A 'mere thread of land': Water races, gold mining and water law in colonial Victoria

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Water law in Victoria has its origins in arrangements made during the gold rush to satisfy the needs of miners and town-dwellers on the goldfields. Rights of access to water and diversion practices were worked out in the peculiar circumstances of the new colony during the 1850s and 1860s, where economic and social conditions were transformed by the discovery of gold. Miners needed abundant, reliable supplies of water to wash gold from the earth and to power steam engines and processing machinery. Laws regulating access to water, however, were poorly defined during this period, with a mix of English common law and American legal doctrine drawn on and adapted to local conditions. This was in response to disputes that quickly emerged over the nature and scale of water diversions, priority of access and the sale of water rights. Conflict was exacerbated by the highly variable nature of rainfall in Victoria and frequent dry seasons which often disrupted mining activity. Out of this confusion, colonial officials gradually fashioned rules to regulate access to water. The State asserted increasing authority over the distribution of water in this period, laying the foundations for the effective public ownership of water rights by the 1880s. The Victorian experience provided leadership in establishing water regulations which the other Australian colonies later followed.

In this article we trace the development of mining laws which regulated water rights in colonial Victoria. While the social and economic importance of both gold and water have long been acknowledged by historians, the intersection of mining practices with the need to capture, store and divert water, the legal basis of this

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1 This research is supported by an ARC Discovery Project, 'Cultural Landscapes of Colonial Water Management in Victoria’s Central Highlands' (DP110100437). The Royal Mining Commission Appointed to Enquire into the Condition and Prospects of the Gold Fields of Victoria, in Papers Presented to Parliament (Victoria), Legislative Assembly, Melbourne, 1862-63, Vol. 3, No. 10, p. 341, referred to the area over which mining races ran as a 'mere thread of land'.

process, and the longer-term implications of the solutions, have been largely neglected. The nature of gold deposits — and the technologies used to extract gold — demanded large quantities of water, and miners looked to the State to mediate competing claims to this resource. The English model of ‘riparian access’ and American ‘prior appropriation’ doctrine were influential in the Victorian context, although modified to suit local circumstances. The creation of laws, by-laws and regulations gradually established the legal status of water as a public resource which individuals and groups could extract and utilise for private purposes. We begin here with a brief review of the legal concepts and customary practices relating to water that settlers brought to Australia, and outline the impacts of the gold rush, mining technologies and the industrial use of water. We then describe the development of the legal framework which regulated the diversion of water for mining purposes on the Victorian goldfields, and the consequences of mining-related water law for the development of later water legislation.

The traditional English riparian principle held that rivers and streams belonged to everybody, with property owners along the banks granted rights to use the flow for drinking, washing or watering animals, but they were unable to seize the water for personal use and deprive others of its benefits. English water laws had developed gradually since the Roman period, building on the importance of water as a source of industrial energy, but these laws became very unsettled during the eighteenth and early-nineteenth century as conflicts over water rights emerged during a period of intense social, economic and technological change. This was the heyday of the ‘Age of Water Power’, with thousands of water mills serving the growing textile, transport and other industries. Private capital investment in the construction of canals, and the growth of new transport industries based on them, further stimulated interest in the ownership of water. New water users had to fit in with older operations and accommodate finite water resources, and this often led to conflict over water supply and access to rivers, streams, dams, canals, etc. The instability of water doctrine was related in part to the nature of water itself, which, as a ‘moveable,
wandering thing’ was difficult to possess as tangible property, but could nevertheless be appropriated, used and polluted.\(^5\)

The English appropriation doctrine emerged in the eighteenth century with the rapid growth of capitalism and competitive markets, as water and other natural resources increasingly became instruments of production and wealth. This ‘prior use’ doctrine was based on the notion that first usage created a title to the water flow.\(^6\) The idea emerged from legal treatises as much as court rulings, with Sir William Blackstone arguing, for example, that rights to flowing water should follow occupancy, or first possession.\(^7\) This appropriation theory replaced the older notion of ancient use and natural flow as a basis for determining water disputes. The English appropriation model had a number of features that were later incorporated in American and Australian water law. These included the existence of prior usage rights for a given water source; limits on volumes of water diverted; the need to use water ‘beneficially’; and the forfeiture of water rights for non-use.\(^8\) In England, however, rights to appropriate water could only be asserted by landowners adjacent to watercourses, whereas in Australia and the United States these rights were unrelated to land ownership.

Between 1800 and 1850 in Britain there emerged a modified theory of rights to natural flow, whereby riparian owners (those whose land included or abutted the bank of a river or lake) could use water for the reasonable needs of their land.\(^9\) The right to access water was an incident of ownership of riparian land, a ‘natural right’ accruing to the landholder.\(^10\) They belonged to a community of users and could not diminish the flow quality or quantity to downstream users. Riparian owners thus did not ‘possess’ the water but enjoyed a right of access, a situation reinforced by the Court of Exchequer in 1851.\(^11\) In the case of

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\(^6\) Getzler, *op. cit.*, pp. 175-77, 204.

\(^7\) Blackstone, *op. cit.*, pp. 395, 402-03.

\(^8\) E. Harris, ‘Scarcity and the Evolution of Water Rights in the Nineteenth Century: The Role of Climate and Asset Type’, *Monash University, Department of Economics Discussion Paper 45/10*, 2010, pp. 4-5.


\(^11\) Getzler, *op. cit.*, pp. 282-90; D. E. Fisher, *Water Law*, Sydney, 2000, pp. 64-78. This principle was applied in South Australia in 1867, when the upstream landowner was
artificial water-courses, such as races and canals, courts commonly used doctrines of grant and prescription to order rights in these various situations. Common-law judgments and parliamentary legislation during the nineteenth century responded to the competing claims for allocation of water for individual property owners, commercial actors and urban users in a pragmatic and largely ad hoc manner. The need to provide clean water, drainage and sewerage for town-dwellers also resulted in the growing acceptance of water as both common good and a commodity.\footnote{Strang, The Meaning of Water, Oxford, 2004, pp. 31-32.}

In the United States, the discovery of gold in California in 1848 led to the development of water rights that recognised both English riparian law and prior appropriation to support hydraulic mining, a hybrid system known as 'the California doctrine'.\footnote{Kanazawa, 'Efficiency in Western Law: The Development of the California Doctrine, 1850-1911', Journal of Legal Studies, Vol. 27, No. 1, 1998, pp. 159-61.} Courts promoted appropriation (diversion) claims to encourage the productive use of water from existing riparian rights, in ways that resonated on the Australian goldfields a few years later. Under this doctrine, the first person who came to a stream and claimed its water, or part of it, acquired a vested right to the water, making it a form of personal property. The first in time was the first in right.\footnote{Worster, op cit., p. 88.} Unlike in England, this right to appropriate water was not related to the ownership of land. Elements of the California doctrine were soon applied in the Victorian context as well, including the extraction of water for mining purposes by non-landowners, water trading, seniority of water rights, and the forfeiture of unused water.\footnote{Harris, op. cit., p. 4.}

This was the prevailing understanding of water rights that miners and settlers brought with them to the Australian colonies in the 1850s. Previously, squatters in the Port Phillip District in the 1830s and 1840s had centred their runs on reliable water sources in creeks and rivers, swamps and springs. This ‘wrapping’ of water sources effectively excluded latecomers who might encroach on the land, and it was these water-rich parcels that the squatters took up as pre-emptive rights under the Selection Acts of the 1860s. Water thus became a defining

\footnote{Dunn and Another v. Collins, in Reports of Cases Argued and Determined in the Supreme Court of South Australia, Vol. 1, Adelaide, 1867, p. 132.}

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feature of the squatting landscape and the new pastoral geography. Nevertheless, the limited security of squatting tenure discouraged landholders from investing much in improvements to water supply, even though the squatters enjoyed a *de facto* possession of the resource.

When the gold rush began in 1851 colonial authorities were forced to respond to a new set of circumstances in navigating conflict over water use on the goldfields. Like the miners themselves, they developed solutions that accommodated the needs of competing individuals and groups. As most gold mining took place on Crown Land, water laws and rights were negotiated in this public domain. Water came to be recognised as both a private (individual) and public (communal) good. Water laws, like mining legislation, were thus subject to frequent review and modification as new needs and technologies emerged.

An important distinction soon emerged, however, between English and Australian jurisprudence relating to water. In England, riparian laws and access to water resources was closely associated with the private ownership of land. In Australia, however, the Crown was effectively invested with exclusive and absolute rights of land ownership. In addition, the doctrine of Royal Minerals stipulated that the Crown also retained legal ownership of precious metals. This resulted, as geographer J. M. Powell argued, in the increasing recognition of the public ownership of water as a resource, later expressed in the 'nationalisation' of surface water in Victoria in 1886. Powell also acknowledges, however, the role of mining in highlighting the importance of water laws in a dry environment and the negotiation of public and private rights of access.

The story of gold’s impact on Victoria is well known. Tens of thousands of migrants arrived from around the world. Towns and cities grew quickly, creating new industries and a demand for commodities, luxuries, and transport and communication infrastructure, while the agitation of miners provided a vital catalyst

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17 On the northern reaches of the Loddon and Wimmera Rivers, squatters carefully diverted water down normally dry billabongs to provide extra water supplies. J. M. Powell, *Environmental Management in Australia 1788-1914*, Melbourne, 1976, p. 44.
for political reform throughout the Australian colonies.\textsuperscript{20} Mining also had a major impact on the natural environments of the goldfields, with forests plundered, hillsides eroded and waterways polluted in the relentless pursuit of gold.\textsuperscript{21} The role of water in these transformations has been less examined, despite its significance. Water was crucial for almost every kind of gold mining activity, but miners were initially profligate in their use and waste of this vital resource. Arriving predominantly from a damp and green Britain, colonists found that their expectations of water availability could not always be accommodated in the drier environmental conditions of Australia.\textsuperscript{22} Most Chinese miners came from the lush and fertile south-eastern provinces of Guangdong and Fujian, and they too brought with them the idea that water should be abundant on the goldfields. Miners soon learned, however, that water was often seasonally scarce and surface diggings often stopped entirely in the drier months until rains arrived to replenish supplies. Bendigo was well known as a ‘winter diggings’ where alluvial mining was largely limited to the winter and spring.\textsuperscript{23} Contemporary observers noted that the richness of a goldfield was as much a consequence of the available water as the quantity of buried minerals — more rain led to more gold.\textsuperscript{24}

The mining areas of Victoria, however, varied significantly in geology, topography and rainfall. At Ballarat, for example, Yuille’s Swamp (Lake Wendouree) was a source of good drinking water, and Yarrowee Creek provided water for gold washing,\textsuperscript{25} but at Bendigo and Mt. Alexander (Castlemaine), the nearest large rivers were a day’s journey away and small creeks slowed to a trickle or dried up altogether in the summer, stalling gold production for up to six months.

of every year. In the north-east, around Beechworth and Yackandandah, average annual rainfall exceeded 900 mm per annum and fed numerous creeks and springs which were widely used for sluicing.

Alluvial mining dominated work on the goldfields during the early years of the gold rush. Gold occurred as flakes or nuggets, eroded into the beds of creeks and streams, and recovering such gold meant working the surface soil layers or sinking shafts up to about ten metres deep. Large quantities of water were needed to wash gold from the earth. Miners used a succession of pans, cradles and rockers in the first decade or so of alluvial mining, which were cheap and simple techniques but inefficient in their recovery of gold. Puddling machines were used in drier areas, consisting of a ring-shaped trough up to six metres or more in diameter, which was filled with clay and water. One or two horses dragged a set of harrows suspended from a cross-beam fixed to a central post to mix the clay and loosen the gold. When the contents broke down to sludge a valve was opened to release the mix as waste and the gold was recovered from the bottom of the trough. The sludge flowed into the nearest stream, filling waterholes and causing rapid siltation and damaging floods. Alluvial miners at Bendigo regarded miners using puddlers as 'outcasts' for their wilful pollution of limited water supplies. Each puddler used up to 5,000 litres of water a day, with the peak of this method in Bendigo occurring around 1856, when 3,000 puddling machines provided work for close to 10,000 men.

Ground sluicing was a more intensive method of working an alluvial claim and involved larger quantities of water. It was the main method of working elevated ground on the slopes above watercourses. Channels were dug and paved with stones, with the gold being caught under or behind the stones. Alternatively, sluices could be made from wooden boards. A stream of water was conveyed by a race from the headwaters of a creek or gully, carrying the topsoil and wash dirt into the sluice. Stones were removed using a sluicing

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fork and the water was drained away in a tail-race. Hydraulic sluicing was an intensification of this process, with a stream of water from a race channelled into a series of progressively smaller pipes, ending in a nozzle, or 'monitor'. The high-pressure water was directed at the wall of a creek or gully, blasting away the deposit and washing it towards sluicing channels in which the gold could settle. This technique, introduced from California in the 1860s, required even more water but dramatically increased the volume of soil that could be worked by a small group of miners.31

Water was also an important element in deep lead and quartz reef mining, both of which developed strongly on the goldfields as yields from surface alluvial mining began to dwindle. Deep leads were ancient watercourses buried deep beneath the surface, while reefs were ore bodies containing gold and other minerals. Mining and processing such deposits required access to sophisticated technology and substantial capital, which were usually far beyond the means of a few miners working together. Deep leads often flooded and had to be pumped out before the ore was hauled to the surface. Winders for hauling the ore and stamp batteries for crushing it were mostly driven by steam engines, with boilers needing a good supply of clean water. Alternatively, some batteries were driven by water wheels or pelton wheels, fed by a race from a reservoir.32 Clean water was also needed to wash the ore through the batteries and pans were used to separate the gold.

Water races were built across the goldfields to meet all these needs. They resembled simple earthen aqueducts, usually about one metre wide and up to one metre deep. Some were tens of kilometres long, while others were only a few hundred metres in length. Races followed the contours of hills, winding in and out of gullies, with stone revetments sometimes used to support the race along the side of steeper hills. Tunnels, flumes and siphons could also be used where necessary. For large races, dams were often built on the creek or gully at the head of the race while smaller races relied on seasonal water flows. The dams were usually built of earth and clay, the water flowing out through sluice gates to either side of the dam wall or through

piped openings below the centre of the dam wall. Water was drained from the diggings through tail races, which could also be of substantial length and depth.\textsuperscript{33}

While many miners secured their own water supplies with races and dams, there were also calls for the government to build reservoirs to store water for domestic and industrial needs. By 1861 there were at least 29 reservoirs built or under construction on the goldfields, with a total capacity of around 600 million gallons, or 2,700 ML.\textsuperscript{34} It was also observed, however, that some of these storages were too small to meet the needs of both townsfolk and miners.\textsuperscript{35} The Coliban System of Waterworks, developed by the government at great expense over almost twenty years, eventually provided a reliable flow of water to the Castlemaine and Bendigo mining areas from 1877.\textsuperscript{36} On the Ballarat field the local councils secured their own supply by constructing a number of dams in nearby watersheds.

Many of these water races, dams and tail races are preserved today in the gold mining districts of central and north-eastern Victoria. Along with the diggings themselves, they provide an enduring archaeological and landscape legacy of the gold rush, and indicate some of the ways miners sought to overcome the environmental limits imposed by variable water supplies. Similar networks of water races have been recorded in the Shoalhaven goldfields in NSW, in north-eastern Tasmania and at Otago in New Zealand, but little work has yet been done to understand these relics in Victoria, in spite of their ‘historical legal significance’.\textsuperscript{37} Water supply systems represented a

\textsuperscript{34} Legislative Assembly, ‘Reservoirs’, in Papers Presented to Parliament (Victoria), Melbourne, 1861-61, No. 32.
\textsuperscript{35} Gold Fields Royal Commission of Enquiry, \textit{op. cit.}, p. 421.
\textsuperscript{36} Russell, Water for Gold!, pp. 208-09.
substantial investment of time, money and labour. Lengthy races could take several years to build, at the cost of thousands of pounds, and miners were clearly anxious to ensure that they could secure a supply of water to justify the expense of construction. Miners in the Beechworth District were also concerned about the priority of water rights, where, under local by-laws, those working creek beds claimed a superior water right over those working the creek banks or using water to drive machinery.  

38 In the first years of the gold rush in the 1850s, miners washed alluvial gold from creek beds and gullies. When these were worked out they cut races and dug reservoirs to bring water from higher sources to wash gold from the dirt. Those with experience of the Californian fields often took the lead in applying water to local gold extraction. The custom of prior appropriation was effectively introduced in Victoria in 1853, when miners asked local goldfields commissioners for a permit to construct a race and be given priority of access in diverting water from a stream. The first permits were issued verbally, granted *ex nemo motu* ('by pure movement', by one’s free will, or without restraint), often without defining clearly the extent of privileges conferred. Subsequent written permits were often posted on a nearby tree, but there were no maps or plans defining their extent, and the scant wording of permits did not sufficiently connect the ‘right’ with any area of land. Many of the permits changed hands, and large sums of money, sometimes several thousand pounds, were exchanged in the belief that the permits gave good legal title to the water rights taken out.  

39 Conflict emerged when the permit holder changed the scene of his operations or diverted the water he was authorised to use into another drainage area. As Powell has noted, the Victorian government at this time had neither the financial strength, nor the technical expertise, nor even the political opportunity or inclination, to move quickly to regularise the ‘chaotic’ state of water diversion for mining purposes.  

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40 Powell, *Watering the Garden State*, p. 50.
Figure 1: Water race, Creswick regional Park Victoria. Photo by Peter Davies.
The legal validity of permits and water diversion in this early mining stage was thus uncertain. It was based on vaguely worded gold regulations, rulings by local courts, and by-laws and understanding of local conditions. Nevertheless, as miners invested large amounts of time, money and effort in these constructions, they believed that their rights to races and reservoirs were as secure as their titles to mining claims. Gold regulations issued by the colonial government in 1853 specified that 'sluice washing will be permitted, at running streams', but made no mention of water storage and diversion. Regulations in 1855 indicated that 'sluice washing or other water privileges will be allowed only by special sanction', which may have been understood to encompass water races. The Goldfields Act of 1855 (18 Vict. 37), which provided for the issue of Miners' Rights and the establishment of Local Courts, made no explicit mention of water diversion. This was in spite of urging by the 1855 Goldfields Commission for the government to deal with the lack of water supply on the various goldfields, and that individuals diverting water for their own ends 'should receive direction and encouragement'. The Commissioners also noted the problem of sludge, but queried whether disposal in pits or dispersal through channels was really the answer, while complaints about the excessive and wasteful use of water by Chinese miners were also acknowledged.

In 1857, however, laws began to catch up with the reality of mining, when the Goldfields Amendment Act extended the provisions of the Miner's Right to allow miners 'to cut construct and use races and dams for mining purposes through and upon any Crown lands and to divert and use for mining purposes any water which Her Majesty could lawfully divert and use' (21 Vict. 32; s.3). Holders of mining leases were also entitled to 'water-rights and other easements' on payment of a rent or royalty (s.11), and local wardens were entitled to arbitrate disputes over water rights and easements (s.76). Mining Boards were enjoined to make by-laws concerning fees to pay for 'clearing and keeping clear the sludge and water channels' associated with puddlers (s.111).

41 Smyth, op. cit., p. 398.
43 Ibid., Vol. 56, 13 June 1855, p. 1420.
Lack of co-operation between competing miners, however, continued to result in highly wasteful diversion methods, with everyone taking water where they could. Races were marked out and cut parallel to each other, often very close together, which was a waste of time and labour, and multiplied water lost through seepage and evaporation. Sometimes claims for water exceeded the naturally available supply, while permits were lost and it became difficult to prove what rights they conferred. This was especially the case in the Beechworth district, and much of the impetus for legal reform relating to water diversions came from conflicts over the ‘minute subdivision of water’ in this district. In some areas miners tunneled into hills to tap springs at their source, but this often led to nearby creeks and gullies running dry. Conflict also emerged over water used in different mining technologies, with ground sluicing applying water directly to alluvial deposits, while quartz miners used races to drive waterwheels and crushing batteries.

Confidence in the legal validity of water rights and permits was shaken in August 1858 when Judge Thomas Cope of the Beechworth Court of Mines found in the case of Hooper v. Mayzen that the use and diversion of water were illegal if such water was taken from a creek or a river running through alienated lands, or lands lawfully held for mining purposes, such as with a Miner’s Right. Cope judged that water licences taken out before the 1857 Goldfields Amendment Act had no legal value, prompting much anguish and demonstration among the miners affected. Contemporary opinion varied as to the impact of this decision. Members of the 1862-63 Royal Mining Commission felt the judgment was legally doubtful but that it still had the effect of destroying the legal validity of water permits, which ‘were not worth the paper on which they were written’. Others, such as Secretary of Mines Robert Brough Smyth, suggested that Judge Cope’s decision had an impact in places where it appeared to apply very closely, but otherwise races were cut and rights were established under by-laws in the old way. Miners believed they had at least some rights by occupying Crown lands for cutting races and diverting water, and

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47 Argus 24 August 1858, p. 4; Ovens and Murray Advertiser, 18 August 1858, p. 2.
hoped that the laws would soon be amended. Smyth recorded instances on the goldfields when claimholders diverted water to work a particular area, and then used the water to work the ground elsewhere, sometimes in a different watershed. Soon the miner came to believe that 'he had an exclusive right to the enjoyment of the water over which he had had control for a long period ... and in this manner, by slow growth as it were, the claimholder was transformed into an owner of water'.

This quickly and inevitably resulted in conflict between miners and the new 'water merchants' who held access to water races. The latter could, if they chose, decide which miners received water and who did not. Miners tried to thwart them by cutting and diverting the water channels, leading to disputes and litigation. For the licence holders, their claims gained a greater sense of legitimacy when they were transferred from one miner to another. When a miner moved between claims he would take 'his' water with him and then sell the right to the water when he moved out of the district. Shares in water permits could also be purchased and traded and often changed hands for substantial amounts of money. Tension also arose among miners in the 1850s and early 1860s when claiming first, second and subsequent water rights under the permit system, based on the date of registration, a process which reflected the prior appropriation model used in the United States. By-laws in the Beechworth district, for example, specified that 'superiority ... shall be determined by priority of occupation, the earlier occupant having the superior right' to available water. In other cases miners co-operated with water merchants to work their claims. In the Hepburn Division of the Castlemaine District in 1860, for example, miners earned about £1 per day, a good return, but only after paying £3 or £4 per week for water to the sluice owners.

An Amending Act in 1862 clarified the legal situation relating to water diversion for gold mining. It conferred authority to grant licences for up to fifteen years:

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50 Ibid., p. 339.
52 Board of Science, Second Annual Report, Melbourne, 1860, p. 23.
to cut construct and use races dams and reservoirs through and upon any Crown lands whether the same shall or shall not have been demised [leased] ... and take or divert water from any spring lake pool or stream situated or flowing upon or through or bounded by any such Crown lands ... in order to supply water for gold mining purposes to such person or any other person who may be engaged in mining for gold and it shall be lawful for the person to whom any such license shall be granted to take or divert water to the same but no greater extent as and than he might do if he were the owner of such Crown lands (25 Vict. 148; s. 11).

Protection of water races and reservoirs on Crown lands was also made explicit in the 1862 Land Act (25 Vict. 145), where pre-existing water easements on purchased land were not to be interfered with. Further legislation in 1862, known as the Drainage Act (25 Vict. 153), attempted to provide for miners to co-operate in the drainage of neighbouring quartz reefs by pumping machinery, but made no provision for the co-operative drainage of alluvial lands.53

Regulations based on the amending legislation were issued in December 1862. These included provisions to make the water diversion licence much more clear and distinct than the earlier permits, with an accurate scale plan endorsed on the grant. In essence, water licences included the provision that land used for a race (known as ‘gathering ground’) should not exceed four acres for every mile in length of the race (equal to land width 33 feet wide); an annual rent of not less than £5 per annum; and a charge of ten shillings per annum for every one million gallons of water drawn from a reservoir. The regulations also clarified priority of access in the case of diminished water flows, with licensees permitted to take water in order of priority of the dates of the respective grants.54 Nevertheless, while the 1862 legislation gave certainty of tenure to the race-holder on Crown land, the issue of diverting water along races through private land was still undefined, and miners were dissatisfied with the lack of legal certainty. The 1862-63 Commission called for the provision of easements and compensation to landholders whose land might be affected by such races, and cited the precedent of canals, aqueducts and pipes for

53 Gold Fields Royal Commission of Enquiry, op. cit., pp. 8, 16.
54 Smyth, op. cit., pp. 399-400.
domestic supply as grounds for permitting the diversion of water to the goldfields.\(^{55}\)

The *Mining Statute* of 1865 was a landmark in water laws on the goldfields, spelling out water rights in detail, and specifying the privileges and penalties associated with the Miner’s Right and Consolidated Miner’s Right (for groups or companies), and the jurisdiction of Mining Boards, which had replaced the local courts under the 1857 amending legislation. The holder of a Miner’s Right or Consolidated Miner’s Right was entitled to:

- cut construct and use races dams and reservoirs for mining purposes through and upon any Crown lands and to take or divert water from any spring lake pool or stream situate or flowing through or adjoining Crown lands and to use such water for mining for gold and for his own domestic purposes ...

The penalty for wrongfully taking water from a race or reservoir as a first offence was a fine of up to £5 or imprisonment for up to one month, with subsequent offences attracting penalties of up to £20 or three months in prison. Pollution of races and reservoirs with sludge or other ‘noxious matter’ attracted similar penalties.

Licences of up to fifteen years were also available to construct water races on Crown lands irrespective of whether such land was held by a Miner’s Right. Such licences permitted the holder to:

- deepen widen clean repair or otherwise improve any race drain dam or reservoir cut or constructed through or upon any Crown land and to take or divert water from any spring lake pool or stream situated or flowing upon or through or bounded by any such Crown lands ... for the purposes of mining for gold or any metal or mineral (29 Vict. 291; s. 36).

Damage to land by the construction of a race required the payment of compensation to the landholder. Also, the property and interest in any race or dam conferred by a licence was deemed to be ‘a chattel interest’ (that is, an article of property) and thus transferrable. Under the 1865 Statute, Mining Boards could make by-laws for the district, including the drainage of mines and the disposal of waste water and sludge.

The year 1865 also saw legislation providing for the construction of reservoirs for domestic supply. The Waterworks Act (19 Vict. 288) gave authority to the Board of Land and Works to construct reservoirs in thirty-nine localities, mostly townships around the goldfields. The law provided for the compulsory purchase of land and associated races, drains and dams to be incorporated into reservoir construction. Stimulated by the drought of 1865, water storage expanded rapidly in the following years, and by 1871 there were at least 206 dams in the Bendigo area providing water for mining and domestic purposes.56

Local by-laws were also developed by district Mining Boards, subject to the wider framework of colonial legislation, to regulate mining practices and water diversion in light of different regional conditions. These were often minor distinctions, such as the requirement for water licence applicants in the Ballarat District to mark out the course of a proposed race with painted posts one mile apart, but markers at Beechworth were to be no more than 100 yards apart. By-laws could also reflect the development of activities and technologies, as well as environmental pressures, in different places. Holders of water rights around Ballarat, for example, had their races protected by an easement 20 feet wide, whereas easements in Beechworth extended only five feet to each side of the race.57 The Beechworth Mining District had the greatest extent of water races in the colony, with 1,011 miles (1,627 km) constructed by the end of 1868.58 The cutting of parallel water races close together in this area during the 1860s may have meant that a wider easement was rarely feasible without overlap by competing licence holders.

The amount of water to be diverted for mining purposes was also regulated by district by-laws, with volumes varying widely depending on competition for gold deposits, natural flows in water courses and storage volumes in reservoirs, and the technology employed to extract gold. Volumes were measured by ‘sluice-heads’, which consisted of a wooden box of specified dimensions and incline, through which water flowed at a certain pressure. Up to 2.3 million gallons (10.5 ML), for example, were available per sluice-head each day in the Ararat District, but only 211,500 litres (0.96 ML) at Ballarat. The cost of such water, if

57 Department of Mines, op. cit., pp. 253, 275.
58 Smyth, op. cit., p. 547.
provided by a water merchant or company, also varied substantially from place to place.\textsuperscript{59}

In spite of variations among local by-laws, legislation relating to water diversion for mining in Victoria was well established and widely understood by the late 1860s, and remained in place largely unchanged for the next few decades. The Crown issued licences for the private construction and maintenance of races and reservoirs for mining purposes, while retaining notional ownership of the water as a resource. A licence to construct a race across land alienated from the Crown could also be granted after the \textit{Mining on Private Property Act} of 1884 (48 Vict. 796; s.36), with the rent for the land fixed at one shilling per acre per annum. The \textit{Mines Act} of 1890 (54 Vict. 1120) subsequently consolidated many of the water-related mining provisions of the 1865 \textit{Mining Statute}. A water-right remained analogous to an easement, and the licence-holder was expected to construct the race with sufficient skill and efficiency so that no overflow or percolation should affect a neighbour’s land. The 1890 legislation also specified that a dredging claim carried with it the right to use the water of a river if it was the only practical way of working the claim and did not interfere with private rights.\textsuperscript{60}

Mining laws relating to water use established the expectation that the State would regulate access to this most vital of resources. Miners looked to legislators and the courts to create a workable system of water diversion that balanced the needs of the mining industry with domestic and municipal supplies. By the 1880s the thrust of Victorian legislation relating to water was directed increasingly towards irrigation on the northern plains, and the expansion of rural settlement. The \textit{Water Conservation Act} (1881) established local Waterworks Trusts to create and maintain water storages, and in the same year the government invoked dormant powers contained within the 1869 \textit{Land Act} to reserve strips of land 1-2 chains (20-40 metres) wide on either side of 280 designated watercourses. This asserted the State’s rights to riparian access when adjacent Crown land was sold to private purchasers, and preserved access to water for all local occupiers.\textsuperscript{61}

\textsuperscript{59} Ibid., pp. 404-06.
\textsuperscript{61} Powell, \textit{Watering the Garden State}, p. 101.
During the 1884-1886 Royal Commission on Water Supply, the chairman, Alfred Deakin, acknowledged that Victorian legislation had 'already recognised the power of the State over all sources of water supply', citing section 36 of the 1865 Mining Statute and its provision to divert water from Crown land for mining purposes, and the law's role in issuing water rights. Thereafter the Irrigation Act (1886) effectively nationalised State ownership of Victoria's surface water, reserving all rights to the Crown while creating statutory rights of water access for domestic and stock supply. This legislation was among the first in the world to declare State ownership of water use rights and 'to abolish previously recognised riparian rights in order to assert State management'. The legislation recognised water as a public resource, to be managed for the collective good via local irrigation trusts. After Federation, the Victorian Water Act (1905) abolished the irrigation trusts and established the State Rivers and Water Supply Commission to bring about the efficient, centralised control of water resources throughout Victoria. The Act clarified riparian rights, vesting the State with the right to the use, flow and control of water, and ensuring the bed and banks of water bodies remained public property.

Water clauses in the Victorian mining acts thus represented a gradual process of regulating and re-claiming State control over water rights. They were an early move towards the principle of public control and ownership of a crucial resource, establishing an important precedent for future management. Laws and by-laws represented a mix of English and American doctrines and practices that were applied and adapted to local circumstances. By the 1860s and 1870s there was an increasingly elaborate and specific set of regulations determining the nature, extent, costs and circumstances of water rights for mining purposes. These were expressed variously in statute law, orders in council, and by-laws issued by the seven mining districts in the colony. While district by-laws had to conform to the Mining Statute, they

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63 Powell, Watering the Garden State, pp. 113-4. In India, the Northern India Canal and Drainage Act (1873) allowed government control over the use of irrigation water. Deakin was aware of these developments when he drafted the Victorian legislation in the 1880s. J. B. Teisch, Engineering Nature: Water, Development, and the Global Spread of American Environmental Expertise, Chapel Hill, 2011, pp. 30-33.
65 Powell, Environmental Management in Australia, p. 136.
provided scope to regulate mining and water rights which recognised the development of local environmental and mining conditions.

Gold could only be won with good supplies of water, but frequent shortages of supply forced miners and officials to establish workable arrangements for the diversion of water. Miners resorted to excavating lengthy races to tap the headwaters of creeks and gullies, and constructing dams to moderate the flow. This investment in infrastructure and the sale of water directed attention to the commodification of water and brought about its legal recognition. The problems of directly applying relevant overseas precedents stimulated new and creative legislative solutions in response to the unique local circumstances of colonial Victoria, establishing a new way of managing water appropriate to the needs of a dry continent.