

# **Flood Country: Histories Floods in the Murray-Darling Basin, Australia<sup>1</sup>**

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## **Introduction**

Eastern Australia has become well known for its long, unpredictable droughts. Yet, this region also experiences large floods. This paper moves beyond Australia’s droughts to examine how people have lived with and understood floods in what is now known as the Murray-Darling Basin, from the 1850s to the early 2000s. The web of rivers and their catchments that comprise the Basin cover approximately one-seventh of the continent and most of inland eastern Australia (see Figure 1).<sup>2</sup> Within this large area are diverse local environments, which are connected through the rivers and flood flows.

Today, the region produces a significant portion of Australia’s agricultural goods for domestic consumption and export, especially food.<sup>3</sup> Many of the crops are grown through irrigation and most of the watercourses have been regulated for agriculture. One hundred and five large dams (more than 10 metres in crest height) stood in the Basin in the year 2000, just under a quarter of all large dams in Australia.<sup>4</sup> In recent years water and land management in this area has become an increasingly controversial topic. In broad terms, the most prevalent issue is perhaps the conflict between the water needs of established agricultural farms and industries, and the ramifying ecological degradation from these water extractions, with consequences for downstream farmers

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<sup>1</sup> This paper is based sections of my book *Flood Country: An Environmental History of the Murray-Darling Basin* (Collingwood, Victoria: CSIRO Publishing, 2012). Please see this publication for more detailed information on sources and in depth discussions of the case studies included here. Briefly, this book and paper draw on a variety of primary material, including newspapers, government archives and documents, and national, state, and local library collections; additional sources vary between floods.

<sup>2</sup> Australian Bureau of Statistics, ‘Water and the Murray-Darling Basin – A Statistical Profile, 2000–01 to 2005–06 (4610.0.55.007)’. Australian Bureau of Statistics, <<http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/DC0DC8AAE4ECD727CA2574A5001F803A?opendocument>>. 2008.

<sup>3</sup> Australian Bureau of Statistics, ‘Water and the Murray-Darling Basin’.

<sup>4</sup> R Kingsford, ‘Review: Ecological impacts of dams, water diversions and river management on floodplain wetland’, *Austral Ecology*, 2000, 25, pp. 109–27, p.118.

and Indigenous cultures and livelihoods.<sup>5</sup> For example, there are a number of wetlands in the Basin that are seen to be important places of biodiversity, locally and internationally, which have received reduced amounts of water, particularly during floods, due to upstream water extractions.<sup>6</sup>

Floods are important in these debates; and so is history. Histories of people's past relationships with floods have shaped the environment, the way the rivers flow, and the political landscape of these debates. This paper examines changing approaches to floods in this region across a period of immense cultural and environmental change marked by the advent of British colonisation. I particularly examine two of the ways floods have been understood. First, as major sources of water in dry regions, floods have been highly valued. Second, they have been seen as 'natural disasters', causing death and destruction. Indeed, floods were on average the most costly 'natural disaster' in Australia between 1967 and 1999.<sup>7</sup> The idea of 'natural disasters' is clearly also deeply cultural, as scholars have established.<sup>8</sup> Our understandings of events as disasters are directly influenced by where and how we live and how we understand our places, especially how much damage is caused to built works and agriculture and how many human lives are lost.

The label 'natural disaster' in some sense also classifies an event as unusual.<sup>9</sup> But floods in Australia challenge such a classification. Floods are central to river hydrologies and ecologies in many Australian rivers. Although large floods are unpredictable in an absolute sense, they occur often enough, like bushfire or storm events, that they are frequently followed by a retrospective sense of fatalism. But these events are then all too often quickly forgotten. An additional aim of this paper then is to pay attention to past floods, which is an important antidote to this pervasive, and often convenient, cultural amnesia.

In order to illuminate these and other understandings of floods, this paper focuses on three cases studies of particular flood events that occurred between the 1850s and 1960s. These studies were selected for the issues they raise, as each reveals understandings of rivers and floods specific

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<sup>5</sup> Jessica Weir, *Murray River Country: An Ecological Dialogue with Traditional Owners* (Canberra: Aboriginal Studies Press, 2009), pp.26-46; and, Paul Sinclair, *The Murray: A River and Its People* (Melbourne: Melbourne University Press, 2001), pp.3-25.

<sup>6</sup> Kingsford, 'Review: Ecological impacts of dams, water diversions and river management on floodplain wetlands in Australia', pp.109-27.

<sup>7</sup> Bureau of Infrastructure, Transport and Regional Economics, 'Economic Costs of Natural Disasters in Australia'. Report 103 (Canberra: Bureau of Infrastructure, Transport and Regional Economics, 2001), p.vii.

<sup>8</sup> Christof Mauch, 'Introduction', in C Mauch and C Pfister (eds), *Natural Disasters, Cultural Responses: Case Studies Towards a Global Environmental History*, (Lanham: Lexington Books, 2009), pp.1-16, pp. 2-8.

<sup>9</sup> Mauch, 'Introduction', pp. 2-8. Floods have also been seen as 'natural hazards'. A useful distinction between 'natural disasters' and 'natural hazards' is given by Greg Bankoff: 'hazards are viewed as the product of an unruly nature whose effects can be largely (though never completely) neutralised by the application of appropriate technology. Disasters, on the other hand, occur mainly from a lack of that application'. Greg Bankoff, *Cultures of Disaster: Society and Natural Hazards in the Philippines* (London: Routledge, 2001), p. 3. Reference to floods and other events as 'natural hazards' in this sense largely gained prominence in Western countries in the 1970s and 1980s and the term has fallen from use with critiques of the ideas that underpin it, especially that of an 'unruly nature'. 'Disaster', however, has not undergone the same level of cultural unravelling. Another common distinction is that a hazard is the event itself and a disaster is its effects on human societies.

to their local areas and historical contexts as well as ongoing themes in approaches to floods. Two of the studies focus on towns and their surrounding regions: the 1852 flood in Gundagai, on the Murrumbidgee River, is placed within the context of British colonization and I examine why people continued to occupy this floodplain despite a series of large flood; and, the 1890 flood in Bourke, on the Darling River, reveals how floods were cast as important sources of water to mitigate droughts amidst growing support for more irrigation. The final case study takes a river-long view to examine the ways in which the regulation of the Murray River shaped understandings a flood in 1956. Through these case studies, the paper takes up a number of key themes: different kinds of understandings of floods, including local and managerial perspectives; areas of tension and agreement between custodians of these different understandings; the particular forms of river management that centralized government enabled; and the emergence of the Murray-Darling Basin as a managerial unit. Ultimately, this paper examines the ways in which people, the rivers, and floods have re-made each other.

## **Flood Hydrology**

The weather and climatic influences on floods in the Murray and Darling river systems are significantly driven by the El Niño–Southern Oscillation or ENSO. ENSO in eastern Australia is broadly characterized by an oscillation between a number of consecutive dry years and then a number of consecutive wet years and so on and, as far as we know, it is irregular.<sup>10</sup> Many rivers of the rivers have highly variable flows, and in recent decades the flow of the Darling River has been ranked among the most variable of the world's large rivers.<sup>11</sup> Large floods that spill out onto vast floodplains can pass quickly to leave riverbeds that are almost or completely dry.

The Great Dividing Range provides a point at which many rain-bearing weather systems break, feeding floods. Annual local rainfall averages range from more than 1000 millimetres a year in the east, generally decreasing to less than 300 millimetres a year in the west. A number of significant weather systems contribute to floods in the Murray and Darling river systems. Tropical systems are important for the hydrology of the Darling river system. The rain from monsoon systems can be substantial, causing large floods in the north-western tributaries, such as along the Queensland reaches of the Paroo, Warrego, and Balonne rivers. As floodwaters move south from these tributaries the Darling River can experience floods without any local rain. The Darling also

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<sup>10</sup> Don Garden, *Droughts, Floods & Cyclones: El Niños That Shaped Our Colonial Past*, (North Melbourne: Australian Scholarly Publishing, 2009), 1-6; and, Barrie Pittock *et al.*, 'Climatic Background to Past and Future Floods in Australia', in A Poiani (ed.), *Floods in an Arid Continent*, Advances in Ecological Research No. 39. (California: Elsevier, 2006), pp. 13–39.  
17-18.

<sup>11</sup> Puckridge *et al.*, 'Flow variability and the ecology of large rivers', *Marine and Freshwater Research*, 1998, 49, pp.55–72, p. 62 Figure 4.

has wide, flat floodplains along its mid and lower reaches so that floods can stretch for kilometres. In the Murray river system, snowmelt in the southern ranges contributes to seasonal inflows in the winter and spring months and, sometimes, to large floods when these are accompanied by substantial rain. Although the rivers in the Darling system tend to flood during summer months and those in the Murray system in winter and spring, rivers in both systems have been known to flood at various times of the year.<sup>12</sup>

## Flood Country

Aboriginal people have profoundly shaped diverse environments throughout the continent for approximately 55,000–60,000 years. British colonisation began a second major, much more concentrated, human environmental disruption.<sup>13</sup> The largely Christian, Anglo-Celtic newcomers struggled to gain knowledge about floods, including through their own experiences and through information shared by Aboriginal people. These colonists came from environments very different from those of inland Australia. Rivers in Britain flooded, but those rivers and floodplains had vastly dissimilar hydrologies, ecologies and soil compositions, and were influenced by place-specific weather conditions. Many Australian rivers are characterised by their variability, in contrast to the more consistent and abundant flows of other rivers around the world, including those in Britain and continental Europe. The word 'drought' gathered new meaning in Australia as droughts often lasted years, not days as in many European countries.<sup>14</sup> Historian Don Garden has noted that the meaning of 'drought' also encompassed economic dimensions.<sup>15</sup> The same is true of 'flood', which gained different cultural and economic meanings in different contexts.

Some of the complex cultural meanings that have been given to floods are evident in the phrases 'flood country' and 'flooded country'. These terms were first used by colonists in the 1850s, and can be found quite frequently in documents relating to rivers in the Murray and Darling systems from this time onwards.<sup>16</sup> Initially a simple description of flooded land, these evocative

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<sup>12</sup> Pittock et al., 'Climatic Background', pp. 15, 17; and, Sinclair, *The Murray*, p. 29.

<sup>13</sup> Tom Griffiths, 'The Nature of Culture and the Culture of Nature', H Teo and R White (eds), *Cultural History in Australia*, (Sydney: University of New South Wales Press, 2003), pp. 67–80, pp. 70–71; Heather Goodall, 'Main Streets and Riverbanks: The Politics of Place in an Australian River Town', in S Washington, P Rosier, and H Goodall (eds.), *Echoes From the Poisoned Well: Global Memories of Environmental Injustice* (Lanham: Lexington Books, 2006), pp. 255–70, pp. 255–58; Don Garden, *Droughts, Floods & Cyclones: El Niños That Shaped Our Colonial Past*, North Melbourne: Australian Scholarly Publishing, 2009), pp. 14–17; Weir, *Murray River Country*, pp. 3–10; Sinclair, *The Murray*, pp.16–22.

<sup>14</sup> H C Russell, 'On periodicity of good and bad seasons', *Journal and Proceedings of the Royal Society of New South Wales*, 20, 1897, pp. 70–115. p. 71.

<sup>15</sup> Garden, *Droughts, Floods & Cyclones*, p. 11.

<sup>16</sup> See for example, 'Diagram shewing extent of flooded country' (1857); 'Direct route to Hay [from Wagga Wagga]' (1881); *South Australian Register*, 17 March 1860, p. 3; *Cairns Post*, 23 November 1951, p. 1; *Maitland Mercury*, 18 August 1860, p. 4s; *Maitland Mercury*, 19 December 1863, p. 2; *Sydney Morning Herald*, 14 January 1926, p.10; *Sydney Morning Herald*, 10 September 1863, p. 4; *Sydney Morning Herald*, 14 January 1926, p. 10; *Sydney Morning Herald*, 19

words came to describe the way the nature of the landscape had been shaped *because* it had been flooded. Even in the harshest of droughts, the words conjured up the image of the imagined water covering the land. Early grazing properties adjoined the rivers, which were important sources of water for livestock and domestic uses. For graziers, these words were shorthand for land that not only was good for sheep and cattle grazing as it was fertile floodplain, but was also where floods might endanger livestock. The words have especially (but not exclusively) been used by graziers as well as early surveyors, and have endured in some grazing regions. The terms have been used to describe floods and floodplains around Australia but are especially associated with the Murray and Darling rivers and their tributaries, an historically important sheep-grazing area.<sup>17</sup>

The word 'country' echoes Aboriginal concepts of land and water as well as relationships with particular regions.<sup>18</sup> Its use by graziers in these contexts may reflect the strong involvement of Aboriginal people in the pastoral industries, multifaceted colonial frontier relationships and environmental understandings, and connections with places as well as English notions of 'country' and 'countryside'. In this way, the terms 'flood country' and 'flooded country' draw attention to the complexity and ongoing ramifications of colonisation and to processes of gaining knowledge of rivers and land. These terms also indicate a certain set of relationships with floods: to put it simply, floods were good because they regenerated vegetation, brought richness to alluvial soils and were sources of water, but they could also be dangerous.

The remainder of this paper examines three case studies of particular flood events, in towns and their surrounding regions, with the aim of analysing the broader cultural and environmental contexts in which they occurred and changing approaches to floods more generally over the next century.

## **Gundagai, Murrumbidgee River, 1852: Economic Interests**

European graziers took sheep and cattle into inland eastern Australia in the 1820s, pushing past the legal limits of colonial settlement. These 'squatters', as they were called, followed the rivers inland, reaching the western edges of the river systems by the mid nineteenth century. The westward movement of graziers was accompanied by significant violence, between this broad group and local

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October 1861, p. 6; *South Australian Register*, 15 October 1862, p. 2; 'Camel team in flooded country, South Aust.' (1913); 'Bush Driving Through Flooded Country, Murray River, South Aust.' (1909).

<sup>17</sup> Heather Goodall, 'The River Runs Backwards', T Bonyhady and T Griffiths (eds.), *Words for Country: Landscape and Language in Australia* (Sydney: University of New South Wales Press, 2002), pp. 31–51, p. 42; Dayle Green and Libby Connors, 'The European Explorers and Settlers', in Roland Breckwoldt *et al* (eds.), *The Darling*, (Canberra: Murray-Darling Basin Commission, 2004), pp.24-51, pp. 33-38; and, Michael Pearson and Jane Lennon, *Pastoral Australia: Fortunes, Failures & Hard Yakka* (Collingwood, Victoria: CSIRO Publishing, 2010), pp.175-176, pp.19-39.

<sup>18</sup> Weir, *Murray River Country*, pp.10–15.

Aboriginal people.<sup>19</sup> The flows of the rivers were a factor in conflicts between Aboriginal groups and pastoralists, as droughts increased competition for resources, including along the Murrumbidgee River in NSW in approximately 1838 to 1840.<sup>20</sup>

As towns began to be established inland, floods posed new kinds of problems. The greater concentration of people, buildings and property increased the potential for large economic losses and loss in human lives. A series of floods in the town of Gundagai, located on the Murrumbidgee River, is a revealing case study in terms of how floods were approached within the colonial town planning and factored within colonists' processes of gaining and evaluating environmental knowledge. The town was surveyed in 1838 as a service town for travellers, at the only crossing place over the Murrumbidgee River on the main overland route from Sydney to Port Phillip (Melbourne).<sup>21</sup> The site was a river flat, located between the Murrumbidgee River and a looping tributary, surrounded by hills. From the few surviving records related to the town's survey, the pre-existence of buildings at the site appears to have been the main reason the town was established there.<sup>22</sup> The NSW Surveyor-General at the time later drew attention to the importance of these factors: 'the design [of Gundagai] was made to follow the road, and to embrace a paddock and buildings then in use'.<sup>23</sup> According to those who arrived around the time of the first allotment sales in 1841, local Aboriginal people, Wiradjuri, told them about two large floods that had occurred along the river in the past decade.<sup>24</sup> Colonists continued to build on the flat despite these warnings. Perhaps they thought large floods were unusual occurrences, perhaps they did not believe Wiradjuri, or perhaps the growing trade on the flat was worth the risk.

Gundagai experienced a series of large floods soon after it was established. These were in: October 1844, May and August 1851, and in June 1852. The 1844 floods were destructive, but only one death was reported.<sup>25</sup> The height to which the flood had risen ('32 feet', 9.75 meters) was

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<sup>19</sup> Heather Goodall, 'Contesting Change on the Paroo and Its Sister Rivers', in Richard Kingsford (ed.), *A Free Flowing River: The Ecology of the Paroo River* (Hurstville, New South Wales: National Parks and Wildlife Service, 1999), pp.179-200, 183-184; Green and Connors, 'The European Explorers and Settlers', pp.33-38; and, Pearson and Lennon, *Pastoral Australia*, pp.19-39.

<sup>20</sup> Bill Gammage, 'The Wiradjuri War, 1838-40', *The Push*, 1983, 16, pp.3-17, pp. 3-17.

<sup>21</sup> 'Port Phillip Road Stations Recommended by Mr. Stewart', Letter from Deputy Surveyor General S A Perry to Surveyor-General, 21 July 1838, in 'Gundagai', *New South Wales Legislative Council. Votes and Proceedings*, 1852, 2, pp. 239-278, p. 263.

<sup>22</sup> See the following archives from the State Records of New South Wales for surviving records of the initial town survey: HCD Butler, Surveyor-General - Letters Received 1822-1855. HCD Butler, 7 Jan 1836-21 June 1838. NRS 13736, [2/1520]. Reel 3057; S Perry, (1838) 'Gundagai', 'Approved by Executive Council'. Survey map. NRS 13859, [Map 2811]; GC Stapylton, Surveyor-General - Letters Received 1822-1855. GC Stapylton, 4 Jan 1830-20 June 1840. NRS 13736, [2/1582A]. Reel 3091.

<sup>23</sup> 'Village of Gundagai. Mr. Bingham's Report', Thomas Mitchell's notes on Henry Bingham's report of the 1844 flood, 2 December, 1844. 'Gundagai', *New South Wales Legislative Council. Votes and Proceedings*, 2, 1852. pp.251-278, pp.263-264.

<sup>24</sup> *SMH*, 11 November, 1844, p.2; and, B O'Keefe *et al.*, *The Watermen of Gundagai* (Gundagai: Old Gundagai Project Committee), p.12,

<sup>25</sup> *SMH*, 22 August, 1844, p.3; and, O'Keefe *et al.*, *The Watermen of Gundagai*, p.13.

marked by debris lodged high in trees.<sup>26</sup> People's attention was also drawn to older debris, lodged even higher, which, one resident wrote, 'would have perhaps otherwise escaped our observation'.<sup>27</sup> It was now recognized as '[t]he vestiges of a former inundation, which must have been eighteen inches above that from which we had lately suffered'. The resident further noted that '[t]he aboriginals do not appear to consider the flood at all extraordinary'.<sup>28</sup> Residents formulated various plans to relocate the whole or part of the town; however, the colonial government did not agree to these as such an exchange would set a precedent for other towns that flooded. Further, land sales were an important source of revenue for colonial governments and an exchange (rather than new sale) of land would undermine this revenue.<sup>29</sup>

Despite this flood, and a new recognition of the signs of past floods, residents and newcomers readily invested in land and development on the floodplain in the proceeding years.<sup>30</sup> The flat was seen to be an attractive location as it allowed businesses, such as blacksmiths, to catch passing trade from travellers. This benefit seems to have outweighed the risk of future damaging floods. One resident wrote that:

... as a man of business I should be a serious loser by competitors, who would occupy even a tent on low ground on the concentrated line of traffic, and though I had determined to build on high ground, relinquished the idea on finding that I would be prejudiced by it.<sup>31</sup>

Commercial advantage was weighed against the risk of floods.

Two floods in 1851 were large but not as high or destructive as the 1844 flood, and no loss of life was reported.<sup>32</sup> In June 1852 the Murrumbidgee flooded again, to much higher levels than previous floods in the town. The water rose fast and at night, making it difficult to respond to quickly. The turbulent water, which carried debris including large logs, tore down buildings in which many people had sought safety or perched on roofs.<sup>33</sup> The flood reached depths of 40 feet at the river and 14 feet in the highest parts of the flat.<sup>34</sup> Many who were saved were rescued by

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<sup>26</sup> James Gormly, 'When it Broke: Drought of 1850-51', *Gundagai Independent*, 4 May, 1915, p.4; *SMH*, 29 October 1844, p. 4.

<sup>27</sup> *SMH*, 11 November, 1844, p.2.

<sup>28</sup> *SMH*, 11 November, 1844, p.2.

<sup>29</sup> This was a complex process and who argued for which proposals showed how environmental knowledge was contested. However, due to the length of this paper I have not explored these here. See O'Gorman, *Flood Country*, pp.26-30.

<sup>30</sup> 'Copy of a Letter from the Bench of Magistrates at Gundagai to the Surveyor-General', 4 February 1850, in 'Gundagai', *New South Wales Legislative Council. Votes and Proceedings*, 2, 1852. pp.251-278, p. 268.

<sup>31</sup> *SMH*, 19 July, 1852, p.2.

<sup>32</sup> *Goulburn Herald*, 30 August, 1851, p.3.

<sup>33</sup> *SMH*, 5 July 1852, p. 2; Gormly (1915b).

<sup>34</sup> *Goulburn Herald*, 4 September, 1852, p.8; and, C Butcher, *Gundagai: A Track Winding Back* (Gundagai: A.C. Butcher, 2002), p.84.

Aboriginal men, who ferried people to safety in bark canoes and boats. Two men were mentioned by name in contemporary documents, Jackey and Yarri, who were thanked by some survivors who published accounts of the floods in local and metropolitan newspapers.<sup>35</sup> Official and unofficial death tolls put the total number of fatalities in Gundagai at between 75 and 100, from a total population of about 400.<sup>36</sup> A government report indicated that out of 78 buildings on the flat, 48 were 'entirely swept away' and only three were undamaged.<sup>37</sup> Donations to help the survivors were collected from around NSW, totaling more than £1800. These came from secular, parish, and synagogue-based sources.<sup>38</sup> The colonial government organized some aid, which was this was less than the private donations, consisting of flour and blankets and totaling approximately £892.<sup>39</sup>

Many editorials and accounts of the flood in the press contained general calls for the government to exchange people's allotments for those on higher land.<sup>40</sup> A metropolitan newspaper, the *Sydney Morning Herald* championed this idea and aimed 'to shame the Government into a right position' by published many editorials and articles blaming the government for siting the town on a floodplain.<sup>41</sup> Responding to this kind of public pressure (rather than calls from the townspeople themselves), the colonial government issued a proclamation in October 1852 that residents in Gundagai could exchange allotments 'liable to inundation' for new, higher land.<sup>42</sup> Despite this offer, some people did not exchange their allotments and continued living and trading on the flat. Others left the town.<sup>43</sup> Even after two more large floods in 1853, some residents continued to remain on the flat.<sup>44</sup> The risks to life and costs of floods, it seemed, were outweighed by the risk of conducting business further from the road.<sup>45</sup> It was only when the government set a deadline for

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<sup>35</sup> O'Keefe, *et al.*, *The Watermen of Gundagai*, p.8; and, W Soerjohardjo, 'Aspects of Life in Gundagai, 1840-1860', Masters thesis, 1986, The Australian National University, Australia, pp.159-164.

<sup>36</sup> *Sydney Morning Herald*, 19 July, 1852, p.2; *Maitland Mercury*, 14 July, 1852, p.3; and, 'Copy of a Letter from the Commissioner of Crown Lands, Lachlan District, to the Colonial Secretary', 16 July, 1852. 'Gundagai'. *New South Wales Legislative Council. Votes and Proceedings*, v.2, 1852. pp.251-278, pp.245-247.

<sup>37</sup> 'Copy of a Letter from the Commissioner of Crown Lands, Lachlan District, to the Colonial Secretary', 16 July, 1852. 'Gundagai'. *New South Wales Legislative Council. Votes and Proceedings*, v.2, 1852. pp.251-278, pp.245-247.

<sup>38</sup> *Maitland Mercury*, 4 August 1852, p. 2; *Maitland Mercury*, 17 July 1852, p. 4; *Maitland Mercury*, 21 July 1852, p. 3; *Maitland Mercury*, 31 July 1852, p. 4; *Maitland Mercury*, 7 August 1852, p. 2; *Maitland Mercury*, 18 August 1852, p. 1; *Goulburn Herald*, 4 September 1852, p. 4.

<sup>39</sup> Sub-enclosure in 'Copy of a letter from the Colonial Secretary to the Bench of Magistrates at Gundagai', 6 July 1852, in 'Gundagai' (1852), p. 241; *Goulburn Herald*, 15 January 1853, p. 4.

<sup>40</sup> See for example: *Sydney Morning Herald*, 19 July, 1852, p.2; *Sydney Morning Herald*, 21 July, 1852, p.2; *Goulburn Herald*, 10 July, 1852, p.4; and, *Goulburn Herald*, 24 July, 1852, p.4.

<sup>41</sup> *Sydney Morning Herald*, 7 July, 1852, p.2.

<sup>42</sup> *New South Wales Government Gazette*, 20 October, 1852, p.1533.

<sup>43</sup> James Gormly, 'When it Broke: Drought of 1850-51', *Gundagai Independent*, 4 May, 1915, p.4; and, James Gormly, *Exploration and Settlement in Australia*, (Sydney: D.S. Ford, 1921).

<sup>44</sup> *Goulburn Herald*, 9 July, 1853, p.2; and, *Goulburn Herald*, 23 July, 1853, p.2.

<sup>45</sup> The population of Gundagai (North and South combined) recovered to 347 by 1856. *The Blue Book*, 1856; and, Butcher, *Gundagai*, p.17.



residents to take up this offer in 1859 that the flat seems to have been abandoned for living and trading.<sup>46</sup>

This case study shows that environmental knowledge was only one factor at work in colonial town planning and for residents. Knowledge of rivers and floods was weighed against the economic interests of the government and those who lived, traded, and bought land on the flat. Further, many colonists appeared to consider large floods as unusual occurrences; after experiencing a large flood they believed that the 'big one' was behind them. This belief, in part, led them to continue living on the flat. In addition, this study draws attention to some of the wider contexts of colonization, including the roles given to Aboriginal people as prophets and saviors, but also dismissals of their advice.

These floods in Gundagai occurred relatively early in the process of pastoral expansion, at a time when the colonial government had given little thought to the environmental vulnerability of settlement in the inland or to problems posed by climate and river flow. There was little administrative provision, beyond land sale, for assisting people with the environmental challenges they faced. Land was seen primarily as a resource to be exploited, and new settlements were generally located on the fringes of areas under state control.

By the late 1850s pastoralism and goldmining dominated the region geographically and economically, centred on the rivers of Victoria and New South Wales (NSW). Entire environments changed significantly under mining regimes. Mining settlements could swell to thousands of prospectors, increasing soil erosion and degrading water quality through land clearing and hydraulic sluicing.<sup>47</sup> The competing demands on water from miners led colonial governments to introduce systems of water rights for miners in the 1860s, which signalled a new level of government regulation over rivers and water use. However, pastoralists were mostly left to experiment with systems of water storage and to solve disputes amongst themselves (for example when upstream dams meant that downstream properties received little or no water).<sup>48</sup> One of the central reasons for this lack of regulations around pastoralists' water use was the challenge of monitoring such widely dispersed properties. In response to severe drought in the mid 1880s, governments began to support the establishment of bores to pump water from aquifers in NSW and Queensland. These bores changed the landscape of pastoralism, allowing pastoralists to graze stock far from rivers, and to

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<sup>46</sup> New South Wales Government Gazette, 9 November, 1858, p.1837.

<sup>47</sup> C J Lloyd, *Either Drought or Plenty: Water Development and Management in New South Wales*, (Parramatta: Department of Water Resources, New South Wales, 1988), p.72; S Macintyre, *A Concise History of Australia* (Cambridge: Cambridge University Press, 1999), p. 87; J M Powell, *Watering the Garden State: Water, Land and Community in Victoria, 1834–1988* (Sydney: Allen & Unwin, 1989), p. 49; J M Powell, *Plains of Promise, Rivers of Destiny: Water Management and the Development of Queensland, 1824–1990* (Bowen Hills: Boolarong Publications, 1991), pp.52–4.

<sup>48</sup> See O'Gorman, *Flood Country*, pp.61-77.

carry and transport more stock, particularly in dry western Queensland where 800 bores were sunk between 1885 and 1901. The rivers remained important as both sources of water and for the rejuvenation of vegetation from floods.<sup>49</sup>

### **Bourke, Darling River, 1890: An Engineering Approach**

The variability in the rivers' flows and a desire for consistent water supply for farming led many people in the late nineteenth century, and later, to see floods as a 'waste' of water, in this region and around the world. For instance, historian Tim Bonyhady has persuasively argued that W.C. Piguenit's painting 'The Flood in the Darling, 1890' was intended by the artist to be an argument for 'water conservation'; that is, damming floodwater for use during droughts for irrigation and water supply more generally (Figure 2). This argument for storing floodwater was gaining political momentum at the time the painting was completed in 1895. In contrast to this message of changing the river, the painting also attempted to convey the beauty of this flooded landscape in the style of the European Romantics. An additional layer of meaning was that the 1890 flood along the Darling River was widely seen as a national calamity because it caused stock losses that numbered in the millions and threatened to destroy the important wool-loading town of Bourke in NSW.<sup>50</sup>

The 1890 flood in Bourke marks a transition in popular and governmental approaches to floods towards engineering, including both structures for flood mitigation and for storing floodwater for irrigation. The town was established in 1862 as a service centre for pastoralists on the only land large enough for a town that was unclaimed by colonists. It quickly became an important trade and distribution centre for wool-growers, facilitated by two main transport routes that passed through the town: the river and the Great Western Railway, completed in 1885.<sup>51</sup>

The town's location on the Darling River was at a point where floodwater accumulated from the river's tributaries. As noted earlier, the Darling's flows have historically been largely determined by the amount of water carried by its tributaries and areas adjacent to the river received comparatively little rainfall.<sup>52</sup> In 1890 all of the Darling's tributaries flooded. In 1864, 1873 and 1887 large floods had come down the Queensland rivers and many had regarded these floods as the largest possible.<sup>53</sup> The 1890 flood, however, surpassed even these heights in most towns, including

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<sup>49</sup> Pearson and Lennon, *Pastoral Australia*, pp. 99–101; Lloyd, *Either Drought or Plenty*, pp. 101–14; Powell, *Plains of Promise*, pp. 45–9 and 66–78.

<sup>50</sup> Tim Bonyhady, *The Colonial Earth* (Carlton, Victoria: Miegunyah Press, 2000), pp. 282–3 and pp. 301–5.

<sup>51</sup> Bourke and District Historical Society, *Bourke: A History of Local Government* (Sydney: Wentworth Books for the Bourke and District Historical Society, 1978), pp. 22–3. The site of the current town was originally called 'Prattenville' by early settlers.

<sup>52</sup> Pittock et al., 'Climatic Background', pp. 15 and 17.

<sup>53</sup> *Western Herald*, 15 March 1890, p. 4.

in Bourke.<sup>54</sup> The nature of the Darling's flows, especially the contribution of monsoonal rain from the Queensland tributaries, meant that people in Bourke could anticipate large floods many weeks in advance. The town's residents requested help from the NSW colonial government, and in March and April that year the government sent paid workers from Sydney by rail to aid local volunteers in building an embankment or levee around the town. The government also sent other supplies, including boats. Although built quickly, within a month of the flood's peak, the embankment was intended as a permanent structure, one that would protect the town from future floods. However, as the flood rose, the embankment gave way and parts of the town flooded causing some damage.<sup>55</sup>

The embankment marked a new approach to floods through government supported mitigation works. Since colonisation, had used levees to protect agricultural land as well as settlements.<sup>56</sup> However, the significant participation of the colonial government signalled a shift towards government accountability. This flood highlights an important point of transition to greater government responsibility in managing environmental events. Government finances can be seen as necessary for long-term flood planning, particularly for built works, but also for emergency aid. However, this kind of government involvement also created the opportunity for centralised governments to have greater power over local responses to flood events. A report by government officials on the management of resources in Bourke during the flood stated that:

The direction of affairs and the control of special expenditure, should be at the outset entrusted by the Government to thoroughly qualified persons, who should be in sole and supreme control, and thus unnecessary expenditure, imperfect arrangements, and personal disagreements, all of which have been experienced at Bourke to the disadvantage of the service, would be avoided in the future.<sup>57</sup>

They argued that distant government officials could overcome local politics and what were seen to be inefficiencies.

In the 1880s and 1890s, an engineering approach to ensuring people's security from the fluctuations of river flow more generally was gaining support in eastern Australia. The establishment of the irrigation settlements of Renmark in South Australia in 1886 and Mildura in Victoria in 1887 by the Canadian-born Chaffey Brothers (who had established similar settlements in California) had spurred arguments for irrigation and water supply dams to be built on the inland rivers. These settlements attracted migrants from Europe and so demonstrated the potential

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<sup>54</sup> *Darling Downs Gazette*, 15 March 1890, p. 4.

<sup>55</sup> See O'Gorman, *Flood Country*, pp.86-100.

<sup>56</sup> Levees could, however, be problematic as they could raise food heights in other places (see Lloyd, *Either Drought or Plenty*, p.289).

<sup>57</sup> Fosbery *et al.*, 'Floods in the Town and District of Bourke (Report of the Board Appointed to Inquire Into)', *New South Wales Legislative Assembly. Votes and Proceedings*, 1890, 8, p. 3.

advantage of irrigation to increase the population and the density of land settlement, a long-standing goal of Australian colonial governments. A severe drought, now known as the Federation Drought, lasting from approximately 1895 to 1902 in inland NSW, crippled the pastoral industry and further increased popular support for extensive river engineering including the construction of large dams and irrigation networks by governments, particularly along the Murray River. From the early 1900s, a newly Federated Australia embraced river engineering as an answer to the variable flows of the inland rivers.<sup>58</sup>

### **The Murray River, 1956: The Failure of Engineering**

In the twentieth century the dam became a powerful symbol of technological advancement around the world, and dams as well as other works were built to 'harness the flows' of many river systems for hydro-electricity and agriculture. Like many places, these projects were enabled through highly centralised government water management in Australia, which drew on experiences of river management and engineering in the USA, especially California's irrigated agriculture. The eastern states of NSW, Victoria and South Australia established joint State and Federal bureaucracies, most significantly the River Murray Commission and the Snowy Mountains Hydro-Electric Scheme. Both of these focused river engineering along the Murray River, which was transformed into a 'regulated river' in just one generation. The Lake Victoria Reservoir, Hume Dam, Snowy Mountains Hydro-Electric Scheme, five barrages on Lake Alexandrina blocking the river mouth, thirteen locks spanning the Murray, Lake Mulwala and other works were completed between 1915 and 1974. Fearless ideologies of control and management underlay the construction of these river engineering projects. The seasonal flows of the Murray River were reversed for irrigation needs, and eastward flowing rivers were turned westward by the Snowy Mountains Scheme.<sup>59</sup>

By 1956, many of the large river engineering works had been completed and the Snowy Mountains Scheme was under construction. In that year large floods swept through the Murray and Darling river systems simultaneously. Pulses of water were sent through the catchments for 10 months, with peaks along the Murray between July and October, and the Darling between late

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<sup>58</sup> See O'Gorman, *Flood Country*, 110-132; D. Wright, "The River Murray: Microcosm of Australian Federal History," in *Federalism in Canada and Australia: The Early Years*, eds. B. Hodgins, D. Wright, and W. H. Heick (Canberra: Australian National University Press, 1978), 277-86; J. M. Powell, *The Emergence of Bioregionalism in The Murray-Darling Basin* (Canberra: Murray-Darling Basin Commission, 1993), 63-67; Lloyd, *Either Drought or Plenty*, 181-3; and Daniel Connell, *Water Politics in the Murray-Darling Basin* (Sydney: The Federation Press, 2007), especially 75-6 and 92-95.

<sup>59</sup> I Tyrrell, *True Gardens of the Gods: Californian-Australian Environmental Reform, 1860-1930* (Berkeley: University of California Press, 1999), pp. 172-3; Powell, *Watering the Garden State*, pp. 150-67; Lloyd, *Either Drought or Plenty*, pp. 181-4; Connell, *Water Politics in the Murray-Darling Basin*, pp. 56-61. A 'barrage' is a structure built across a watercourse to regulate and manage water flow. The barrages built near the mouth of the Murray were intended to control upstream water levels for irrigation, reduce salinity levels along the lower Murray, improve navigation at the Murray's mouth, and reserve water for Adelaide and south-eastern South Australia (Murray-Darling Basin Commission, 2006).

August and early October. Along the Murray, the floods were largely seen to be a failure of engineering to control and regulate the river. Harnessing snowmelt and small flood flows was seen to be an important aspect of controlled water supply on the Murray, but no specific flood mitigation strategy was included in any dam designs in the Murray or Darling river systems before 1956. River regulation was rather focused on mitigating the effects of drought.<sup>60</sup>

The Victorian government coordinated a state-wide effort towards mitigating the floods though levees and sand bags, with many resources for building these being prioritised towards irrigation areas like Mildura. The Federal government also made army personnel and equipment (including 'Army duck' watercraft) available during the floods, which in some ways was possible only because of an extended military force following World War II.<sup>61</sup>

Irrigated agriculture along the Murray and elsewhere had expanded following the two World Wars, partly supported through large numbers of European migrants, and there were large agricultural losses from the floods.<sup>62</sup> For example, in the irrigation district of Mildura in Victoria, located near the confluence of the Murray and Darling rivers, the floods devastated citrus and dried fruit farmers. In 1997, Emergency Management Australia placed a figure of £30 million (\$840 million, 1997 values) on the immediate and long-term costs of the floods in NSW, Victoria and South Australia, with a large proportion attributed to losses in agricultural production.<sup>63</sup>

Following these floods, and under pressure from state governments, local councils and residents, the Prime Minister, Robert Menzies, standardised aid for NSW, Victoria and South Australia, with a 'pound for pound' contribution that was not to be repaid.<sup>64</sup> Victoria distributed combined state and Federal funds, as well as a small number of private donations (a total of £72 from three donors) to individuals and councils through an especially established state government committee.<sup>65</sup> Private donations were also made directly to flooded areas to aid with recovery.<sup>66</sup> As compared the floods in 1852 and 1890, government responsibility for financial assistance had grown dramatically by 1956, and environmental challenges were being taken up as state responsibilities, particularly where they interfered with national aspirations, as with irrigated agriculture.

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<sup>60</sup> See O'Gorman, *Flood Country*, pp.135-171.

<sup>61</sup> See O'Gorman, *Flood Country*, pp.135-171.

<sup>62</sup> Powell, *Watering the Darden State*, pp.

<sup>63</sup> Emergency Management Australia, 'EMA Disasters Database: 1956 Floods'.

[www.ema.gov.au/ema/emadisasters.nsf/c85916e930b93d50ca256d050020cb1f/0fc5da61368c5094ca256d3300057e35?OpenDocument&Highlight=0,1956](http://www.ema.gov.au/ema/emadisasters.nsf/c85916e930b93d50ca256d050020cb1f/0fc5da61368c5094ca256d3300057e35?OpenDocument&Highlight=0,1956), 2007.

<sup>64</sup> Telegram from Prime Minister Menzies to Playford, Premier of South Australia, n.d. 'Flood Control – investigation of flood control and mitigation in the Murray Valley'. Series A987, Item E1077, Part 1, National Archives of Australia.

<sup>65</sup> Letter from F. Kenny (Secretary, Victorian Flood Relief CoMaitland Mercuryittee) to Secretary of the River Murray Commission, 5 March 1957. 'Flood Relief 1956 General File'. Inward Correspondence Files. Item 64/3703. VPRS 1163/P008/5. Public Records Office Victoria.

<sup>66</sup> *Sunraysia Daily*, 18 August 1956, p. 1.

In response to these floods, non-irrigating farmers in the upper Murray valley voiced concerns that the irrigation dams being built as part of the Snowy Mountains Scheme could raise flood heights by releasing water when the river was flooding. Engineers and politicians quickly countered these concerns. However, in the aftermath of a series of floods two years later, farmers in the upper Murray raised similar concerns, arguing that the Hume Dam and to a lesser extent those built for the Snowy Mountains Scheme had increased both the height and frequency of floods by maintaining full dams for the irrigation season. These farmers argued that water managers had thereby undermined local flood knowledge, which in turn increased damage to farms and stock losses. Further, some argued that the dam should be used for flood mitigation rather than irrigation water supply.<sup>67</sup>

These concerns about dams point to changes in understanding of floods from extensive river engineering as governments became intertwined with river flow; they were, in a very real sense, embedded in the river. Along regulated rivers like the Murray, floods were no longer regarded as 'natural disasters' in the way they had been and were instead seen to come from a river controlled by officials. The upper Murray farmers' sense of injustice at suffering floods for the sake of irrigation, however, was felt rather than vindicated. Indeed, later research showed that the Hume Dam had helped to prevent a number of floods both before and after its enlargement in the late 1950s (partly for flood mitigation), for example in 1937, 1941, 1959, 1962, 1963, 1965 and 1968.<sup>68</sup> While this may be seen as a benefit in terms of flood mitigation, steadier river flows and the accumulation of longer periods with fewer floods caused ramifying ecological disaster along the river and floodplains.<sup>69</sup>

The floods and generally wet years of the 1950s set a new agenda for engineers. In the following decades the eastern states embarked on extensive programs of dam building to feed irrigation networks, encourage new networks, supply water to growing populations and industries, and in some areas to mitigate floods, made cost-effective as they protected highly productive regions. For example, in the 1960s and 1970s new dams on the Namoi and Macquarie Rivers in the upper Darling River system, NSW, supported the establishment of water-intensive cotton growing.<sup>70</sup>

In the 1960s to 1980s, the privileged position of irrigation and national development through dams was also challenged by economists, some dry-land farmers, environmentalists, and civil rights activists. The concerns of residents in the upper Murray over changed flood flows were felt across

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<sup>67</sup> Newspaper clippings, in 'Flood Control – investigation of flood control and mitigation in the Murray Valley'. Series A987, Item E1077 Part 2. National Archives of Australia.

<sup>68</sup> Sinclair, *The Murray*, p. 70.

<sup>69</sup> Sinclair, *The Murray*, p. 70; Weir, *Murray River Country*, pp. 26-29.

<sup>70</sup> Powell, *Watering the Garden State*, pp. 258–62; See O'Gorman, *Flood Country*, 185-192.

Australia and internationally as the social and environmental changes caused by dams, the privileged position of irrigation industries, and the challenges of limited water resources all helped to turn dams from revered national icons to controversial constructions responsible for social injustice and environmental degradation. The increasing popularisation of ecology from the 1970s was central to these challenges, as this approach emphasised the consequences of reductions in river and flood flows in declining habitat for many species.<sup>71</sup>

The effects of changed river and flood flows along the Murray, such as the death of flood-dependent red gum forests, as well as increased soil salinity, had been recognised early.<sup>72</sup> However, these problems increased and gained wider public recognition in the 1970s and 1980s, particularly among farmers and rural communities, as irrigation was pursued more intensively and more widely. Water diversions also meant that floodplains were not regularly flushed of accumulated salt. Land clearing for more intensive forms of agriculture also increased salt levels in the soil by causing the water table to rise.<sup>73</sup>

In some areas, the idea persisted of irrigation and dams as emblems of national development and technological progress, preventing residents of flood country voicing their opposition to irrigation schemes even if they were disadvantaged by reduced river flow. For example, environmental historian Heather Goodall has noted that graziers on the Darling River, who were disadvantaged by reduced river flow from cotton irrigation in the Bourke area, were reluctant to oppose irrigation publicly. Goodall wrote that graziers were 'uncomfortable about positioning themselves as opponents of "progress" and profit-making development'.<sup>74</sup> The power of more than a century of river development and land settlement rhetoric endured.

The 'top-heavy' approach in government water management was also evident in a centralization of responses to potentially damaging floods and other 'natural disasters'. In the 1970s Australian state involvement in community preparations and responses to floods were formally centralized by policy and legislation, for the first time giving state governments power to take charge in events that were seen to be natural disasters. Previously, responses to events like floods had fallen under the responsibility of local governments and community groups, and state aid had been largely been *ad hoc*. This move, which was undertaken by all states and territories, was prompted by a series of environmental events, including Cyclone Tracy that devastated Darwin in 1974, costly floods in Brisbane the same year, and large floods along the Namoi River in NSW

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<sup>71</sup> See O'Gorman, *Flood Country*, pp.179-197.

<sup>72</sup> Powell, *Watering the Garden State*, pp. 255-8.

<sup>73</sup> Connell, *Water Politics in the Murray-Darling Basin*, pp. 17-18.

<sup>74</sup> Goodall, 'The River Runs Backwards', p. 48.

throughout the 1970s.<sup>75</sup> This centralization was largely a response to the need to quickly transport equipment and people around states, and sometimes Australia, during environmental events like floods. However, it also gave additional powers to state governments to take total charge of areas declared to be in danger from a 'natural disaster', including enforcing an evacuation. The declaration of 'natural disaster' areas points an additional consequence of these new laws. Many of the Acts and new government departments attached legal or administrative significance to the term 'disaster' or 'natural disaster', and so from the mid-1970s these terms gathered new economic, legal, and bureaucratic meanings in Australia.<sup>76</sup> Such top-heavy decision-making in natural disasters and their aftermaths was codified in law but was deeply resented by local residents. As historian Peter Read has shown, since Cyclone Tracy in 1974 locals had urged place-sensitive responses to disaster management.<sup>77</sup> Mounting administrative issues and criticism from local communities during and after large floods through the Darling river system in 1990, prompted a review of the governing legislation in Queensland and other states.<sup>78</sup>

Similarly, 'top heavy' water managers were increasingly unable to address complex social and environmental problems, in part created by the intensification of agriculture. In the 1980s most water management departments in the eastern states underwent significant restructures in order to more effectively manage many of the water supply and environmental problems caused by irrigation.<sup>79</sup> Similarly, in 1993 the River Murray Commission, which had largely focused on irrigation along that river, was reconstituted as the Murray-Darling Basin Initiative, in order to address basin-wide issues of water quality (which had deteriorated due to irrigation extraction and toxic run-off from, for example agricultural chemicals) and rising soil salinity, largely attributed to irrigation.<sup>80</sup>

These changes were further influenced by international pressure, including through the Brudtland report or *Our Common Future* published by the United Nations (UN) in 1987. The report developed concerns, raised in UN conferences since 1977, over water security and access; the 'needs of the present' must be met, the report stated, 'without compromising the ability of future

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<sup>75</sup> 'About Us', State Disaster Management Group. State Government of Queensland.

<http://www.disaster.qld.gov.au/about/>, accessed 17 April 2008; and, J J Pigram, *Australia's Water Resources: From Use to Management*, (Collingwood, Victoria: CSIRO Publishing) pp.35-36.

<sup>76</sup> 'About Us', State Disaster Management Group. State Government of Queensland.

<http://www.disaster.qld.gov.au/about/>, accessed 17 April 2008.

<sup>77</sup> Peter Read, *Returning to Nothing: The Meaning of Lost Places* (Cambridge: Cambridge University Press, 1996), 148-171.

<sup>78</sup> For more details see: O'Gorman, 'Local Knowledge and the State'.

<sup>79</sup> Connell, *Water Politics in the Murray-Darling Basin*, p. 16.

<sup>80</sup> Queensland joined the Initiative in 1996. Murray-Darling Basin Commission, 'Murray-Darling Basin Agreement', Murray-Darling Basin Commission archived website, [www2.mdbc.gov.au/about/the\\_mdbc\\_agreement.html](http://www2.mdbc.gov.au/about/the_mdbc_agreement.html), 2007; Pigram, *Australia's Water Resources*, pp.160-3.



generations to meet their own needs'.<sup>81</sup> In the 1990s Integrated Catchment Management was taken up by Australian states and in 2004 by the Federal government as a means to further address declining water quality and increases in soil salinity.<sup>82</sup>

In 2007 the Australian Federal government announced a \$10 billion fund to aid in the management of ecosystems and competing demands on water in the Murray-Darling Basin. This money has invigorated Federal involvement in the region and has been accompanied by bureaucratic changes. In December 2008 the Murray-Darling Basin Authority was created (replacing the Murray-Darling Basin Commission within the Initiative), in accordance with the *Water Act 2007*. This most recent restructure is part of a history of government attempts to address changing concerns and aims in river management. A major aim of the new management and funding is a government 'buy-back' scheme for purchasing farms and their associated water licences. The water entitlements of these licences are intended by the government to contribute to environmental flow allocations, for example to wetlands; that is, when there is water in the rivers to meet these entitlements.

In his recent book *Water Politics the Murray-Darling Basin*, Daniel Connell drew attention to the fact that Australians have not yet seen the full environmental consequences of water extraction, especially for irrigated agriculture: 'There are long lag times in these ecological systems that mean it will be many years before the full extent of degradation caused by contemporary levels of extraction are evident'.<sup>83</sup> The ecology of the Basin will continue to change for many hundreds of years in response to extractions, the introduction of new fauna and flora, and dramatically different land use practices since European colonization. Flood flow and size will also alter as these changes manifest in future landscapes.

While a number of government agencies have been adjusted, or created, to facilitate residents' participation in decision-making processes related to rivers, floodplains, and flood events, there are continuing areas of difference between the interests of some residents of floodplains and government managers.<sup>84</sup> For example, along the Macquarie River in NSW there are disputes over the location of levees, which are used to both protect property from floods and illegally divert water into storages.<sup>85</sup> Perhaps one reason for these ongoing tensions, as noted by social geographer

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<sup>81</sup> G Brundtland. Chair. 'Report of the World Commission on Environment and Development: 'Our Common Future''. United Nations, <http://www.un-documents.net/wced-ocf.htm>, 1987).

<sup>82</sup> Connell, *Water Politics in the Murray-Darling Basin*, pp.26-45.

<sup>83</sup> Connell, *Water Politics in the Murray-Darling Basin*, p.17.

<sup>84</sup> Another issue in flood and floodplain management is the disparate aims of different government agencies. The length of this paper prevents a discussion of this issue. For more on this, see: Kingsford, 'Review: Ecological impacts of dams, water diversions and river management on floodplain wetland'.

<sup>85</sup> See the following reports about illegal levees on the Macquarie River floodplains, New South Wales: 'Report Reveals Illegal Murray-Darling Irrigation', *ABC News*, <http://www.abc.net.au/news/stories/2008/02/25/2171517.htm>, accessed 3 March 2008; and, 'Murray-Darling Woes', *Sky News Online*, [www.skynews.com.au/eco/article.aspx?id=219253](http://www.skynews.com.au/eco/article.aspx?id=219253),

Sharon Pepperdine, is that riverine and floodplain management structures focus largely on biophysical issues and do not account for complex social and industry relationships.<sup>86</sup>

## Conclusions

This paper has examined changing approaches to floods in the Murray and Darling river systems over 160 years; from the early settlement of Gundagai, whose residents criticised government surveyors for establishing the town on a floodplain and who evaluated Aboriginal knowledge and their own experiences of floods against the commercial value of trading on the flat; to the complex environmental and social circumstances brought by river engineering and an increasing centralisation of responses to floods as both important sources of water and 'natural disasters'.

In the context of relief arrangements, we have seen an increasing centralisation to state (and Federal) governments. Centralised water management and responses to floods have provided important bureaucratic frameworks. Two of the most beneficial aspects of these have been the coordination of disparate claims on river flow and floodwater, and the mobilisation of resources during flood events. However, the way these frameworks have functioned during particular floods and their ability to address local issues and circumstances have been the source of many tensions.

Competing understandings of floods connect with different values and livelihoods; for example, floods are important to graziers in semi-arid areas because they rejuvenate pastures, but they are viewed as destructive by some irrigators and residents of townships. Different values and understandings of floods have been influenced by broad changes in approaches to environments. Most significantly, the expansion of irrigation and proliferation of dams in the twentieth century radically altered flood flows and represented an understanding of environments and rivers as controllable resources for the production of agricultural commodities. Projects built in these periods, such as the Snowy Mountains Scheme and the Hume Dam were made possible through highly centralised state and Federal government water management.

Remnants of all of these past practices and management approaches are still present in the landscape. Grazing, dams and irrigation, as well as social and legal arrangements like water allocations, have shaped current environments, rivers, and floods. These and other current management plans and practices enter into environments shaped by past relationships with rivers and floods. Physical traces and cultural legacies of past understandings and practices are another

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accessed 3 March 2008 (No longer available online. Excerpts archived at: *Water Conserve: Water Conservation Portal and Search Engine*,

<http://www.waterconserve.org/shared/reader/welcome.aspx?linkid=93416&keybold=water%20AND%20%20theft>, accessed 8 August 2009).

<sup>86</sup> Sharon Pepperdine, 'Integrating Social Considerations in Catchment Management', in E Potter, A Mackinnon, S McKenzie, and J McKay (eds.), *Fresh Water: New Perspectives on Water in Australia* (Melbourne: Melbourne University Press), pp. 202–16, 202.

reason why histories are so important in understanding and addressing contemporary issues, and need to be considered in current approaches to managing and living in the region. Within these radically altered and continually changing physical and cultural landscapes, climate change presents another element of uncertainty in considering future approaches to floods. It is out of this complex history and a new contemporary context that we will ultimately need to create liveable water futures.



Figure 1: Map of the Murray-Darling Basin, 2012 (Credit: Ian Falkner)



Figure 2: W.C. Piguenit, 'The Flood in the Darling, 1890'. NSW Art Gallery.