctrine with that of prior appropriation there is lack of similar evidence to suggest that squatters adapted the riparian doctrine in Victoria.²⁶ Even though, in most parts of the colony, squatters' activities were focused on the harnessing, including diversions and obstructions, of water resources to aid their main economic activity of grazing.²⁷ The lack of adaptation of this water right institution can be understood through explanation of four key factors.

First, as mentioned, squatters adapted their land ownership and dominant economic activity to deal with rainfall variation via the scattering of land ownership throughout the colony giving them flexibility in production location thereby limiting the need to alter riparian rights. Second, squatters had precarious land tenure where the Crown could revoke occupational licenses at any time. Hence, uncertainty of land tenure resulted in what little efforts there were to harness water supplies being relatively insignificant. Third, typically, the average size of squatters' runs were large enough to have continuous inclusion of smaller rivers (refer to Appendix 2 for a map of a squatting run) so that the construction of dams had limited impact on adjacent owners.²⁸ On larger rivers dam construction was not sufficient to cause significant impacts on downstream

²⁵ *ibid.*, p.179

²⁶ The prior appropriation doctrine provided that those first in time were first in right making seniority a key feature of this institution.

²⁷ Powell, J. M., (1989), *op.cit.*, p. 42

²⁸ While there are various statistical records available for this era there are no recordings of the average size of squatters' runs due to the fact that they did not have ownership rights and they were not required to register their claims.

owners. Finally, squatters also attempted to overcome surface supply variation via the sinking of wells and bores on their properties to tap into artesian water supplies. This would also have provided some water supply security in times of severe regional drought without requiring any alteration to the riparian doctrine.

The relative equilibrium in water rights institutions that persisted for the first couple of decades of settlement expansion came to an abrupt halt with the discovery of gold at Ballart in 1851. Gold discoveries resulted in a massive expansion of population in Victoria (refer to table 1, above) the likes of which have not been paralleled as thousands of migrants entered the colony to prospect. Subsequent gold mining efforts required prospectors to harness water resources to assist mining activities with most fields experiencing severe water deficiencies.²⁹ However, unlike with the expansion of squatter settlement, the administrative machinery of government was quick to establish legislation to regulate water use by miners. Horse-driven puddling demanded the greatest use of water and became the dominant form of mining after the exhaustion of most surface gold and consequent discovery of relatively shallow alluvial deposits in the mid to late 1850s. Hence, regulation for this type of water use was encapsulated in the Gold Fields Act (1857) that allowed for the establishment of local Mining Boards and Committees that formulated water use rules suited to local conditions such as miner numbers, claim size, predominant mining techniques, and water availability.³⁰ These Boards and Committees were also responsible for the issuing of licences for the construction of dams, storages, and diversions on Crown land for mining purposes thereby conferring usufructuary interest in running water unrelated to the common law riparian doctrine.³¹ In essence then, it can be argued that gold mining had little impact on water use and the riparian doctrine outside populous mining districts.

²⁹ *ibid.*, p.46

³⁰ Harris, E., (2002), *op.cit.*, p. 86

³¹ Clark, S. D. and Renard, I. A., (1972), *op.cit.*, p.481

It was not until the 1860s that the continued use of the riparian doctrine began to be challenged. This next phase in the evolution of water rights was pre-determined by government redistribution attempts rather than users responding to increased scarcity or recognising that this doctrine was unsuited to a country of high rainfall variability. The move toward more evasive government intervention in the allocation and pricing of water was a direct function of the impacts of the gold rush on population numbers. Specifically, technologically available gold supplies began to dwindle by approximately 1865 which left Victoria with a large surplus labour supply in an under developed industrial economy. In addition, during this period, Chartist reformers infiltrated parliament. Chartists supported the right to land ownership for every man, a view that offered the colonial government a perfect solution to the colony's labour glut via the creation of a class of yeoman farmers engaging in intensive agriculture on small blocks.³² This philosophy became enshrined in various legislative enactments during the 1860s referred to as the selection acts and was a direct attack on the privilege of squatters who, by this time, had become wealthy pastoralists locking up tens of thousands of acres of the best land in the colony.

The introduction of selection was accompanied by the recognition that an increased number of small hold, intensive agriculturalists would require access to water that was limited under the riparian doctrine. In the years prior to this there had been a general recognition by colonial administrators when selling "wastelands" of the value of water access which had led policy makers to reserve narrow strips of land along some inland and coastal water sources.³³ However, it was not until the mid-1850s that this emerged as a general policy of Crown frontage reservation. The intention of administrators in promoting this policy was twofold: to facilitate full land occupation as settlement expanded and to provide recreational access to waterways. In theory this resulted in the Crown claiming unbroken strips of land parallel to many watercourses to prevent private land

³² During this period it was considered that only men had the right to land ownership hence, the use of gender specific reference to male land ownership.

³³ Cabena, P. B., (1983), *Victorian Water Frontage Reserves*, Preface

from coming in contact with the water. In effect, therefore, landowners were unable to acquire riparian rights. However, this policy proved relatively unsuccessful in removing riparian rights acquisition.³⁴ This resulted from disputation over fencing of reserved areas. Often squatters incorporated these frontages into their own paddocks refusing to fence them due to the prohibitively high cost of additional fences. The Crown also refused to construct fencing due to the cost. As a result, the Crown could not enforce this reservation policy and squatters continued horizontal fencing to the waters edge leading to the inclusion of this land in their private property and promoting the uninterrupted acquisition of riparian rights.³⁵

The general failure of the Crown frontage reservation policy was accompanied by the failure of selection to fully fulfil the desire by government to create a class of yeoman farmers. This was due to inherent flaws in the selection legislation. In fact, in framing most of the selection acts the parliament failed to recognise that the variations in climate and topography in the areas being opened for selection. In short, many of the areas being made available to the small, intensive agriculturalists were unsuited to this activity. In this way, the government of the day failed to recognise the inherent mobility benefits that squatter settlement and grazing provided to guard against cyclical water supply shortages. In addition, this administrative redistribution of land rights resulted in a zero-sum-game as squatters' spent valuable resources defending their land holdings and specifically, their precious water frontages against selection via the use of friends or relatives as dummy selectors and peacocking their runs. A more effective redistribution of water rights did not take hold in the colony until the late 1870s when severe drought dried up many inland rivers and lakes. As a result, the relatively increased number of small-hold farmers settled during the selection era (refer to table two, below) found themselves unable to secure water supplies. The impacts of this drought on the expanded permanent, agricultural population

³⁴ *ibid.*, p.25

³⁵ For further details of the failure of the Crown frontage reservation policy refer to Cabena, P.B., 1983

led the government to more closely consider the issue of water supply security to the more remote areas of the colony.

Table 1: Victorian population by location 1860-1880³⁶

	Capital City (Melbourne)	Other urban^a	Rural
1861	123,061	112,249	303,357
1871	191,449	182,701	357,378
1881	262,389	173,054	426,903

^a Other urban is representative of regional centres such as Ballarat and Bendigo

It was during this drought period that small-scale irrigation experiments become widely publicised within the colony. These relatively successful experiments turned the public's mind to the possibilities irrigation provided in terms of protecting the newly settled agricultural population against continued water shortages. And, by the 1880s, the administrative redistribution of water rights culminated in the attempted abolition of riparian rights and the move to large, government sponsored irrigation schemes.

III: The nature of water rights in Victoria: The introduction of irrigation, 1878 to 1905

The drought of 1877-1881 was devastating for the small farmers settled under the selection acts. As Powell aptly notes:

In previous droughts only a small number of squatters had been affected, but now thousands of small farmers and their families were in dire distress, with only their votes to lift them out of their misery.³⁷

Until this drought, the colonial government had remained complacent about water supply security for the expanded agricultural population. It was this exogenous shock and the potential for political backlash it created that jolted legislators to move from rhetoric to action in water right redistribution attempts. These accelerated actions culminated in the passing of the Irrigation Act (1886) which

³⁶ Vamplew, W., (ed.), (1987), *Australian Historical Statistics*, p.41

³⁷ Powell, J. M., (1989), *op.cit.*, p.98

discouraged private collective responses due to the incorporation and financial advantages provided (explained below).

Government action in relation to the 1877 drought was confined to securing domestic supplies for those settlers in more remote areas. To these ends the parliament appointed the Water Conservancy Board (WCB) in 1878 to investigate the possibilities for water conservation in the colony.³⁸ Generally, the WCB's reports on domestic supply were cautious as to the extent of works required to provide suitable supplies. In fact, the WCB noted:

it is wise not to rush into expensive projects at the risk of financial failure, but rather so to lay out the works that they be gradually developed as the demand for water increases.³⁹

The initial report of the WCB detailed a number of schemes in various districts throughout the colony for the provision of stock and domestic supply with management being vested in specially created local authorities referred to as Waterworks Trusts. And, almost immediately after the receipt of this report, the parliament enacted the Water Conservation Act (1881) which provided for the formation of trusts and conferred on them quite extensive powers over the control, allocation, and pricing of water. However, these powers were confined to the administration of a particular source(s) within the trust district. All other water sources were still controlled to a large degree by riparian owners or miners who acquired usage licences from the Board of Land and Works under the Mining Act (1865). The major contribution of the WCB and the subsequent creation of the trust system was that they ushered in a new theme of decentralised administration that came to dominate water supply frameworks for the duration of the nineteenth century.

Paralleling the investigations of the WCB into domestic water supply security for the colony, a small number of private landowners had begun to experiment with irrigation. Reports regarding private irrigation were published in a widely

³⁸ The WCB comprised two members: George A. Gordon, Chief Advisory Engineer of Water Supply to the Board of Land and Works; and Alexander Black, Assistant Surveyor General.

³⁹ Gordon, G. A. and Black, A., (1881), 'First Report of the Water Conservancy Board', *VPP*, Paper Number 18, p.6

circulated supplement to the Melbourne paper *The Argus* called *The Australasian*. This supplement had a special section, 'The Yeoman', devoted to discussion of issues affecting the agricultural population in remote parts of the colony. Generally, private irrigation reports began to be more frequently publicised after 1878 however, many of the schemes being reported had started in the preceding years.⁴⁰ It was not until 1882 that the undertaking of private irrigation within the colony began to accelerate as reports of successful schemes became more frequent leading many other individuals to pursue small-scale irrigation. By 1883 the public interest created by these private schemes led the parliament to establish an investigation into the methods and extent of success of these undertakings. This investigation included seven properties in total located in Victoria's northwest: Mr. Crystal at Torrumbarry; Mr. Robertson and Mr. Wagner at Pericoota; Mr. Officer at Swan Hill; Mr. Fairban at Lara; Mr. Smith at Portland; Mr. Booth at Gunbower; and Mr. Garden at Cohuna.⁴¹

Primarily, these individual efforts highlighted the experimental nature of irrigation within the colony. As a result, the main focus was on the contribution of these trials to the understanding of the technical requirements of irrigation such as the details of how water was applied to properties from low lying rivers; the method of application via canals and furrows; the cost associated with these schemes; and the increase in productivity achieved. In most cases, these reports were accompanied with praise for the virtues of private initiatives that were attempting to protect agriculture from the vagaries of rainfall. In most instances, individuals engaging in irrigation owned river frontage properties and used pumps to lift water from the river to apply to their land. And, while under common law, these activities would have been found unreasonable by a court there was no challenge brought by any owner under the riparian doctrine during this period. This was due to the fact that most of these individuals were wealthy pastoralists

⁴⁰ One farmer, Mr. Patchell from Kerang had reportedly engaging in small scale irrigation of 13 acres for 19 years (Agricultural Reporter, (1883), 'Irrigation on the Loddon', *The Australasian*, 34 (876), January 13, p.55

⁴¹ Anon, (1883), 'Irrigation in Victoria', *The Australasian*, 34 (888), April 7, p.437

who had managed to avoid land redistribution under the selection acts therefore, as explained above, the average acreage of land ownership was still relatively large thereby including smaller streams within property boundaries. Therefore, it can be argued that these activities posed little disruption to the continued use of the riparian doctrine.

Nevertheless, these experiments provided practical information to parliament regarding the value of irrigation within the colony in terms of its ability to protect agriculturalists from drought. And, while private collective action responses had not yet come to dominate this undertaking, the government legislated to encourage the creation of local organisations via amendments to the Water Conservation Act (1883). This amendment inserted sections to provide for the establishment of bodies similar to Waterworks Trusts referred to as Irrigation Trusts that would have exclusive responsibility for promoting irrigation in the districts within which they were formed. However, there were no irrigation trusts formed under this legislation due to the prohibitively high transaction costs associated with their creation. These costs stemmed from two main factors: irrigation was in its infancy during this period; and uncertainty of water rights.

First and foremost, as mentioned above, irrigation was in an embryonic stage when the 1883 act was passed. Individual farmers lacked the knowledge, capital, access to markets, and incentives to pursue this activity on a scale large enough to require a collective action response. Given increases in land settlement had only been marginal in the previous decades it can be argued that agriculture itself was in its infancy thereby preventing the creation of any large scale rural ventures during this period. Simply put, there was no fundamental incentive that led to the need for individuals to engage in collective action. In other words, the benefits did not outweigh the costs of such organisation.

Second, there was considerable uncertainty as to the water rights of irrigators. As explained above, the government had not yet engaged in any decisive action

to remove riparian rights therefore, access to water for non-river frontage properties was limited. The only method by which those owning back blocks could access water was to contract with riparian owners to gain such access via riparian land. In addition, in order to supply water to back blocks channel construction through privately owned land with river frontage was required. Newspaper reports suggest that this type of contracting was difficult, if not impossible to secure for non-riparians with water trusts facing significant difficulties in gaining access to private lands to secure domestic supply as a result of owners demanding exorbitant compensation payments for their agreement to permit channel construction on their properties leading to hold-up costs.⁴² These reports indicated that these problems were a result of information asymmetries caused by the vagaries of the 1883 act which was unclear regarding the right of irrigators to force right-of-way through private lands. And, as with the first point mentioned above, this led to the transaction costs associated with irrigation being prohibitively high preventing the widespread application for irrigation trust formation under the 1883 act. These two factors combined formed a disincentive for settlers to engage in collective action regardless of whether it was sanctioned by the government or not.

However, in the years following (approximately 1883 to 1886), reports of private irrigation and collective action increased significantly. The uncertainty associated with water rights that had limited irrigation in first few years of the 1880s had been overcome by two main factors. First, in many instances, problems associated with non-riparian contracting and right-of-way access were avoided by irrigation organisations including only those individuals who owned land through which channels were constructed. Nevertheless, many of these problems were avoided altogether as many farmers came to realise the relative benefits of irrigation outweighed the costs to them of hold-up. In other words, farmers realised they would gain much more by joining a company that wanted to

⁴² Agricultural Reporter, (1884), 'Irrigation Experiments', *The Australasian*, 36 (951), June 21, p.826

use their land to construct channels and availing themselves of the water provided than they would by holding out for compensation. Hence, the benefits of contracting rather than competing were increasing during this period.

Second, information regarding how these organisations could acquire water rights became much more widespread thereby decreasing the asymmetries that had previously existed due to limited understanding of appropriators rights. Such information increased as the number of news reports of successful companies increased. Specifically water rights could be acquired in two main ways. First, if the company was to utilise supplies that were not allocated to a waterworks trust they could acquire pumping licences from the Water Supply Department allowing them access to a certain amount of water from a particular source. And, although the government was still uncertain as to the legal position of riparian owners this legislative action would have taken precedence over common law should there be a legal challenge.

Second, section 76 of the 1883 act allowed waterworks trusts to supply water to any person, company, corporation whatsoever for whatever purpose. As a result, these organisations could acquire water through contracting to buy a certain amount from trusts. However, this was only possible once water had been provided for domestic and stock purposes. Given during the mid-1880s rainfall was relatively abundant in the northern areas of the colony excess water for irrigation was quite readily available. In addition, information asymmetries that had existed regarding financing options also began to decrease with local reports detailing the number of companies acquiring bank funding.⁴³ These private schemes were on a much smaller scale than that which framers of the 1883 legislation had envisaged. However, the costs of such small scale organisation were much lower than they were under the legislation due to the

⁴³ Agricultural Reporter, (1885), 'Irrigation at Kerang', *The Australasian*, 39 (1009), August, 1, p.203

ease of monitoring and enforcement as a result of group homogeneity and geographical proximity.

As a result, in the years between 1883 and 1886 private collective action came to dominate rather than legislative sanctioned collective action because the costs associated with formation under the legislation were prohibitively high. This was a result of two main factors: minimum numbers required for trust formation and details required in application for trust formation. First, the 1883 act required three-quarters of landholders owning two-thirds of the land within a district to agree to form a trust. However, via private irrigation schemes the minimum number of members and the size of the schemes was highly flexible preventing costly, protracted contracting negotiation with a large number of owners. Second, the legislation required extensive details regarding the particular irrigation scheme to be submitted to parliament including: the amount of land irrigable and its estimated value; the quantity of water to be used; the value of waterworks already constructed in the district; plans and descriptions of works to be constructed; and costs of these works. The provision of this information required potential trusts to expend large amounts of money prior to the beginning of a scheme which they had no guarantee would be sanctioned by parliament. If the scheme was approved there would be little ability for a trust to deviate from the original details provided unless an application to do so was again submitted to the parliament for approval. This merely increased the costs associated with formation while limiting the flexibility afforded to irrigation organised via this method. As a result, in all aspects of formulation, the costs associated with using bureaucratic channels was far higher than those of local collective action. In this way, there was little incentive for farmers to create trusts.

The widely publicised success of irrigation experiments lead to significantly increased interest in the options irrigation provided for drought proofing farmers. This fervour was accompanied by increased interest by members of parliament in the question of irrigation. It was at this time that one of the most influential

individuals in Victorian water history, Alfred Deakin, began his rise to prominence.⁴⁴ Deakin's influence was at the forefront of the irrigation debate during the early 1880s and, by the middle of that decade, Deakin had single handedly guided both a Royal Commission into irrigation and its resultant legislation, the Irrigation Act (1886), through parliament.

The main impact of Deakin's role on water rights institutions in Victoria under the 1886 Irrigation Act was two-fold. First, was his unwavering emphasis on government intervention to control water right allocation in Victoria. His preference for government control was motivated by his meeting with Elwood Mead during a tour of the western region of the United States as Chief Commissioner of the 1884 Royal Commission.⁴⁵ Mead's philosophies regarding water rights captured Deakin's imagination. Specifically, Mead argued against the private ownership of water rights claiming that this type of institutional arrangement led to wasteful exploitation and speculation as had been experienced in the western states of the United States due to the prior appropriation doctrine. The similarities between the climate in the western states and Victoria led Deakin to become convinced that such problems would also occur in Victoria should private ownership be permitted. As a result, in framing the 1886 Irrigation Act Deakin included a section (section four) that permanently vested the ownership of all water resources within the colony in the Crown. This was a radical alteration to the institutional framework used to govern water the effects of which continued to dominate all future institutional changes right up until the introduction of water trading in 1989. In effect this section removed the possibility for any further acquisition of riparian rights within the colony resulting in a forced redistribution of water rights like that which had been attempted

⁴⁴ Alfred Deakin was Victoria's first Minister for Water Supply and, after Federation in 1901, became Australia's second Prime Minister.

⁴⁵ Mead was the Chief of the Irrigation and Drainage Investigations Bureau, a division of the US Department of Agriculture. He later came to Victoria after being appointed the Chairman of the SRWSC, a position he held from 1907 to 1915.

during the selection era.⁴⁶ Nonetheless, owners that had already acquired these rights maintained them even after this act was passed while all other individuals within the colony were vested with statutory riparian rights. It was not until the 1905 Water Act that legislation fully removed all riparian rights within Victoria.

Second, via the framework the 1886 act provided for the introduction of full-scale, government-sponsored irrigation in the colony. This was an attempt to overcome a number of problems associated with trust formation under the 1883 act the most important of which was the lack of finance provision by the treasury to fund the large schemes trusts' were expected to undertake. At the same time, access to capital for private individuals and firms was becoming more difficult to obtain on the open market as British capital markets began closing their doors to Australian colonies. The provision of government finance also promoted larger undertakings of irrigation than had been expected under the 1883 act but were not pursued. This fulfilled a philosophical sub-theme that dominated government action during this period that was intended to make the deserts bloom and drought proof farmers. In addition, one of the other advantages provided by the 1886 act was that it gave legal standing to private irrigation companies via its incorporation powers. Prior to this, many private organisations were unable to secure legal recognition for these businesses resulting in them being unable to gain protection under corporate law. However, by forming a trust under the 1886 act these organisations would not only have access to increased funds allowing them to build much more extensive schemes but they would also be afforded the protection of incorporation. As a result, the number of trusts formed under the 1886 legislation increased substantially in the following years. And, by 1895, 25 trusts had been formed and £934,277 of loans advanced.⁴⁷

⁴⁶ The inclusion of efforts to remove further acquisition of riparian rights within the colony within this legislation indicates that the government believed, regardless of the absence of case law, that water frontage owners did acquire riparian rights.

⁴⁷ Anderson, A., Grattan, W., Langdon, T., and White, J. S., (1896), 'Report of the Royal Commission on Water Supply', VPP, Paper Number 80, p.200

However, it was not long before the trust system met with difficulties that eventually led to its collapse at the turn of the twentieth century. Of all the problems trusts faced during these years, the most significant problems that led to their eventual reorganisation were lack of water supply due to construction coordination failure, lack of water supply security, and extremely poor financial management. Construction coordination failures resulted in trusts that had completed the necessary infrastructure having to wait significant periods of time before securing water supplies. Once water was available, this infrastructure was unable to support water provision due to lack of maintenance. By the time supplies were provided this infrastructure was in such poor condition due to lack of maintenance that it could not support water provision. Lack of water supply security was a result of the institutional arrangement itself with the government allocating a certain volume of water from a certain source(s) to each trust. This allocative system was fraught with difficulties because trusts had no guarantee that the amount of water allocated to them in one year would be continued into the next. Hence, they were unable to assure members that sufficient supply would be available therefore creating a disincentive to irrigate.

Poor financial management was in part related to the above two problems confronting trusts in that if water was unable to be supplied then farmers could not make use of supplies and therefore, would not be required to pay for the water. This was a crucial failure of the trust system in that calculations for loan amounts from the colonial treasury and subsequent repayment requirements were based on the assumption that all land claimed able to be irrigable within a trust would in fact be irrigated thereby requiring all farmers to pay the associated water costs. However, this did not occur (refer to table two below), and in some instances, even where water was available farmers did not use it due to relatively abundant rainfall during the late 1880s. In turn, there was no provision within the 1886 Act for Commissioners of trusts to enforce payment if the water provided was not used.

Table 2: Amount of land claimed to be irrigable and amounts actually irrigated

TRUST	Area Irrigable (ac)	Percentage of Land Irrigated				
		1891	1892	1893	1894	1895
Bacchus Marsh	750	8.00	21.33	16.67	19.47	42.40
Benjeroop and Murrabit	10000	5.50	14.34	18.74	8.58	39.03
Cohuna	96771	0.53	5.48	7.60	5.49	24.48
Dry Lake	1513	0.00	6.68	16.46	39.39	27.96
East Boort	10796	4.87	4.81	5.24	9.07	29.26
Emu Valley	1000	0.00	0.00	0.00	8.00	0.00
Harcourt	500	0.00	8.40	9.40	8.40	10.00
Kerang East	16000	0.00	12.69	16.63	24.58	66.26
Koondrook	6500	6.42	6.35	5.00	0.45	15.12
Leaghur and Meering	10300	6.79	6.87	13.30	15.17	21.14
Marquis Hill	9500	0.00	0.00	11.13	26.63	82.08
Myall	4000	0.00	6.95	25.85	2.95	12.05
North Boort	10000	0.20	0.20	0.20	0.06	0.00
Rodney	230616	0.13	0.81	1.17	1.63	5.30
Swan Hill	13500	12.25	9.16	13.48	8.22	19.77
Tragowel	192000	5.86	4.50	7.29	6.54	13.23
Twelve Mile	8830	10.05	15.89	36.46	14.76	38.70
Wandella	16000	6.60	4.39	20.72	16.87	59.40
Western Wimmera	900000	0.05	0.06	0.08	0.06	0.09
Yatchaw	6753	0.00	0.00	22.21	44.42	14.81

These factors resulted in trusts being unable to pay back even the interest on government loans and the eventual collapse of the system. The lack of payment problems can be traced to principal-agent problems that plagued trust management. As a result, this led to trust Commissioners becoming subject to moral hazard and adverse selection problems.⁴⁸ In this instance, moral hazard manifested itself in the Commissioners being unable to enforce minimum irrigation on the part of trust members. While adverse selection was evidenced in trusts acting as sectoral interest groups to attain additional funding to invest in their district, the benefits of which would be internalised by landowners on sale, while making little effort to engage in the required amount of irrigation. Overall, it was the financial problems that crippled the effectiveness of trust system and led

⁴⁸ Harris, E., (paper in progress), 'Agency Problems in Victoria's early provision of water supply'

to its eventual collapse. However, it was also a function of the management paradox the 1886 Act created which gave no security of water rights to trusts or their members.

The collapse of the trust system led to yet another reorganisation of water rights institutions with the full centralisation of water allocation and pricing under the SRWSC in 1905. And, as had decentralisation before it, this alteration prevented any ability for collective action or private innovation to influence institutional change and establish flexible, adaptable property rights institutions. In addition, centralisation subsequently resulted in significant financial losses for Victorian taxpayers during the entire period of the SRWSC existence as the government continued to subsidise water schemes construction, maintenance, and management well into the 1980s. This resulted in the irrigation industry in Victoria becoming highly inefficient as the institutional framework created incentives to maintain the production of low valued crops on marginal lands via the continuance of low water prices that were unable to cover the true cost of provision.

IV: The nature of water rights in Victoria: The move to centralisation, 1905 to 1984

The failure of the trust system signalled to legislators that decentralised management of water resources was not an effective arrangement for their administration. Nevertheless, government control over water rights allocation and pricing was still considered the best method of management. Therefore, in keeping with this theme, once trusts failed, legislators believed that the only way to overcome problems confronted by decentralised management and retain control over water supplies was to move to full centralisation of water right allocation and pricing. This was achieved via the passing of the Water Act (1905) which created a new state agency, the SRWSC, to administer all rural water supplies within the now state. Theoretically, this body was instilled with the

power of government combined with the initiative of private enterprise.⁴⁹ In practice, private initiative gave way to political preferences for economic development the keystone of which was cheap water.

This institutional framework was created to overcome the problems that had plagued the trust system. One of the major problems created during trusts management was the fact that farmers were only compelled to pay for water if they used it. The lack of use due to lack of supply and relatively good rainfall years in the late 1880s and early 1890s had resulted in many farmers not using the water available to them. And, as mentioned, this resulted in trusts being unable to repay even the interest on government loans. As a result, under SRWSC management, surety of revenue was a key aim of the government. To this end the government created an institutional arrangement that compelled farmers to pay for a minimum amount of water regardless of whether they used or not. In addition, this compulsory charge was intended to ensure that those who benefited from water provision would also meet the associated costs. Another significant feature of the 1905 Act was that it prevented farmers from selling water unless they sold the parcel of land to which the water right was attached. This was intended to exert economic pressure on landholders to use water regularly and wisely or sell properties to someone who would.⁵⁰

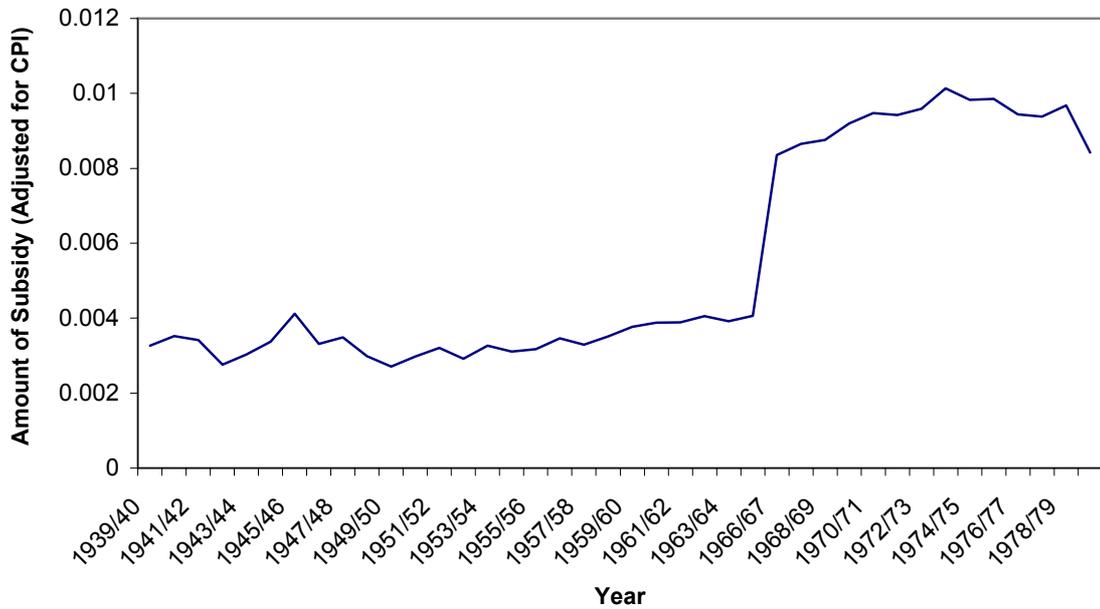
Combined, these features of the new institutional framework for management established a system with inherent, inbuilt rigidity preventing farmers from being flexible in their production decision and encouraging them to use water inefficiently because they had to pay for it. To compound these problems of inflexibility, the compulsory charge was set at a level that did not cover the costs associated with supply, management, and maintenance of irrigation. As a result, this system was characterised by the provision of massive subsidies to rural areas as indicated in the recording of the amount of subsidy itself (refer to graph

⁴⁹ East, R., (1962), 'Pioneers of Irrigation in Victoria,' *Aqua*, 13 (9), May

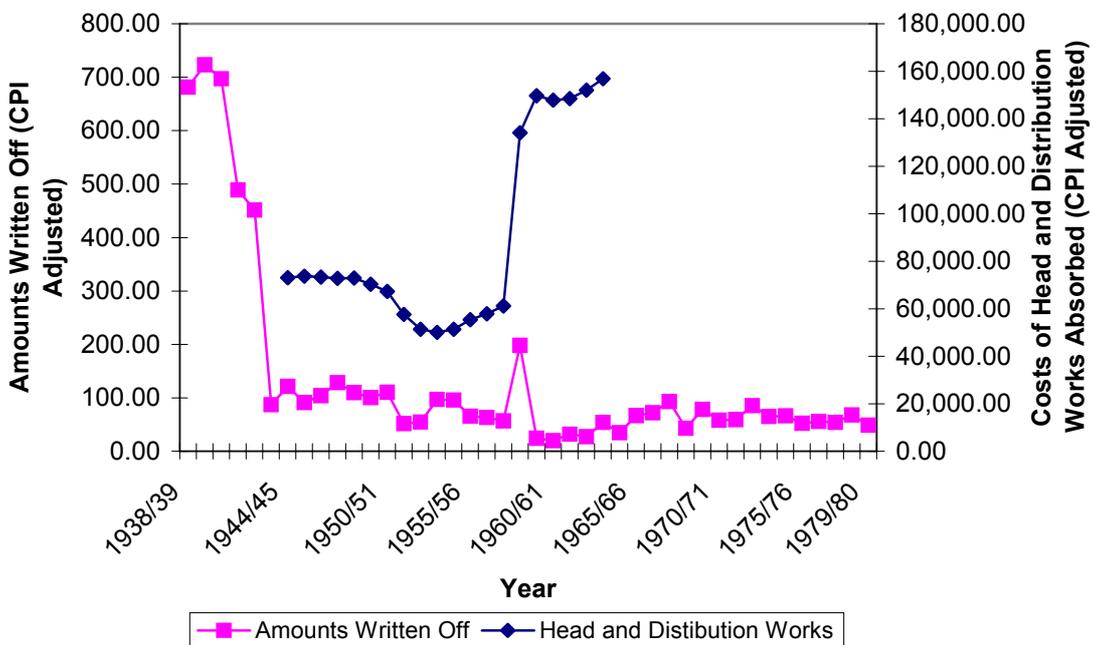
⁵⁰ Rutherford, J., (1964), 'Interplay of American and Australian Ideas for the Development of Water Projects in Northern Victoria', *Annals of the Association of Australian Geographers*, 54

1, below) as well as via capital costs absorbed by the government and amounts written off over time (refer to graph 2, below).

Graph 1 Per capita subsidy for country water supply 1939/40 to 1978/79⁵¹



Graph 2 Irrigation costs absorbed by the Victorian State Government⁵²



⁵¹ Harris, E. M. (2002), *op.cit.*, p. 138

⁵² *ibid.*, p.139 and 141

These costs were spread over the entire tax paying population resulting in the population in rural areas gaining the benefits of irrigation while those in urban areas shouldered much of the cost. In turn, this institutional system resulted in income being redistributed away from urban areas to the rural population.

The SRWSC dominated water management in Victoria for almost a century and while it overcame some of the impediments to the development of a large-scale irrigation industry it did nothing to foster efficiency or sustainability in water use throughout the period. The resultant structure of irrigation was that it became dominated by the production of low valued crops, such as wheat and dairy on marginal lands that were unsuited to intensive cultivation. It also inhibited flexibility in production by locking agriculturalists into irrigated farming. And, much like the effect of Reclamation in the United States, there was little incentive for institutional efficiency because rule makers did not bear the full cost of their actions.⁵³

It was not until the passing of the Water (Central Management Restructuring) Act in 1984 that significant changes to this institutional framework took place with the move back to decentralisation as government attempted to rationalise the operations of the bureaucracy. These changes led to the abolition of the SRWSC and its replacement with the Rural Water Commission (RWC) as well as the creation of eight regional water authorities that became responsible for the allocation and pricing of water to specific areas of the state. This renewed interest in decentralisation, previously experimented with in the 1880s and 1890s (as explained above), and the desire for increased accountability of public bodies formed the basis for more fundamental changes later in the 1980s. The most significant of these institutional changes took place with the passing of the Water Act (1989) with this act finally removing the nexus between land and water and introducing the ability for farmers to sell their water rights either permanently or temporarily.

⁵³ Anderson, T. L. and Hill, P. J., (2004), *op.cit*, p.199

Nonetheless, the act did nothing to alter the nature of ownership of water rights regardless of its provisions to allow trading. As a result, water rights are still owned by the government which has the ability to remove these rights from any farmer(s) at any time with or without compensation. In effect, this situation prevents individuals from having exclusive rights of ownership to the good they trade. This fundamentally undermines two of the three basic requirements as mentioned above for markets to successfully evolve that is, defined and defensible property rights. Without the provision of ownership to water the impacts of reforms will be significantly limited as farmers are still unsure about their ability to exclude others and extract rents associated with the ownership of a unique asset. At the very basic level government had introduced the mechanisms to allow for markets to evolve, that is, trading water rights separately from the land to which they are attached, but had refused to secede ownership rights to farmers. This is an example of traditionalist economic ideas regarding private property and water stifling the evolution of a true water market. As a result, the current reform agenda will be threatened by continued uncertainty as to the rights of water holders in respect of what specific rights are being traded under this new legislation. Should current reforms attain their main aim of sustainable water use then this is one fundamental issue that requires urgent clarification.

Conclusion

As it can be seen from the above historical investigation, for the bulk of Victoria's history, water rights have been dominated by successive government redistribution that have limited the evolution of well defined, defensible, and tradable rights. From the earliest replacement of squatter settlement adaptations to deal with high levels of uncertainty because of rainfall variation government has consistently imposed institutional changes that have undermined the ability for private water development to evolve. At all junctures government action has proved to be premature especially in regard to the encouragement and support

for irrigation during the early 1880s. The costs associated with private collective action were far smaller than those connected with legislatively approved organisational forms and indicates that small-scale schemes were inherently more efficient and flexible being more suited to the state of Victorian agriculture and farmer knowledge than the larger schemes envisioned by the government of the day. However, the promotion of government endorsed organisation with the financial and corporate advantages that could not be paralleled in the private sector resulted in the replacement of private initiatives as these advantages were considered by irrigation farmers to be crucial to success. Centralisation decreased the costs associated with private organisation but limited the flexibility inherent in this method of collective action preventing both water use efficiency and ownership.

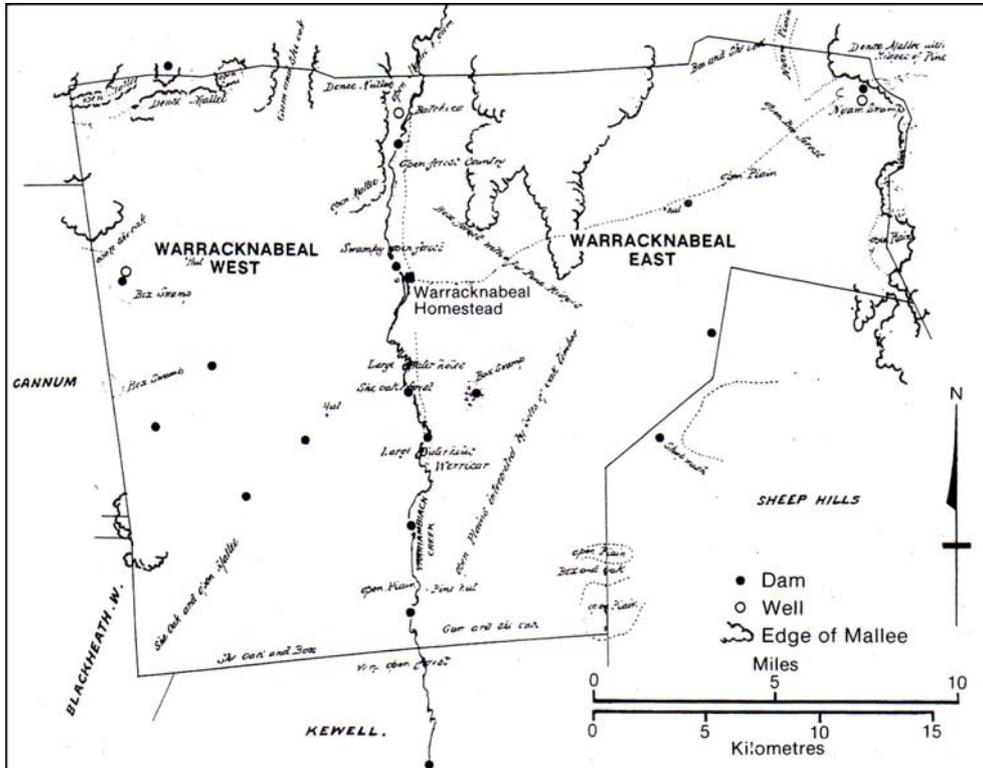
With the introduction of trading without clarification of water right ownership, the effects of this successive intervention has resulted in high levels of uncertainty as to what bundle of rights farmers are exchanging when they sell their water rights. This will do nothing to assist the evolution of a market for water and will only prove to limit the capacity of current reforms to ensure long run sustainable water use is achieved.

Appendix 1: Value of Victorian wool exports

Year	Value of Wool Exports ('000 £)	Total Value of Exports ('000 £)	Value of Wool Exports as % of Total Exports
1826	48	360	13.33
1827	24	362	6.63
1828	41	570	7.19
1829	64	601	10.65
1830	35	420	8.33
1831	76	490	15.51
1832	74	605	12.23
1833	104	714	14.57
1834	214	992	21.57
1835	300	1115	26.91
1836	369	1237	29.83
1937	321	1182	27.16
1838	384	1579	24.32
1839	443	2236	19.81
1840	566	3014	18.78
1841	548	2476	18.60
1842	601	1580	38.04
1843	686	1551	44.23
1844	645	931	69.28
1845	1009	1234	82.66
1846	1020	1631	62.54
1847	1272	1982	64.18
1848	1240	1557	79.64
1849	1239	1793	69.10
1850	1614	2078	77.67

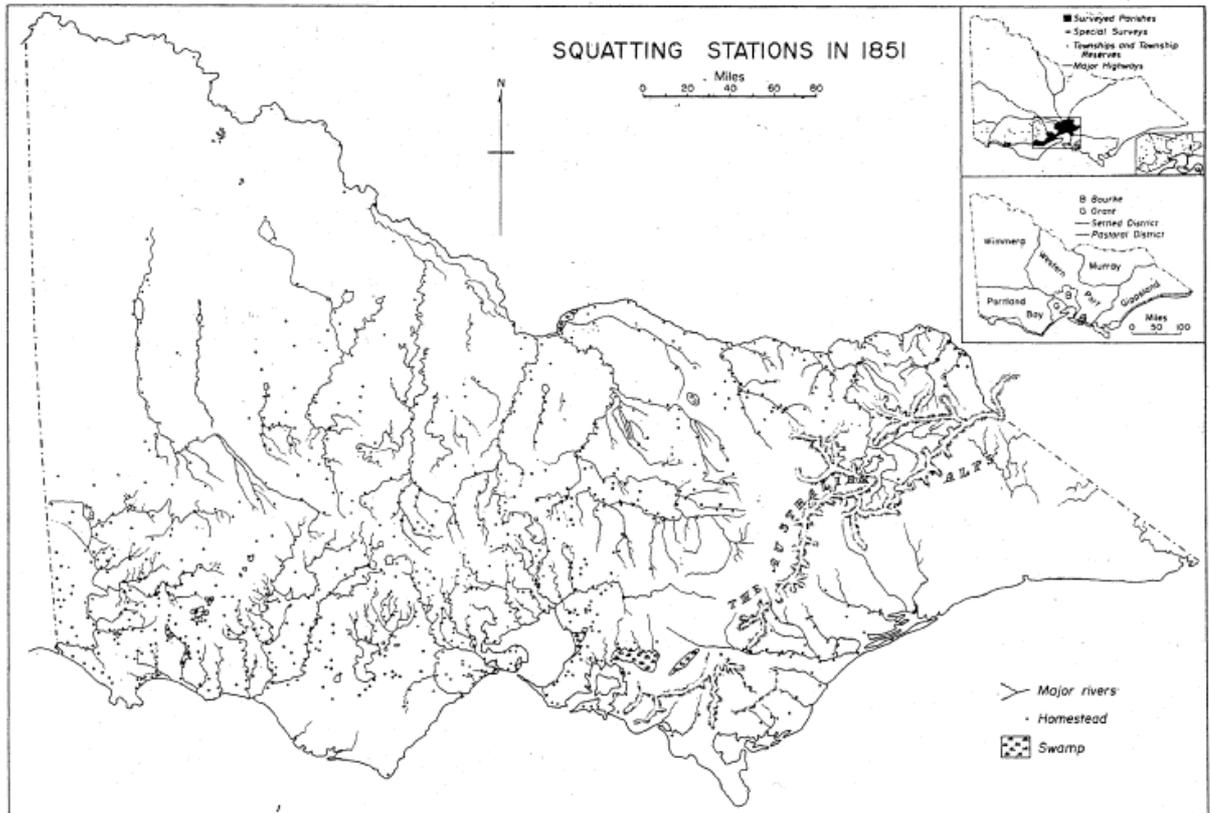
Source: Vamplew, W., (1987), *Australian Historical Statistics*, p.109

Appendix 2: Squatters run at Warracknabeal, 1869



Source: Powell, J. M., (1989), *Watering the Garden State*, p.45

Appendix 3: Thomas Job Ham's Squatting Map of Victoria



Source: Powell, J. M., (1968), 'Three Squatting Maps for Victoria', *The Australian Geographer*, 10 (6)

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