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**DAMS AND DISPUTES: WATER INSTITUTIONS IN COLONIAL NEW SOUTH WALES,
AUSTRALIA, 1850-1870**

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ABSTRACT

This paper will analyse the operation of the British common law of riparian rights in the Riverina District of New South Wales (NSW), Australia between 1850 and 1870.* Theorists argue that the predisposition of people to fight over or cooperate to exploit valuable resources depends on how well property rights are defined and enforced.† The operation of the riparian doctrine in the Riverina provides an empirical, historical example of why inefficient property rights promote violence. Violence in this instance was based on collective action directed at the destruction of water supply infrastructure, specifically dams, constructed on various rivers within the Riverina. This paper considers why collective action in violence did not spill over into infrastructure construction. It is argued that the failure of collective action was due to its high costs stemming from several factors: failure to meet optimal group size; problems of free riders; hold-up concerns; and the introduction of a much disputed land policy in 1861 referred to as selection.

* The Riverina District is also referred to as the Murrumbidgee District. Primarily it includes the area between the Murray and Murrumbidgee Rivers including part of the length of the Lachlan River. Refer to Appendix one for a map of the Shire Councils included in the district.

† Anderson, T. L. and Hill, P. J., (2004), *The not so Wild, Wild, West*, pp. 14

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I INTRODUCTION

There is much literature that considers the process of creation, evolution, and impact of property rights on resource exploitation throughout history.¹ Within this literature, numerous empirical examples consider the conditions under which collective action can be used to create or adapt property rights to increase institutional efficiency and prevent overuse. Cooperation is more likely to occur when groups are small, homogenous, and geographically proximate because the costs of transacting will be lower than for larger, heterogenous, geographically dispersed groups. This paper contributes to property rights literature by providing a detailed historical example of the circumstances under which violence rather than cooperation dominates users' interactions. In addition, while the doctrine provided the opportunity for non-violent enforcement via the legal system, the costs associated with a legal resolution to disputes was prohibitively costly. As a result, the doctrine promoted instability in the exploitation of colonial water resources over this period.

Much has been written about the early violence over water supplies in the Riverina during the period being examined.² However, these studies confine their discussion of these conflicts to merely a description of events that took place rather than an investigation of how the institutional framework promoted this outcome. Violence that dominated during this period resulted in the wasteful use of limited resources, but also led to the stagnation of water supply development in a region that was subject to constant, crippling drought.

The plan of this paper is as follows; section two will outline the theoretical literature relating to property rights and collective action. Section three, details the nature of the riparian doctrine as it applied to the Riverina. Section four, considers the uncertainties created by the riparian doctrine in relation to infrastructure construction and reasons for the predominance of violence over cooperation in water supply improvements during the period being examined.

II PROPERTY RIGHTS AND COLLECTIVE ACTION

Property rights are dynamic, being both created and altered over time. Creation stems from a lack of property rights to resources that become increasingly scarce as more actors compete over ownership. As a result, in order to protect rents and limit over use actors create property rights to delineate ownership. These activities then prevent the resource from becoming a manifestation of the tragedy of the commons. The tragedy would result if the resource was owned by no one leading to competition being characterised by a race where users rush to harvest the good before

the next person.³ History has shown that creation of property rights often takes place via collective action where a group of individuals acting in the absence or remoteness of the state attempt to maximise rents associated with clearly defined, defensible property rights. Cooperation is prompted by increasing scarcity that leads to increasing marginal benefits of definition. In turn, this provides an incentive for a group of individuals to define property rights allowing them to ensure efficient utilisation and exclude non-group members.

Nevertheless, such definition does not come without costs. These costs are determined by the characteristics of the user (negotiating) group. In this way, when groups are smaller, homogenous, and geographically proximate costs associated with either defining or amending property rights will be lower than for large, heterogenous, geographically dispersed groups. Therefore, when group characteristics exhibit the former attributes history has indicated a stable form of property rights will be forthcoming. However, these costs are also dependent on the size of the area to be protected in that, a larger geographical area will increase the optimal size of the collective required.⁴ In turn, by increasing the size of the collective, the costs of organisation increase as members are more likely to free ride in larger groups because their lack of contribution is less easily monitored. Furthermore, as group size expands the proportion of rent for each member decreases thereby reducing the incentives for individuals to become a member of the cooperative. Once a group has attained the optimal size required for the creation of property rights enforcement is typically determined by moral obligation or religious affiliation, more broadly, the social norms that prevail. Mutual monitoring reinforces the socially accepted behavioural norms of exploitation that exist reinforcing compliance. Punishment may occur should individuals break the rules associated with resource use, but such punishment is typically nominal.⁵

Generally, when a stable set of property rights does evolve, the credible threat of violence remains the backdrop of contractual enforcement should any party choose to deviate from the agreed terms.⁶ Umbeck illustrates the importance of a credible threat in his analysis of property rights on the Californian gold fields.⁷ In this instance, it was the fact that every miner carried a gun thereby equalizing violence potential and providing the credible threat of violence that ensured a stable set of property rights to mining evolved. As a result, all miners could then devote maximum resources to mining, maximising productive returns, and increasing overall societal wealth.

Institutions that fail to define or enforce property rights efficiently encourage conflict and violence. Whether the credible threat of violence will evolve into fighting rather than negotiating to reorganise or enforce property rights will depend on whether participants expect this form of communication to convey essential information more cheaply than threats or negotiation.⁸ For instance, in the act of enforcement of rights, negotiation will be costly if an actor is faced with a low probability of success

via this method. Assume one method of negotiation to enforce rights is via the legal system that is; individuals can rely on a third party arbitrator (judge) to interpret rules to determine which person is acting outside their rights and apply an appropriate remedy. The choice of this method of negotiation as compared with violence will be determined by the resource costs of each compared with the likelihood of winning that is, the benefits. To calculate the likelihood of success information regarding the probability of winning under either method is required.

In an information perfect world, where all future states are known, it would be assumed that these probabilities could be perfectly calculated by actors allowing them to determine actions based on transaction costs. However, given in the real world actors are plagued by problems of information asymmetries and bounded rationality making these probability calculations more difficult, determining the success rate of either method will be a function of the information available to calculate success rates. Specifically, if an actor has information that previous negotiations via the legal system have been more successful than violence, *ceteris paribus*, they would calculate their likelihood of winning to be higher under negotiation. Nevertheless, if information regarding past legal decisions is either unavailable or lacks consistency, the predictability of negotiation leading to success decreases. In turn, this would increase the costs of negotiation while limiting the potential benefit. If, however, it is assumed that the actor has information to indicate that violent enforcement has led to high levels of success then they would favour violence over negotiation. Therefore, it can be argued that in the presence of inefficient institutions that lead to rights conflict, whether an individual will choose negotiation or violence to resolve the conflict will be a function of both the costs and the level of success, or benefits, that will be forthcoming. For society as a whole, violence is the most costly of resolution methods as it leads to the dissipation of rents as individuals devote valuable resources to fighting rather than producing. Regardless, before discussing the implications of theory on the predisposition to violence in the Riverina, an explanation of the intricacies of the riparian doctrines operation in NSW is required, this will be the subject of the next section.

III RIPARIAN RIGHTS

The riparian doctrine dictated that only individuals owning land that came into contact with the water source acquired riparian rights. These rights were usufructuary in nature where use and obligation was determined by the reasonableness doctrine. Reasonableness was defined as “any use that does not work actual, material, and substantive damage to the common right which each proprietor has, as limited and qualified by the precisely equal right of every other proprietor”.⁹ The reasonable use doctrine classified water usage into two categories: ordinary or extraordinary. Ordinary use allowed a riparian owner to use water to supply domestic and stock needs. A riparian engaging in ordinary use under the doctrine had no restrictions imposed upon them. In this way, if

a riparian used all the water in a stream or river for drinking water leaving nothing for those downstream the downstream riparian had no redress under the doctrine.

However, if a riparian used the water for any other purposes, such as irrigation, this would be classed an extraordinary use under the doctrine. It was in uses that were deemed extraordinary under the doctrine that a riparian had a corollary obligation not to diminish the quality or quantity of water flowing to lower riparians.¹⁰ In this way, while riparians had the right to divert water from a stream or watercourse and to change the course of a stream within their property boundaries, these activities were not permitted to alter the quantity or quality of water flowing to downstream riparians. Hence, riparian owners were permitted to use water flowing through or passed their land in such a way that was not incompatible with the equal or correlative rights of all other owners on the stream.¹¹ As a result, the riparian doctrine dictated users were equal in both right and obligation implying an inter-relationship of owners along a stream referred to as the 'community of the river'.¹²

Riparians were also entitled to lease or contract out their rights to non-riparians granting them access via the riparian property. However, non-riparians did not acquire riparian rights, nor did they become part of the community of the river. In this way, non-riparian contractors had no legal redress under the doctrine regardless of the impacts of upstream riparians activities. Nevertheless, should a non-riparian contravene the doctrine they could be subject to an action for damages by an injured riparian regardless of whether the riparian being injured had exercised their rights under the doctrine.¹³

Whether riparian rights actually existed in Australian colonies prior to Federation (1901) has been the subject of much debate in water rights literature.¹⁴ One of the major complicating factors is that while it could be assumed that British common law was inherited in all Australian colonies by virtue of the *Australian Courts Act* (1828), that established the date for the introduction of British common law to NSW as July 25, 1828, after this date English decisions handed down had no binding effect, although they could be relied upon as decisions of a coordinate jurisdiction.¹⁵ As a result, while this act established the riparian doctrine in Australian colonies, it meant that colonial courts could adopt, adapt, or remove the doctrine as they saw fit.¹⁶ Therefore, whether an Australian court would apply the doctrine in its purest form and to its fullest extent was uncertain. In this way, it could be assumed that until a case of riparian rights came before a court in each colony, whether or not individuals would be bound by this doctrine was uncertain. Nevertheless, in NSW this uncertainty was overcome by court findings enforcing this common law relatively early in the colony's history.

As early as 1853, in the case of *Cooper v. Corporation of Sydney*, where the plaintiff claimed an injunction to prevent the defendant from extending a trench that would remove water from a stream flowing through the plaintiff's property the NSW Supreme Court determined that if the disputed stream could be proven to be continually or habitually flowing rather than causal and accidental, then the plaintiff was entitled to the flow of water without any unreasonable use by any other proprietor or occupier.¹⁷ In this way, the NSW Supreme Court reinforced the common law perception that riparian owners were entitled to the flow of water without any unreasonable use by any other proprietor or occupier.

Further cases supported the continued application of the riparian doctrine in NSW. For example, in *Lord v. Commissioners of the City of Sydney* (1857), appealed from the NSW Supreme Court to London's Privy Council it was found that subtraction of water from a stream that bordered Mary Lord's property for municipal purposes was an infringement of her riparian rights. While this case focused on whether Lord was entitled to compensation for dilution of river flow due to the extraction of water by the Crown, the findings were quite clear that the boundary of her property was the centre of the stream (*ad medium filum aquae* or 'middle thread').¹⁸ As a result, the Privy Council found in favour of Lord allowing her compensation for the damage caused by municipal water extraction. *Hood v. the Corporation of Sydney* (1860) also found riparian rights applied to an action for compensation by Hood for water extraction by Commissioners of the Sydney Water Corporation. However, in this case, Hood's activities had diminished the quality of stream water flowing to downstream owners of which the Corporation was one. On balance therefore, the court found riparian rights favoured the Corporation asserting the requirement that as downstream owners the Corporation had the right to receive water without interference in quality or quantity. As a result, Hood could not claim compensation for water extraction because his activities substantially impacted on the correlative rights of other riparians.¹⁹

Nevertheless, for the purposes of this paper, the most important riparian rights case heard by the NSW Supreme Court was that of *Pring v. Marina* (1866). In this case, the defendant erected a dam across a water course that interrupted the flow to the plaintiff's downstream property. Here the defendant claimed he was entitled to reasonable use of the water, and the obstruction, being only minor and temporary, permitted him to avail himself of this right. However, the court found that the right to an undiminished quantity of water was the right of every riparian and, as a result, judgement was in favour of the plaintiff because the defendant's action was inconsistent with the common law rights of other riparian owners.²⁰ From the evidence above, it is clear that NSW common law codified the riparian doctrine clearly within the colony over the period being examined here. In light of this, the discussion now turns to an examination of the nature and extent of conflict over dam construction in the Riverina.

IV RIPARIAN RIGHTS AND CONFLICT

In the Riverina, riparian rights led to conflict and violence because, in an arid country, they failed to define and enforce property rights efficiently. This is evidenced in the fact that periodic bouts of violence occurred predominately in drought years when water became a commodity.²¹ While it is clear the riparian doctrine was ill suited to Australian conditions, commentators have argued the doctrine brought stability and tranquillity to volatile frontier communities, such as the Riverina, arguing the social system, notorious for uncompliant behaviour, exhibited extraordinary compliance with riparian laws.²² However, the extent of violence as documented by more recent analysts and the local newspaper of the time (the *Pastoral Times*) indicates this was not the case.

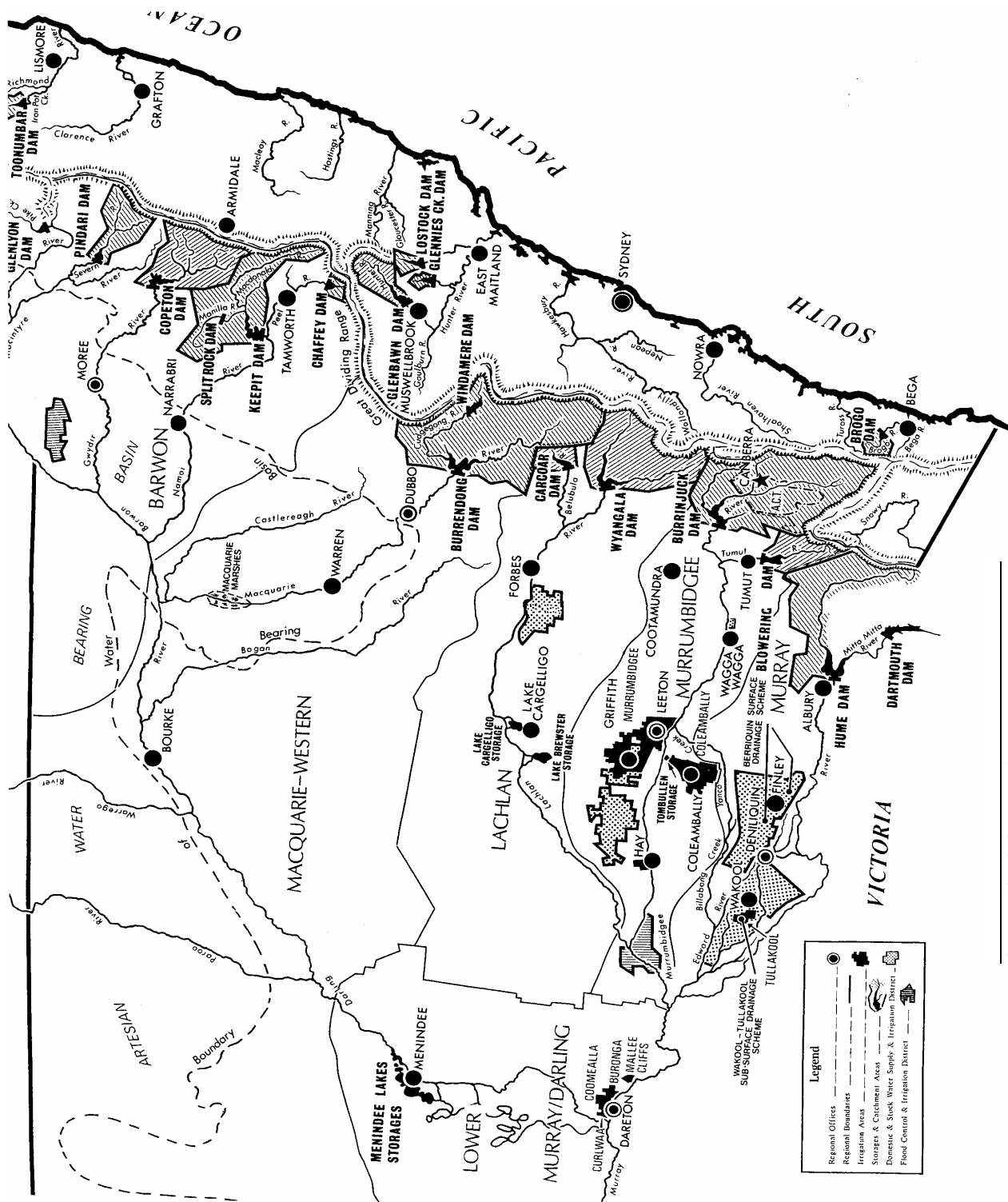
Violence took the form of dam cutting where settlers would dismantle the banks of dams effectively destroying their storage ability. And, while there is no evidence to suggest any deaths occurred during these violent acts, they did become more heated over time. For instance, the Desailly brothers whose dams had been destroyed on a number of occasions erected a log house with loopholes for guns with the intention of shooting anyone that might try to cut down a newly constructed dam.²³

Dam cutting as a reprisal for interference with water supply began in 1858. Violence was first reported on November 17 of that year when a group of eight or nine squatters²⁴ and their farm hands proceeded to destroy every dam located along one Riverina river referred to as the Billabong Creek (refer to Appendix two for a map of its location).²⁵ In this instance there was no evidence of these squatters attempting to negotiate a resolution either between themselves and the offending party or via seeking legal redress. In fact, one squatter who had two dams destroyed in the raid, William Brodribb, a magistrate, noted that until the group of squatters had arrived at his house explaining they were going to destroy all dams along the Billabong, including his, he had never faced objection to these water storages.²⁶ After this initial flurry of violence, squatters attempted to prevent further violence by organising a series of meetings on the 'dam question' in the following year.²⁷

These meetings were aimed at negotiating an agreement to allow dam construction under locally established regulations. Generally, the dams themselves were not the subject of dispute, in fact, it was agreed that they were indispensable to the region. Hence, the regulations to be devised were an attempt to ensure that all squatters had equal right to construct dams at varying intervals and specific heights along the river. And, while the regulations established in July, 1860 were claimed to be morally binding there was no evidence of enforcement requirements or penalty for acting outside of the rules.²⁸ In addition, while the regulations were an indication of collective action, the aim of the squatters in establishing these rules was merely to alert the legislature of the

ineffectiveness of the riparian doctrine, and encourage an enactment to formally over ride the common law. In the years immediately following these initial confrontations, however, rainfall increased within the district leading to severe flooding that destroyed all the dams on the Billabong and other rivers within the region. Regardless, it was not long before squatters again faced severe water shortages and a series of violent destruction began again in earnest.²⁹

Appendix Two: Location of Disputed Rivers



Source: Lloyd, C. J., op.cit

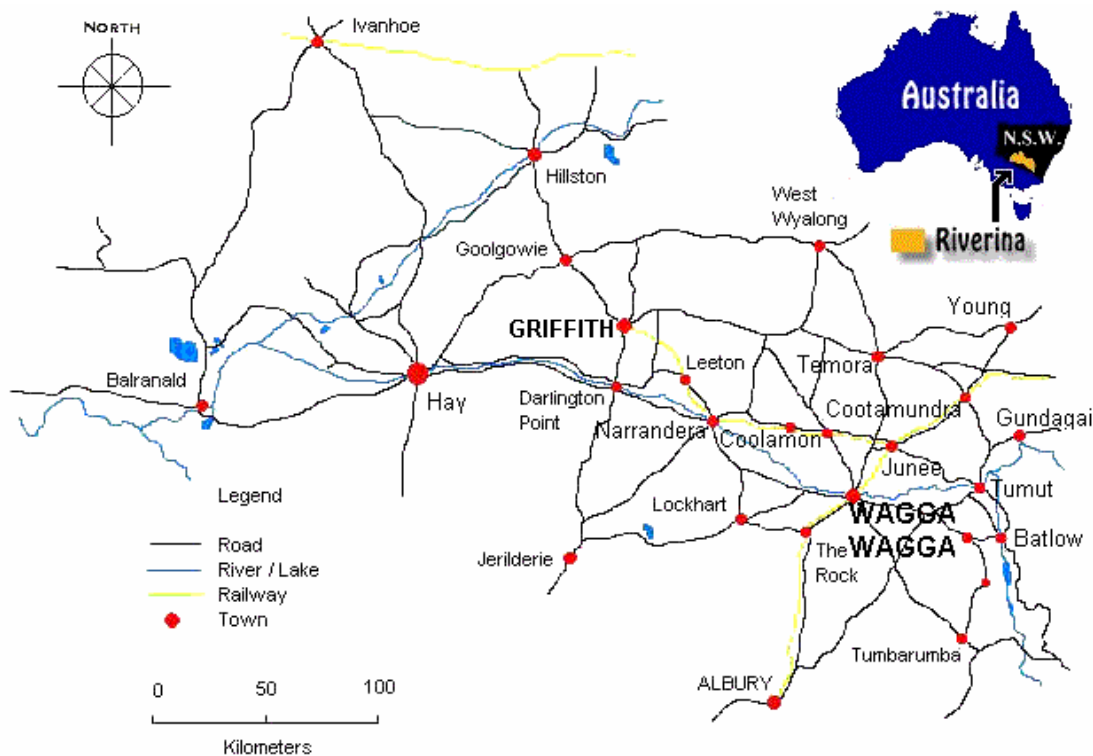
Paralleling the violent destruction of dams' squatters had, in some instance, engaged in cooperative efforts to construct channels from streams and rivers to increase flow to tributaries and blocks without river frontage. These canals were referred to as 'cuttings' where squatters would dig deep furrows for water to create flows from more permanent water supplies to creeks that generally lacked substantial flow even during average rainfall years. For example, the Willandra cutting was begun in 1865 located on the north side of the Lachlan (refer to Appendix one) and included the deepening of the creek bed as well as a channel of approximately 17 kilometres. Five squatters were responsible for this construction with the expenses being proportionately borne.³⁰ Similar cuttings were undertaken on the Yanko and Willanthry Creeks. While there is no account of how many squatters were involved in these projects evidence indicates that all expenses were shared proportionately.³¹ In addition, there is no detail of how this water was to be shared amongst participating squatters. However, given the general understanding of the application and operation of the riparian doctrine, it could be argued that water was distributed based on this common law premise. Regardless, the most crucial point here is that there is clear evidence of collective action to improve water supply yet, these did not spill over into dam construction. The reasons for this will be the subject of the following section.

V RIPARIAN RIGHTS AND COLLECTIVE ACTION

In light of the details above, acts of violence were clearly the preferred method of riparian right enforcement by squatters during this period. Stemming from this are two main issues to be considered. First, why did squatters use violence to enforce their rights rather than use negotiation via the legal system? Second, why did collective action in canal construction and violence not result in cooperation for dam construction?

First, violence was the preferred method of dispute settlement because it was less costly than negotiation using the legal system and the success (benefits) of violence were well known being the topic of a number of newspaper articles.³² Furthermore, violence was less costly than legal redress because of the inherent uncertainties associated with the riparian doctrine and limited information regarding the likelihood of winning in court that is, the benefits were not assured. Uncertainty in relation to success using legal means stemmed from two factors: the limited number of successful cases and the nature of the doctrine itself. First, while there were a limited number of cases of squatters' bringing legal action against those who infringed their riparian rights all of these were settled out of court.³³ In and of itself this indicated there was a lack of information as to whether court proceedings to defend riparian rights would be successful.

Appendix One: Geography of the Riverina District



Source: Riverina Tourism, (2005), Personal Correspondence with Kate Ritchie, 29 July

Second, this information asymmetry was compounded by the fact that the intricacies of the doctrine's application meant it was difficult for squatters' to calculate the probability of success with any certainty using the court system. Specifically, the right of a riparian owner stemmed from the species of land rights granted and the nature of the river system being considered. In relation to land rights, riparian rights were part and parcel of the land itself with their acquisition being restricted to land granted under freehold. Squatters' land claims, while sanctioned by the Crown under an annual licensing system did not give them legal ownership, it was simply right of occupation. Whether right of occupation was sufficient for an individual to become a riparian proprietor is unclear.³⁴ Given squatters were not provided with freehold ownership or indeed ownership of any type then it could be claimed that they did not acquire riparian rights and therefore, a court would not have enforced an infringement of such rights amongst squatters'. In addition, the riparian doctrine defined a river by continuous flow, however, in NSW, during times of drought, once flowing rivers often turn into a series of waterholes. Therefore, identifying a definite water course became problematic as did the definition of the rights and obligations of 'riparians' when dams were built in dry watercourses that ran into other properties.³⁵

Despite these problems, most squatters believed they acquired riparian rights. Evidence indicates that regardless of whether a court would enforce these rights, the principals of the riparian doctrine were known, accepted, and their implications understood. For example, an article in the *Pastoral Times* stated:

*It may be primarily said that no one is justified in diverting water from a stream to the injury of any party having an inherent right to the use or advantage of the stream at a lower point of the river. Here then at the outset arises a cause for innumerable actions. A diverts a portion of the Lachlan; B, C, and D holding stations lower down, assert that they have been injured, and commence their actions in the Supreme Court. It being principally a question of damages and not of law – for as we have shown, primarily the diversion is illegal...*³⁶

As a result, even without support of court judgements, squatters' believed in principal that erection of dams themselves was not prevented under the doctrine but they accepted that owners were liable for actions at common law for any injury inflicted.³⁷

Given these complexities of any legal defence of rights, squatters would have taken these factors into account in their decision making regarding their likelihood of victory in defending their rights via the legal system. As a result, on balance, squatters' would have recognised the lack of surety of success in the courts resulting in violence being relatively less costly than court negotiations. However, regardless of the costs associated with uncertainty of winning through the courts, evidence from squatters' quite clearly indicates that using the court system as a dispute resolution mechanism was prohibitively costly.³⁸ In this way, because costs of a legal defence were high and victory via this method could not be assured, the benefits of this type of negotiation process were far lower than the costs. As a result, violence dominated water rights conflicts over this period in the Riverina.

Nevertheless, while violence may have been less costly than negotiation, this activity still had costs associated with it. Importantly, it allocated resources away from productive activities to defence leading to a negative-sum-game. In light of this, a second issue must be considered regarding the predisposition to violence over water rights conflicts in the Riverina, that is, given there was collective action in both violence and channel cutting, why did this not lead to collective action in dam construction? Four main factors can explain the lack of cooperation here. First, the optimal size of collective action was not achieved. Specifically, because the optimal size of groups engaging in collective action increases as the size of the territory to be protected increases, squatter numbers were insufficient to ensure collective action could take place on the scale required for dam construction. While disputes noted here occurred primarily on the Billabong

Creek and Lachlan River, these rivers covered considerable lengths of approximately 640 and 1,370 kilometres respectively. The number of squatters in the entirety of the Riverina at this time was approximately 373.³⁹ Therefore, it can be argued that squatters did not reach the optimal size required for collective action in dam construction. A corollary point here is that collective action in canal cutting and violence required smaller numbers for effective cooperation because the area of exclusion was smaller. For instance, the Willandra and Yanko cuttings were only 17 kilometres in length; therefore, the optimal size for collective action was reached relatively easily. In addition, violence required fewer numbers for optimality to be reached. Given it was also sporadic in nature, organisation of this type of collective action was less costly. Overall, this evidence indicates that the optimal size for collective action in dam construction was prohibitively high therefore making it more costly than the predominant forms of cooperation.

Second, collective action in dam construction was costly because the larger group requirements for effectiveness increased the likelihood of free riders. Free riders in this context could be those who did not contribute the required resources for construction or administration of the organisation. In larger groups the contribution of each member is less observable than for smaller groups therefore, in the larger groups required for dam construction, the inability of squatters to protect themselves from free riders resulted in the lack of collective action in these endeavours. Third, because cooperative dam construction required higher participation numbers there was an increasing probability of individuals engaging in hold-up in the form of a legal challenge. Assuming occupation was sufficient for the acquisition of riparian rights, *Pring v. Marina* (1866) indicates that a court would have found in favour of the complainant with the legal remedy being either an injunction or damages. As a result, hold-up was a very real threat to cooperative efforts and could have resulted in considerable compensation being required.

Finally, any incentive that may have existed or evolved over time for collective action in dam construction in the early 1860s was quickly eroded by the introduction of a new land settlement policy referred to as selection that is, free selection before survey. Selection was introduced in NSW in 1861 and constituted a specific land settlement policy aimed at emulating the population density and social structure of the English country side, often referred to as the sturdy yeomanry.⁴⁰ Two main legislative enactments introduced selection into NSW. The first, the Crown Lands Alienation Act (25 Vic., No. 1), allowed individuals to select between 10 and 320 acres of any Crown land at a fixed price of £1 per acre of which a deposit of 25 per cent was required and full payment within three years, providing the individual resided on the land for three years and had completed improvements to the value of £1 per acre.⁴¹ The second, the Crown Lands Occupation Act (25 Vic., No. 2) allowed squatters' to secure leasehold land via an auction system with a flat rate rental being paid. Once leasehold was acquired, squatters' then retained the pre-emptive right

to purchase this land under freehold once the lease had expired. After squatters' bought the property and were granted freehold, they then had the right to lease adjoining land three times the size of the freehold property at a rental of £2 per square mile, per annum.⁴²

The contention created by the 1861 acts was that they allowed selectors to choose land originally claimed by squatters under the leasehold system of licences introduced in the late 1820s. As a result, squatters' in the Riverina faced possible encroachment of their land by selectors without compensation. This had one major impact on the squatters' incentives to engage in collective dam construction. Specifically, it increased the uncertainty associated with land occupation creating a substantial disincentive for any further improvements to water supplies on either an individual or collective level. In fact, rather than improve water supplies, squatters' diverted their resources to the protection of land claims via dummymyng and peacocking. Dummymyng was a method by which squatters' would contract with agents to select parcels of land on their run, register these with the Department of Lands (often under false names), and then sell the land back to the squatter for a small fee. This practice also involved the registration of land selected under family members' names, including children. Peacocking was a practice used primarily by dummy selectors where they would 'pick the eyes' or vantage points out of the country so as to render the intervening land useless.⁴³

From the explanation above, it is clear that the riparian doctrine was an inefficient institutional arrangement in that it promoted conflict. This conflict was manifested in violent attempts by squatters to enforce their riparian rights against encroachment. In this instance, violence was the least costly method by which squatters could be relatively certain of success in their rights enforcement. In this way squatters were increasing the benefits gained from acting violently compared with the costs and benefits of engaging in negotiation via the legal system. The failure of squatters to engage in extensive infrastructure construction in the form of dams was the result of the costs of organising large-scale projects because they did not meet the optimal group size for collective action to be forthcoming. Furthermore, they were also unable to effectively protect against free riders due to the larger group size and hold-up because there was a likelihood that this would take the form of legal redress which was an extremely costly process. Finally, because of the introduction of free selection, any possibility for larger-scale collective action was removed. As a result, the riparian doctrine was not only inefficient in that it promoted a negative-sum game as resources were allocated to violence rather than production but also in that it failed to provide the appropriate incentives for larger-scale collective action to take place. Given squatters failed to adapt this doctrine or replace it, as occurred during a similar period in the western United States with the introduction of prior appropriation, further study on why a transition to a more efficient set of property rights did not occur is warranted.

VI CONCLUSION

Theoretical literature claims that property rights institutions that are inefficient in their definition or enforcement of rights will lead to conflict and promote violence. This paper has provided an empirical example of this in the Riverina district of colonial NSW that supports this theoretical contention as well as indicating why, in this case, violence was the preferred method of rights enforcement. In addition, it also provides some insight into the limitations of the doctrine that failed to promote collective action in water supply improvements that could have prevented any further waste of resources in the form of violence. While squatters showed a high propensity for organising smaller groups to engage in limited improvements in water supply and to enforce their rights via violence, the riparian doctrine resulted in such high levels of uncertainty more extensive cooperation was avoided. Counterfactually, had selection not been introduced, it could be argued that over the decades considered here squatter numbers in the Riverina may have increased thereby resulting in attainment of optimal group size for collective action to be effective. In turn, this would have led to cooperation for the large-scale infrastructure projects to secure water supplies being realised. However, the problems of large group cooperation such as guarding against potential free riders and threats of hold-up would have to be overcome, adding to the cost of this organisation. Nonetheless, due to the alteration in land settlement by the colonial government to increase settlement in the more remote parts of the colony, any possibility of larger-scale collective action was foregone as squatters diverted scarce resources to protect their land holdings against selection. For all these reasons the riparian rights doctrine was inefficient. Why this high level of inefficiency did not lead to either an evolution of water rights by squatters themselves or an adaptation of the riparian doctrine by the NSW courts will be the subject of further research.

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- 16 Courts in the western United States opted to remove the riparian doctrine and replace it with prior appropriation. For instance, in Colorado, riparian rights were replaced without compensation owing to the 'imperative necessity' of the circumstances (Epstein, R., 'The Allocation of the Commons: Parking on Public Roads', *Journal of Legal Studies*, 31(2), S520)
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- 18 ER Reports, (1852-1859), Privy Council, Volume 14, Lord v. Sydney (Commissioners for City of) [1859], pp 991-1001
- 19 Legge, J. G., (1896), *op.cit.*, Volume 2, pp. 1294
- 20 *Ibid.*, pp. 397
- 21 During the period being studied here there were five droughts in NSW: 1857, 1858, 1861, 1862, and, 1863.
- 22 Lloyd, C. J., *op.cit.*, pp. 117
- 23 *ibid.*, pp. 53
- 24 Squatter was the label given to those settlers in the Riverina during this period. The word squatter emerged in NSW in the early 1820s and was the label given to individuals who moved outside the legislated limits of settlement (referred to as the Nineteen Counties) without a licence of occupation. Squatters' occupation was 'legalised' by the colonial governments Orders-in-Council in 1827 and 1829 which permitted these settlers to occupy as much land as they desired for an annual licensing fee of £10.
- 25 This group was led by three men, James and Edward Ashcraft, and Peter McGregor who, later that month, were tried for wilful and malicious destruction of property in the Court of General Quarter Sessions of the Peace in Goulbourn. While they were acquitted on this charge they were indicted for riotously assembling (Brodribb, W. A., (1883), *op.cit.*, pp 98/99).
- 26 Brodribb, W., (1883), *op.cit.*, pp. 99
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- 41 King, C. J., (1957), op.cit., pp. 81
- 42 *ibid.*, pp. 82
- 43 Robertson, Sir, S., (1924), op.cit., pp. 239 and 426