The persistence of correlative water rights in colonial Australia: a theoretical contradiction?

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Abstract

This paper analyses whether the evolution of water law in the Australian colony of New South Wales (NSW) contradicts theoretical models that suggest in arid countries correlative, land based water rights will be replaced with individual ownership. Evidence from NSW shows a series of Supreme Court decisions between 1850-1870 adopted correlative riparian rights thereby implying that the common law was inefficient. However, further consideration of factors that gave rise to these decisions suggests the value of water was higher when used in unity because of the non-consumptive nature of water use in the pastoral industry. The findings suggest that even in the presence of aridity if non-consumptive water uses prevail correlative water rights are efficient.

Key words: water rights, common law

JEL Classification: N57, Q25, K11

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1. Introduction

Evidence from colonial New South Wales between 1850 and 1870 appears to contradict the theoretical proposition that in arid climates, land based water rights like riparian rights will give way to private individual ownership because the latter allows for a more precise definition of rights.[1] In contrast with empirical evidence from the American west during the nineteenth century and formalisation of prior appropriation by the judiciary, the NSW Supreme Court did not promote a shift to individual ownership. Instead, it applied the riparian rights correlative doctrine of reasonable use as it evolved from 1850.[2] Based on the instrumentalist school's view of the judiciary as outlined by Schieber and McCurdy, this outcome suggests that NSW common law was inefficient.[3] In other words, unlike the judiciary in the American west over the same period, NSW judges failed to adopt a facilitative stance toward entrepreneurial activity making capital investment less profitable.[4] This choice is even more surprising given the Australian Courts Act (1828) that introduced common law into the colony meant the NSW Supreme Court was not bound to apply English precedent to solve water conflicts.[5] This allowed

[1] Lauer, T. E., 'Reflections on Riparianism' *Missori Law Review*, 35 (1970); *Anderson*, T.L and Peter, J. Hill, 'The Evolution of Property Rights in the American West' *Journal of Law and Economics* 18 (1975); Rose, C.M., 'Energy and Efficiency in the Re-alignment of Common Law Water Rights' *Journal of Legal Studies* 19 (1990); Scott A. and G. Coustalin, 'The Evolution of Water Rights' *Natural Resources Journal* 35 (1995); Kanazawa, M. 'Efficiency in Western Water Law: the development of the California Doctrine 1850-1911' *Journal of Legal Studies* 27 (1998); Johnson, N. D., 'Property Without Possession', *Yale Journal on Regulation* 24 (2007); Libecap, G. 'The Assignment of Property Rights on the Western Frontier', *Journal of Economic History* 67 (2007)

[2] Cases that implemented riparian rights in NSW were: Cooper v Corporation of Sydney (1 Legge 765 (NSW 1853)); (Lord v Commissioners of the City of Sydney (12 Moo. P.C. 473, 14 Eng Rep (1859) (NSW)); Hood v Corporation of Sydney (2 Legge 1294 (NSW 1860)); Pring v Marina (5 NSW (L.) 390 (1866)); and Howell v Prince (8 NSW (L.) 316 (1869)).

[3] Schieber, H. N. and McCurdy, C. W., 'Eminent-Domain Law and Western Agriculture' *Agricultural History* (1975) 49

[4] Posner, R. E., *Economic Analysis of the Law* (2003)

[5] 9 Geo. IV. c83. After the introduction of English common law on July 28, 1828, section 24 of this legislation meant colonial courts were no longer bound by English court decisions. Section 24 stated: "That all Laws and Statutes in force within the Realm of England at the Time of the passing of this Act, (not being inconsistent herewith, or with any Charter or Letters Patent or Order in Council which may be issued in the pursuance hereof), shall be applied in the Administration of Justice in the Courts in New South Wales and Van Diemen's Land respectively, *so far as the same can be applied within the said Colonies*; and as often as any Doubt shall arise as to the Application of any such Laws or Statutes in the said Colonies respectively, by and with the Advice of the Legislative Councils of the said Colonies respectively, by Ordinances to be by them for that Purpose made, to declare whether such Laws or Statutes shall be deemed to extend to the Colonies, and to be in force within the same, or to make and establish such Limitations and Modifications of any such Laws and Statutes within the said Colonies respectively as may

the NSW Supreme Court to adopt, adapt, or ignore any or all aspects of English precedent established after 1828 unsuited to colonial conditions. This article seeks to explain this divergence from expected outcomes.

In the course of analysis it will be argued that aridity is not the only dimension that should be considered when evaluating common law efficiency. The extent of consumptive compared with non-consumptive uses must also be taken into account to determine efficiency outcomes. Consumptive water use reduces the flow of rivers and streams via extraction for instance, mining or irrigation. These activities often take place at large distances from the water source requiring high levels of infrastructure investment in the form of channels and ditches to transport water to the activity point. If uses are predominantly consumptive water takes on private good characteristics therefore, private individual ownership may be more efficient. Non-consumptive uses imply the opposite that is, water use does not significantly reduce flow as water remains in the river or stream for utilisation for example, hydropower. If water use is dominated by non-consumptive activities water takes on public good characteristics with its value being higher when used in-stream.[6] In this context, correlative sharing arrangements, like the doctrine of reasonable use, may be efficient. By shifting the focus of the analysis to consider the implications of consumptiveness in addition to aridity a more complete assessment of efficiency implications of common law decisions can be provided. Moreover, it will be shown that the application of correlative water rights underpinned by the reasonable use doctrine in colonial NSW between 1850 and 1870 was efficient even in the presence of aridity.

The plan of the paper is as follows: section two provides a brief outline of the characteristics of appropriative rights. The discussion will highlight the advantages of this class of rights when aridity is present, water use is primarily consumptive, and there

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be deemed expedient on that Behalf: Provided always, that in the meantime, and before any such Ordinances shall actually be made, it shall be the Duty of the said Supreme Courts, as often as any such Doubts shall arise upon the Trial of any Information or Action, or upon any other Proceeding before them, to adjudge and decide as to the Application of any such Laws or Statutes in the said Colonies respectively" (9 Geo. IV. c83).

[6] Rose "Energy"

are high levels of capital investment using evidence from Californian mining areas during the 1850s. Section three details the evolution of common law water rights up to the introduction of the correlative reasonable use doctrine. The reasonable use rule evolved in the eastern states of the US and England to prevent the reduction of water flow along a shared water course where non-consumptive uses predominated. Section four gives some preliminary statistics on aridity in NSW including a description of how early settlers dealt with water scarcity. Section five gives an overview of land policy adopted in NSW during the 1830s and how this acted to prevent the NSW Supreme Court from applying appropriative rights to resolve water disputes in the colony. The licensing system granted occupancy rights to users with the Crown retaining ownership rights. Once the Crown asserted title over colonial land, it also claimed ownership of water as an incidence of land claims. As a result, possessory rights, the foundation for appropriative rights, could not be applied to land or water as an incidence of land rights.

Section five will consider the efficiency implications of Supreme Court decisions to apply reasonable use in light of the two key dimensions: aridity and consumptive compared with non-consumptive uses. Evidence suggests that in NSW correlative rights were efficient because water use in the pastoral sector which, by 1850, accounted for 11% of GDP and over 77% of the total value of colonial exports, was primarily non-consumptive.[7] Therefore, water was more valuable when used in unity (in-stream). Furthermore, this sector required low levels of capital investment in water infrastructure development. This suggests the application of reasonable use in NSW did not result in capital investment losses as would have occurred if the doctrine had been retained in mining areas of the American west during a similar period. Therefore, correlative rights in NSW were efficient even in the presence of aridity. The findings presented here suggest that in arid regions where water use is primarily non-consumptive and economic development is dominated by industries requiring low levels of capital investment, correlative water rights will be efficient.

2. Appropriative Rights

[7] Vamplew, W. *Australian Historical Statistics* (1987)

Appropriative rights are based on first possession where those who are first-in-time are first-in-right. This class of rights may be efficient when they recognise first-movers, innovators, and entrepreneurs, who initially experiment with and use a resource.[8] The evolution of prior appropriation in water use on the Californian gold fields is a good example of these efficiencies. Prior appropriation in California evolved primarily from the needs of an expanding gold mining sector during the mid-nineteenth century. Gold discoveries in the late 1840s encouraged a large population influx over the proceeding decades when there were no government controls placed on the possession or use of natural resources within the state. The timing of gold discoveries, just after California was annexed to the US following the war with Mexico, meant that most land was owned by the federal government.

Gold mining was a lucrative economic activity which required relatively high levels of capital investment therefore, the delineation of property rights to natural resources was crucial. In the absence of a state legislature, miners themselves created regulations to enforce rights to claims and key inputs, such as water.[9] The rules that evolved resulted in water becoming governed by appropriative rights. This became known as the prior appropriation doctrine. Prior appropriation allowed miners to divert water onto non-riparian lands and permitted transfers between individuals. However, seniority of water rights based on first appropriation (use) was not a new concept. In fact, courts in both the US and England applied this dictum, referred to as prior use, to a number of cases before the 1850s.

Prior use developed in England from the 1600s as courts attempted to clarify prescriptive rights, what they were and how they came into being.[10] Shury v Piggot[11] is the most cited of these cases where the court established seniority of right. This created precedent for subsequent claimants to employ prior use as the basis for asserting or defending rights

[8] Libecap "Assignment"
[9] Umbeck, J. R., *A Theory of Property Rights* (1981)
[10] Scott and Coustalin "Evolution"
[11] 81 Eng. Rep. 280 (1625)

to water.[12] Nevertheless, for the next century the implications of this doctrine resulted in considerable confusion for English jurists.[13] Blackstone's *Commentaries* in the late eighteenth century attempted to provide clarity of the issue by stating that rights to flowing water should follow occupancy, or first possession. This rule was subsequently applied in the influential case of Bealey v Shaw.[14] Prior use replaced the ancient use doctrine that had been used to determine water conflicts before industrialisation. However, its application created complexity in determination of cases at a time when such intricacies reduced the common laws responsiveness to increasing water use conflict. As a result, after a period of uncertainty as to how to determine riparian cases, prior use was systematically invalidated by Lord Denman's decision in Mason v Hill.[15]

In California, the adoption of prior appropriation among miners was paralleled by the newly formed state legislature adopting English common law throughout the state in 1850. Kanazawa argues this was aimed at reducing the costs and uncertainty of producing legal rulings because most judges and lawyers were acquainted with the common law and had necessary materials available to them.[16] In passing this legislation, an existing part of the English common law thus adopted was the riparian doctrine. Riparian rights limited the right to water use to individuals who owned land abutting a water source. However, prior appropriation did not rely on land ownership, allowing any person to claim a right to water based on their action of using it. Therefore, it was inevitable that such contradictory sets of rights would create conflict ultimately decided within the courts.

Between 1853 and 1857 there was inconsistency in the California Supreme Court's application of riparian rights. For instance, the court supported elements of the riparian doctrine drawn from both English and eastern American cases in Eddy v Simpson[17] and

[12] Lauer, T. E., 'The Common Law Background of the Riparian Doctrine', Missouri Law Review 28 (1963); Scott and Coustalin "Evolution"
[13] Ibid.
[14] 6 East 208, 102 Eng. Rep. 1266 (1805)
[15] 10 Eng. Rep. 692 (1833). Refer to Scott and Coustalin "Evolution" pp. 863-868 for a detailed analysis of Denman's decision.
[16] "Efficiency"
[17] 3 Cal 249, 252 (1853)

Crandall v Woods[18]. However, in Irwin v Phillips[19] the court found in favour of the individual making first use of the water based on invoking the English common law rule of *disseisin* or 'naked possession.'[20] The rule allowed miners to acquire possessory rights to land if the legal owner did not act to prevent a trespasser.[21] Given neither the US federal government nor the newly formed Californian state government acted to prevent the occupation and use of public lands by miners, possessory rights were permitted. Possessory rights were based on the presumption of a land grant being made. This allowed the California Supreme Court to support the fundamental principle of prior appropriation in water use.

Prior appropriation evolved in California to facilitate capital investment in gold mining. Water was a crucial input for successful mining and was often required a long distances from the source. For this reason, the rigidities of correlative riparian rights would have imposed limitations on the continued expansion of the industry by reducing private capital investment. It was these conditions that prompted miners to informally regulate use to achieve efficiency via prior appropriation. California Supreme Court judgments show a tendency on the part of the judiciary to give formal sanction to these informal miners' codes. In the early years of application, this support provided incentives for bargaining between bilateral riparian owners and appropriators because transaction costs of negotiation were low.[22] This supported Coasian bargaining and efficient use.[23] Such an outcome substantiates Posner's claim that the common law tends toward efficiency suggesting the judiciary played a crucial role in promoting economic development in California via its impact on water law.[24]

3. Correlative Riparian Rights

[18] 8 Cal 136, 141 (1857)
[19] 5 Cal 140 (1855)
[20] Schieber and McCurdy "Eminent-Domain"; McCurdy "Stephen J. Field"; Kanazawa "Efficiency"
[21] McCurdy "Stephen J. Field"
[22] Rose "Energy"; Kanazawa "Efficiency"
[23] Kanazawa "Efficiency"
[24] Pisani, D. J. 'Enterprise and Equity: A critique of western water law in the nineteenth century' *West Historical Quarterly* 18, (1987)

Riparian rights are a class of privileges that resemble the more general property law doctrine of nuisance and the general tort law of negligence.[25] They can only be acquired by individuals owning land coming in contact with a water source, conferring on them usufructuary rights. Under common law, when land borders a river or stream, the boundary of ownership extends to the bed of the water source. In this way, individuals own land *ad medium filum aquae* (to the 'middle thread'). It is by virtue of position they acquire rights to make use of water flowing over this land. Prior to industrialisation in England and the US, courts had determined riparian cases based on ancient use, providing protection for individuals with the oldest uses. However, changes in water use during industrialisation challenged this approach as the need to protect and encourage capital investment increased. Initially, the challenge was met by applying the prior use doctrine as outlined. By the mid-1800s courts in the US and England located a suitable doctrinal basis for water dispute resolution in the correlative rights doctrine of reasonable use.[26]

Reasonable use was first applied in a New York case, Palmer v Mulligan[27] in response to pollution and flow interruptions. In *Palmer* the court established the basis for creation of correlative rights to water use that became the foundation for later interpretations of riparian rights. Essentially the judgment found riparians had equal rights to use the water source and uses could involve some inconvenience to others however, these were not actionable if they were merely minor.[28] These principles were further refined in the US Supreme Court case Tyler v Wilkinson.[29] Justice Story, citing *Palmer*, rejected the plaintiff's mere priority of appropriation and reasoned that because the right to enjoy flow in a channel was an incident of riparian land, every riparian owner must own the right to use flow.[30] For this reason, he asserted that any diversion or interference must not reduce the value of the common right. Furthermore, the reasonableness of a particular diversion or interference should be considered given the circumstances.

[25] Rose "Energy"
[26] Ibid.
[27] 3 Caines R. 307 (1805), cited in Rose "Energy".
[28] Ibid
[29] 24 F. Cas. 472 (CCDRI 1827)
[30] Scott and Coustalin "Evolution"; Lauer "Reflections"; Lauer "Common Law"

English courts followed this US precedent, albeit after a lag of twenty years. In England, reasonable use was first applied in Wood v Waud[31] and later refined in Embrey v Owen.[32] *Embrey* was the more influential of the two cases citing the US precedent in *Tyler*. Thus, the judgment, handed down by Parkes, J. defined reasonableness stating:

> All that the law requires of the party by or over whose land a stream passes, is, that he should use the water in a reasonable manner, and do so as not to destroy, or render useless, or materially diminish or affect the application of water by the proprietors above or below on the stream.[33]

The development of the reasonable use doctrine reflects the different paths of economic development experienced in both US eastern states and England. Initially, US Atlantic states were confronted with water use conflicts between mill owners and farmers or households, leading to legislative action that gave priority of water use to the former because those activities were more economically valuable.[34] However, legislation was incomplete because it failed to indicate a priority use where two mill owners came into conflict. Therefore, these disputes were settled in the courts leading to the introduction of reasonable use. In England, the opposite occurred, with mill owners being primary stream users before the nineteenth century. As industrialisation accelerated, accompanied by significant population expansion and competing water uses, conflicts became centred on use of the river to carry water away versus its use to provide urban water.[35] And, much like what occurred in the US, these disputes were settled using the common law leading to the adoption of reasonable use.

However, the interpretation of what was considered reasonable use in both the eastern states of the US and England varied. Reasonable use in the eastern states evolved to allow any given riparian to divert some significant flow, more than under the English rule, for their own use, even if it worked a substantial detriment to some other riparian.[36] Moreover, US jurisdictions have accepted and used four classes of reasonableness: purpose, destination, quantity, and pollution.[37] In England, what was considered

[31] 3 Exch. 748, 154 Eng. R. 1047 (1849)
[32] 6 Exch. 353 (1851)
[33] 6 Exch. 353, 371 (1851)
[34] Rose "Energy"; Scott and Coustalin "Evolution"
[35] Lauer "Common Law"; Scott and Coustalin "Evolution"
[36] Epstein, R. A., "Possession as the root of title" *Georgia Law Review* 13, (1978-79)
[37] Scott and Coustalin "Evolution"

reasonable had a more strict emphasis on the natural flow principle. Natural flow allowed riparians to sue for damages to their "right" to a continued flow by a sensible diminution.[38]

4. Aridity in NSW

Rainfall in Australia is low by world standards and highly variable from year to year. Figure 1 illustrates the average annual rainfall in NSW. It shows that rainfall decreases incrementally across the state with the lowest rainfall region getting 200mm (8 inches) annually. The map highlights that, except for a strip of area from the coast to approximately 250km inland, most regions in the state experience rainfall of 20 inches (500mm) or below a year. Therefore, most of NSW receives similar or below average annual rainfall to America's Great Plains and Far West.

[38] Ibid

Figure 1: Average Annual Rainfall NSW[39]

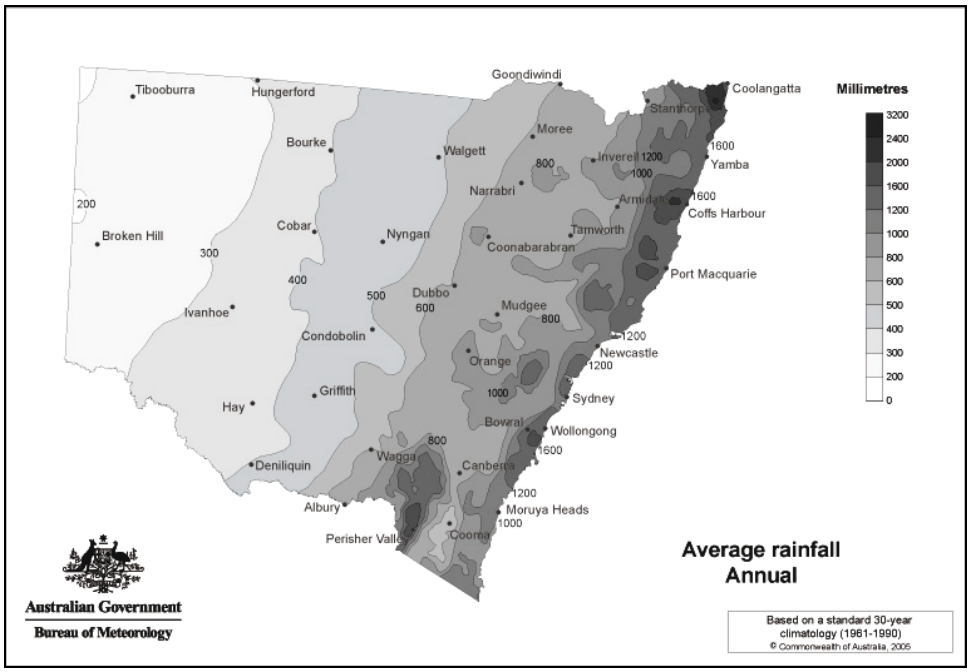

Table 1: NSW annual river run-off[40]

River Basin	Run-off (GL pa)	River Basin	Run-off (GL pa)
Bega	911	Macleay	1950
Bellinger	1482	Macquarie	1479
Brunswick	544	Manning	2450
Castlereagh	177	Moruya	394
Clarence	5219	Murrumbidgee	3559
Clyde	1057	Naomi	716
Darling	106	Richmond	3345
East Gippsland	232	Shoalhaven	1560
Gwydir	910	Snowy	1317
Hastings	1854	Georges	770
Hawkesbury	2765	Towamba	426
Hunter	1900	Tuross	585
Karuah	1240	Tweed	802
Lachlan	1054	Murray	1364

[39] Metric conversion: 200mm = 8 inches; 300 = 12 inches; 400 = 16 inches; 500 = 20 inches; 600 = 24 inches; 800 = 31 inches; 1200 = 47 inches

[40] Complied from data in Australian Natural Resources Atlas (1985)

In terms of groundwater, the most substantial sources available in NSW are in the Murrumbidgee, Naomi, and Lachlan valleys. In these areas, bores can be constructed to tap into very large supplies.[41] These systems are connected to the Great Artesian Basin, one of the largest groundwater basins in the world, estimated to contain close to 65 billion megalitres of water. Early settlers in NSW were familiar with the principle of artesian water from the 1860s with some limited attempts by squatters to access these supplies.[42] However, the extent and cost of these activities has not been the subject of any comprehensive studies so it is difficult to say to what extent squatters used groundwater to supplement surface supplies. Anecdotal evidence suggests that squatters found locating potable groundwater supplies suffered from uncertainty and was high cost.[43] A government report summed up the situation in 1885 stating:

> There are localities in which the existence of underground water has been discovered and turned to account by means of wells; but it has happened in many cases that, of two wells sunk within a few yards of each other, one, and the deeper of the two, has been perfectly dry, while the other has passed into a water-bearing drift…but in the absence of anything like determinate surface indications, the sinking of wells has been found to be a very costly, and in many an almost ruinous undertaking.[44]

This suggests that early settlers in NSW faced relatively high levels of water scarcity. Moreover, lack of water played a significant role in shaping economic development early in the colony.

5. Land Policy and Correlative Rights in NSW

Even before the end of convict transportation in 1839 the pastoral sector dominated economic development in NSW. Pastoral sector expansion was primarily a response to the increasing value of Australian wool on British markets.[45] However, sheep grazing had a significant advantage over more permanent forms of agriculture because it was drought tolerant. Grazing reduced the risks associated with water scarcity in the more arid districts of NSW because it was a geographically mobile industry with sheep able to

[41] "Atlas"
[42] Lloyd, C. J., *Either drought or plenty*, (1988); Jervis "Western Riverina"
[43] For example, Lloyd and Jervis both note one squatter; William Brodribb, sank three wells in 1865 at a cost of £1,000 striking water at 150 feet ("Drought" and "Western Riverina").
[44] Lyne, W., "First Report of the Royal Commission on Conservation of Water" *NSW Parliamentary Papers*, Paper No. 29 (1885)
[45] Vamplew "Historical Statistics"

be moved great distances at relatively low costs. To compliment mobility advantages, squatters scattered their land claims over wide areas. These advantages, combined with an abundance of land, made the pastoral industry the main driver of economic development during the period being examined. Table two illustrates the importance of the pastoral sector as a percentage share of GDP. Mining has been included for the purposes of comparison as the period of study includes the years of the Australia gold rush (1851-1865). The table shows that of the two sectors, the pastoral industry contributed more to GDP than mining in all but five years (1852, 1853, and 1861-1863).

Sheep grazing took place on publicly owned land illegally occupied by squatters. However, unlike California, NSW colonial administrators acted quickly to assert Crown title to this land by conferring occupancy rights on squatters via a land licensing system in 1836. Under the licensing arrangement squatters could occupy as much land as they wanted in any district outside the official boundaries of settlement for the cost of a £10 licence.[46] In each district, a Commissioner for Crown Lands was appointed to enforce the licensing system. Those founding occupying land without a licence were subject to criminal prosecution with penalties being determined by a Justice of the Peace.[47] This suggests that unlike the expansion of mining in western America, pastoral activities in NSW were not undertaken at the frontier where formal legal and government institutions are largely absent.[48] Instead, population movement into the interior in NSW was accompanied by formal institutions to promote law and order.

[46] This system was created under the Squatting Act (1836).
[47] Most districts had at least one Justice of the Peace appointed by 1840 with Magistrates, police. and gaols being established over the following decades (Jervis, J., 'The Western Riverina: Part 3' *Journal of the Australian Historical Society*, 38).
[48] Libecap, G. D. "Contracting for property rights" in Anderson, T. L. and McChesney, F. S. (eds.), *Property Rights* (2003)

Table 2 Pastoral and Mining Sector's contribution to NSW GDP[49]

Year	Pastoral sector share of GDP (%)	Mining sector share of GDP (%)
1850	10.03	0
1851	15.15	0
1852	8.51	23.75
1853	13.06	13.40
1854	11.81	5.31
1855	11.35	1.86
1856	13.10	1.62
1857	13.36	6.28
1858	12.68	5.85
1859	14.14	10.09
1860	13.58	9.55
1861	10.79	13.67
1862	10.46	17.65
1863	10.20	12.93
1864	11.46	10.19
1865	12.03	9.49
1866	12.07	8.62
1867	10.98	9.15
1868	11.76	8.82
1869	14.29	6.35
1870	14.94	5.75

Squatting licences acted to support continued growth of the pastoral sector via regulating occupation without conceding the Crown's ownership rights. Implicitly it recognised incumbent parties that had experience in exploiting land and were low-cost, high-valued users while authorities retained the right to evict users at any time without compensation.[50] The assertion of Crown title to colonial land underpinning the licensing system prevented the Supreme Court from applying appropriative rights as a remedy to water conflicts.

Appropriative rights are based on prescriptive rights established by occupancy or possessory rights. Occupancy rights presume the absence of any prior occupant and

[49] Data from 1850 to 1860 adapted from Vamplew, W. *Australian Historical Statistics* (1987). Data from 1861to 1870 adapted from Haig, B., 'New Estimates of Australian GDP: 1861-1948/49' *Australian Economics History Review* 41 (2001)
[50] Libecap "Assignment"

therefore, no resource rights exist at all.[51] In NSW, the licensing of squatter occupation established the Crown as the prior occupant of land, thereby conferring on it the ownership of water resources as an incidence of land claims. Accordingly, no prescriptive rights could exist and therefore, appropriative rights could not be employed to remedy water rights conflicts. Furthermore, no colonial legislation created the possibility for prescriptive rights to be obtained. The NSW Supreme Court expressly dealt with the application of prescriptive rights in the colony in two cases: Cooper v Corporation of Sydney and Howell v Prince.[52] In *Cooper* the plaintiff claimed right to compensation for reduction of water flowing to his property created by the defendant's diversions to supply the city of Sydney. During the judgment, the court briefly considered the issue of prescription and whether, in the absence of legislation, it was possible for the judiciary to instruct the jury to presume a grant. Stephen C.J. emphatically denied this potential maintaining, "all lands have been, throughout the colony, at a very recent date, in the hands of the Crown, and that there can be no grant from the Crown, except by record open to everybody."[53] By virtue of these claims, if access to water was an aspect of the land in question, the Crown declaration included ownership of water. Nevertheless, Stephen C.J. added,

> But, in addition to this, the Crown has never occupied or used the land, from whence the water claimed is derived, except only for the purposes of supplying the city with that element. Would not the presumption, therefore, of a Crown grant, conveying to an individual the surplus, or casual overflowing of the water from that land, be too violent to be adopted by any tribunal?[54]

This statement appears to leave open the possibility for prescription to be claimed in subsequent cases thereby allowing appropriative water rights to be introduced at some future date. However, 16 years later, in *Howell*, the court expressly denied this potential in the absence of legislative authority with Hargrave J. stating,

> The alveus of the stream cannot lawfully be interfered with. The Prescription Act ought to be adopted, so that the rights of persons may be protected who have enjoyed the use of the water, it may be for many years, and whose enjoyment has been acquiesced in. [55]

[51] Rose "Energy"
[52] 1 Legge 765 (NSW 1853); 8 NSW (L.) 316 (1869)
[53] 1 Legge 765, 771 (NSW 1853)
[54] 1 Legge 765, 771 (NSW 1853)
[55] 8 NSW (L.) 316, 319 (1869)

Possessory rights rely on *disseisin* or 'naked possession' where the legal owner does not act to prevent a trespasser. Licensing of squatter occupation meant the Crown had acted to assert its right as the original owner by regulating the trespassing that occurred. As a result, there was no common law foundation for individuals to claim either occupancy or possessory rights in the colony. Therefore, the potential for the application of appropriative rights to water conflicts in NSW was removed. Clark supports these findings arguing that at no time did the colonial government allow a period of legislative inaction in which custom could develop into a recognised body of law.[56] Nevertheless, the Supreme Court did retain flexibility in the way it interpreted the precedent it cited, particularly in terms of the definition of reasonable. This could have allowed it to reduce the impact of the correlative aspect of reasonable use if aridity would have caused the inefficiencies theoretically expected. However, the court did not do this suggesting that non-consumptive water use in the pastoral sector made correlative water rights efficient even in the presence of aridity.

6. Reasonable Use and Efficiency in NSW

Flexibility in interpretation of precedent meant the Supreme Court was not required to apply reasonable use but even if it did, it retained freedom in what should be considered reasonable in the colony. There were two possible interpretations. First, given the conditions of water scarcity in the colony, dams and diversions were reasonable in that they did not devalue the common right. This would have supported damming and diversion activities that were beginning to take place in some areas of the colony, such as the Riverina.[57] *Tyler* established a precedent for this where Story J. argued:

> The true test of the [reasonable use] principle and extent of the use is, whether it is to the injury of the other proprietors or not. There may be a diminution in quantity or a retardation or acceleration of the natural current indispensable for the general and valuable use of the water, perfectly consistent with the existence of the common right.[58]

The judgment would have been known by the NSW Supreme Court given it was cited in *Embrey*.

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[56] Clark, S. D., 'The River Murray Question: Part I – Colonial Days' *Melbourne University Law Review* 8, (1971)
[57] Harris, E. 'Dams and Disputes: water institutions in colonial New South Wales' *Department of Economics Discussion Paper*, 08/07, Monash University
[58] 24 F. Cas. 472, 474 (CCDRI 1827)

Second, it could have argued these activities did devalue the common right and thus, were not reasonable in NSW. If aridity was the main determinant the former interpretation would have to be applied. However, if both non-consumptive uses and aridity were a concern for the court, it could be supposed the latter interpretation would be employed. Evidence suggests that the latter interpretation was applied in two key judgments: *Cooper* and Pring v Marina. [59]

Cooper cited *Embrey* as the authority for judgment that entitled the plaintiff to reasonable flow of water as incident to the property of land. In *Pring*, relying on *Embrey*, the judgment makes clear what is accepted as reasonable use in the colony, Chief Justice Stephen's stating:

> The erection of a dam by a riparian owner across a running stream, might, perhaps, under some circumstances, be lawful. But it cannot be so, I conceive, if it obstruct – though for one moment only – the flow of the entire stream to the other lands below.[60]

To understand how the combination of non-consumptive uses and aridity might have influenced this outcome, the efficiency of appropriative rights in the presence of these factors must be considered. Non-consumptive uses leads water to take on public good aspects where its value is higher when used in unity. Theoretically, this leads to a preference for correlative compared with appropriative rights because predominant uses mean the waterway better lends itself to common-pool sharing arrangements.[61] Water scarcity acts to limit the efficiency gains of appropriative rights because periods of drought magnify losses for downstream owners. Under drought conditions appropriation would result in higher losses than correlative water rights because of increasing supply uncertainty for junior appropriators.[62] This would lead to allocative inefficiencies in appropriative rights due to unequal sharing of risk and diversion capacity among firms.[63] A feasible alternative to reduce these losses exists under correlative rights that produce a

[59] 5 NSW (L.) 390 (1866)
[60] 5 NSW (L.) 390, 396 (1866)
[61] Kanazawa "Efficiency"
[62] Milliman, J. W. 'Water Law and Private Decision-Making: A Critique', *Journal of Law and Economics*. 2, (1959)
[63] Burness, S. B. and Quirk, J. P., 'Appropriative Water Rights and Efficient Allocation of Resources', *American Economic Review* 69, (1979); Burness S. B. and Quirk, J. P., 'Water Law, Water Transfers, and Economic Efficiency: The Colorado River', *Journal of Law and Economics* 23, (1980)

higher value of output for every possible level of stream flow.[64] Combined with non-consumptive use this reinforced the high value of water when used in unity. The decision in *Embrey* recognised this as a crucial consideration at that time in English development where the court explicitly noted that without the qualification of correlative rights based on reasonable use, "rivers and streams would become utterly useless, either for manufacturing or agricultural purposes."[65] NSW Supreme Court judgments applying reasonable use explicitly followed the precedent established in *Embrey*.

Although this discussion suggests judgments were concerned with efficiency outcomes, the argument needs to consider the likelihood that the Supreme Court had a preference for following English precedent. This may have been prompted by NSW's colonial status. Evidence from three key judgments: *Ex parte* Nichols[66]; Williamson v The New South Wales Marine Assurance Co.[67]; and *Ex parte* Dunne,[68] suggests this is not the case. In all three cases, the court ruled English precedent was not appropriate. *Williamson's* judgment specifically noted:

> As to the decisions by the Superior Courts in the United Kingdom, the greatest respect were paid to these decisions when brought before the Court in the ordinary way, but the fact of one Superior Court having decided in a particular way, did not amount to a sufficient reason why the Court here should alter its judgment.[69]

This lends weight to the argument that at least, in part, the courts interpretation of reasonableness recognised the economic development implications. In other words, this interpretation continued to facilitate entrepreneurial activity in the pastoral sector without imposing capital investment losses. Capital losses were limited because grazing was a low capital intensive industry. The main capital investment for squatters was their flocks. On average, sheep could be purchased at auction for between 9 and 13 shillings per head, depending on wool quality with each sheep producing approximately 2.5 pounds of wool annually.[70] Additional capital costs included land rental which prior to 1860 was £10 per annum for a licence to occupy as much land as settlers wanted. After 1860 a change in

[64] The logic underpinning this outcome is detailed in Burness and Quirk "Appropriative".
[65] 6 Exch. 353, 371 (1851)
[66] 1 Legge 123 (NSW 1839)
[67] 2 Legge 975 (NSW 1856)
[68] *Ex parte* Dunne, 13 NSW (L.) 210, 217 (1875)
[69] Ibid
[70] Jervis "Western Riverina 2"; Government Statistician, *NSW Census*, (1860)

land policy increased average rental costs to £24 per annum.[71] Squatters also invested capital in infrastructure construction, predominantly buildings such as a shearing shed and wool store as well as a residence. Vann estimates these amounted to an average of £42 per annum.[72] These figures suggest that apart from the cost of sheep, squatting was a low capital intensive industry. Therefore, capital investment losses associated with correlative water rights were lower in NSW than they would have been had the doctrine been retained in Californian mining areas.

Moreover, by applying reasonable use the NSW Supreme Court provided for a relatively even distribution of rents accruing from water use thereby supporting economic growth. Considered in conjunction with Schedvin's claims that Australian economic development relied on exploitation of a series of staple products of which wool was one, evidence presented here suggests that water law decisions between 1850 and 1870 acted to support this process.[73] Therefore, NSW Supreme Court decisions did tend toward efficiency by imposing correlative water rights that supported common-pool sharing arrangements. In terms of water rights theory, these empirical findings suggest that under conditions where water use is non-consumptive and water scarcity prevails, correlative rights may be efficient.

7. Conclusion

This paper analysed the apparent divergence between theoretical predictions about the evolution of water rights under arid conditions and outcomes in colonial NSW from the perspective of common law efficiency. It has been shown that in addition to aridity, the nature of water use with regard to the degree of consumptive versus non-consumptive use need to be analysed to assess efficiency outcomes. Non-consumptive uses result in water taking on public good characteristics leading to a higher value when used in unity. Under these conditions, water better lends itself to correlative sharing arrangements even in the

[71] This is based on an average land claim of approximately 32,000 acres in the 1840s (Roberts, "Squatters"). Yearly rental amounts were apportioned based on the number of sheep a claim was capable of carrying. The minimum rent was £10 and minimum carrying capacity was 4,000 sheep. Rent would increase from this basic cost at £2 10 shillings per thousand sheep.
[72] *The Squatting Directory for New South Wales* (1865)
[73] Schedvin, C. B. 'Staples and Regions of Pax Britannica' *Economic History Review* 43 (1990)

presence of aridity. Furthermore, the Supreme Courts adherence to an interpretation of reasonableness preventing interference or obstruction to watercourses mitigated the potentially large losses appropriative rights would have imposed given water scarcity. In turn, because the pastoral industry required low levels of capital investment, these decisions acted to support economic development. Therefore, the common law of water rights in colonial NSW were efficient.

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