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Flood Country

Floods in the Murray and Darling River Systems,
1850 to the Present

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A thesis submitted for the degree of Doctor of Philosophy of
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This thesis is an account of research undertaken between March 2005 and September 2009, primarily at The Australian National University.

Unless otherwise indicated the work presented herein is my own.

None of the work presented here has ever been submitted for any degree at this or any other institution of learning.

Emily O'Gorman
September 2009
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Abstract

In the region of drought-dominated inland eastern Australia now known as the Murray-Darling Basin, floods occupy a special status. Although relatively infrequent, they are crucial sources of water for people, animals, and plants. They drive hydrology in the region, supplying most of the surface and ground water. Floods are often transformative events for people as well as the non-human environment. This thesis explores Australian settlers’ changing relationships with, and understandings of, the rivers and floodplains of the Murray and Darling river systems from 1850 to the present. It analyses floods in terms of the two dominant roles that they have played in settler history in the Murray and Darling river systems: as ‘natural disasters’ and as part of the wider hydrology of rivers. Four key flood events are closely examined. The selected flood episodes – 1852, 1890, 1956, and 1990 – illuminate changing ways of knowing and managing rivers, floods, and floodplains over a century and a half, and some of the long-term consequences for people, rivers, and ecologies. Analysis is also anchored in an examination of a number of themes: regional tension with centralised governments over decision-making processes; the particular forms of river management that centralised government enables (such as large-scale riverine engineering); different kinds of knowledge of the rivers, especially regional (or local) knowledge, scientific knowledge, and government (and managerial) knowledge; tensions and cooperation between the custodians of these different kinds of understanding; and the emergence of the Murray-Darling Basin as a managerial unit. The thesis aims to present a ‘floods-eye-view’ of the history of the area (and, partly, of Australia) and explore the ways that settlers, the rivers, and the floods have re-made each other.
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Conversions

This thesis uses the measurements quoted in primary sources, except where conversions to contemporary (metric) units have been necessary for comparison or clarity. Conversions are provided below.

**Imperial to metric:**

1 acre = 0.405 hectares
1 inch = 25.4 millimetres
1 foot = 30.5 centimetres
1 yard = 0.914 metres
1 mile = 1.61 kilometres
1 pound = 0.45 kilograms
1 acre foot = 0.123 hectare metres

(Acre feet and hectare metres are units of volume, i.e. acre = area, feet = depth).

**Other measurements:**

1 cusec = 28.35 litres per second
1 megalitre = 1,000,000 litres
Introduction

In 2008 the Macquarie River made headlines around Australia. Newspapers reported that floodwater was being ‘stolen’. Scientists had released a study claiming that irrigators had built unapproved earth embankments along the river. The embankments, the scientists maintained, would illegally divert flood flows to drought-stricken farms. The scientists argued that ‘harvesting’ floodwater in this unmonitored way could damage the internationally recognised Macquarie Marshes wetlands down river. The ecology of the wetlands is dependent on sizable flood flows; thousands of birds flock to the marshes to breed during flood events. Graziers also relied on floods to rejuvenate pastures and replenish water supplies in the lower Macquarie. Journalists reported that irrigators were stealing environmental flows intended for the marshes, and had done so for years without prosecution. A spokesman for irrigators in the area claimed that they were being victimised by government, graziers, and environmentalists. These newspaper reports about this region, located on the eastern edge of the Darling river system in New South Wales, came in the wake of national discussions about environmental degradation along the iconic Murray River as Australians reassessed, and sought to reform, their relationships with rivers.

A year later, in another part of the Darling river system, floods again made headlines; but for a different reason. The town of Bourke, located on the upper reaches of the Darling River in New South Wales, flooded. The flood caused $6 million worth of damage to property and infrastructure in the town. The state government declared Bourke a ‘natural disaster zone’ and the Federal government initiated financial assistance to those who suffered losses from the flood.²

These two instances, of conflict on the Macquarie and disaster in Bourke, draw attention to the complex ways in which floods in the Murray and Darling river systems are entangled in the lives and livelihoods of residents of flood country and ultimately impact upon the nation. Floods in these river systems are central to the boom and bust nature of the watercourses and the environments and ecologies they are connected with. ‘Boom and bust’ environments, as Libby Robin and Leo Joseph have recently noted, are also cultural concepts.³ It is the role of floods in booms, within a region frequently in drought (busts), that have shaped settler understandings of them as simultaneously important sources of water and ‘natural disasters’. This often fraught duplicity has created frequent conflict in a region that has become Australia’s agricultural heartland.

The Murray and Darling river systems together form what is now known as the Murray-Darling Basin. The web of rivers and their catchments that comprise the Basin cover parts of four states (Queensland, New South Wales, Victoria and South Australia) and the entire Australian Capital Territory. The Great Dividing Range forms the eastern edge of the Basin and is where most of the rivers have their headwaters. Rain-bearing weather systems that break over these mountains, along with snow falls in the southern ranges and southward moving monsoonal systems in the north, bring rain which feeds floods. Floods drive hydrology in the Murray and Darling river systems, feeding networks of rivers, creeks, gullies, soaks, and underground aquifers; indeed the Darling River has the most variable flow of any river in the world – large floods that spill out onto vast floodplains can quickly pass to leave intensely dry, sometimes completely dry, riverbeds.

Map 0.1
Current topographical map of the Murray-Darling Basin, with the Murray and Darling river systems differentiated.
[By: Jennifer Sheehan, Cartographic Services, Research School of Pacific and Asian Studies, the Australian National University.]
The Basin is a significant part of the total area of Australia; one seventh or 14 percent of the continent.4 Within this vast area are diverse local environments; from the mountainous regions of the Great Dividing Range to the flat black soil floodplains of the Darling River, red gum forests of the Murray, and chains of ponds in the far west of the Basin. There is a wide diversity of environments even within these regions. They are connected through the rivers and floods, which drain into the ocean through a common mouth (if the water reaches it) near Goolwa in South Australia.

There are no large cities within the Basin, except for Canberra; it is an area that is dominated by agricultural industries. In the census years 2005-06, 84 percent of the land in the Basin was owned by agricultural businesses and 67 percent of the land was used for growing crops and as pasture. Agricultural production also used the greatest amount of water in the Murray and Darling river systems in the 2005-06 census period; during this time 83 percent of the water consumed in the Basin went to agricultural industries.5 The region produces a significant portion of Australia’s agricultural goods (comprising 39 percent of Australia’s total agricultural value in 2005-06), especially food. All rice in Australia is grown in the Basin and a number of other foods grown there contribute large percentages of the national totals, such as oranges, apples, wheat, and pork. Many crops that are cultivated in the Basin are grown through irrigation, predominantly cotton, fruit and nuts, and grapes. Many dairy farmers also irrigate pastures.6

The Murray-Darling Basin and the role of these industries has been the focus of national debates over the last few decades but increasingly so in recent years. These debates provoke confronting and always difficult questions; how do we live in a land dominated by drought and flood? How should water and changing environments be managed? Floods are important in these debates; and so is history. These questions are not new. Their histories need to be considered in order to shape water futures. Settlers’ changing relationships with rivers and floods in the Murray and Darling river systems

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have shaped the environment, the way the rivers flow, and the landscape in which these questions need to be asked. Floods have also shaped settler understandings of the environment, their lives and livelihoods.

As major sources of water in dry regions, floods have been highly valued, sources of heated debate, and the rationale behind engineering schemes; they have also been seen as ‘natural disasters’, causing death and damage. This thesis explores Australian settlers’ changing relationships with, and understandings of, floods and the rivers and floodplains of the Murray and Darling river systems from 1850 to the present. It takes its starting date as roughly the time when permanent colonial settlement began in the inland. Earlier ventures of settlers into the region are included where relevant.

This thesis closely analyses four key flood events. The selected flood episodes focus on events at different places within the Murray and Darling river systems that occurred at different times. Each focuses on a town but also includes analysis of the surrounding regions and adjoining rivers. These events occurred in: Gundagai (located on the Murrumbidgee River, New South Wales) in 1852; Bourke (on the Darling River, New South Wales) in 1890; Mildura (on the Murray River, Victoria) in 1956; and Cunnamulla (on the Warrego River, Queensland) in 1990. These flood episodes or case studies, together with the chapters that link them, explore changing ways of knowing and managing rivers and floods over a century and a half, and some of the long-term consequences for people, rivers, and ecologies. In particular this thesis takes up a number of key themes: regional tension with centralised governments over decision-making processes; the particular forms of river management that centralised government enables (such as large-scale riverine engineering); different kinds of knowledge of the rivers, especially regional (or local) knowledge, scientific knowledge, and government (and managerial) knowledge; tensions and cooperation between the custodians of these different kinds of understandings; and the emergence of the Murray-Darling Basin as a managerial unit. It aims to present a ‘floods’-eye-view’ of the history of the area (and, partly, of Australia) and explore the ways that settlers, the rivers, and the floods have re-made each other.

Another aim of this thesis is to show how each flood is unique, influenced by vastly different, as well as nuanced, weather, river, and floodplain conditions. Two floods in the same river will be different, so the precise history of each is important now. The

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7 In this thesis the word ‘inland’ refers to the area of Australia that lies west of the Great Dividing Range and east of the central desert region — in short the area that is now the Murray-Darling Basin.
case studies also attempt to draw attention to the diversity of local environments within the Murray and Darling river systems and how they have changed and continue to change.

Map 0.2
Current topographical map of the Murray and Darling river systems showing the location of the four towns I discuss in detail: Gundagai, Bourke, Mildura, and Cunnamulla.
[By: Jennifer Sheehan, Cartographic Services, Research School of Pacific and Asian Studies, the Australian National University.]
Floods and Commentaries

This thesis explores floods in terms of the two dominant roles that they have played in settler history in the Murray and Darling river systems: as ‘natural disasters’ and as part of the wider hydrology of rivers. In this context floods have been understood as both events and part of longer environmental rhythms. They have been managed as emergencies, but also within broader water and environmental policies and understood as part of the way rivers flow. This thesis aims to bring together these somewhat contradictory ways floods have been understood. Its structure is designed to achieve this purpose.

The case study chapters are the backbone of the thesis. Each concentrates on either a single large flood or sequence of large floods that occurred at a particular place and time. Each explores floods primarily as events and examines the ways in which they have been managed, understood, and experienced as natural disasters and emergencies, as well as the conflicts that have followed them. Together they offer a situated examination of how big ideas about the nation, environment, technology, and industries that were held in state bureaucracies, professional fields, and metropolitan media, affected particular areas as they experienced flood events, and how the ideas themselves were in turn shaped by floods and the responses of residents of flood country.

The chapters between the case studies do two things. First, they explore how floods (small and large) have shaped, and been entangled with, wider water and environmental management and transitions in understandings and uses of rivers and floodplains. Secondly, they act as chronological links between the case studies, providing broader perspectives in terms of places and periods of time as well as bridging information and arguments between the close studies of flood events.

Sources and Method

This thesis draws on a humanities perspective to reframe ideas about floods and the settler history of the Murray and Darling river systems and Australia. Floods in the
Murray and Darling river systems and Australia are commonly written about within the sciences and, to a lesser extent, the social sciences. This thesis re-examines these studies, but primarily aims to contribute to the growing body of work in the humanities about floods, rivers, and floodplains. My approach is influenced by recent work and by what are now classic studies in the humanities on rivers, floods, dams, and local knowledge.\(^8\) These include work by academics such as Timothy Mitchell (*Rule of Experts*, 2002), James C. Scott (*Seeing Like a State*, 1998), and Donald Worster (*Rivers of Empire*, 1985).

Particular aspects of these scholars’ work have influenced my approach. Mitchell’s exploration of the local, national, and international effects of river management in British-occupied Egypt has been an important influence. His analysis of the profound consequences of new technology, such as large-scale dams, has influenced my focus on the role of technology and the politics that surround its implementation. In addition, Mitchell’s examination of the relationship between local residents and centralised government in Egypt, especially as these relationships incorporate environments and broader ecological relationships, has contributed to my analysis of the ways in which both local residents and centralised government have shaped rivers and flood flows, points of tension between these two groups, and the immediate and long-term consequences of their actions. Scott’s analysis of the exclusion of local knowledge (what he terms ‘metis’) from increasingly centralised bureaucratic policies and decision-making processes, with the advent of ‘modern statecraft’, has also influenced my examination of the tensions between local residents and centralised government.\(^9\) Worster’s analysis of the ideologies that underpinned dam construction and the expansion of irrigation in the American West in the 1930s has also been influential, especially his examination of the ongoing environmental, social, and political consequences of these schemes, at local, state, and national levels.

This thesis is an environmental history. Broadly defined, environmental history is a branch of the discipline of history that studies people’s changing relationships with

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\(^8\) This thesis explores what local knowledge is, does, and means. It therefore does not offer a preemptive definition of ‘local knowledge’.

their environments. This thesis is situated within, and engages with, a number of key areas of environmental history and the works of academics in these fields. It explores changing ideas of the nation through discussions of cultural imaginings of 'the bush' as a source of national identity, projects of national development such as dams, Federation, and broad changes in understandings of Australian environments (Libby Robin, George Seddon, Tim Bonyhady, Tom Griffiths). Another key influence is the history of science, particularly the way environments have both shaped, and been shaped by, scientific practices, institutions, and bureaucracies (Robin, Kirsty Douglas, Tim Sherratt, Ian Tyrrell). It also draws on work by environmental historians in analysing settler relationships with rivers and floodplains as well as with wider environments on a regional or local scale, particularly in discussions of mining, pastoralism, and irrigation (Heather Goodall, Paul Sinclair, John Merritt, Griffiths, Tyrrell, Robin).

In addition, this thesis draws on and engages with the work of two historians who have written substantial histories of water management in Australia: Clem Lloyd and J.M. Powell. It particularly draws on two of their books, Lloyd’s Either Drought or Plenty (1988, on water management in New South Wales) and Powell’s Watering the Garden State (1989, on water management in Victoria). These works, first published in the 1980s, remain important foundational studies in a variety of disciplines in Australia, including environmental history, human geography, and historical geography. Both histories, while commissioned by state water authorities, critically analyse water management since settlement and explore the way ideas, environments, and individuals have shaped government bureaucracies and management as well as politics. In an historical context, these works can be seen as part of the reflexivity of water management departments in the 1980s as they restructured and assessed their histories in order to address environmental degradation and local conflicts around the effects of dams and irrigation on river flows. These works and their contexts are discussed further in chapter six ('Challenging

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National Development: Dams and Irrigation, 1956 to 1990'). This thesis also draws on other histories of water management in Australia, such as Daniel Connell’s Water Politics in the Murray-Darling Basin (2007).

The research for this thesis was conducted in a variety of libraries, archives, and other places. Many of the documentary primary sources were researched at state libraries and archives located in Brisbane, Sydney, and Melbourne. Research was also conducted at the National Library of Australia, National Archives of Australia, the Murray-Darling Basin Commission (now Murray-Darling Basin Authority) library, and the Australian Dictionary of Biography research room (which provides access to biographical research files), all of which are located in Canberra. In addition, research was conducted at the Bureau of Meteorology library in Melbourne. Other documentary sources, especially for the case study chapters, were researched at local libraries, including at Gundagai, Bourke, Dubbo, Mildura, and Cunnamulla. I draw on government documents, scientific works (including published articles, unpublished manuscripts, government scientific reports, and non-government scientific work), personal papers, survey plans, maps, pictures, manuscripts, past and current legislation (especially in chapters seven and eight) and newspaper articles researched at these locations.

Some documentary sources were found outside of these institutions and services. In travelling to the places I was researching I informally met a number of relevant people. In two cases people passed on documentary sources that were valuable to this thesis.

Ted Lawton in Mildura gave me copies of photographs he took during the 1956 floods. The photographs had been recently digitised by staff at the Mildura library and Lawton granted permission for these to be copied for use in this thesis. He also talked me through the photographs, describing locations and the time they were taken in relation to the progress of the flood. Some of these photographs appear in chapter five ('Mildura and the Murray River 1956: The Failure of Engineering').

Allan Tannock in Cunnamulla gave me a copy of his book, The Warrego Watershed. Chapter seven ('Cunnamulla 1990: The Town That Did Not Flood') discusses this book in detail. This book is available through a number of libraries, but it was important that I met Tannock. We were able to discuss the book and he elaborated on some of the ideas in it. Through our discussions I also gained additional insights into local networks and floods which I might have missed if I only had the book; if I had read the book, in a sense, outside of its local, authored, context. Indeed, it was through local
networks that I was able to meet custodians of local knowledge, such as Tannock. As I visited places, I was gradually directed by residents to certain people who were custodians of both local documentary sources and flood knowledge. I conducted two informal interviews with Tannock which I draw on in that chapter. For chapter seven I also informally interviewed former policeman Harry Edwards. As these interviews were informal I have used them minimally. They have been mainly used to supplement and cross-check documentary sources.

Travelling to places in the inland for research has also informed this thesis in other ways. Spending time in these locations, seeing levee banks and rivers, walking, and in some cases flying, over the floodplains, and talking to people who live there has added to the way this thesis is written and its arguments. Mostly these have been subtle additions, such as in the descriptions of rivers and floodplains presented in the chapters, but some have also been more significant. For example, talking to an employee at the tourist information centre in Gundagai was helpful in the discussion in chapter one ('Gundagai 1852: The Town That Moved') of the location of graves and burial grounds of those that died during the June 1852 flood. Such conversations with residents prompted me to follow certain research threads and also to talk to particular people with local flood knowledge, such as Tannock.

Other sources used in this thesis include local histories, theses, government and non-government websites (for example, the Macquarie Marshes Management Committee website), and scholarly books and articles.

* * *

Overview

Together the chapters of this thesis map the way understandings of floods have changed as well as aspects that have endured. However, each chapter emphasises different themes, places, and floods within the broader scope of the thesis. The first chapter ('Gundagai 1852: The Town That Moved') focuses on a flood that occurred in June 1852 in the town of Gundagai, located on the Murrumbidgee River in New South Wales. The flood was large and destructive, with over 70 people killed, and led to the town being moved to higher ground. Yet there had already been other large floods in the town. Why was the
town surveyed and built on a floodplain? Why did settlers continue to live there despite the threat of large floods? These questions are addressed in this study and are also relevant to many towns that were established in the inland in this period. This chapter examines the way settlers accumulated and evaluated flood knowledge in a location where they had begun to reside only recently, including exchanges with Aborigines about flood knowledge and the way this information was evaluated by settlers. It further analyses the accumulation of flood knowledge by government officials, and tensions between residents of flood country and centralised government over flood knowledge and decision-making processes to address floods, especially as large floods began to occur in the town.

The second chapter ('Experimentation and Regulation: Pastoralism and Mining, 1850 to 1890') explores the way floods shaped water management between 1850 and 1890, as government regulations over settler use of river water became more restrictive. It particularly focuses on water regulations in goldmining and pastoralism, two dominant industries in the inland in this period. Colonial governments formulated extensive regulations around miners' use of river water, diversion of flood flows, and flood mitigation, while pastoralists' use of river water was largely unregulated. This chapter explores how water regulations in mining and the lack of regulations around pastoralists' water use connected with broader government ideologies of land settlement and shaped settlers' relationships with rivers and floods.

The third chapter ('Bourke 1890: The Birth of Engineering') focuses on a large flood that threatened the town of Bourke, located on the Darling River in New South Wales, in 1890. It explores the relationship between the colonial government, district representatives to the colonial government, and the residents of Bourke, both during and after the flood. More specifically, it focuses on the formation of these relationships around the claims of the townspeople on government funds for the building of a permanent flood embankment around the town. This flood marked a transition in government approaches to floods, from predicting flood flows through meteorology to mitigating floods through engineering. It further signalled a shift in government accountability and involvement in local affairs through built works. Government involvement in ensuring settler security from the fluctuations of river flow through engineering was part of a broader government move towards watershed-wide river manipulation. This flood is also examined within the context of Bourke as the centre of an important wool growing district and symbol of cultural identity for urban-dwellers in New South Wales and Australia.
The fourth chapter ('Federation, Engineering, and a 'Watershed' Perspective, 1890 to 1956') explores how rivers and floods in the inland were entangled in colonial, and then state, plans for large-scale engineering works, from before Federation through to the beginning of the post-war period. In this period the Murray River became, and remained, the focus of colonial and state governments' 'river development'. This chapter analyses why the Murray became the focus of government river engineering, why irrigation superseded navigation in governments' priorities for the river, how the creation of federal bureaucratic frameworks facilitated large-scale river engineering and watershed administration, particularly the River Murray Commission, and the role of floods in these developments. It also examines the expansion of irrigation and international influences on Australia's water management for irrigation and its watershed administrations, necessary for large-scale engineering.

The fifth chapter ('Mildura and the Murray River 1956: The Failure of Engineering') focuses on a series of floods that occurred along the Murray River in 1956, particularly as they were experienced in the irrigation district of Mildura located in Victoria. Floods occurred throughout the Murray and Darling river systems in 1956, causing either a single peak or a series of peaks in different areas. This chapter explores the ways in which the floods were perceived by settlers as a failure of state and Federal government engineering to control and manage floods. The floods occurred when projects of technocratic national development were being built to harness and regularise river flow along the Murray and its tributaries for irrigation and hydro-electricity. This chapter further examines the way engineering structures such as the Hume Dam and Snowy Mountains Scheme were perceived by some settlers to have increased both the height and frequency of floods that occurred in 1958 and to have undermined local flood knowledge.

The sixth chapter ('Challenging National Development: Dams and Irrigation, 1956 to 1990') explores three ways in which highly centralised state government water management, programs of dam building for national development, and policies that privileged irrigation, were challenged between 1956 and 1990. It examines the way floods were entangled in these challenges and in changing national perceptions of dams, from projects of national development to being problematic on a number of levels, including environmentally and politically. First, it analyses B.R. Davidson's economic critique of irrigation; secondly, the challenges by residents of flood country along the Namoi and Macquarie rivers to then recent irrigation works, to government water management, and
to the operation of government dams; and thirdly, the way the environmental movement fostered a national change in the perception of dams and irrigation. Yet the centralised management of rivers and ‘flood response’, a development that was strengthened and then challenged in this period, endured into the 1990s.

The seventh chapter (‘Cunnamulla 1990: The Town That Did Not Flood’) focuses on a flood that threatened the town of Cunnamulla, located on the Warrego River in Queensland, in 1990. It explores this flood in the context of rural decline in south-western Queensland and highly bureaucratised and centralised state involvement in flood response. It concentrates on the local knowledge of resident Allan Tannock and his role in preventing the evacuation of the town. This chapter further explores the regional context of the flood through a discussion of the evacuation of Charleville, a town located on the Warrego, upstream from Cunnamulla. It examines some of the tensions between residents of flood country, including custodians of local flood knowledge, and state government officials within a bureaucracy of emergency management that devalued local knowledge and favoured humanitarian approaches to floods above that of communities-in-place.

The eighth chapter (‘Local Knowledge in the Context of Climate Change’) brings examination of floods up to the present, tying issues into a contemporary set of problems. It explores the importance of local knowledge in addressing changed flood flows due to climate change. It also asks, in such a global happening as climate change, what are the limits of local knowledge? It explores the value of local knowledge in the face of environmental uncertainty induced by climate change and other alterations to the environment from past and current settler land use practices.
Gundagai 1852
The Town That Moved

Scanning across the floodplain that stretches between the Murrumbidgee River and its anabranch Morelys Creek it was quite possible for me to pick out unmistakable elements of a water landscape even during these drought years. To the east, on this floodplain, lie ravines carved by past, fast-flowing water and in the distance eucalypts trace out the path of long, eroded watercourses and willows hang over the banks of the Murrumbidgee.

This is a landscape that has been shaped by countless wet periods with intermittent and sudden floods. It is not a place to build a town. Yet the flat within this floodplain was selected by the New South Wales colonial government, surveyed in 1838, as the site for the town of Gundagai, officially established in 1841. Despite damaging floods in Gundagai in the years 1844, 1847, and 1851 it was not until the large and destructive flood in June 1852 that major sections of the town were eventually moved to the hill, north of the flat, named Mount Parnassus. It is this place and event, of flood landscape and the town that moved to a hill, that frame cultural and environmental interconnections particular to the case of Gundagai.

In 2007 I visited Gundagai again, this time not for the purpose of research, but for a break in a drive to Melbourne. In stopping there, I was following a travellers’ tradition that had been the impetus behind selecting the site for the town. Gundagai was established as a service town at the only crossing place on the Murrumbidgee River on the main overland route from Sydney to Port Phillip and South Australia. In an era of pastoral expansion and when gold was beginning to draw settlers south, the town had a steady trade and a period of economic growth in the 1850s.
The flood of June 1852 devastated Gundagai. The floodwaters rose high and fast, fed by large quantities of rain and snowmelt. According to Emergency Management Australia in 2009, this flood remains Australia's worst flood disaster in terms of lives lost.¹ Between 75 and 100 people, or one third to one half of those visiting or living on the flat, were reported to have perished.

This chapter builds and draws on other histories of Gundagai. These include Wardiningsih Soerjohardjo's thesis 'Aspects of Life in Gundagai, 1840-60'; David Lindley's work on the biography of Thomas Lindley (an early settler and landowner in Gundagai); Cliff Butcher's book on Gundagai history Gundagai: A Track Winding Back; and the heritage assessment of 'Old Gundagai' by Brendan O'Keefe et al. The purposes and interests of these histories have been those of biography, commissioned assessments, and broader histories of the town. They have contributed to an understanding of wider social, economic, and political aspects of the town's history. Soerjohardjo noted that the flood 'generated a body of social and economic data which is of considerable assistance in reconstructing a social history of the period'.² Each of their histories describes the June 1852 flood within the broader purpose of the work. I too see the 1852 flood as crucial to the story of the town, the period, and also to this history of floods; especially the way environmental and flood knowledge was accumulated, contested, and evaluated in relation to other settler interests and within local and colonial power structures.

In order to address these questions of flood knowledge a longer perspective is necessary. I examine surveyors' and other government agents' flood knowledge alongside that of settlers, from the time of the town's survey in 1838 to the flood in June 1852. I also examine settler exchanges with Aborigines (predominately Wiradjuri, 'people of the three rivers') about flood knowledge.

In November 1852 a gold prospector, A. Waight, wrote a letter to his sister in England about the flood. He had travelled from Sydney to the Ovens River goldfields and then to the Spring Creek diggings. Recovering from dysentery and abandoned by his three fellow travellers, he described the 'misery' of his travels. He had taken the overland track to the goldfields and crossed the Murrumbidgee at Gundagai, arriving two months

after the June 1852 flood. There he stopped and witnessed the damage: 'The whole town... washed away'. He wrote about the flood, that 'came one night & rose to the tops of the Trees 30 feet & upwards'. He had heard stories from flood survivors, and may have spoken to other travellers or read one of the many regional or metropolitan newspaper reports, but he judged the height of the flood by where he saw things lodged in trees: 'you could see Houses, Cattle, Sheep, Gigs, Furniture, Roofs of Houses, & Clothes, & Human bodies at least as high as that, there was one body found the morning we got there & strange it had not putrefied although it had been there 2 months'. He could also see where people had tried to escape the flood by climbing onto the roofs of buildings:

One place where there had been a school they had placed chairs on the Table & a long form to reach the trap door at the top but it appears from what the Survivors say that they had not the courage or strength to get up as the whole Family was found drowned in the School room.

At the end of his letter, Waight drew a small map of the town’s location. He told his sister that 'the town was built in a very stupid place as the Murrumbidgee is on one side & a wide lagoon on the other no one could imagine a worse place to build the town on as in case of a Flood there is little chance of escape... however it is entirely the fault of the Government'. He wrote that 'the inhabitants have petitioned several times to have it removed to the other side of the river where they would be perfectly secure... It is almost the same with government in this Country [..] there are such a lot (quite useless) employed who never attend to their business through Pride and ignorance'. The June 1852 flood in Gundagai was a source of outrage against the government both in Gundagai and throughout the colony.

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4 Original capital letters and punctuation. A. Waight. Letter to Elizabeth [sister].
5 Original capital letters and punctuation. A. Waight. Letter to Elizabeth [sister].
6 Original capital letters and punctuation. A. Waight. Letter to Elizabeth [sister].
Gundagai had been surveyed by government surveyors. Why was it located on an island between two rivers, with a lagoon collecting floodwater and funneling it into one of the rivers that ran near the town? In a location surrounded by hills, Gundagai’s original positioning on the flat seems puzzling. Surveyors were trained to assess the environmental suitability of potential sites for settlements. The continued location of the settlement on the flat is also puzzling. Settlers had suffered large and damaging floods before 1852, without significant government intervention to protect them.

Following the June 1852 flood, the residents’ and landowners’ decision to continue to live on the flat was also questioned by former residents, visitors to the town, and distant commentators. Why would townsfolk rebuild in a place known to flood? This is a question that has also puzzled historians but been little investigated. For example, Soerjohardjo concluded that although the government surveyed and auctioned land on higher ground after the 1844 flood, ‘the people still preferred the lower ground, the bed of a river, even though their lives were in peril’. Why they ‘preferred’ to live on the flat remains tantalising.

Settler descriptions of floods in Gundagai were infused with discussions of how environmental knowledge was gained and evaluated. Environmental knowledge varied between individuals and over time. Through disparate accounts and representative manuscripts, such as petitions, we can begin to gain a sense of both shared understandings and areas of disagreement. Accounts, for example, indicate the roles given to Aborigines as prophets and saviours, but also the dismissals of their advice. There are also accounts that highlight the signs of previous flood debris, at first unnoticed and then understood, and the way settlers assimilated the experience of recent floods, sometimes as warnings, and sometimes as reassurance that ‘the big one’ was behind them. Environmental knowledge was only one factor at work and was weighed against political, legal, and economic interests of government and those who lived, traded, and bought land on the flat.

The petitions from Gundagai landowners and residents to the government in the aftermath of both the 1844 and June 1852 floods reveal changes in the relationship (and tensions) between residents and landowners and the centralised government over flood

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8 Steven L. Driever and Danny M. Vaughn have noted similar tensions, between accumulating environmental knowledge and various benefits of living on floodplains, in relation to Kansas City, United States of America. See, Steven L. Driever and Danny M. Vaughn, 'Flood Hazard in Kansas City Since 1880', The Geographical Review, 78, 1, January 1988, pp.1-19.
knowledge, responsibility for the siting of the town, and continued occupation of the flat despite the occurrence of severe large floods. These relations between the state and local knowledge significantly shaped diverse settler experiences, not just in Gundagai, but also in each of the other case studies discussed in this thesis.

The June 1852 flood occurred within the context of colonial government expansion into the inland regions of New South Wales. Gundagai was initially established as a government town, part of the colonial government's extension of land survey and greater administrative control beyond the Twenty Counties (or Settled Lands) after the abolition of free land grants in 1831. The town thus represented an early venture by the colonial government in administering inland settlement, especially towns, far from the colonial administrative centre in Sydney.

Gundagai was part of a government drive for increased settlement in the inland and developmental progress of the colony generally. Established on a trade route, it was also part of an attempt to support and secure communication and travel routes between disparate, emergent colonial settlements. Gundagai's early growth and prosperity were due to its position within networks of pastoral trade and later of the gold rush (1850s). Gundagai was also to become the grim exemplar of the environmental challenges to inland settlement and centralised government administration, especially with respect to the establishment of towns in the colony's unfamiliar environments. With the failure of siting and inaction subsequent to disastrous floods, Gundagai's cause became linked to broader questions of government administration, responsibility, and environmental knowledge. The location and flooding of Gundagai provides perspectives on ways in which the imperatives of settlement interconnected with attempts to make sense of the unpredictability of weather and river flow within the particular landforms of floodplains.

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Gundagai Floods in 1844, 1851, and 1852: A Brief Comparison

The heights of the key floods in Gundagai during this period (1844, 1851 and 1852) offer scarce data for comparison. Only one numerical height has been found for the 1844

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flood. James Gormly, then a teenager whose family moved to Gundagai that year, later stated that the 1844 flood ‘would probably have reached a height of 32 feet’ (9.75 metres). In 1844, the height of the flood was judged according to landmarks, buildings, and debris. For example, George Robinson, Protector of Aborigines for Port Phillip, travelling through Gundagai soon after the flood, wrote that the flood reached half way up the walls of houses. Another account, by a resident, described the flood as reaching the tops of the ridgepoles of some buildings. Still another described debris lodged at a ‘great elevation in the trees’. Similarly, no numerical heights can be found for two floods that occurred in 1851, in May and August. The May 1851 flood was described as reaching levels ‘within three feet of the great flood’ of 1844. The August 1851 flood was larger, described as reaching the height of the 1844 flood. The height of the August 1851 flood was also judged in terms of landmarks and buildings. One settler wrote, ‘[t]o those who know the locality it is sufficient to state that the water was at the ridge pole of the blacksmith’s shop’.

The June 1852 flood reached 40 feet and six inches (12.34 metres). A flood in July 1853 rose higher, reaching 41 feet and four inches (12.59 metres). These flood heights were probably recorded by settlers after the floodwaters receded and measured at the bank of the Murrumbidgee. These flood levels were probably close to those reached in the centre of the town, which was level with the top of the riverbank. These two floods are thought to be the highest recorded since the town was first surveyed. The June 1852 flood, though not as high as the one in July 1853, was the more destructive of the two. This may be because in 1853 the rivers were probably still high from the previous year’s flood and rains, and therefore the force of the water would likely not have been as great. Furthermore, the 1852 flood occurred at the height of a boom in Gundagai when there were likely to have been more people in the town.

12 Sydney Morning Herald (SMH), 29 October, 1844, p.4.
13 SMH, 11 November, 1844, p.2.
14 Argus, 19 June, 1851, p.4. This flood occurred on 17 May 1852.
15 Goulburn Herald, 30 August, 1851, p.3.
16 Goulburn Herald, 30 August, 1851, p.3.
17 Cliff Butcher, Gundagai: A Track Winding Back (A.C. Butcher: Gundagai, 2002), p.84; and, Petition from Gundagai residents to Governor FitzRoy, 15 July, 1852, in Goulburn Herald, 4 September, 1852, p.8
18 Butcher, Gundagai, p.84.
Soerjohardjo stated that the word ‘Murrumbidgee’ derived from an Aboriginal warning, ‘Mor-unbeed-ja’, meaning ‘a big flood’. The Murrumbidgee and its anabranch wrapped around the flat, forming a pocket of land about 2.1 kilometres long and 800 metres wide (sometimes described as an ‘island’), from their downstream junction to a point where the watercourses diverged more widely and the anabranch formed a lagoon (‘the lagoon’).

The wide lagoon, to the east of the Gundagai flat, played a significant role in flooding the town (and areas further downstream) during this period. The lagoon was fed by the anabranch (later named Morelys Creek) and the Murrumbidgee upstream from Gundagai. During periods when the Murrumbidgee received quantities of snowmelt from the Snowy Mountains and/or large amounts of upstream and local rainfall and run-off, the lagoon formed as a large basin. Water collected in the wide lagoon and was forced under pressure into the narrow stream (a continuation of the anabranch) that ran through the town. Thus, large floods could be fast rising (12 to 24 hours) on the flat.

Map 1.1
Simplified map of ‘Old Gundagai’, the allotments of which are indicated by the dotted lines. This map also includes contemporary settlement and features, such as the road and railway bridges. The lagoon is evident on the right of the map, near allotment 21.

20 The Murrumbidgee and anabranch initially part about 5km upstream from the original Gundagai site.
Surrounding hills exacerbated the impact of large floods by directing and confining the water in the valley.  

![Figure 1.2](image)

**Figure 1.2**
The flat (the original site of Gundagai) in flood, sometime between 1887 and 1927 and after the town was relocated to higher ground.


Flooding along the Murrumbidgee and anabranch completely cut off settlers on the flat from higher land. It was a combination of the force of the water, the speed at which it rose, its quantity, the amount of water already in the Murrumbidgee and anabranch (or lack of it), and the way people were isolated, that caused floods to be so destructive to the town and so deadly to its inhabitants. The June 1852 flood followed a period of drought and low river flow. The flood was fed by heavy rainfall and snowmelt and the rivers swelled with turbulent water as the flood was not ‘cushioned’ by already full rivers. The intersection of such environmental conditions, which favoured a large and turbulent

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21 Petition quoted in, *Goulburn Herald*, 4 September, 1852, p.8
flood, coincided with a period of growth in Gundagai, and the flood brought together a
cumulation of wider environmental and cultural factors in the history of Gundagai.

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Gundagai Before Survey: Crossing Place and Conflict

Gundagai in 1852 was in many ways a by-product of the 1830s and 40s boom in
settlement and land investment, centred on pastoralism following rapidly from
exploration of the inland in the 1820s. Peter Stuckey established Willie Poolma (or
Polma) pastoral station in 1828 at the site that was later to become South Gundagai. He
was the first European to cross the Murrumbidgee at the point which was later to give
place to the town of Gundagai, and it became known as Stuckey's Crossing or Stuckey's
Ford. Explorers, such as William Hovell and Hamilton Hume (who journeyed near the
area in 1824 on their way to Port Phillip, but veered west of the site), and later Charles
Sturt (who passed through the area and crossed the Murrumbidgee at Stuckey's Crossing
in 1828), used Aboriginal paths (or trackways) on their travels.22 A heritage assessment of
the site has speculated that 'Stuckey may have made use of Aboriginal knowledge or
followed Aboriginal example in making his crossing of the river at Gundagai'.23 At the
time, the flat was likely an established Aboriginal crossing place over the Murrumbidgee,
as it was a ceremonial site and camping place.24 Other squatters joined Stuckey soon after
his arrival. The area, then outside the colonial government's 'official limits of settlement',
had been reported favourably by explorers and, using this information, pastoral
prospectors continued to establish runs, moving south-west along the Murrumbidgee.

Conflicts between squatters and local Aborigines – predominantly Wiradjuri –
erupted in about 1838 along the frontier region near the Murrumbidgee. The conflict was
later termed the 'Wiradjuri War' by Bill Gammage.25 Although Gammage does not
discuss conflict at the Gundagai site directly, his examination of frontier violence in the
broad area indicates the context in which the town was established. While there had

22 Brendan O'Keefe, et al., The Watermen of Gundagai (Gundagai: Old Gundagai Project Committee, 2002),
p.5
24 O'Keefe, et al., The Watermen of Gundagai, p.3 and p.5. Today the remnants of one bora ring are still
evident on the flat. O'Keefe et al noted that some people have suggested that this bora ring is actually a
remnant of a Dutch windmill, which is possible. O'Keefe et al., The Watermen of Gundagai, p.5.
been violent confrontations and attacks between settlers and Wiradjuri and other Aboriginal groups before this time, Gammage argued that between 1838 and 1840 conflict escalated as Wiradjuri became more pro-active and organised in their warfare. Indeed, along the eastern frontier Aboriginal groups went on the offensive and for a short time reclaimed 60 miles of territory from the invaders. 26 Violence between the two groups intensified after a severe drought when the Murrumbidgee stopped flowing. Gammage has argued that increased competition for resources and settler occupation of hunting grounds fostered the war, instigated by Wiradjuri and other clans. 27

Drawing on Gammage's arguments to explain frontier relationships at the particular site of Gundagai, Brendan O'Keefe et al have noted that, 'while the same potential existed for conflict to occur among Aborigines and Europeans around Gundagai, there is no evidence that it actually eventuated'. 28 O'Keefe et al speculate that such violence may have occurred but cannot be proven due to a lack of written records. O'Keefe et al have also hypothesised an alternative account that little frontier violence occurred at the Gundagai site, because diseases, such as small pox and chicken pox, killed substantial numbers of Wiradjuri in the area, lessening conflict over resources and territory. Disease may have also lessened the Wiradjuri's potential for attack and resistance in the immediate vicinity of the future town. These diseases may also have contributed to the end of the Wiradjuri War in the early 1840s. 29 Massacres in surrounding areas, such as that of 60 to 70 Wiradjuri men on Murdering Island in the Murrumbidgee in 1839, further reduced Wiradjuri numbers. 30 It is clear that Wiradjuri numbers declined dramatically over this period. 31

Partly as a direct result of this type of violence, in 1839 Crown Land Commissioners were appointed to districts 'beyond the limits of settlement'. The role of Commissioners was to ensure the administration of the law within their districts and 'to put a stop to the atrocities which have of late been so extensively committed beyond the

27 Gammage, 'The Wiradjuri War, 1838-40'.
29 O'Keefe, et al., The Watermen of Gundagai, pp.5-6.
31 There is some evidence, albeit from settler estimations, of the decrease in Wiradjuri numbers between 1844 and 1854. James Gormly, an early settler at Gundagai, recalled that in 1844 he had seen gatherings of up to 300 Aborigines in the area. In 1851 Gundagai's Land Commissioner, Henry Bingham, estimated there were 40 Aborigines living near the town and 1,140 within the Murrumbidgee area. By 1854, a new Land Commissioner, Charles Lockhart, estimated there were 450 Aborigines in the entire Murrumbidgee district. O'Keefe, et al., The Watermen of Gundagai, p.6.
boundaries, both by the Aborigines and on them'. Further, the Commissioners were instructed to conduct an official inquest into Aboriginal deaths that were suspected to have been caused by settler violence. It was hoped that the Commissioners would facilitate friendlier frontier relations as plans for towns in the inland were being put into effect by the government.

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Surveying Gundagai: Environmental Knowledge and Existing Settlement

Gundagai was surveyed in 1838, as the Wiradjuri War was being fought. By this time the crossing place was frequently used by settlers. The site was already called 'Gundagai' by them — the Wiradjuri word for that stretch of the river, meaning 'cut with a tomahawk [axe] at the back of the knee' (possibly referring to the bend in the river) and adopted as the name of a nearby pastoral station. By 1838 there were also a number of buildings at the crossing place. In August 1837 William Brodribb petitioned the government to establish a punt service over the river. Brodribb managed a station which encompassed the flat between the Murrumbidgee and the anabranch (the eventual site of the town). He had erected buildings on the flat, near the river crossing, but also farmed sheep on the site. Settlers were already regularly camping at the site when the river was high, waiting for a safer opportunity to cross, often with stock. It had in some ways already become a small settlement with a transient population of travellers.

With government approval, Brodribb began a punt service in January 1838, which enabled travellers to cross the river at times when river flow was too high. It also reduced

34 Butcher, Gundagai, p.8; and, Soerjohardjo, 'Aspects of Life in Gundagai, 1840-1860', p.1. In 1836 Governor Richard Bourke introduced new land licensing fees for squatters and in 1837 established seven districts to encompass land which lay outside the official limits of settlement (Gundagai was within District 3).
the risk of drowning, for both stock and people. That year, before the survey was complete, the flat also became home to an Inn (the ‘Murrumbidgee Inn’). The Inn was built by Edward Bernard Green, who rented it to Joseph Andrews, a retired Major of the British Army.

Deputy Surveyor-General Captain Samuel Augustus Perry had selected the Gundagai site for further investigation as a possible location for a township, largely because it was an established crossing place over the Murrumbidgee. The surveying of Gundagai was part of a broader project by the Surveyor-General’s office to establish towns along the Port Phillip Road at crossing places — including over the Murray, Ovens, and Goulburn Rivers, and Violet Creek — to improve transport routes within the colony. Although Perry selected the site at Gundagai, the town survey was entrusted to two teams led by Assistant Surveyors Granville William Chetwynd Stapylton and Henry Cavendish Danvers Butler.

Stapylton had accompanied Surveyor-General Thomas Mitchell on his 1836 Australia Felix expedition as second-in-command. The expedition passed near Gundagai on their return journey in November. Unfortunately neither man recorded a detailed description of the place at the time. Exhausted after 10 months of work and travel, Stapylton discontinued his journal (which ended 12 November, when he reached the Murrumbidgee) and made only a brief survey. He wrote: ‘Hurrah Hurrah Hurrah here ends my journal the country between this point on the Murray & the Stations on the next River [Murrumbidgee] being pretty well known to many’. Mitchell, also exhausted, did not make detailed notes of the area either. Squatters had already taken up land on the upper Murrumbidgee and upper Murray, and there was no impetus for an exploratory

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37 O’Keefe et al., The Watermen of Gundagai, p.12.
The 1838 surveying trip was thus Stapylton’s second visit to Gundagai in an official capacity, but the first that required detailed observation.

In accordance with the wider assignment of improving the Port Philip Road, Perry instructed the Assistant Surveyors’ parties to pay particular attention to the road from Yass to the punt at Gundagai (‘in the description of the road it is impossible to be too minute’), in addition appointing a member of Butler’s party to be particularly responsible for observations of the road. Perry further requested that the surveying groups gather information on the crops that were being grown by settlers there and the possibilities for agriculture and ‘small settlers’.

Perry additionally instructed the Assistant Surveyors to investigate the crossing place itself, the river, and the operations of Brodribb’s punt, ‘in order that the Government may be enabled to form a judgement as to the expediency of making reserves for such establishments as may be requisite in a station of such importance to the public as I conceive Stuckey’s crossing to be’. From this statement the area was clearly held to be an important gathering and crossing place. Perry’s interest in the site was not purely motivated by environmental suitability, but prompted by a number of other factors, including the need to include government land reserves for public amenities associated with an important crossing place. Gundagai also appeared to be a natural gathering place with potential for economic and population growth, as indicated by the pre-existence of buildings on the flat and travel route. Surveyor-General Thomas Mitchell later drew attention to the importance of these factors in the selection of the site. He stated that, ‘the design [of Gundagai] was made to follow the road, and to embrace a paddock and

45 ‘Extracts from Letter of Instructions [from Deputy Surveyor-General S.A. Perry] to Assistant Surveyor Stapylton’, 22 January, 1838, p.260-261. ‘Gundagai’. New South Wales Legislative Council. Votes and Proceedings, v.2, 1852. pp.251-278, p.260. What was to become South Gundagai, on the opposite bank of the Murrumbidgee River, was also marginally surveyed at this time, but no town plans were compiled until 1845 and no lots gazetted for sale until 1846.
buildings then in use'. Indeed, the pre-existence of buildings at Gundagai seems to have taken precedence over environmental observations in determining the site of the town – a situation that Perry would later reference in his defence after the town flooded in 1844.

In 1844 Perry also claimed that no official survey report of the town site had been produced. In assessing the evidence from the survey of Gundagai it is unclear exactly what was produced by the survey teams. It appears that Butler and Stapylton did not answer Perry's detailed instructions about the site. Butler did return a survey of Brodribb's station, and of the road between the Murrumbidgee and Port Phillip (as requested by Perry), but there seems to have been no more documentation made or returned by the Assistant Surveyors (not even the field notes relevant to Gundagai). It was Perry who drew the official 1838 survey map of Gundagai (approved by the Executive Council in August 1838), with a note that 'the original of this is by Mr. Butler'. So, Butler must have communicated something more to Perry but this has not been found (or survived). On Perry's map there is a note that land east of the flat (but not the flat itself) was 'subject to inundation' (Map 2.1).

Why was no official survey report made? The answer can only be speculative. It is possible that the report was not submitted because, only a few days after submitting the survey report of the road between the Murrumbidgee and Port Phillip (18 June 1838), Butler tendered his resignation from the Surveyor-General's office. His letter of resignation, dated 21 June 1838, followed a leave of absence, indicating that he may have suffered from ill health after the January survey trip to Gundagai, which may in turn explain the lack of a report. The other surveyor, Stapylton, travelled on to Port Phillip, where he was sent to work under Robert Hoddle. There, in October 1838, he was

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49 Samuel Perry, 'Gundagai', 'Approved by Executive Council'. Survey Map. 1838. NRS 13859, [Map 2811]. State Records Authority of New South Wales.

50 There is no record of a survey map or any further communication from Butler to the Surveyor-General's Office in the State Records Authority of New South Wales archive.

51 Samuel Perry, 'Gundagai', 'Approved by Executive Council'. 1838. NRS 13859, [Map 2811]. State Records Authority of New South Wales.

reprimanded for several incidents of drunkenness. This behaviour may have begun earlier as there is little surviving correspondence from Stapylton about his Gundagai survey. With little advice available from surveyors about the environment, it appears that the site of Gundagai was surveyed primarily to contribute to travellers’ convenience and settlers’ economic advantage.

Map 1.2
Survey map of Gundagai by Samuel Perry, 1838.
To the right of the allotments is written ‘subject to inundation’.
Below the scale rule is written ‘the original of this is by Mr. Butler’.
Note the location of the lagoon in relation to the allotments.

It was not uncommon in this period for surveyors to survey areas after settler occupation, particularly in areas ‘outside the limits of location’. As historian David Denholm has explained, pastoralists often preceded government surveyors, establishing buildings and runs that a surveyor then ‘legitimised’ ‘with his straight lines’. The grant system (that amounted to free selection) worked well for a government whose experts

were still learning about new environments. Denholm argued that pastoralists' free choice of land 'left the Colonial Office in the clear': if the settler 'chose badly, he alone was responsible'. Free grants ceased in 1831. The survey of Gundagai as a government town at the location of pre-existing settlement brought together the eras of pre- and post-land grants. Surveyors endorsed the site in the same way that areas had been under the grant system. However, the laying out of a town by government surveyors, with allotments to be purchased by settlers, did not hold the freedom from government responsibility the grant system had allowed.

The business that could be gained from the traffic on the road, and the status of the site as an established stopping place, was also of interest to colonial entrepreneurs. At the time of the survey, settler Dennis Kean requested permission from the government to establish an additional punt and 'a place of accommodation' at the crossing, in exchange for a free grant of 100 acres of land. The site of Gundagai, was, from the beginning, one of convenience and economic advantage. By adhering to the river and road, surveyors were reinforcing the economic potential of the site.

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Establishment of the Town: Commerce and Trade in Gundagai’s Planning

In August 1838 Perry secured the Governor’s approval for the establishment of a town at Gundagai. Perry had already marked the town out into half-acre lots, approximately half of which were on the flat between the two watercourses and the rest stemmed north, onto the slopes of Mount Parnassus. Gundagai was laid out on a strict grid plan, with main streets named after major literary figures, for example, Shakespeare, Milton, and Sheridan. The grid layout of the town was an efficient administrative tool for town

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56 'Dennis Kean, By J.R. Hardy, P.M., Yass: Surveyor-General to report on Kean's offer to erect a Punt and house of Accommodation at Stuckey's station, Murrumbidgee, on the road to Port Phillip, on condition of receiving a free grant of 100 acres', 14 February 1838. 'Gundagai'. New South Wales Legislative Council. Votes and Proceedings, v.2, 1852. pp.251-278, pp.262. An inn, the 'Murrumbidgee Inn', was established in 1838, but was licensed to Joseph Andrews, not Dennis Kean. The 'Murrumbidgee Inn' was built on the banks of the Murrumbidgee, on the eastern side of the Port Phillip Road, near the crossing place. It was located outside the later town plans. O'Keefe, et al., The Watermen of Gundagai, p.12 and p.35.
57 Michael Norton (Gundagai’s first police constable), quoted in, Gundagai Independent, 9 September, 1948, p.13.
planning. In modern settler-colonial societies, such as Australia and the Americas, it was widely used.\(^5\)\(^9\) It was practical and quickly done, a way of efficiently parcelling land for sale.\(^6\)\(^0\) The grid could also be adjusted to suit particular topographical as well as functional purposes, whether political and symbolist, military, or to serve mercantile economies.\(^6\)\(^1\) Gundagai fell into this last category. The main travelling route — Port Phillip Road — became the main street of the town (Homer Street), located on a north-south axis running directly though the middle. This street became 'the main thoroughfare' and carried 'heavy traffic'.\(^6\)\(^2\) Town allotments reached almost to the crossing place by the river. Indeed settlers later built outside of the surveyed blocks, to be closer to the trade afforded by the crossing place. Perry aligned Gundagai’s north-south grid lines with magnetic north (a standard feature of colonial Australian towns).\(^6\)\(^3\) Denholm has argued that the ever-dominant straight line, used in surveying much of Australia, was a way of ‘tiding the landscape’ not in and for itself, but ‘to suit someone’s purposes’.\(^6\)\(^4\) In Gundagai it promoted the growth of an economy based on an already established trade, suiting current residents, potential future investors, and ultimately the government in terms of land revenue.

Gundagai was gazetted as a town site on 10 October 1838, and allotments were gazetted for sale on 12 August 1841.\(^6\)\(^5\) Significantly, not all the surveyed sections (or blocks) were put up for sale, only those on the flat which were closest to the crossing place and road. The river flat was clearly envisioned as the town centre. At the initial sales 29 allotments were sold, 23 of which were on blocks bordering the crossing place on the Murrumbidgee River or along Port Phillip Road.\(^6\)\(^6\) Buyers clearly perceived the benefits of

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these locations for trade, and inns, hotels, stores, and private dwellings of timber and brick were soon erected.\textsuperscript{67}

In the years following initial sales, there were many other allotment purchases, as those who owned property extended their purchases, new buyers moved in, and others left the district, selling their allotments and buildings. Despite large property purchases, by 1844 there were only 17 men engaged in trade in Gundagai (excluding servants and women): two wheelwrights, three blacksmiths, two tanners and curriers, three shoemakers, one harness maker, one storekeeper, two surgeons, and three innkeepers.\textsuperscript{68}

The residents were a mixture of emancipist convicts and free settlers. In 1851 between one third and one half of the population was comprised of ex-convicts.\textsuperscript{69} In addition to the buildings listed in surveys and reports, it is also likely that there were less solid structures, such as huts and tents, in the vacant lots and near the river, erected by residents and travellers as semi-permanent and temporary shelters and storehouses.\textsuperscript{70} Allotments were also used as market gardens and stockyards. Gundagai was becoming a major gathering place, an early principal colonial town of inland Australia.

There is evidence that from the start Wiradjuri warned settlers of the danger of flooding on the flat land that lay between the Murrumbidgee River and the anabranch.\textsuperscript{71} Although squatters, such as Stuckey, had settled in the area since the late 1820s, there is no evidence that squatters told surveyors or those who built on the flat about large floods in Gundagai. However, according to settlers who arrived around the time of the first allotments sale in 1841, Wiradjuri spoke of two large floods that had occurred in the past.

\textsuperscript{67} O'Keefe, et al., The Watermen of Gundagai, pp.29-39. At the initial sale, allotments were bought by eleven buyers, one of which was the Land Commissioner for the Murrumbidgee District, Henry Bingham; another was retired Army Major Joseph Andrews. Andrews, who already leased the 'Murrumbidgee Inn', later purchased nearby Kimo Station, and in 1852 owned 18 allotments on the flat. In 1843 Joseph Andrews also opened a post office, which he ran out of the Inn. O'Keefe, et al., The Watermen of Gundagai, p.13, pp.29-30 and p.81.

Spiro Kostof notes that a feature of settler-colonial grid planning was that it allowed this kind of land monopoly by first buyers ('the luck of first ownership'), and perpetuated a wealthy property owning class of first buyers (as land prices were later driven up), rather than the grid being a tool of settler-colonial egalitarianism as sometimes argued by American scholars. Kostof, The City Shaped, pp.99-101.

\textsuperscript{68} SMH, 22 August, 1844, p.3; and, O'Keefe et al., The Watermen of Gundagai, p.13.

\textsuperscript{69} The Blue Book, 1851; Soerjohardjo, 'Aspects of life in Gundagai, 1840-1860', p.28; and, Butcher, Gundagai, p.17.

\textsuperscript{70} O'Keefe et al., The Watermen of Gundagai, p.29-35.

decade; the first in 1830 and the second in 1838 — the year of the town survey.\textsuperscript{72} Colonists continued to build on the flat despite these warnings. Perhaps they thought large floods were unusual occurrences, perhaps they did not believe (or listen to) Wiradjuri, or perhaps the growing business trade on the flat was worth the risk.

During the first three years of town settlement, the inhabitants experienced floods; however there were no reports of damage from these small floods, probably caused by snowmelt and local freshes.\textsuperscript{73} Settlers marked the floods’ heights with a ‘flood-stake’ (one was possibly located near the lagoon and another near the crossing place).\textsuperscript{74} By 1844 some town residents had come to know the behaviour of these floods, such as the particular sound the water made and type of wash that signalled its peak.\textsuperscript{75} In 1844 the town experienced its first large flood and such knowledge became a liability because this flood behaved very differently.

\begin{center}
\begin{quote}
\textbf{October 1844 Flood}
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The drought that began in the late 1830s started to break in 1843.\textsuperscript{76} Rain began steadily falling during the first week of October 1844.\textsuperscript{77} The snow that covered the Snowy Mountains also thawed.\textsuperscript{78} Fed by rain and snowmelt, the Murrumbidgee swelled, isolating shepherds’ huts in paddocks near Gundagai. Although heavy rain on Thursday 9 October swelled the rivers further, the following day they began to fall. Over the next two days rain continued. One resident observed, by examining the flood-stake, that the flood remained stationary from Friday until 10pm on Sunday (12 October). By dusk on Monday,

\textsuperscript{72} In 1844 the SMH reported that some settlers had already been warned by Wiradjuri of floods, one of which they said occurred in 1830. Gundagai’s first Police Constable, Michael Norton, who arrived in 1851, later wrote that Aborigines told him of a large flood that occurred in 1838. See, SMH, 11 November, 1844, p.2; and, O’Keefe et al., Watermen of Gundagai, p.12.
\textsuperscript{73} SMH, 29 October, 1844, p.4.
\textsuperscript{74} SMH, 29 October, 1844, p.4.
\textsuperscript{75} SMH, 29 October, 1844, p.4.
\textsuperscript{76} Charles MacAlister, Old Pioneering Days in the Sunny South (Goulburn: Chas. MacAlister Book Publication Committee, 1907), pp.120-122.
\textsuperscript{77} SMH, 11 November, 1844, p.2.
\textsuperscript{78} SMH, 11 November, 1844, p.2.

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however, the flood had risen two feet and nine inches above any previous flood mark on
the stake. Many still believed ‘Tuesday would show us the receding floodwaters’. 79

Two men had already been flooded out of their home on Monday, and stayed
with another resident and his family, who was later to write to the Sydney Morning Herald
(SMH) about the flood. The unnamed correspondent lived on a ridge, outside the centre
of Gundagai, possibly on the southern slopes of Mount Parnassus. They were confident
that the waters would fall overnight; the flood was moving, ‘with that sluggish movement
which always indicated to us its arrival to its maximum height’. But the flood continued
to rise. Late on Monday night they took a lantern to investigate the progress of the flood
and saw that the water had risen over two feet in a matter of hours. 80

In realising the speed at which the water was rising, the shouts that the group had
heard earlier that night suddenly took on new meaning, with ‘fearful certainty’. They had
thought shepherds were trying to scare off ‘wild dogs’; but now recognised the calls as a
sign that people on the flat were being ‘driven out of their huts’. The correspondent later
wrote that those on the flat had no way to escape. They had already been isolated by the
high rivers for days. 81

Throughout the night the SMH correspondent could hear the shouts and cries of
people ‘in all directions’ and by dawn he was completely cut off from the town. Water
had started to enter their own house. The writer’s family and the two men who had
sought safety with them placed their belongings on benches and tables, and packed some
goods, moving to a higher ridge by dray. There they set stakes in a small plot of dry land
to monitor the speed at which the water was rising — it was rising quickly. The plot of dry
land decreased from three square feet after dawn to two square feet by 10am. They
described the turbulence of the waters, ‘roaring’ and ‘boiling’, the sound of which was
‘awful’. Furniture, goods, dead sheep and pigs floated past. They remained on the ridge
for four days and three nights as the flood reached a final peak on Tuesday afternoon,
and slowly subsided. 82

Going into the town, people gathered to tell stories of the flood. Water had
reached at least three to four feet in all buildings on the flat, and in some places it
reached to the top of the ‘roof-tree’ (ridge pole). The water had arrived quickly in the
town and at night. To escape the turbulent water, people had climbed onto rooftops and

79 SMH, 29 October, 1844, p.4.
80 SMH, 29 October, 1844, p.4.
81 SMH, 29 October, 1844, p.4.
82 SMH, 29 October, 1844, p.4.
into the upper branches of trees. One woman with her four children, along with a traveller staying in the same hut, had climbed into the branches of a tree. They stayed there for three nights, 'in the midst of boiling water'. One of the children fell into the water twice from exhaustion, and 'another became delirious from his sufferings'. The only food they ate was a fowl they caught and ate raw. The woman's husband was nearby but unable to help. 83

Aborigines rescued some settlers using bark canoes. 'Mrs. Guise' (whose husband was in Port Phillip) and her two children climbed onto the roof of their hut, where they stayed 'for several days' as the water rose nearly to the roof. From there, they were 'rescued by the blacks in a bark canoe'. 84 An Aborigine (also using a bark canoe) saved farmers Henry and Susannah Hargreaves, and their children, who lived two miles down river. 85 There is a suggestion in the Gundagai resident's account that others were also saved by Aborigines: 'many escaped to the mountains by aid of a canoe'. 86 Settlers on the Lachlan River (which also flooded at this time) were also 'rescued by blacks in their canoes'. 87

Commissioner for Crown Lands in the Murrumbidgee District, Henry Bingham, wrote to 'the government' soon after the flood. His letter was a statement of 'the great services rendered by the aborigines on that river [the Tumut] and the Murrumbidgee lately when those rivers were in flood, by which many individuals were saved'. Bingham further urged that some reward be presented to the individuals 'as an acknowledgement of their services and exertions'. 88 There is no evidence any reward was given.

As a Land Commissioner, one of Bingham's roles was to promote friendly frontier relationships between settlers and Aborigines. Perhaps his wish to recognise the Aboriginal rescuers as heroes through government reward was a way of demonstrating an example of friendly relationships, to the government and local communities in Gundagai (both settler and Aboriginal). In the context of the recent Wiradjuri War, Aboriginal rescues of settlers during this flood take on even more significance. Perhaps the urgent moments of danger overcame recent hostilities – they were moments in which the skill and knowledge as well as bravery of Wiradjuri, who had survived a smallpox epidemic

83 SMH, 29 October, 1844, p.4.
84 SMH, 29 October, 1844, p.4.
86 SMH, 29 October, 1844, p.4.
87 MacAlister, Old Pioneering Days in the Sunny South, pp.126-127.
88 Maitland Mercury, 30 November, 1844, p.4.
and war, were extended to endangered settlers, invaders, who were perhaps also strangers. 89

The 1844 flood revealed to those in Gundagai the vulnerability of the site to large floods as well as the truth behind Aboriginal warnings. Signs of the flood lingered. The height to which the flood had risen was marked by debris lodged high in the trees. Settlers’ attention was also drawn to older debris, lodged even higher. A resident wrote that, ‘our attention being frequently attracted to the weeds and rubbish left by the late floods at so great an elevation on the trees, we have noticed what would have perhaps otherwise escaped our observation. The vestiges of a former inundation, which must have been eighteen inches above that from which we had lately suffered’. The branches of trees had enfolded this debris, ‘proving a lapse of many years between the intervals of the floods’. 90 The resident further wrote that ‘[t]he aboriginals do not appear to consider the flood at all extraordinary’. On the writer’s ‘first visit to the Murrumbidgee’, while building their father’s head station, Aborigines had told them that during past floods the hill on which they were building was surrounded by water, and that this had proved the case in this flood. 91 They estimated that one of these past floods occurred in 1830, ‘if their [the Aborigines’] calculation of time be correct’. 92

After the flood, residents hypothesised on the cause of the flood. The ‘generally received opinion’ was that ‘the inundation was caused by the sudden thawing of snow on the Maneroo [Monaro] Alps’. 93 One settler noted that a few days before the flood the Snowy Mountains had been covered in snow and they were now bare. 94 The 1844 flood marked a turning point in settler knowledge, with new understanding developed through their own observations and a direct demonstration of what they had heard from Aborigines in the area.

As the water level slowly dropped the damage revealed itself. Fences were broken, gardens destroyed, food was rotting, and animals were dead. 95 Although many had moved

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89 For more on survivors of small pox and war, see: Gammage, ‘The Wiradjuri War, 1838-40’, p.15.
90 SMH, 11 November, 1844, p.2.
91 SMH, 11 November, 1844, p.2.
92 SMH, 11 November, 1844, p.2.
93 SMH, 11 November, 1844, p.2.
94 SMH, 11 November, 1844, p.2. George Augustus Robinson, Chief Protector of Aborigines for Port Phillip, journeyed through Gundagai about a week after the flood. In his journal he commented that the floods were due to a combination of snowmelt and rain. See: Robinson, ‘Chief Protectors Journal (abridged) of an Expedition to the Aborigines of the Eastern Interior commencing April and terminating October’, 1844, in Governor Gipps Despatches, January-May, 1845, p.746. A1236. Mitchell Library, State Library of New South Wales.
95 SMH, 29 October, 1844, p.4.
belongings and stores onto tables, possessions and tradesmen’s tools had been lost, washed away by the force of the floodwaters. On the southern bank of the river, a blacksmith’s shop was destroyed, the post that anchored his anvil was uprooted, and the anvil was carried ‘a considerable distance’. 96 One of the biggest losers was retired Army Major Joseph Andrews, one of the first residents of Gundagai town. He had not moved belongings and stores from the floor, and most of these were ruined or washed away. 97 There was no government or other aid (for example, from charitable relief funds) external to the town itself in the aftermath of the flood. Residents of the town, however, organised their own aid for victims. 98

Only one man died in Gundagai; Thomas Arms, a servant of Charles Thomason, drowned while trying to rescue a woman and her children. There were, however, drownings at other points on the Murrumbidgee near Gundagai, including one man at ‘Jewging’, one at ‘Bagelong’, and one at Yass. 99 In his reminiscences, drover and pastoralist Charles MacAlister recalled that a convict shepherd was drowned at Yalbraith in this flood. The shepherd, Tom Gurney, had taken ‘refuge beneath the overhanging bank of a creek, and the waters rose so quickly that Gurney was suffocated in his lair’. 100 Another body was washed down river, past Gundagai. The body of an Aboriginal man was later found and thought to be the same. Bingham conducted an inquiry into the man’s death. 101 Later, reports from downstream indicated that while human deaths had been ‘less than anticipated’, ‘[a]lmost everyone has suffered in some way’, through stock losses and damage to fencing and buildings. 102

The Lachlan River had also flooded in October. 103 This river, which runs parallel to the Murrumbidgee to the north, was (like the Murrumbidgee) already in flood in early October from heavy rainfall and peaked around the same time. 104 Along the Lachlan the flood rose quickly. Patrick Boswell, then living on the Lachlan, later recalled having to

96 SMH, 11 November, 1844, p.2.
98 SMH, 29 October, 1844, p.4; and, SMH, 11 November, 1844, p.2.
99 SMH, 29 October, 1844, p.4. ‘Jewging’ probably refers to the settlement of ‘Jugiong’ located on the Murrumbidgee River, approximately 40 kilometres north of Gundagai on the Murrumbidgee. ‘Bagelong’ probably refers to the settlement of ‘Binalong’, located 30 kilometres northeast of Jugiong, on Balgalal Creek, a tributary of the Murrumbidgee. Yass is a town located approximately 80 kilometres northeast of Gundagai on the Yass River, a tributary of the Murrumbidgee.
100 MacAllister, Old Pioneering Days in the Sunny South, p.126.
101 SMH, 29 October, 1844, p.4; SMH, 11 November, 1844, p.2; and O’Keefe, et al., Watermen of Gundagai, p.7.
102 SMH, 11 November, 1844, p.2.
103 There were also floods in the Hawkesbury in October 1844. SMH, 29 October, 1844, p.4.
104 The river is not fed by snowmelt, its headwaters being too far north.
quickly evacuate his household. On his way to give aid to a neighbour he had noticed a rapidly swelling creek, which could soon cut off and flood his house. The household – which included thirteen children, five women, and four men – moved to higher ground, temporarily erecting tents before travelling to a near-by station to wait out the flood. They had left the house in two groups. The first group loaded a cart and moved to the hill and the cart returned for the second load of supplies and group of people. The first group had a dry passage, but the water rose so quickly that those who walked in the second group, ‘had to wade almost up to their knees’.

When the flood began to subside Boswell rode to his house, wading through water to get there. While the land around the house was now dry, Boswell saw that the floor was covered with about a foot of mud and the kitchen wall, made of brick, had collapsed. The flood had left a four foot water mark in the house. Boswell considered himself ‘more fortunate’ than others in the district, whose houses had been more substantially damaged and whose stock losses were greater. Boswell managed to save most of his cattle by swimming them onto higher land, however another pastoralist in the district lost 1,100 sheep. Three men drowned in the area.

In this period it was not uncommon for settlers to drown during floods, especially whilst trying to cross swollen rivers. Prior to the establishment of punts and bridges, settlers had little option but to swim horses across rapidly flowing rivers, or themselves wade through floodwater, even though it is evident that many could not swim. For example, James Gormly, a strong swimmer who was later to survive the 1852 flood by swimming to a tree amid turbulent waters, wrote the following account of crossing the flooded Macquarie River in 1851:

At the time there was no bridge over the river, and the boat used for taking over foot passengers had been swamped. I attempted to swim over on horseback when the river was in flood, and was swept down by the force of the current for half a mile before I could land on the other side. At the time three men were drowned in one week in attempting to swim the Macquarie at Bathurst.


Flooded rivers were sites of death and danger not only for those crossing them but also for those living along their banks. For residents of Gundagai, as well as concerned settlers in other parts of the colony, the establishment of a town, by the government, at a location revealed in 1844 to be so clearly in the path of large floods, was cause for action.

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Blame and Responsibility: Bingham, Petitioners, and the Government

Residents and landowners in Gundagai blamed the government for the effects of the 1844 flood. They asserted that it was government agents who had sited a large part of the town on the flat. Settlers were concerned not only that they were living with the danger of large floods, but that town properties were now worthless. The flood endangered the perceived economic future of the town. In this period between the formation of the Legislative Council in 1843 and responsible government in 1856, newspapers and petitions were two important avenues for political expression by settlers. They were also two media that acted as gauges of public opinion for politicians and which politicians (largely) took seriously and which fed back into policy and laws. Indeed, legal historian Kerry Fraser Mills has argued that they were important in shaping the political and legal landscape in this period. Residents and landowners in Gundagai argued for government redress in both newspapers and petitions after the 1844 flood.

In a letter to the SMH soon after the flood, a resident of Gundagai wrote that the government had no option but to move the town: 'The position of Gundagai as a government township is no longer tenable; no one would receive the allotments now as a gift, and the government has no alternative but to remove the site, and allow the present holders of allotments the choice of others on the newly defined village'. Gundagai's allotments were thought to now be valueless. The resident hinted that the initial survey teams were to blame for siting the town there: 'The surveyor who marked out the present township committed an egregious error in the selection of the site, and evidently had no data to form his judgement upon: for the only spot which was not covered by the flood is

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109 Mills, 'Of the people, by the people, for the people: Law-making in New South Wales, 1843-1855', pp.92-98.
110 SMH, 29 October, 1844, p.4
marked on the chart as valueless, being ‘subject to inundations’.

According to this resident, the surveyors’ expertise was inadequate, which led them to misinterpret the environmental suitability of the site for a town.

Concerned for the future of the town, the Land Commissioner for the Murrumbidgee District, Henry Bingham (who also owned allotments in Gundagai), wrote to the Colonial Secretary in early November urging that land on higher ground, on the ‘south bank of the Murrumbidgee’ (and to the south of the township), be surveyed and that landowners be allowed to exchange their floodable land for these new, drier, lots.

He further added that ‘the water was 4 to 5 feet deep in the huts at Gundagai, and parties suffered severe loss of property; and with the prospect of similar inundations, all chance of the advancement of Gundagai, as an Inland Township on its present site, I would say are at an end, as no persons would now think of purchasing allotments, or of building in such a precarious situation’.

Indeed, soon after the flood the population of Gundagai dropped to eight people (again, excluding women and servants). The aftermath of the flood brought more concern about economics than future safety. The economic ramifications of the flood could badly affect landowners (land value could fall), residents (town growth could fall), and the government (land revenue could fall). The Colonial Secretary replied to Bingham in December that the Governor, George Gipps, would order the survey of lots on the south bank of the Murrumbidgee, but that landowners would not be able to exchange their land as Gipps, ‘considers that what a man buys, he buys for better or for worse’.

Another man, named John Spencer, also wrote to the Colonial Secretary in early February 1845. Spencer wrote in support of Bingham’s choice of land for survey on the...

111 SMH, 29 October, 1844, p.4
south bank of the Murrumbidgee.116 Spencer had recently moved (within the previous year) to Gundagai from Bredalbane Plains, and was later to become Gundagai correspondent to the Goulburn Herald.117 He was a proprietor of a hotel, ‘Thatched Cottage Inn’ (later ‘Family Hotel’), on the southern bank of the Murrumbidgee, near Gundagai. The land on which he had built had not been surveyed and Spencer’s support of surveying land near his hotel was perhaps an attempt to increase his business through development at the site.

In his letter Spencer pre-empted a general petition by residents in the current Gundagai township. He had seen an advertisement in the SMH indicating that a petition and letter were being compiled by the ‘Gundagaites’, which would express the views of the ‘District generally’. Spencer acknowledged to the Governor that the notice in the newspaper had requested that no one write personally to the Governor until the petition and general letter were compiled. Spencer, however, was concerned about the petition. He told the Governor that the petitioners planned to request that new allotments be surveyed on higher land on the northern side of the river and they would not see the benefit of new allotments on the southern side of the river. Indeed he told the Governor to disregard ‘the Petition of adverse persons who fancy their interests may in some slight manner be interfered with’.118 He suggested that the actual purchased allotments in Gundagai township were ‘inconsiderable’ and therefore the Governor should look to the future development of the site on the southern side of the river, ‘the beautiful and admirable site suggested by Mr. Bingham’ rather than the ‘present low land’.119

However, Bingham’s proposal had already been disregarded by the Governor. The Colonial Secretary replied to Spencer that Gipps had ‘already decided that he cannot incur the expense of laying out a new Township at that place’.120 Inquiries into the cost of a survey for allotments on the southern bank, through the Surveyor-General’s

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department, had returned a survey tender that would cost half the earnings from allotment sales. Gipps determined that he could not ‘sanction the expense’. 121

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Economic Futures and Environmental Knowledge: 1844 Petition

The general petition arrived at the Governor’s offices soon after. It was signed by nine landowners in the township. The petitioners pointed out that they had relinquished their financial interests in other towns when they moved to Gundagai. They had put ‘considerable’ amounts of money into developing their properties, erecting businesses such as inns and stores, as well as dwellings. These, as well as goods and belongings, had been ‘considerably injured’ by the flood. They requested that three town sections (15, 16, and 17), which were ‘without the reach of floods’, and already surveyed, be subdivided. They also requested an opportunity to purchase these allotments without competition from other bidders. 122

The petitioners further explained that their move to Gundagai had been motivated by the financial opportunities the town afforded. They had planned to capitalise on the situation of the town as ‘the only Township in the neighbourhood’. The petitioners saw Bingham’s proposal for allotments on the opposite side of the river as the seeds of ‘a rival Township’. A new town could do them ‘great injury’ through increasing competition for trade. 123 Indeed, the petitioners made a pledge to the Governor that they would purchase the allotments in the three sections they requested at the full government price of £8 an acre, ‘if no allotments are laid out on the South bank of the

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Murrumbidgee'.

Their collective action was a commercial manoeuvre. By acting collectively, and potentially moving their businesses together, they could ensure the trade centre of the town remained intact and would continue to be a business hub — ideally without competition. Further, negotiating collectively with the government potentially increased the force of their arguments and gained political clout. Their proposal had a number of advantages over Bingham's and Spencer's (Spencer, however, was not mentioned in the petition). First, it was an expression of 'public opinion', given the number of signatures, and as such carried weight with the Legislative Council. Secondly, it would cost the government less and possibly ensure it an easy profit as the sections were already surveyed and a surveyor would only need to sub-divide them.

In addition to negotiating the future economy of the town, the petitioners were also trading in environmental knowledge. The flood, they argued, had revealed which parts of the town were subject to inundation, something that had not been recognised in the initial survey. With this knowledge they were able to support their argument against the survey and sale of land on the opposite side of the Murrumbidgee, because 'ample room in the most favourable situation [above the height of the 1844 flood] can be found adjoining the present Township'. Further, through the direct experience of a flood, they had acquired substantial knowledge of the Gundagai site, compared with the government, especially which land was liable to large inundations. Their experiences gave them a kind of 'knowledge capital' with which to trade and a platform from which to argue.

Gipps in some ways seemed to recognise this. He agreed to the subdivisions of the three sections the petitioners requested. Perhaps also, by fulfilling the petitioners' request, he was placing responsibility for the choice of flood-free sections and allotments on the
landowners. The new allotments, however, were to be sold at competitive auction rather than at a set price to the current landowners; it was, Gipps notified, 'the law'. 128

Further, Gipps was not convinced that the Murrumbidgee would flood to such a height again. He thought the 1844 flood 'a very unusual rising of the Murrumbidgee'. Such a flood, the Colonial Secretary wrote (on behalf of Gipps) was 'not known to have occurred before, and may never occur again'. 129 The Governor, far from the site of the town, had not heard Wiradjuri warnings and had not seen the old debris in the trees. Perhaps such evidence did not count — it was certainly not mentioned in any official documents. Surveyor-General Thomas Mitchell also hypothesised that such a flood 'may perhaps never reach them again'. 130 The views of Gipps and Mitchell were very different to the observations of George Augustus Robinson. Robinson, Protector of Aborigines in Port Phillip, had travelled through Gundagai about a week after the flood. He wrote in his report on the expedition that 'Gundagai... is a township... on flooded land'. 131 The Governor's wording in his letter to the petitioners may have been guided by the potential legal and financial implications of admitting that the initial town surveyors had made a mistake. Such an admission would make the Government liable and expose it to claims of compensation not only in Gundagai but potentially throughout the colony. Negotiations over environmental knowledge were interwoven with legal, economic, and political trade-offs after the 1844 flood.

Bingham had fallen out of favour with Gipps. Bingham's suggestion that the townspeople be allowed to exchange allotments was illegal, and this Gipps thought Bingham 'ought... to have known'. Indeed, in his letter to the petitioners, Gipps called Bingham's proposal 'inconsiderate' — to both himself (Gipps) and the town's residents and landowners. Bingham's suggestion had been made, it seemed, 'without the knowledge and even against the wishes of the townspeople'. Gipps forwarded a copy of his letter addressed to the petitioners, containing these statements, to Bingham. As a consequence, Bingham, already caught between the interests of the government and

settlers in his position as Land Commissioner, became overtly mistrusted and alienated by both.\textsuperscript{132}

Bingham defended himself against these allegations. He wrote to the Governor, denying any knowledge of breaking the law, arguing that he had been called on by two residents of Gundagai to suggest a new survey and that at least one of these men’s names (Andrews) had been forged on the petition.\textsuperscript{133} The reply to Bingham’s letter was short. It did not acknowledge his claims to innocence. Bingham’s letter to Gipps and Gipps’ reply were published in the SMH in full.\textsuperscript{134} The Colonial Secretary wrote, at the Governor’s direction, that ‘he [Gipps] feels it necessary to intimate to you, that it is quite contrary to official practice... to publish his correspondence without permission from the head of Government’.\textsuperscript{135}

The letters became the subject of editorials and letters to the newspapers that severely criticised Gipps. One editorial argued that Gipps’ maxim in other situations, ‘that he was sent here ‘to protect the interests of the Crown’ had been carried over to ‘the Gundagai case’. Gipps’ was a partisan stance that did not deal in justice but defended the interests of the Crown.\textsuperscript{136} Deputy Surveyor-General Perry attempted to defend the Governor and himself (as he held responsibility for the town’s survey). He wrote to the SMH. He argued that ‘Gipps had nothing whatever to do with the laying out of that town’ and that surveyors (including himself) had sited the town there only because individuals had already erected buildings on the flat – private individuals had effectively selected the town site, surveyors had merely formalised their selection.\textsuperscript{137} Perry inferred that surveyors were therefore not to blame, but rather the settlers who had chosen the site. He wrote:

The site having been adopted according to the selection of private individuals, as indicated by their occupancy of the ground, and all other circumstances taken into

consideration, it was necessary that the details, not of the ground but of the subdivisions
and appropriations, should be approved merely for the purpose of proclamation and
record [of Gundagai as a township]...'.

In another letter Perry elaborated on this point. He explained that as the region lay
outside 'the limits off proclaimed counties... exceptions to the existing regulations for the
sale of land were made in favour of those persons who had previously established
themselves upon the land'. The surveyors (and government) had wished to give those
who had built at the crossing the opportunity to purchase the land.

As the survey plans were being drawn up in January 1838, Gipps was travelling
to Australia to take up the post of Governor General. Perry argued that he could therefore
have had nothing to do with choice of the site: 'he merely marked the plans as approved
— after it had been laid before the Council, and without considering whether Gundagai
was in New South Wales or on the moon'. Further, Perry argued that settlers who
chose to buy allotments after the survey did so based on their own assessments of the site:
'the purchasers of allotments selected for themselves and upon their own knowledge of
the country'. It was settlers who had close knowledge of the country (rather than
surveyors or the governor) and who were therefore accountable.

The editors of the SMH did not agree. They argued that surveyors had selected the
site upon their own expertise and that a site suitability survey was not the job of settlers.
They wrote:

Aware that private adventurers have little leisure and less qualification for the task of
surveying scientifically the country in which they are toiling for bread, the Government,
very properly, declined to act upon the selections of such persons. The Government thus
became responsible for the eligibility of the selection. The selection was thus made from
official data, and from those alone... it is rather too bad to come forward now, when the
selection is proved to have been a calamitous blunder, with an attempt to absolve the

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138 Original emphasis. SMH, 15 February, 1845, in 'Gundagai, New South Wales’. Newspaper Clippings
139 SMH, 15 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library,
State Library of New South Wales.
140 SMH, 15 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library,
State Library of New South Wales.
141 SMH, 15 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library,
State Library of New South Wales.
official survey from all responsibility, and cast the whole of the burden upon the private selection!\textsuperscript{142}

It was in response to this editorial that Perry revealed that no survey report was made. In his words: 'I do not perceive any trace of the [official survey] report in question — I merely said I called for one. In fact no report was furnished'.\textsuperscript{143} All of Perry's arguments (in three letters) were dismissed by the SMH editors — they argued that Perry's points did not relinquish Gipps' current responsibility. In fact, the issues raised by Perry only confirmed the 'sweeping indiscriminate doctrine, 'that what a man buys he buys for better or worse'.\textsuperscript{144} Such a doctrine was 'contrary to the transactions of every-day life, and monstrously untenable in its application to the present case'.\textsuperscript{145} The editors argued that the purchase of allotments was equitable with the purchase of products, not marriage:

If you buy a coat from a tailor, and it falls to pieces the first time you put it on; a loaf from your baker, and it proves to be half sand; a pipe of mine from your merchant, and it turns out to be a pipe of wine — would any of these sellers have the impudence to tell you, in answer to your demand for a genuine article, that 'he cannot sanction the proposed exchange'.\textsuperscript{146}

The editors wrote that, 'Captain Perry... shines much better as an officer than logician'.\textsuperscript{147} The fact remained that Gundagai allotments were clearly 'not fit for either of the two purposes for which they were marked out': as building allotments and town allotments.\textsuperscript{148}

Excerpts of Gipps' letter continued to be quoted in the following months, especially the phrase 'for better or worse', which appealed to poets and journalists. In early 1845, a poem (initialled J.L.T.) was published in the Sydney Atlas. The poem was

\begin{flushleft}
\textsuperscript{142} Original emphasis. SMH, 15 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library, State Library of New South Wales.
\textsuperscript{143} SMH, 18 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library, State Library of New South Wales.
\textsuperscript{144} Original emphasis. SMH, 15 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library, State Library of New South Wales.
\textsuperscript{147} SMH, 15 February, 1845, in 'Gundagai, New South Wales'. Newspaper Clippings file. Mitchell Library, State Library of New South Wales.
\end{flushleft}
highly critical of Gipps, and expressed a sense of injustice. The final stanza was particularly personal:

Then Gundagai, then Gundagai
Be liberal with your purse;
Again your town allotments buy
‘For better or for worse’;
And if, as further still you wend,
To land still worse you go,
Gipps will stand your friend
In the settlements below!149

The Land Commissioner’s (Bingham’s) written exchange with Gipps, made public, fostered animosity towards the Governor, while Bingham became a hero within the colony (although largely ostracised locally and out of favour with Gipps).

Bingham’s suggestion of an allotment exchange was well known by the 1850s and gained increasing support beyond Gundagai, particularly after the 1852 flood. Residents’ accounts of the 1844 flood had been published in the SMH, so that the effects of the flood were known in the colony’s capital. Made aware of settler concerns in Gundagai, the Governor’s attitude was heavily criticised in the metropolitan press, as was his refusal to grant land exchanges. Public debates revolved around Bingham’s communications with Gipps, which largely took place before the general petition from Gundagai. The general petition requested different action from that proposed by Bingham, and overtly argued against his suggestion.

The actual course of action the Governor took was to issue no compensation but to release land for sale in locations suggested by the petitioners and to release additional land in South Gundagai as requested by Bingham. While bound by legal restrictions, such as those around allotment exchange as compensation, these actions indicate opportunism on the part of the Governor. He indeed seems to have proceeded with the interests of the Crown as primary, seeking to maximise land revenue. This course of action appears immediately shrewd as it was likely to contribute to the short-term growth of the town because buyers could purchase land thought to be above flood mark whilst continuing to trade on the flat. This is in fact what happened, as settlers readily invested

in land and development on the floodplain after the 1844 flood. The next section explores why settlement on the floodplain flourished despite the warning of the 1844 flood.

* * *

Town Growth: North and South Gundagai

In 1845 the Governor instructed Surveyor James Larmer to proceed to Gundagai to mark out the three sections requested by the petitioners and to gather information on the land suggested by Bingham.\(^{150}\) Larmer marked out the height of the 1844 flood to the south of the river on his survey map. By June 1845, Larmer had measured out the three plots on the northern side of the river. He suggested that there were two further sections (blocks) on the south bank suitable for division and sale.\(^{151}\) In 1845 the new allotments in North Gundagai, and in 1846 those in what now became South Gundagai, were gazetted for sale. Only three property owners who had experienced the 1844 flood bought allotments in the new sections of North Gundagai in the initial sales in August and November 1845.\(^{152}\)

Despite the effects of the 1844 flood and fears of residents that the township was ‘no longer tenable’, the population and industry of North Gundagai grew extensively and the economy recovered quickly. The year following the flood, both established residents and newcomers bought new allotments (not previously purchased by another) on the flat. The 1844 flood had not deterred all those who had experienced the inundation from investing and building there, suggesting that the economic benefits of the location outweighed the risk of future damaging floods. For example Henry and Susannah Hargreaves, whose farm about two miles from Gundagai had been flooded in 1844,


bought an allotment on the flat in 1848.\textsuperscript{153} To recover their economic losses they left the farm and worked for a squatter and in various business partnerships with other settlers. In Gundagai, Hargreaves built a wooden house and bought a dray cart with bullocks (presumably hiring as a goods carrier) and by their own account the family ‘got on very well’.\textsuperscript{154}

Another settler, who experienced the 1844 flood and re-built on the flat, later wrote that his reason for rebuilding there was the economic advantage afforded by trading on the Port Phillip Road. He wrote,

\ldots as one of the sufferers of the flood of 1843 [sic], and one of the subscribers to the memorial [petition] presented to the late Sir George Gipps, I can assure you that I found 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.\textsuperscript{155}

Building on the flat was a business decision. Although liable to inundation, it was the best place to trade. Higher land was simply too far from the road. The importance of catching the passing trade influenced the way settlers evaluated environmental knowledge and where they chose to live and invest. Commercial advantage was weighed against environmental risk. Further, it was competition from traders on the floodplain close to traffic that threatened the trade of settlers on higher land. Shops and inns near the road and on the flat offered convenience to travellers and so flourished economically. If the town had been moved after the 1844 flood, or those on the flat had been ensured a set price for allotments and re-located as a group, perhaps the economic advantages of building on the flat would have been reduced, as competitors would have also moved. On the other hand, the economic lure of the flat may have remained too strong.

Visitors and residents in Gundagai, in the period following the 1844 flood, commented on its economic growth. Michael Norton, who had lived in Wagga from

\textsuperscript{153} Henry Hargreaves, Letter to his nephew and nephew’s wife, 11, 14, 19 June, 1870. ML DOC 949. Mitchell Library, State Library of New South Wales.

\textsuperscript{154} Henry Hargreaves, Letter to his nephew and nephew’s wife, 11, 14, 19 June, 1870. ML DOC 949. Mitchell Library, State Library of New South Wales. While the family was saved in the 1844 flood, they had lost substantial amounts of property in the form of goods and chattels from in flood.

\textsuperscript{155} SMH, 19 July, 1852, p.2.
Map 1.3
Survey map of South Gundagai by James Larmer, 1845.
Note the line of the 1844 flood height drawn by Larmer.
In the right-hand corner of this map is Larmer’s description of the survey, which reads:
'Survey of the site proposed by Mr. Commissioner Bingham as an addition to the town of
Gundagai on the south bank of the Murrumbidgee [sic] River’.
[James Larmer, ['Gundagai', 'South side Murrumbidgee River, shows Spencers Hotel and
other buildings']. Survey map. 1845. NRS 13859, [Map 2824]. State Records Authority of
New South Wales.]

Map 1.4
The survey of allotments in South Gundagai by James Larmer, 1845.
[James Larmer, 'Gundagai', '40 allotments in South Gundagai'. Survey map. 1845. NRS
13859, [Map 2827]. State Records Authority of New South Wales.]
1847 and was appointed Gundagai’s first police constable in 1851, later wrote that in the 1840s and 1850s ‘[m]oney was plentiful’ and ‘could be made in quick order’. 156 Another settler commented that, ‘[m]oney in both pockets is the popular air here just now’. 157 Further, there is evidence some settlers on the flat assimilated the experience of the 1844 flood not as a warning, but as a reassurance that ‘the’ large flood was now behind them. 158 They thought that another large flood was unlikely to occur for many years, much as Gipps and Mitchell had asserted.

Between 1847 and 1850 land sales increased rapidly in North Gundagai, with the total number of purchased allotments reaching approximately 280 by 1851. 159 In 1851, along with gaining a police constable, Gundagai’s first National (government) School

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156 Michael Norton (Gundagai’s first police constable), quoted in, Gundagai Independent, 9 September, 1948, p.13.
opened. The introduction of new legislation in May 1847, giving squatters longer leases (of 14 years) and greater security, may have also contributed to an increase in trade from those droving livestock. Further, there were more pastoral stations being established in the inland, with settlers increasingly pushing west. Immigration to Australia also increased rapidly in this period.\textsuperscript{160}

South Gundagai expanded and by 1850 had developed into a small settlement of 25 purchased allotments and a number of buildings.\textsuperscript{161} South Gundagai remained second to North Gundagai, however, in terms of industry, population, and buildings. In 1850 Surveyor Larmer wrote to the Governor that,

\begin{quote}
In South Gundagai there are two public houses of poor accommodation, one small brewery, and a blacksmith's shop. Whereas in North Gundagai there are four public houses, a steam flour mill, four substantial stores, butchers', bakers', blacksmiths', and carpenters' shops, as well as private dwellings and numerous huts occupied by labourers employed in the town.\textsuperscript{162}
\end{quote}

Indeed it is difficult to find historical evidence of South Gundagai itself. While travellers, Land Commissioners, and others often described the population and buildings of North Gundagai, South Gundagai was not as closely observed. Further, it was sometimes subsumed into broader regional assessments. For example, the 1851 census for Gundagai – giving a population of 397 – did not differentiate between North and South, and probably included horticulturalists and pastoralists in the surrounding region.\textsuperscript{163}

Development at Gundagai boomed despite another high flood in 1847. The flood entered parts of the northern and southern sections of the town but did not cause much damage and no loss of life was recorded. In 1850 Larmer wrote to the Governor that settlers living in North Gundagai had in some ways become reconciled to periodic inundations, and that there were benefits from floods, such as improved pasture following flooding. He wrote that, 'if the inhabitants of North Gundagai formerly

\begin{footnotes}
\footnotetext[160]{Stuart Macintyre, \textit{A Concise History of Australia} (Cambridge: Cambridge University Press, 1999), p.81.}
\footnotetext[163]{O'Keefe, \textit{et al.}, \textit{The Watermen of Gundagai}, p.15; and, Butcher, \textit{Gundagai}, p.17.}
\end{footnotes}
considered it necessary for their safety to exchange their allotments and remove to South Gundagai they do not entertain the same opinion now, — and admit that although for a short period, or for a few hours only, they suffer inconvenience from floods, they are sensible the pasture is immensely improved'.

Indeed, cattle in Gundagai and surrounding stations were well known for their quality, and the town became a centre for stock trading. Drovers Charles MacAlister later recalled trading in Gundagai in 1848. He wrote that, 'Everything about the 'Big Flood' town, except the business men, was as 'green as a leek'; trade was good and the cattle in rare order'. MacAlister was writing this account after the 1852 flood, the 'Big Flood', had occurred. Here he referred to floods as beneficial, indicating that in the late 1840s they had gained a positive name by making the land green and fertile. Michael Norton wrote that in Gundagai at this time, 'people... were of a nomadic stamp, of the peddling order... and shrewd dealers they were too. Gundagai was then a famous dealing place, and speculators would ride over from Melbourne and different parts of Victoria three or four times a year to buy our stock. Our cattle was [sic] the first in the market'. Gundagai's businesspeople had gained a reputation for shrewd dealing.

Contesting Environmental Knowledge: Government Buildings and Dams

North, and to a lesser extent South Gundagai, prospered in the late 1840s; and rivalry between the two centres increased. Economic competition between the two became entangled with disputes over environmental knowledge, specifically which location would be more suitable for siting government service buildings. These arguments were couched...
in terms of which lands were subject to flooding and which sites minimised river crossings.

One settler from the South, Robert Pitt Jenkins, argued that the government reserve for the Court House and Lock-up in the North was subject to flooding and that the buildings should be built in the South. Jenkins was one of only two permanent magistrates in the town and he used his official position when lobbying the Governor in December 1849 to change the location for these buildings to the South, despite the fact that tenders had already been called for the erection of the buildings on the North Gundagai site. To convince the Governor, Jenkins referred to the authority of 'the oldest residents in North Gundagai' that 'the site chosen is subject to inundation'.  

Jenkins reasoned to the Governor that the erection of the buildings in South Gundagai would benefit the work of the magistrates. He argued that it was likely the Gundagai Bench would join with that of Tumut, with sessions being held in Gundagai. For travelling purposes, it would be more convenient for the Tumut magistrates to have the building in South Gundagai – so they would not have to cross the river. The Tumut magistrates, he argued, would also be 'more disposed to take their share of Police duties if the Police Office were on the south side'. Jenkins also argued that 'there is only one magistrate on the north side and he will reside there in all probability a very short time'.

Hearing reports of Jenkins' letter 'out of doors', the other permanent Magistrate, W.A. Smith, wrote to the Governor on behalf of the Bench of Magistrates [meaning Smith and the occasional magistrate]. Smith explained that Jenkins' views were from him 'alone, as a private individual, and not from the Bench'. Further, his suggestion was not supported by information or the weight of population. Smith wrote that the North Gundagai site was 'the most eligible for the purpose owing to its central position in the most flourishing portion of the Township and being above 'flood mark'. Further, Smith argued that,

...independently of the eligibility of the selection made by us, the very circumstance that two hundred and eighty allotments have been purchased in North Gundagai, which has a

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population of upwards of two hundred and fifty persons, while South Gundagai has not more than twenty residents, who have bought about twenty-five allotments, is of itself a sufficient reason why public buildings should be erected in North Gundagai.\textsuperscript{172}

North Gundagai had expanded considerably, whereas South Gundagai had fewer residents and this in itself, Smith argued, recommended North Gundagai as the best site. Indeed, Smith argued that Jenkins had no defensible reason to back his arguments. Smith told the Governor that Jenkins' suggestion was instead motivated by the potential for personal gain; for 'his own private convenience' of having the buildings close to his own place of residence, rather than sound environmental knowledge and demographic logic.\textsuperscript{173}

The Governor sought Surveyor Larmer's opinion. Larmer, who five years previously had surveyed parts of North and South Gundagai, wrote that the current site for the Court House and Lock-up in North Gundagai was 'unobjectionable – but that if necessary for its [the building's] removal many others exist' in North Gundagai. Larmer had discussed the matter with Smith, and agreed that Jenkins' suggestion was made for 'personal convenience and accommodation'.\textsuperscript{174} The location for the Court House and Lock-up did not change.

Government knowledge and information about floods in Gundagai was insubstantial; and settler experience was limited. Aboriginal knowledge seems to have been open to doubt by residents and landowners and generally overlooked by Government surveyors and the Governor, who infrequently visited the township and lived in distant locations. It could be argued that given the paucity of reliable and valued information, environmental knowledge was not only contestable, but vulnerable to manipulation and claims by those with ulterior motives. Jenkins, for example, may have harboured economic motivations in his attempts to influence the siting of Government buildings, to bring more trade and stimulate development in the neighbourhood. In the money-driven atmosphere of Gundagai, the prospect of economic benefits was linked to location firstly on the main travel route at the river crossing and then to population density promoted by the introduction of new services, including government buildings. In

\begin{footnotesize}
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this way the commercial imperative tied most building sites to the river flat despite its history of flooding.\textsuperscript{175}

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Gold and Floods: 1851

The opening up of the Ovens goldfields in 1851 began a new wave of business for those in Gundagai as large numbers of prospectors travelled the Port Phillip Road between the Turon, Snowy Mountains, Bathurst, Ovens gold fields, and Sydney.\textsuperscript{176} The gold fields also attracted those living in Gundagai. For example, the three Gormly brothers, James, Thomas, and Jeremiah whose parents Patrick and Mary Gormly emigrated from Ireland in 1839-40. In 1849 the Gormlys bought a large allotment in North Gundagai, with a view to establishing an agricultural business. They moved to Gundagai from nearby Nangus Station so that the two youngest of their eight children could attend the National School. In 1851, the three eldest brothers — James (15), Thomas (19), and Jeremiah (22) — travelled to the Turon River gold fields. Drought conditions, which lowered the river level, had induced prospectors to mine the riverbed.\textsuperscript{177} Floods in 1851 and early 1852 washed out many mines.\textsuperscript{178} The Gormly brothers, however, continued to mine in the river under dangerous conditions. They were at the Turon diggings for a year.

The Murrumbidgee also flooded in 1851. In May that year a fast-rising flood deposited a thick layer of mud through Gundagai, but no damage or drownings were recorded.\textsuperscript{179} In the lower reaches of the river the flood came as a relief to pastoralists. It was described by one as a ‘seasonal blessing’ that came ‘just in time to save many, many flocks from starvation and death’.\textsuperscript{180} The drought had intensified in the first half of 1851, and fodder was in short supply. While some sheep drowned in the flood, it was seen to have saved the lives of many more.

\textsuperscript{175} Wardiningis\hspace{1pt}Soerjohardjo argued that Jenkins subscribed to the English class system and considered himself upper-class. She argued that this class consciousness and sense of privilege influenced his demands for the Court-House and Lock-up to be built in South Gundagai for the convenience of magistrates. However, economic motivations cannot be underestimated as an additional factor, as Soerjohardjo has also argued. See, Soerjohardjo, ‘Aspects of Life in Gundagai, 1840-1860’, pp.81-88.


\textsuperscript{177} Maitland Mercury, 7 February, 1852, p.2.

\textsuperscript{178} Goulburn Herald, 6 September, 1851, p.3.

\textsuperscript{179} Argus, 19 June, 1851, p.4.

\textsuperscript{180} Maitland Mercury, 12 May, 1851, p.4. See also, Maitland Mercury, 14 May, 1851, p.2; and, Maitland Mercury, 22 May, 1851, p.2.
In August 1851 the Murrumbidgee flooded again, rising to the height of the 1844 flood in Gundagai. While there was no loss of life, the floodwaters damaged a number of buildings and swept away a recently erected store in South Gundagai. A government bridge over the creek was also washed away.\textsuperscript{181} After these two floods in 1851, residents again petitioned the Governor, Charles FitzRoy (who had succeeded Gipps), this time requesting the construction of a dam at the junction of three creeks that fed the lagoon.\textsuperscript{182} Their letter explained that the three creeks funnelled floodwater into the lagoon, which only had one outlet — the anabranch that ran through the town (Morelys Creek). The velocity of the water accelerated as it was fed from the wide lagoon into the narrow channel, causing large floods to be fast rising, turbulent, and damaging to the town. By damming the lagoon, they argued, the town would be safer from ‘the yearly inundations’; ‘the physical evils... [that] retard their [the petitioners’] progress, and threaten their ultimate ruin’.\textsuperscript{183}

The dam proposal marked a new tactic by settlers in their relationship with government and rivers. The river could be moved instead of the town. The petitioners argued that ‘the remedy is merely a matter of money’, also hinting at some sort of compensation for the damage caused to their property.\textsuperscript{184} FitzRoy did not accede to the request for a dam nor issue any compensation.

In June 1852 the Gormly brothers returned to Gundagai to prepare for a new enterprise — selling flour and other goods to miners at the gold diggings at a considerable profit. By this time, the town was in the midst of substantial economic growth. One of the brothers, James, later recalled that the three ‘were anxious to start as soon as possible, as we heard flour was going at £16 a bag’ on the gold fields. In 1915 James Gormly wrote that he later discovered that two men (one being his brother-in-law) had sold flour to miners for £20 a bag; the profits from this became the basis of at least one of the men’s future fortunes. Gormly lamented that this was ‘what my family missed by the ’52 flood’.\textsuperscript{185}

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\textsuperscript{181} \textit{Goulburn Herald}, 30 August, 1851, p.3.
\textsuperscript{182} Petition quoted in, \textit{Goulburn Herald}, 4 September, 1852, p.8. The petitioners included ‘the Magistrates, Licensed Squatters, Storekeepers, Licensed Victuallers, Mechanics, Labourers, and other residents in the Town and District of Gundagai’.
\textsuperscript{183} Petition quoted in, \textit{Goulburn Herald}, 4 September, 1852, p.8.
\textsuperscript{184} Petition quoted in, \textit{Goulburn Herald}, 4 September, 1852, p.8.
June 1852 Flood

The three Gormly brothers did not leave Gundagai as planned. While gathering supplies for their trip, the Murrumbidgee had begun to rise. The Turon River and creeks near Ophir remained in flood that year. Rain continued throughout coastal and inland New South Wales, and the river stayed high. In May, rain intensified around Gundagai. The Murrumbidgee, creeks, and lagoon near the town swelled. On about 18 June James Gormly went to the punt to cross to South Gundagai. The river was so high that the punt could not take passengers. Instead the punt owner, Spencer, allowed Gormly to swim with his horse behind the punt ('for which he charged 10 shillings'). The next day, Gormly returned to find that the river had broken its banks. He swam his horse across, and reached home. After this, however, 'the punt could not again be worked'. The creek 'was likewise impassable', except by boat or swimming.

On Thursday 24 June the water began to reach houses and businesses in the town. Some residents in the lowest areas on the flat moved to higher ground by boat, but many stayed, thinking themselves 'safe in their houses'. By Thursday evening the flat was covered with water and residents became apprehensive 'of having a high flood'. They made preparations for an inundation, moving belongings and stores off the floor. The next morning the water had reached the height of the 1844 and August 1851 floods. A rescue party from South Gundagai was organised to try to save those on the flat. Two settlers managed to manoeuvre a boat to the Thatcher family, who had taken refuge in the loft. However, on its return the boat filled with floodwater and five children and one of the boatmen drowned. After this, a resident later wrote, further rescues were 'impossible'. The turbulence of the water, its strong current, and the debris it carried with it, including large logs, made rescues difficult and dangerous. People cried out for help but could not be rescued.

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186 There were floods as far north as the Condamine River in June. *Maitland Mercury*, 24 July, 1852, p.4.
187 *Maitland Mercury*, 22 May, 1852, p.2.
189 SMH, 5 July, 1852, p.2; and, James Gormly, 'When It Broke: Drought of 1850-51', *Gundagai Independent*, 4 May, 1915, p.4.
190 SMH, 5 July, 1852, p.2.
191 SMH, 5 July, 1852, p.2.
192 SMH, 5 July, 1852, p.2.
That night the swirling water tore down buildings in which many people had sought safety or perched on roofs: 'Crash after crash announced the fall of some house, and... screams... followed the engulfing [sic] of those who still clung'.\(^{193}\) Some became trapped inside buildings and could not escape, such as the McKenna family. The family lived at the National School, the mother and father being teachers there. The whole family drowned at the school (including five children), as well as two of their wards, and another man. Their efforts to escape by stacking furniture up to the roof were later described by Waight.\(^{194}\) Most of those in buildings drowned.\(^{195}\) Some people attempted to swim from rooftops to tree tops; while some reached them, others were swept away and drowned in the attempt.

Thirty-six houses were completely washed away.\(^{196}\) Whole rooms of houses and businesses were demolished by the floodwaters, roofs were separated from buildings, and other buildings were completely swept away. The flood peaked at 11 o'clock that night, and began to fall at 3am on Saturday morning. It reached depths of 40 feet at the river, and 14 feet in the highest parts of the flat.\(^{197}\)

Many of those who survived swam from the buildings to perch in trees. James and Thomas Gormly swam from the roof of their family's home as it collapsed.\(^{198}\) James Gormly later recounted that he and Thomas were strong swimmers. So was their father, but he drowned trying to save his wife.\(^{199}\) His father had managed to take 'a goodly sum of notes' with him (Gormly explained 'there was no inland banks in those days') and these he handed to Thomas, 'the strongest swimmer', foreseeing his own death.\(^{200}\) The family (which, besides James, Thomas, and their father and mother, included two brothers and a sister) perched on the roof of their house. 'There was no panic in our family', James Gormly wrote. 'The three who could swim never thought of deserting the

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193 SMH, 5 July, 1852, p.2; and, James Gormly, 'When It Broke: Drought of 1850-1', Gundagai Independent, 11 May, 1915, p.4.
196 SMH, 5 July, 1852, p.2.
197 Petition from Gundagai residents to Governor FitzRoy, 15 July, 1852, in Goulburn Herald, 4 September, 1852, p.8; and, Butcher, Gundagai, p.84.
198 James Gormly, Exploration and Settlement in Australia (Sydney: D.S. Ford, printer, 1921), p.5.
199 James Gormly, quoted in Mary Last, Gundagai Independent, June 1952, in '1852 Flood'. Clippings File, Gundagai Library.
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others'. For a time the house held against the strong current and hammering debris, but at dusk it 'broke away from its foundations' and was carried by the current. When the building smashed into a tree, it crumbled. The three strong swimmers attempted to rescue three other family members, only managing to hold onto one each – the father his wife, and the two brothers a sibling each. Amidst the turbulent water, which swept them against debris and trees and sucked them under the surface, Thomas and James lost hold of their siblings. The brothers were unable to locate any other family members and nearly gave up themselves. James Gormly wrote: 'We both felt inclined to give up the terrible struggle but each tried to cheer the other on with words of encouragement. Had it not been for this companionship and mutual help we would both have been drowned.' The brothers managed to climb into a tree but, deciding it was too weak to hold against the water, stripped off their coats and shoes and swam for another, a large oak. This tree did not feel safe either but they were too exhausted to swim any further. Gormly described how cattle and horses that washed past tried to scramble into their tree. Soon their clothes 'froze stiff' in the winter night.

They could see others stranded in trees. The brothers talked to a person perched in a nearby tree – their conversation suddenly cut off as the person fell into the water. Others also fell into the water: 'During the night we heard several cries suddenly cut off, as some person was engulfed in the awful water'. 'It is not at all pleasant', James Gormly wrote, 'to see a person perish, and not be able to stretch out a hand to give assistance'. People also died in the trees, probably from exhaustion and exposure. Many remained in trees for two nights (the two Gormly brothers for one night), before being rescued when the floodwater became less turbulent.

Most who were saved were rescued by Aboriginal men, who ferried people to safety in bark canoes and boats. Only two men were mentioned by name, Jackey (other spellings: Jacky and Jackey Jackey) and Yarri (other spellings: Yarry, Yarde, Yarra). There is evidence, however, that more Aborigines were involved in rescuing settlers at Gundagai. The Land Commissioner of the Lachlan District, who later conducted a

207 SMH, 5 July, 1852, p.2; and, Harry Turnbull, 'The Stuff Old-Timers Were made Of', p.197.
208 For other individual rescues by Jackey and Yarri see: O'Keefe, et al., The Watermen of Gundagai, p.8; and, Soerjohardjo, 'Aspects of Life in Gundagai, 1840-1860', pp.159-164.
government inquiry into the flood, wrote to the Governor that, ‘[flour of the aboriginal natives were very active during the flood, and saved many lives and much property’.

One rescuer has recently been identified as Long Jimmy. A letter from two survivors of the flood to the SMH stated that the Murrumbidgee District Land Commissioner, Henry Bingham, ‘deserves the highest praise for effectually and powerfully exerting that great moral influence he had over the aboriginal natives, in urging them to cut canoes... by which many lives have been rescued’. Including, the letter implied, Bingham’s own life. Aborigines also rescued settlers on the Lachlan.

Between them, Jackey and Yarri were credited with saving about 28 people. As O’Keefe et al note, while Yarri has become a more celebrated hero of the flood in recent years, contemporary sources attribute a larger number of rescues to Jackey, totalling 20 people. Indeed, Jackey was more often mentioned in contemporary newspaper reports, which were frequently written or informed by survivors. For example, a survivor’s account to the SMH stated that Jackey, who worked for Andrews, ‘afforded in this respect the most valuable assistance, saving a great many lives’. Jackey had a connection with settlers in Gundagai through his employment with Andrews. Some reports say he was ‘owned’ by Andrews and the terms of his employment are unclear. From some accounts it appears his skill with canoes was well known and settlers sought him out for rescues.

James Gormly described how the dangerous conditions created by the flood led settlers ‘to give the boat to Andrews’s Jackey... who was known to be capable of managing...

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211 SMH, 10 July, 1852, p.6. See also, SMH, 21 July, 1852, p.3.
212 SMH, 10 July, 1852, p.6

Yarri was later credited with saving 49 people. However it is not clear how this figure was determined. Allen Crooks, Yarri: Hero of Gundagai (Lawson, NSW: Mission Publications, 1986), pp.89. For more on Yarri after the 1852 flood see: ‘Yarri’, ‘1852 Flood’. Clippings File. Gundagai Library.
217 SMH, 5 July, 1852, p.2.
218 SMH, 5 July, 1852, p.2.
a bark canoe'. A failed rescue by settlers had led to the drowning of an entire family (the Thatchers). The boat had smashed and after its repair, settlers gave the boat to Jackey. Gormly noted Jackey's method of manoeuvring the boat (much larger than a bark canoe): 'Although the course Jackey adopted was slow, it was a sure and safe one... Jackey was a strong, cautious, careful man, but his mode of propelling a boat by standing up in the bow, and using one of the oars as a paddle had not the same power to force the skiff against the current as two men using the sculls in the ordinary manner would have.' Gormly wrote that settlers asked Jackey to rescue the Riley family first, as they had young children. This Jackey did by paddling 'half-a-mile upstream' into the current 'and then drifted back to the house'. According to Gormly, Jackey rescued eight people from the house. With 'a full load [in the boat]... he acted with great caution, and landed his passengers late in the afternoon'. As night was setting in it was too late to rescue any more and the water was reaching dangerous heights and velocity.

The next day (27 June) Jackey again took the boat out. Amongst those he saved were the Turnbull family, numbering at least seven. The family had been stranded for two nights on the roof of a house which had, so far, withstood the flood. The family was the 'only one rescued in its entirety'. Harry Turnbull, the son of Mrs. Turnbull, later wrote that his mother ('once Miss Andrews') had nursed Jackey through an illness and he had rescued her through loyalty. Harry, recalling the stories his mother told him, wrote that after the family's rescue, 'Jacky [sic] was offered a large sum to go back for the gentleman who was sitting in the fork of a tree, but he said he dared not try it.' Although the current had weakened, rescues were still dangerous because of debris. James and Thomas Gormly were probably also saved by Jackey.

Yarri probably also had a connection with settlers on the flat. James Gormly claimed that Yarri had shepherded for his father at nearby Nangus Station. Gormly described how, on the first day of the flood, Yarri's bark canoe had come close to the

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220 James Gormly, 'When It Broke: Drought of 1850-51', Gundagai Independent, 11 May, 1915, p.4. The boat was repaired by Joseph Morely.
224 Harry Turnbull, 'The Stuff Old-Timers Were made Of', p.197; and, O'Keefe et al., The Watermen of Gundagai, p.8.
Gormly family as they perched on the roof of their house. Yarri came close enough that he and Gormly were able to exchange words, but the current swept Yarri past. Gormly wrote, '[h]e was on his knees, crouched in the bottom of his frail canoe, which was liable to be upset at any moment'. Only the strong current prevented Yarri from rescuing the Gormlys from the roof of their house: 'We knew Yarry was willing to run any risk to give assistance, but that assistance was then impossible, as even in still water his canoe would only carry two light persons'. Gormly continued that, '[n]ot withstanding the danger he incurred, Yarry did good work that day'. He was able to rescue a 'large family named Reardon'.

Yarri's use of a canoe and Jackey's use of a boat may account for the larger number of settlers Jackey rescued — Jackey could take up to eight people in the boat and Yarri only two.

The danger faced during rescues made those performed by Aborigines a source of gratitude, wonder and praise from survivors. A man travelling through Gundagai at the time of the flood wrote that Aboriginal rescuers had performed 'a most difficult and dangerous task... These fellows (Black if you like) did splendid service'. The Aboriginal rescuers were honoured by settlers in poems and stories immediately following the flood.

Material gratitude to Jackey and Yarri was however slow to appear. It was not until 1875 that it was announced the heroes of the flood could collect six pence from settlers in Gundagai. O'Keefe et al note that Jackey died at an unknown date before this announcement. Yarri continued to live in and around Gundagai until his death in 1880. He was baptised James McDonnell on 16 August 1875.

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232 Town and Country Journal, 14 August, 1875 in, ‘Yarri’. ‘1852 Flood’. Clippings File. Gundagai Library. Tokens of gratitude also included the presentation of king plates to Yarri and Jackey. These seem to have been presented up to twenty years later. There is evidence that in his old age Yarri was taunted by youths in Gundagai. ‘Yarr’ (with newspaper reports about Yarr, dated between 1879 and 1880), in ‘Yarri’. ‘1852 Flood’. Clippings File. Gundagai Library; and, O’Keefe et al., The Watermen of Gundagai, p.8.
The Immediate Aftermath

Stories of survival and death began to reach the newspapers in July 1852. A correspondent to the SMH wrote of the aftermath:

The scenes on the high part, where the remains of the inhabitants are congregated, is truly distressing. At every step you see someone lamenting the dead. Here and there the sorrowing remains of what three days before had been a large and thriving family. Mr. Thatcher saved himself but lost sight of his family... There are few that lived on the flat [North Gundagai] that have not to lament the loss of some relation; nearly all are penniless.235

James Gormly also described the scene on the banks. He and Thomas had been rescued by boat on the afternoon of 25 June and taken to Kimo Hill (east of North Gundagai, across Jones’ Creek) where a number of other survivors had gathered. Gormly later wrote that he and Thomas were in a better condition than most, despite exhaustion and exposure. Gormly attributed this to the tough conditions they had withstood while mining the bed of the Turon River. Barefooted, with one foot slightly frostbitten, and stones digging into his soles, Gormly walked and ran along the bank meeting other survivors. The brothers also swam a creek to where some houses remained on a hill. He wrote, ‘I was so much excited about the fate of those still in the trees and on the roofs of houses, that I walked and ran about until night set in’.236 Two days after the flood many still awaited rescue, fighting exhaustion and cold temperatures. The brothers sought warm clothes but ‘it was impossible to buy articles of clothing’ with the money their father had given them. There was no store and many had few (or no) possessions left. Those whose houses had not been flooded housed those who had been rescued and shared food. James Gormly was given a guernsey by a friend who also sat up that night to make him a pair of boots.237

On June 28 the floodwater had receded enough for a search for survivors to begin. Gormly described going to the south bank where he counted 19 bodies that had washed ashore and been placed in a stable.238 Gormly wrote that, ‘[a]lthough nearly all the

235 SMH, 5 July, 1852, p.2.  
residences of those drowned were on the north side of the river, most of the bodies were found on the south side as the current swept nearly straight across the river channel, which ran in a straight line from the highland on the south bank to the foot of Kimo Hill.\textsuperscript{239} The strong current was the most dangerous and destructive element of the flood. One settler described the impact of the fast and high floodwater in the following way:

In many places not a tree is left standing. Large trees six or seven foot in diameter, are torn up by the roots, or broken short off, and carried to a considerable distance... All the alluvial soil on the banks of the river is washed away and nothing left but large holes, or rather yawning guls, partly filled up with sand and rocks. Everywhere are to be seen strewn about the wreck of houses, fences, carts, furniture of all sorts, hay, straw, and dead animals.\textsuperscript{240}

For months following the flood carcasses of animals such as horses and cattle rotted in the forks of trees. A traveller on his way to the goldfields saw a horse carcass lodged in the fork of a red gum 39 feet 'above the river's summer level'. The skeleton of the horse was 'a monument showing the height of the flood', a grim reminder.\textsuperscript{241} Indeed, two months after the flood Waight interpreted such signs of the flood's height and impact as kinds of perverse monuments, which told more about the flood than just its height. Such things unravelled a history of living on the flat and provoked frustration that was underpinned by long accumulating tension with the government. This was the case even for those who did not live in Gundagai, such as Waight.

One of the first bodies found on the north side of the river was James Gormly's eldest brother. James and Thomas found some wood to make him a coffin and placed the body 'in an out house for the night, so we could have it buried the next day'.\textsuperscript{242} 'James Riley's cook' stayed with the body that night although he was exhausted from being stranded in a tree for two nights. Gormly wrote that the cook 'by some means procured candles, and, I believe, read his prayer book the greater part of the night'.\textsuperscript{243} Constable Michael Norton organised the burials of those who were not claimed by family or

\textsuperscript{239} James Gormly, 'When It Broke: Drought of 1850-51', Gundagai Independent, 1 June, 1915, p.4.
\textsuperscript{240} Goulburn Herald, 24 July, 1852, p.4.
\textsuperscript{242} James Gormly, 'When It Broke: Drought of 1850-51', Gundagai Independent, 1 June, 1915, p.4.
\textsuperscript{243} James Gormly, 'When It Broke: Drought of 1850-51', Gundagai Independent, 1 June, 1915, p.4.
Bodies continued to be found in the following days, but many remained missing. The flood had swept a think layer of mud through the town, covering the dead. The thickness of the mud, Gormly argued over fifty years later, was the reason that many bodies were never found. He recalled a chance finding of a body in the days following the flood, that had been buried under two feet of flood silt. While searching for the dead he ‘saw the end of a woollen muffler, such as those worn around people’s neck’. He continued: ‘I tugged at this for some time but found it was fast to something under the surface. I then removed about two feet deep of mud with my hands, and found the body of a girl about eight years of age’. The mud, Gormly asserted, ‘accounts for the small number of bodies of those drowned that were recovered – in all probability not one-third’.

While the floodwaters lingered, the dead were counted, as best they could be. A SMH headline ran, ‘Gundagai — Dreadful Flood, — Sixty-Four Lives Lost — June 28’. Later reports from those in the town put the total number between 80 and 100. There was some hope people who were missing were still alive. The difficulties that were apparent in assessing the number who had died may have also been influenced by the fact that there had been a number of travellers in the town at the time of the flood and some of their deaths may have taken a number of weeks to confirm. The deaths of some travellers were, however, included in the official report. Discrepancies in the death toll (between official reports, newspapers, correspondence from those in the town, and earlier and later accountings), may also stem from the fact that bodies continued to wash ashore up to a month after the flood; the bodies of two adults and three or four children were found in mid-July. Waight, whose account was given at the beginning of this section, noted that a body was found when he stopped in Gundagai, two months after the flood.

The official death toll calculated by the Commissioner of Crown Lands in the Lachlan District by 16 July was 75, comprising 68 from North Gundagai and seven from South. The Commissioner named those who had died and who had survived. Most of the deaths were from North Gundagai, where the number of people at the time of the

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246 SMH, 5 July, 1852, p.3.
247 SMH, 19 July, 1852, p.2; and, Maitland Mercury, 14 July, 1852, p.3.
248 By 14 July, 12 people were reported as still missing. Maitland Mercury, 14 July, 1852, p.3.
249 Lindley, Early Gundagai, p.78.
flood was estimated to be about 200 (including travellers). The 1851 census indicates the total population of Gundagai (including North and South and probably also those living in the immediate vicinity of the town) was about 400 at the time of the flood.\textsuperscript{251} If we combine available sources: the Lachlan District Land Commissioner's report, 1851 census, and the estimated number of people in North Gundagai at the time of the flood, then just under one third of those in North Gundagai died during the flood. However, with estimates of deaths reaching over 100, as much as half the population on the north bank may have died. The number of dead remained (and remains) far from certain.

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Burials

The Reverend Charles Brigstoke, a Church of England clergyman, travelled from Yass to Gundagai, arriving on 14 July (three weeks after the flood). There he compiled a list of those who had died, which he numbered at 76. In a letter to Bishop Broughton in Sydney, dated 19 July, he wrote, 'Seventy-six, my lord, I have ascertained, and I think correctly, must have perished'. He wrote that 31 bodies had so far been buried (but his later descriptions indicate he had buried at least 32). Nineteen were buried in South Gundagai, 'in hardwood coffins, in one place, without distinction of sect or creed, and over which I read the burial service, which ceremony was attended by many of the relations and friends of the deceased'.\textsuperscript{252}

Brigstoke buried 13 bodies in North Gundagai. These burials were grouped by religious denomination (a common practice), with eight 'Romanists' buried a short distance from the bodies of five Protestants. Although Brigstoke appears to have overseen all the burials, he 'did not interfere' with the traditional reading of the Last Rites over the eight Catholics, for which ritual 'the Priest from Yass was daily expected'.\textsuperscript{253} According to Brigstoke's tally there were 45 others who died, the burials of whom he did not account for in his letter, and these were victims who were possibly never found. Names of victims could have been gained by eyewitness accounts of drownings. In contrast to Brigstoke's

\textsuperscript{251} Goulburn Herald, 10 July, 1852, p.3; and The Blue Book, 1851.

\textsuperscript{252} Charles F. Brigstoke, Letter to Bishop Broughton, Bishop of Sydney, 19 July, 1852, in SMH, 26 July, 1852, p.2.

account of the burials of 32 victims, the Lachlan District Land Commissioner indicated that at least 35 bodies had been interred by the time Brigstoke wrote to the Bishop of Sydney.\footnote{\textit{Copy of a Letter from the Commissioner of Crown Lands, Lachlan District, to the Colonial Secretary}, 16 July, 1852. 'Gundagai'. \textit{New South Wales Legislative Council. Votes and Proceedings}, v.2, 1852. pp.251-278, pp.245-247; and, Charles F. Brigstoke, Letter to Bishop Broughton, Bishop of Sydney, 19 July, 1852, in SMH, 26 July, 1852, p.2.} Brigstoke did not indicate (beyond North or South Gundagai) the places where the bodies were interred. The \textit{Goulburn Herald} reported that the 'bodies that have been recovered were interred with little ceremony — what ceremony could be expected? — they were wrapped in calico and put into holes!'\footnote{\textit{Goulburn Herald}, 10 July, 1852, p.4.}

During the initial stages of research I tried to find where the victims were buried by finding graves, headstones, and/or commemoration sites in Gundagai cemeteries. With the deaths numbering between 75 and 100, I imagined there would be some sign of the burial sites, marked around the time of the flood or in later commemoration. Arriving in Gundagai, I went to the Tourist Information Centre to find out where the victims of the flood were buried. There are two cemeteries in Gundagai, so I was unsure which one to go to. The woman behind the desk told me they had not been buried in the (current) cemeteries. She pointed out the window and said they were buried just there, under the park (Carberry Park) and up into the garden of the adjoining house. There was no plaque or marker to commemorate victims collectively buried in the park, either there or elsewhere in the town. There were a few memorial gravestones in North Gundagai cemetery to individuals or families. David Lindley, the grandson of one of the survivors, built a monument on the flat (now a golf course) to those in his family who had perished before he had had the chance to meet them.

David Lindley recently wrote a biography of his grandfather, Thomas Lindley, licensee of the 'Rose Inn' and resident of Gundagai from 1850 to 1853. Thomas Lindley, away from Gundagai on business at the time of the flood, lost his wife and children in the flood. David Lindley, drawing on a thesis by E. Carpenter, noted that there are probable sites where most of the recovered bodies were interred — in South Gundagai in Section 10 along Ferry Street; and in North Gundagai along Otway Street.\footnote{\textit{Lindley, Early Gundagai}, p.76.}

Using a combination of Surveyor Larmer's field books of survey dates and a variety of survey maps compiled between 1838 and 1850 recording sites and relationships
between locations, it appears that by 1852 there was a cemetery (surveyed and in use) in North Gundagai that was indeed on Otway Street. Larmer's field books show that he surveyed cemeteries in North and South Gundagai in 1850 and show the North Gundagai burial site was in part located on land that was (and still is today) on Otway Street. According to Larmer’s field book survey, the cemetery covered parts of four blocks (or sections) and part of Otway Street. Most of the cemetery was located on the north-eastern intersection of Otway and Sheridan Streets (section 37), outside the settled areas on the flat (north-east of the main part of the town), on the slopes of Mount Parnassus.

The question remains, was this cemetery in use by 1852 and was this where those who died in the flood were buried? There are four indications that it was. First, Brigstoke grouped the burials of bodies found in North Gundagai according to religious denomination, but not those in South Gundagai. This suggests that there were areas marked (and consecrated) for denominational burial in North Gundagai. Secondly, a settler stated in a letter to the SMH following the flood that 'the graves are on the hill', indicating that there was a set burial site on the slopes of Mount Parnassus. (The writer continued that 'had they [surveyors] placed the living where they have put the dead, their number would have been much larger now'). Thirdly, there seems no reason for a delay in using the burial site once Larmer had surveyed it in detail in 1850. It was close to the town and a distinct site. Lastly, this was the exact site indicated by the woman in the Tourist Information Centre. By the time of my visit in 2006, the burial ground had been taken over by the town's expansion and had now become a park close to the town’s high street. While the site remains un-memorialised by a statue, stone, or plaque, the place holds memories that are held in oral tradition.

258 James Larmer, Surveyors' Field books 1794-1861; Larmer 1849-50. NRS 13889, 636. State Records Authority of New South Wales. A note about survey maps: the dates of when particular sites were surveyed is questionable as survey maps are working drawings and continually added to. This is why surveyors' field books, which record the dates surveys were made, are important supplements in reading survey maps historically.
259 SMH, 10 July, 1852, p.6.
260 SMH, 10 July, 1852, p.6.
Another cemetery, located further north (the current North Gundagai cemetery), was marked on Perry’s 1838 survey map, but this site could have been added to the map by later surveyors.261 The Otway Street site is likely to be where victims of the 1852 flood were buried, but the presence of grave stones dating to the 1850s in the present day cemetery, suggest that both were in use by 1850 and had been drawn on the 1838 map by Larmer that year or earlier (perhaps even by Perry).

Larmer also surveyed a cemetery for South Gundagai in 1850. In his field notes he marked the cemetery close to a nearby station’s (‘Willee Poolma’) woolshed, along the ‘new road to Tumut’.262 However, this was probably not where victims of the flood were buried as it was only roughly surveyed and far from the developed areas of South Gundagai. In early survey maps of South Gundagai (compiled in 1845) there was a mark labelled ‘graves’ in a recreation reserve close to the river, on the western side of Mount Street and along the old road to Tumut, which was probably where victims of the flood were buried.263 The burial ground was located on the banks of the river, close to where the bodies were found.264 Perhaps the South Gundagai cemetery surveyed by Larmer in 1850 was to offer settlers denominationally segregated grave sites, as the Mount Street site seems not to have made this distinction.

264 This is a different site to the current South Gundagai cemetery, located on Tumut Road, which was, however, in use by 1846. The oldest gravestone in the Tumut Road cemetery is that of Edmund Crisp who died on 27 August 1846. However, the lack of denomination segregation and location of the Mount Street site near the river, where the bodies washed up, suggests it was the place victims were buried.
Damage

Survivors of the flood of June 1852 faced a town in ruins. The 'Thatched Cottage Inn' in South Gundagai, along with a number of other buildings, had been washed away. On the flat in North Gundagai almost all houses and businesses were damaged or washed away altogether. The recently erected Court House and Lock-up were completely destroyed. Magistrate Jenkins wrote a letter to the Governor in July 1852, one month after the flood. His purpose was to seek vindication for his opinion that the Court House and Lock-up should have been built in South Gundagai. He wished to 'prove to the satisfaction of His Excellency that the late disastrous flood confirms my representation that the site chosen was ineligible from the fact of its being subject to inundation'. The flood of 1852 was

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infused with a history of contention over environmental knowledge and feelings of resentment from those who felt they had been ignored or treated unjustly. The response to Jenkins’ letter was short and to the point: ‘In reply I am desired to inform you that His Excellency can only very deeply regret that the recent melancholy dispensation of Providence should have confirmed your opinion’.266

In both North and South Gundagai fences, gardens, small farms, business stores and domestic goods, along with animals, were washed away, drowned, or destroyed by the flood. The combined damage to buildings, fences, produce, and property ‘improvements’ was estimated to be £3,731. Damage or loss of household and store goods was greater, estimated to be £4,395.267

Travellers and visitors in the town robbed the dead and looted property that washed to shore.268 Those on their way to the diggings, ‘and others’, made bark canoes, searching for valuables amongst furniture, breaking open cash boxes and chests of drawers. A number of Police Constables were ‘sworn in’ soon after the flood to control looting. This action came too late. The day that police began to search for stolen belongings looters were leaving town as ‘several drays started, loaded with the plunder of the unfortunate sufferers’.269

The flood in Gundagai and its consequences were widely reported in newspapers throughout the colony. The tragedy caused an outpouring of feeling for the victims. Soon after initial reports of the flood reached Sydney the SMH published a poem, ‘Ode to the Dead of Gundagai’ by ‘Theta’ — a poet who published widely in newspapers and journals in this period. Extracts from the poem reveal the feelings of pathos and tragic loss after the flood:

Sleep dead, who died at Gundagai!
Upon that dreadful heavy night,
What then avail’d the piercing cry,
Which rose above the waters’ might?
Ah what avail’d thee? Thine the fate,

268 SMH, 19 July, 1852, p.2; and, Maitland Mercury, 17 July, 1852, p.3.
269 SMH, 21 July, 1852, p.3.
By flat seal'd — He willed thy doom;
In joy, in youth, in health elate
Unwarn'd — ye met a watery tomb...

All living sympathise with thee;
And nature seems, still on to mourn;
The very leaves on every tree,
Ere falling — by the rude blast torn...

The pale cold moon, with dewy face,
Her glistening tears will o'er thee shed;
And stars which gleam in boundless space,
Shine on those lone, unburied dead.
But brightest of all lights which shine,
The lights that light th' eternal shore.
Oh may their gleam, and grace, be thine,
All Heaven thy lot for evermore.  

* * *

Charities and Government: Aid and Responsibility

Immediately after the flood survivors, whose houses either had been washed away or were uninhabitable, were given food, shelter and blankets by inhabitants whose property had not been damaged.  

271 However, supplies of food, especially flour, began to run low and by 10 July the survivors were ‘in a state of starvation’. The floods had cut off supply routes and the town itself had few stores left. Further, many had little money to buy or order goods.  

Relief funds were collected — totalling more than £1,800 — in Maitland, Braidwood, Sydney, and the goldfields. They came from secular, parish, and synagogue-
based sources.\textsuperscript{273} The funds were held in trust by the colonial government for distribution.\textsuperscript{274} The Governor and other government officials in Sydney, hearing of the consequences of the flood in Gundagai on 5 July through ‘the reports contained in the public journals’, wrote to the Magistrates in Goulburn and Yass, requesting they send flour and blankets for distribution in the town, and to send the accounts to the Auditor-General.\textsuperscript{275} Government expense for these supplies was supplemented by the public subscriptions. Government contributions to the immediate relief effort were later estimated to have totalled approximately £892.\textsuperscript{276} While some of the money from relief funds went to the purchase of these material goods for immediate relief, the remainder was probably distributed in the form of tradesmen’s tools and monetary grants.\textsuperscript{277}

By 21 July local Magistrates in Goulburn had organised the delivery of almost six tons of flour and 64 blankets to Gundagai, with another three tons of flour to follow.\textsuperscript{278} Charles MacAlister was amongst those who took the provisions from Goulburn to Gundagai. On arriving in Gundagai, he recalled that ‘[w]e found that the accounts of the flood had not been exaggerated in the least’. He saw ‘several’ horse and cattle carcasses high in the trees and the damaged buildings.\textsuperscript{279} The need for supplies in Gundagai was pressing. There was less than two tons of flour left in the town.\textsuperscript{280} Once the goods arrived in Gundagai, however, there was some confusion over handing out the blankets.\textsuperscript{281} One resident (Spencer) claimed that ‘one pair of blankets was doled out to a person accustomed to the comforts of life, and a whole bale [of blankets] remaining

\footnotesize
\begin{itemize}
\item \textsuperscript{273} 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; and, Goulburn Herald, 4 September 1852, p.4.
\item \textsuperscript{274} Goulburn Herald, 4 September, 1852, p.4.
\item \textsuperscript{276} Goulburn Herald, 15 January, 1853, p.4. At the time, however, government aid was thought to extend only to organising the delivery of supplies, which were paid for out of public subscriptions. Goulburn Herald, 4 September, 1852, p.4.
\item \textsuperscript{277} Goulburn Herald, 15 January, 1853, p.4.
\item \textsuperscript{279} MacAlister, Old Pioneering Days in the Sunny South, p.142.
\item \textsuperscript{281} Maitland Mercury, 14 July, 1852, p.2; Maitland Mercury, 17 July, 1852, p.4; Maitland Mercury, 21 July, 1852, p.3; and, Maitland Mercury, 31 July, 1852, p.4.
\end{itemize}
In Gundagai, responsibility for the distribution of relief money, blankets, boots, warm clothing, and rations was placed in the hands of the local magistrates and the Reverend Brigstoke.\(^{283}\)

Initial government aid was based on what could be gained from newspapers, rather than ‘official’ reports.\(^{284}\) The government commenced relief measures on the basis of this information, ‘having no reason to doubt the correctness of the published reports’.\(^{285}\) However, on 6 July 1852 the Governor requested an official report from the Commissioner of Crown Lands for the Lachlan District, Edgar Beckham. Beckham was instructed to travel to Gundagai and report on ‘the nature and extent of the damage... particularly in respect to loss of human life’.\(^{286}\) Further, Beckham was asked to organise additional relief, as far as possible, in the town, and report on damage in other areas in the district.\(^{287}\) Bingham, the Land Commissioner for the Murrumbidgee District, was acting as coroner and conducting inquiries into deaths.\(^{288}\)

While Bingham acted as coroner, Beckham compiled an official list of both those who had died and survived, as well as property damage and losses from production. Bingham reported in a letter dated 16 July, that none of those living on the hill (Mount Parnassus) in North Gundagai had drowned or suffered property damage. He listed a total of 110 survivors and calculated that 68 died in North Gundagai and seven on the southern bank of the Murrumbidgee. He counted the number of buildings on the flat – 78 – writing that 48 were ‘entirely swept away’, eight were ‘so much injured as to be untenable’, and 13 out of the remaining 16 ‘were under water’. He added that, ‘the whole village is now a perfect wreck, and it is impossible for any, but an eye-witness, to imagine the fearful devastation committed by the flood’.\(^{289}\)

Beckham reported that, contrary to some newspaper reports, no lives had been lost in Wagga and there had been ‘very little damage’ to property in that town (except for

\(^{282}\) Goulburn Herald, 9 July, 1853, p.2.

\(^{283}\) Maitland Mercury, 17 July, 1852, p.4; and, Maitland Mercury, 31 July, 1852, p.4.

\(^{284}\) Goulburn Herald, 9 July, 1853, p.2.

\(^{285}\) Maitland Mercury, 10 July, 1852, p.4.

\(^{286}\) Maitland Mercury, 10 July, 1852, p.4.


\(^{289}\) SMH, 10 July, 1852, p.6.

Beckham also wrote that 'several small settlers and mechanics' living between Gundagai and Jugiong had 'lost everything'. He made arrangements for them to receive the same aid 'as granted the survivors of Gundagai'. Indeed there had been floods along the Murrumbidgee, Tumut, Turon, Hawkesbury and Shoalhaven Rivers, as well as in Braidwood and Queanbeyan, and along the Condamine River, and settlers reported deaths, damage, and narrow escapes; the flood in Gundagai remained grimly outstanding among these accounts.

In July 1852 the extent of farmers' losses in the wider district was not known, but the Goulburn Herald estimated that losses of 'growing crops', wheat, and 'other grain' were extensive, as well as damage to farm buildings, such as barns, and warned that prices of produce, wheat, and hay could rise. The newspaper urged farmers to return to work replanting as soon as possible, to guard against a wheat shortage. Further, '[t]he land has been prepared by the flood'.

Beckham ended his report with predictions of another flood: 'Both the Tumut and Murrumbidgee are rising rapidly, and another flood may be expected'. Indeed, Gundagai flooded again on 9 August 1852. The flood did not reach the heights of the June flood or that in 1844, nor were the waters as turbulent, giving by contrast 'the appearance of a great lake'. The river had not fully subsided since the June flood and the August high water levels lingered – some places in Gundagai remained flooded for months.

Although the government was active in organising immediate aid to Gundagai, it was not enough. Throughout the colony the tragedy of the June 1852 flood was seen to be the result of government inaction.

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292 Original emphasis. Goulburn Herald, 10 July, 1852, p.4.


294 Goulburn Herald, 28 August, 1852, p.5.
Government and Settler Accountability

Early newspaper reports of Gundagai’s flood in the regional press and the SMH were mostly accounts from residents, as well as from the Gundagai correspondent for the Goulburn Herald, John Spencer, and visitors who had seen the effects of the flood. Many of these accounts included calls for the government to move the ‘ill-fated township’, arguing that an exchange of allotments should be offered, much as Bingham had suggested in 1844. Some accounts assumed that the government would institute an allotment exchange. One resident wrote to the SMH that ‘[n]o doubt the government will lay out more of the township on high ground, and offer to those who hold flooded allotments an exchange’. Such an exchange now, they suggested, would be some compensation to the living, but ‘who can recall the dead?’. Spencer wrote in the Goulburn Herald (whose account was also published in the SMH), that ‘[i]t is to be hoped that the government will never again sell any land in these flats, for building purposes, but give the owners of allotments other land in exchange, on the hill above high water mark’. Bingham’s proposal was clearly the basis for these arguments – his idea of a free exchange of allotments was taken up in a way that suggests the concept had become fused with the story of the town. This is despite residents rejecting the proposal in 1844; not, however, on principle, but because they did not agree with the alternative location Bingham had suggested at the time.

In July 1852 the SMH published a full re-print of Bingham’s 1844 letter to Governor Gipps and Gipps’ reply, in order ‘to shame the Government into a right position’. An editorial accompanied the letters. It criticised the government’s history of inaction as ‘an error of judgement, subsequently aggravated by an act of deliberate and inflexible injustice’ that amounted to ‘false representations’ in subsequent land sales. These past actions, the editorial continued, now ‘involves the Colonial Government in a deep

297 SMH, 19 July, 1852, p.2; SMH, 21 July, 1852, p.2; Goulburn Herald, 10 July, 1852, p.4; and, Goulburn Herald, 24 July, 1852, p.4.
298 SMH, 19 July, 1852, p.2.
299 SMH, 19 July, 1852, p.2.
300 SMH, 21 July, 1852, p.3.
301 See, for example, Maitland Mercury, 10 July, 1852, p.2; and, SMH, 13 September, 1852, p.2.
302 Original emphasis. SMH, 7 July, 1852, p.2.
responsibility for this appalling sacrifice of human life'.\textsuperscript{303} A resident wrote that the townspeople were as yet in no state to petition Governor FitzRoy, as 'all seem so completely depressed that they can hardly be persuaded to meet and memorialise [petition] the Governor-General, from whose wise and liberal policy they may expect much. Would that his predecessor had acted similarly'.\textsuperscript{304}

One letter to the SMH, written by W. Martin, a former resident and storekeeper at Gundagai, used very strong language to describe how the government had managed to ‘allure... a number of people (many of them poor) into such a vortex of danger'.\textsuperscript{305} ‘The first error’, he wrote, ‘was an incompetent surveyor’. The surveyor, he argued, had been 'blind' to indications of past floods and chosen the only place, ‘the very lowest flat’, that ‘ordinarily' inundates. Parts of the township were ‘more or less under water every winter’. He also criticised the surveyor’s decision to lay out the town around existing buildings: 'If it suits me to live in a waterhole, it is no reason why a town should be laid out around me'. The second error, Martin continued, was ignoring Bingham’s letter. Although the three new allotments had been marked out for sale, government buildings were erected on the flat, including the Court House and Lock-up, as well as the National School, ‘in the very centre of the flood’. This was done, Martin argued, against the wishes of ‘a portion of the inhabitants’. A bridge had also been erected across the river that divided the northern section of the town (later Morelys Creek) in 1850 — against which ‘all on dry land’ (those who lived and traded on the hill) had protested because it was located in such a position that it would wash away in a flood. The government had responded that the site of the bridge could not be changed because the surveyor had already selected it. It washed away in the 1851 flood.\textsuperscript{306}

The main error, Martin argued, was that surveyors had continually refused to listen to those who knew the area. He argued that ‘[s]urveyors should be intelligent practical men (as many of them are) who would not be ashamed to take counsel of some old resident bushman’ rather than be pretentious, ‘with their classical tastes and poetic names to streets’. He suggested that a ‘surveyor need take an oath of office... that no local influences should induce him to choose any other than a safe and eligible spot’. To those who built on the flat, he wrote, ‘I have little to say’. His criticism of them was essentially the same as the surveyors, they had not listened: ‘They were warned almost every year –

\textsuperscript{303} Original emphasis. SMH, 7 July, 1852, p.2.
\textsuperscript{304} SMH, 19 July, 1852, p.2.
\textsuperscript{305} Original emphasis. SMH, 10 July, 1852, p.6.
\textsuperscript{306} Original emphasis. SMH, 10 July, 1852, p.6.
the blacks tell of a larger flood, that had been previously known'. He pointed out that there were marks near most rivers 'by which we may judge the height they have been wont to reach (in this case it was peculiarly so) — logs in trees, &c.'. However, Martin also empathised with those in Gundagai, writing that '[i]f culpable, if in error, how they have suffered'. With many new town sites soon to be surveyed, Martin warned: 'remember Gundagai'.

Another settler, Lachlan Ross, made a similar criticism of residents and landowners in Gundagai, that they had not listened to Aborigines' warnings. Ross included an account of the flood in a pamphlet that detailed his journey to the gold fields. He concluded: 'our sable brethren told the [first settler] builders [in Gundagai] that a big flood had covered the flat, and also pointed out the height it had attained'. 'But', he continued, 'I expect the colour of their skin was against their being believed. And here in 1852 is the result: 73 lives lost besides several strangers who were not accounted for'.

Residents defended themselves against allegations that they were in any way at fault for living on the flat, arguing they had no choice. One resident wrote, that if he had not traded on the flat he would not have survived economically, and so it was erroneous to consider 'persons occupying the flat... blameable'. Others argued they were trapped into living on the flat; having sunk money into buying and building there they had no means to relocate. Still others argued that they had only a choice to buy 'on low land or low land'.

Letters such as Martin’s were overshadowed by a general outcry at the callousness of the government, especially in the Goulburn Herald, which published extensive editorials and comments made by residents of Goulburn. A public meeting was held in Goulburn, a town located north-east of Gundagai (which had also flooded). There, residents of the town expressed their anger at the government. A settler who was vocal at the meeting, D.H. Thorne, argued that, ‘[t]he selfishness and cupidity of the Government had produced the disaster’. Thorne further argued that a similar flood ‘will one day level the township of Wagga’, which had also flooded to high levels in June. In fact, he argued, ‘[t]he same might be said of half the townships in the colony’. Thorne read out Bingham’s

307 Original emphasis. SMH, 10 July, 1852, p.6.
309 SMH, 19 July, 1852, p.2.
310 SMH, 13 September, 1852, p.2.
1844 letter to Gipps, using it as evidence of the government's responsibility for the recent disaster.\footnote{Goulburn Herald, 17 July, 1852, pp.4-5, p.4.} Thorne also defended those who lived and built on the flat: 'It may be said that after the warning of the 1844 flood the people are not deserving of commiseration: but it must be remembered that many of them had expended their all — and who so placed would not stand by their property... Had the Government attended to the recommendation of Mr. Bingham, Gundagai would be Gundagai still'.\footnote{Goulburn Herald, 17 July, 1852, pp.4-5, p.4.} In the public meeting blame and responsibility were laid entirely with the government.

One settler who wrote an independent letter to the Goulburn Herald, signed 'a squatter', pointed to an additional reason that the government should offer compensation to survivors. He proposed that 'a prompt and liberal distribution of money, land, and provisions' would offer surviving residents of Gundagai an incentive to stay in the town, 'to prevent them departing to the gold fields'.\footnote{Goulburn Herald, 14 August, 1852, p.4.} Before the 1852 flood Gundagai had been at the height of an economic boom, fed by a combination of increasing pastoralism and the early stages of the Victorian gold rush. The flood had caused such loss of life and property that economic reasons for settlers to reinvest in the town were few, unless the government took some action to secure the town from floods.

The Reverend Patrick Fitzgerald (who lived in Wagga but whose ministry encompassed Gundagai) was also concerned about the survival of the district after the flood. The effects of drought and flood, along with the lure of gold rushes, seemed to mark the beginnings of a downturn in the economy. Three families from his ministry had been killed in the flood. His regular congregation was now reduced to just six families. Deaths, economic hardship, and the pull of the gold rushes seemed to him a worrying combination. He was pessimistic about the future of the entire area, from Wagga to Gundagai. One month after the flood he wrote to The Reverend J.D. Lang of his concerns: 'In the first place the District had suffered from the great drought, 2. from gold mania, 3. from floods, is it any wonder that enterprise has been checked and that objects of public utility have suffered from withering neglect'.\footnote{Patrick Fitzgerald (The Reverend). Letter to J.D. Lang (The Reverend), p.3. Papers of Lang, J.D. Volume 6. Correspondence, 1820-54. MLA2226. Mitchell Library, State Library of New South Wales.} Indeed, Fitzgerald was ready to leave the area: 'it would break my heart to leave. I will endeavour to struggle on as I am till April next. If circumstances are not more favourable then, I must apply to the Synod
to release me from my charge. 315 Almost completely destroyed by the 1852 flood, materially and morally, the survival of Gundagai as a township was at stake.

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1852 Petition: Pressuring the Government

Landowners and residents of Gundagai sent a petition to Governor FitzRoy, dated 15 July. The elected member for the Murrumbidgee District, George Macleay, presented their Petition to FitzRoy. 316 The petition was more encompassing than past petitions and included ‘Purchasers and Lessees of Land in the Town of Gundagai and other residents of the same’, including settlers in the northern and southern sections of the town. However, not all residents were consulted about the petition, including Spencer, who complained in the Goulburn Herald that the petition had been drafted and sent by only one section of the population who had put themselves down for ‘goodly sums’ of compensation and reduced the estimates of losses by others. Spencer generally agreed with the petition, however, and reasoned that if the Governor responded favourably then ‘these claims can be easily adjusted’. 317

The petitioners argued that they had located businesses and residences on the flat and other places that were flooded in 1852 because they trusted government expertise. They stated that they,

...cannot take any blame to themselves for locating where they did. Gundagai was a government township, and its apparent eligibility for commerce, induced your petitioners to stake their capital and labour in it, and placing, as they did, the most implicit confidence in the talent and experience of the surveyors employed by the local Government, they could not have possibly supposed that the bed of a lagoon or dry basin

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of a river would have been selected as the site for a town, and much less could they have apprehended even the possibility of so disastrous an event.318

The petitioners clearly portrayed the effects of the 1852 flood as the fault of the government and surveyors, whose expertise they had ‘implicitly’ trusted. The petition did not request an exchange of allotments, or any specific government action; but included a list of those who had died and survived, and details of the estimated cost of damage to property. With these documents, the petitioners left ‘their lamentable case in your Excellency’s hands, feeling assured that... your Excellency will not fail to extend to them the benevolence and justice so intimately associated with... the British Crown’.319

FitzRoy’s reply to the petitioners, dated 6 August, was that the government had already acted by coordinating immediate relief, and could do nothing more.320 FitzRoy adopted the position of his predecessor, Gipps. Perhaps the Governors did not want to appear to admit that the surveyors had made a mistake or that the government was thereby liable. Perhaps also, they did not want to set a precedent for other towns, settlements, and farms. Further, an exchange of allotments would reduce government revenue from land sales (as Gipps indicated in 1844).

Macleay, however, continued to lobby the Executive (or Legislative) Council on behalf of the petitioners. In the Council, Macleay raised the history of the town’s survey and continued location on the flat. He argued that the site of the town ‘always appeared to him a highly improper place for a township, situated as it was at the base of a range of mountains’. However, Macleay also described the surveyors’ reasoning behind the location of the town, giving some justification to the initial decision. The flat was a convenient crossing place, already a place of settlement, and ‘it was in consequence of the representations of persons resident in that neighbourhood that some years after it was so occupied by that township’. Macleay also blamed Governor Gipps, who had rejected the inhabitants’ request for ‘permission to exchange their purchased allotments in a more

318 Petition from Gundagai residents to Governor Charles FitzRoy, 15 July, 1852, in Goulburn Herald, 4 September, 1852, p.8.
319 Petition from Gundagai residents to Governor Charles FitzRoy, 15 July, 1852, in Goulburn Herald, 4 September, 1852, p.8. The lists appended to the petition were the same as those submitted to the Governor by the Crown Lands Commissioner for the Lachlan District, Edgar Beckham.
320 Letter from the Colonial Secretary to Gundagai residents, 6 August, 1852, in Goulburn Herald, 4 September, 1852, p.8
elevated position’ on the southern side of the river. Once more, Bingham’s request was attributed to the residents of Gundagai.

Macleay continued that Gipps was not, however, wholly to blame. He argued that, ‘from what he had since seen, that that refusal had not been the cause of the loss of a single life’. Instead, ‘had the prayer been conceded the people would not have availed themselves of the opportunity, on account of the superior commercial value of the present site being much nearer to the crossing place’. He argued that people had continued to live and build on the flat to take advantage of trade from travellers on the Port Phillip Road and that, having experienced the flood of 1844, ‘they were confident of security from any flood that could again occur’. On the basis of their experience with the 1844 flood perhaps settlers judged themselves knowledgeable about what to expect in a large flood and the height to which the river could rise. James Gormly later argued that the 1852 flood was unexpected by settlers because the 1844 flood had been so large that the possibility of another flood like it soon, if ever, seemed remote. This expectation was not entirely guesswork. Gormly later wrote that before the 1852 flood, when he first moved into the area along the Murrumbidgee (from 1844), he had spoken with Aboriginal people about floods on the Murrumbidgee, who called the 1844 flood ‘The Old Man Flood’, the highest they had seen. The people Gormly spoke with, he trusted. He wrote that others later said floods could go higher than the flood in 1852, but on consulting with his friends he doubted these reports. Gormly included this anecdote to show that settlers as well as Aboriginal people in the area thought the 1844 flood, and then the 1852 flood, unusually high.

Macleay called for ‘a copy of all correspondence that has taken place between the Executive Government and the inhabitants of Gundagai respecting the adaptability for that spot for a township’ to be laid upon the table and be made publicly available. The Colonial Secretary agreed to Macleay’s request as the matter was of ‘considerable public interest’ and on 20 July 1852 ordered the correspondence be printed. Macleay again raised the issue at a meeting of the Council on 24 August, requesting the amounts paid for ‘allotments that are situated in the highest flood mark’ be laid on the table. His

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321 Maitland Mercury, 14 July, 1852, p.4.
322 SMH, 19 July, 1852, p.2.
324 Maitland Mercury, 14 July, 1852, p.4.

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purpose was to keep the question of compensation open: ‘to enable the house to assist in determining the difficult question of what compensation was due to the unfortunate sufferers by the flood from the Government’.326

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The Petition and the Press

FitzRoy’s response to the petitioners was made public. The minutes of the Legislative Council, where Macleay championed the petitioners, were also reported in newspapers. The residents’ petitions of 1851 and 1852, along with FitzRoy’s responses were re-printed in the Goulburn Herald and SMH.327 Indeed, the SMH, in an earlier issue of the newspaper, had also reprinted Bingham’s 1844 letter to Governor Gipps, and Gipps’ response — but not the landowners’ petition of the same year, which rebuked Bingham’s proposal of an allotment exchange.328

There was little further reportage in the SMH after it printed the 1851 and 1852 petitions. There were no more outraged editorials. In September 1852 a letter to the SMH, signed ‘One of the Survivors’, lamented that the ‘colonial press’ had not taken up the petitioners’ fight.329 The newspaper had printed the 1851 and 1852 petitions with little comment besides ‘[t]he reply of the Governor-General to the latter [1852 Petition] is most unsatisfactory’, and indicated that the newspaper had been requested to publish the letters.330 Without the support of the press, the ‘Survivor’ wrote, Gundagai ‘is left to fight it [sic] own battles, and maintain its own rights single-handed’.331 The ‘Survivor’ defended settlers who lived on the flat, implying that the lack of reportage by the SMH may be due to a sense that settlers were somewhat responsible for locating on the flat: ‘We are informed it has been reported, to our prejudice in the metropolis, that sufferers [those who had lost relatives, friends, and property] and survivors had shown an obtuse predilection for the inundated flat, obstinately preferring it to any other portion of the town... we had no alternative but to live where we did... we had not to pick between hill

326 Maitland Mercury, 28 August, 1852, p.4.
327 Goulburn Herald, 4 September, 1852, p.8; and, SMH, 31 August, 1852, pp.2-3.
328 SMH, 7 July, 1852, p.2.
329 SMH, 13 September, 1852, p.2.
330 SMH, 31 August, 1852, p.2.
331 SMH, 13 September, 1852, p.2.
and dale but between low land and low land'. \textsuperscript{332} It was argued that even the land that bordered the northern limits of the town was under water during the 1852 flood, 'varying in depth from three feet six inches to eight feet'. \textsuperscript{333} Earlier reports, however, contradicted this claim, stating that buildings on the hill were not inundated. Indeed, Beckham's report excluded settlers and dwellings on the hill as they were all uninjured, indicating there were allotments available for sale on the higher ground.

In September the Colonial Secretary laid government correspondence 'relative to Gundagai' on the table in the Legislative Council. It is very possible that members of the public and journalists read copies of these letters and reports. The correspondence included the 1844 petition which argued against Bingham's proposal for an allotment exchange. Further, no resident or landowner in Gundagai (besides Bingham) had ever directly asked the government for an allotment exchange. This may have contributed to the lack of support implied by journalists and settlers in Sydney, who appeared to have abandoned Gundagai.

While the cause of the petitioners petered out in the SMH it was taken up with vigour locally, especially in the Goulburn Herald, which printed an editorial that was highly critical of FitzRoy's reply to the 1852 petition. \textsuperscript{334} The editorial criticised the government for not acting, either in the past or now. Further, 'the Government knew full well that the place would likely be deluged, Commissioner Bingham gave notice of the fact' in his 1844 letter. The locals were of the view that the blame and responsibility lay in the history of the government's failure to act to protect residents. 'What', the editorial asked, 'is the consequence of this neglect of Government? Eighty human beings are launched into eternity'. \textsuperscript{335} The article described the government's response to the recent petition as being 'cold and unfeeling', arguing that the government had done almost nothing in response to the catastrophe except to express sympathy and organise 'immediate relief'. Even this aid was thought to be lacking, as its cost had not even matched amounts donated by subscribers that year. Responsibility, it was claimed, lay with the government that had a demonstrated record of neglect. The editorial called for landowners to be allowed to exchange allotments, but indicated that this was not the most favoured action by residents of Gundagai: 'the more intelligent inhabitants of Gundagai' wanted money to be allocated 'for the purpose of damming up the mouths of the three branches of the

\textsuperscript{332} SMH, 13 September, 1852, p.2.
\textsuperscript{333} SMH, 13 September, 1852, p.2.
\textsuperscript{334} Goulburn Herald, 4 September, 1852, p.4.
\textsuperscript{335} Goulburn Herald, 4 September, 1852, p.4.
river' and 'a bridge over the river that divides North Gundagai into two portions' (Morelys Creek). 336

The *Goulburn Herald* editorial indicated an exchange of allotments was not what residents necessarily wanted, although it was what Macleay implied in parliament and what was generally believed. Perhaps the absence of a request for an allotment exchange in the petition contributed to the SMH's apathy towards Gundagai's cause after the printing of the 1852 petition. Technically the petitioners had not asked for anything. The press and settlers in other regions of the colony had assumed that survivors would demand an allotment exchange and, indeed, immediately after the flood survivors had also assumed this was the next course of action. Now, however, some in Gundagai appeared to be angling for the fulfilment of the 1851 petition for a dam to be built to prevent the lagoon from funnelling water onto the flat. The idea of an allotment exchange, which landowners and residents had never directly or collectively sought from the government, had grown in public acceptance, stemming from Bingham's 1844 letter to Gipps, an idea that was, at the time, dismissed by landowners and residents as unfair and unwanted. Bingham's proposal seemed to gain dramatic and mythological proportions in 1852. It was also appropriated into the history of the town as part of its ongoing struggles with an unresponsive and neglectful government. The initial outcry by 1844 petitioners against Bingham's proposal went unmentioned. Bingham had died shortly after the flood, on 24 August 1852 at the age of 56, and so did not witness these fall-outs. 337

Bingham's proposal was sometimes appropriated by the townspeople themselves to make certain arguments. For example, the Gundagai correspondent to the *Goulburn Herald*, Spencer, reporting on FitzRoy's reply to the 1852 petition, stated that the government had acted like a 'dishonest speculator' by allowing people to purchase allotments known to flood, taking the profits and refusing compensation. The 'hardship is felt the greater', he continued, 'from the fact that the inhabitants petitioned the Government to remove the site of the town as they anticipated this catastrophe would some day befall them'. He stopped short, however, of arguing for an allotment exchange to now take place, instead arguing, in a general way, 'that a few thousand pounds could not be considered more nobly expended than in restoring a whole community to their

336 *Goulburn Herald*, 4 September, 1852, p.4.
former independence and prosperity'. It is strange that Spencer in 1852 should attribute the idea of an allotment exchange in 1844 to the town generally as he alone had supported Bingham’s request in writing at the time. Perhaps he too had succumbed to the general momentum and inaccuracy of the town’s story.

Despite the failing interest of the SMH (perhaps an indication of the waning attention of its readership), the government gave in to local pressure from Gundagai and Goulburn, and internal pressure from Macleay, and agreed to act. On 20 October 1852 it issued a proclamation in the Government Gazette that residents in Gundagai could exchange allotments ‘liable to inundation’ for land on higher ground. The announcement did not specify where the new allotments would be located, but left it to land owners who wished to take advantage of the offer to ‘address themselves to this Office’, indicating that there was a choice of sites. Landowners would be gifted land on surrender of their deeds for flooded allotments.

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Gundagai: Move?

Despite the government’s offer, some settlers did not exchange their allotments and continued living and trading on the flat. Others, such as James and Thomas Gormly, left the town for the goldfields. The floods in New South Wales and northern Victoria had uncovered fresh gold deposits.

Even after more floods in June and July 1853 (the latter being two feet higher than the June 1852 flood), some residents continued to remain on the flat. After the first of these floods, the Gundagai correspondent to the Goulburn Herald wrote that the force and height of the water was ‘quite powerful enough to destroy the fencing of those who were foolish enough to fence in paddocks... under the impression that such a flood

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338 Goulburn Herald, 28 August, 1852, p.5.
341 Goulburn Herald, 15 January, 1853, p.4.
344 Goulburn Herald, 9 July, 1853, p.2; and, Goulburn Herald, 23 July, 1853, p.2.
as had occurred would not occur again for fifty years'. Spencer argued that, '[w]e have experienced floods now three years in succession... a warning, one would think, sufficient to make all turn their attention to higher land'. Settlers, Spencer wrote, risked building on the flat with the belief that large floods would not recur for many years. The potential for Gundagai's population to decline due to the floods and drought, as well as departures for the goldfields, was somewhat eased in the following years as small quantities of gold were discovered near Gundagai in 1853, providing a short-term economic and population fillip for the region.

Following the 1853 floods some residents once more rebuilt on the flat. The economic advantage of trading on the flat was a strong lure. Settlers weighed this benefit against (what were probably seen as unlikely) dangerous floods. In 1854 a traveller passing through Gundagai on his way to the Victorian gold fields wrote: ‘What struck me as being somewhat remarkable was that some of the places swept away by the flood had been re-built, and were actually occupied as stores and residences... some of the most prominent business places were still on the old site, such, for instance, as the post office, kept by a highly respectable store keeper, and one of the most frequented and best conducted inns’. The risks to life and costs of floods, it seemed, were outweighed by the risk of conducting business further from the road. The population of Gundagai (North and South combined) dropped from about 400 in 1852 to 347 by 1856, possibly as a combined result of deaths from the June 1852 flood, settlers leaving for the gold fields, and the realisation of the extreme risk of large floods.

In November 1858 the government set a deadline of 1 February 1859 for residents to take up its offer of allotment exchanges. The deadline appears to have prompted landowners, who had not already exchanged their allotments, to act, as after 1859 there are no further reports of settlers living or trading on the flat. An 1857 survey map of North Gundagai shows a changed town. The flat had been transformed into

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345 Goulburn Herald, 9 July, 1853, p.2.
346 Moreton Bay Courier, 1 January, 1853, p.3; Moreton Bay Courier, 12 March, 1853, p.2; Maitland Mercury, 12 January, 1853, p.1; Maitland Mercury, 6 April, 1853, p.3; and, Maitland Mercury, 27 April, 1853, p.2. In the 1860s larger quantities of gold were found in North Gundagai and the town experienced a gold rush. See, Soerjohardjo, ‘Aspects of Life in Gundagai’, p.18.
347 SMH, 7 March, 1854, p.2.
348 The Blue Book, 1856; and, Butcher, Gundagai, p.17.
349 New South Wales Government Gazette, 9 November, 1858, p.1837.
large land divisions that suggest grazing areas (rather than town allotments). In this map, town allotments were entirely on the slopes of Mount Parnassus, north of the anabranch.

Map 1.8
North Gundagai, 1857. Note the absence of town allotments on the flat.

So, why did so many die in the June 1852 flood? Residents, landowners, government surveyors, and Governors were embedded in networks of negotiation over, and evaluation of, environmental knowledge that were influenced by other considerations. Knowledge of floods became a matter of risk evaluation for residents, landowners, and surveyors. From at least 1844 (and possibly earlier) residents and landowners weighed the risk of potentially infrequent, large floods against living and trading on the flat — environmental speculation against economic advantage. Prior to the 1844 flood, settlers had also evaluated accounts of floods from Aborigines in terms of their own experiences and asked: was Aboriginal knowledge accurate? The 1844 flood proved to some that it was. Government surveyors, in laying out the original town plan, had weighed the risk of possible floods against convenience to travellers and the pre-existence of settlement on the flat.
Some residents and landowners undoubtedly purchased or leased land not knowing that the land could flood (as some stated in 1852 to defend their occupation of the flat). They were financially ‘trapped’ on the flat. Others, however, bought land and lived on the flat knowing it could flood – as with the Hargreaves family. As Spencer indicated in his 1853 newspaper report, those on the flat also ‘traded-off’ estimates about when the next flood would occur. This was another element of risk evaluation.

Were the Governors at fault? Both Gipps and FitzRoy were working within legal and financial constraints. However, Gipps and, initially also, FitzRoy, risked the lives of those in Gundagai to gain land revenue and to avoid the expense of flood mitigation. For example, Gipps, though bound by the law to disallow allotment exchanges (and at the risk of establishing a precedent), did not concede to the 1844 petitioners’ request to purchase allotments they believed to be above flood mark at a set price. Such a solution would possibly have helped to re-locate the town centre at the time. FitzRoy did not agree to the expense of erecting a dam, probably because of the cost of the structure as well as legal constraints. Gipps’ and FitzRoy’s knowledge of floods at Gundagai derived from their surveyors. Surveyor-General Thomas Mitchell told Gipps after the 1844 flood that floods might never occur again in Gundagai. This reveals both the kind of hypotheses that were made about frontier regions and the inland rivers, and the way government expertise worked within government decision-making. Surveyors’ knowledge was always cumulative – the initial survey of the town determined its site, but such knowledge was added to by subsequent surveyors. Residents’ knowledge was also cumulative. Gundagai and the June 1852 flood provide a perspective on the ways in which the imperatives of settlement connect with attempts to make sense of the unpredictability of weather and river flow.

By the early 1900s the flat had become a recreation ground and town common, used for grazing animals such as pigs, cattle, and cows, as well as for fairs. The opening of the Prince Alfred Bridge (a road bridge) across the Murrumbidgee near the Gundagai punt in 1867, saw the punt close the same year.\(^{351}\) A new road was constructed for the approach to the bridge, on a slightly different route to the original travel route. The railway was extended to Gundagai by 1886.\(^ {352}\) Originally sited and surveyed as a town because of the road to Port Phillip and as the main crossing place over the Murrumbidgee, the new infrastructure, altered travel route, and modes of transport ushered in a changing economic topography for Gundagai as a stopping place for

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\(^{351}\) Butcher, Gundagai, p.15.
travellers. The town also developed new industries such as asbestos mining. In recent decades the 1852 flood and site of the old town has became the foundation of a tourist industry in Gundagai.

Figure 1.3
View of the flat, the original site of Gundagai, after the northern part of the town was relocated. This picture also shows the bridges that were built after the town’s relocation. [Charles Louis Gabriel, 1857-1927. Gundagai photograph collection, taken by Dr C.L. Gabriel, from the Butcher and Bell collections [823] [picture] between 1887 and 1927. nla.pic-an8526479-823. National Library of Australia.]

The hydrology of the Murrumbidgee watershed has changed significantly since the 1850s, largely because of settler land use practices and the building of Burrinjuck Dam (completed in 1907) and Tantangara Dam (completed in 1960 as part of the Snowy Mountains Scheme, at the Murrumbidgee’s headwaters). The flows of the Murrumbidgee were significantly reduced by the dams, with Tantangara Dam diverting 99 percent of the river’s annual flow into Eucumbene Dam. These water storages on the Murrumbidgee have reduced the general flow of the river; however, large floods (over seven metres) have continued to occur at Gundagai. After the completion of the dams in 1960, through to 1991, five floods rose above the seven metre mark, reaching from nine to 11 metres. Between 1843 and 1960, 15 floods exceeded seven metres, and were generally higher (between nine and 12 metres). 353 The flood of August 1853 was the only one greater than

353 For flood heights see: Butcher, Gundagai, p.84.
the June 1852 flood. The June 1852 flood in Gundagai remains one of the largest floods recorded in Gundagai since colonisation.

Figure 1.4
The flat in flood after North Gundagai was relocated. This photograph was taken from the slope of Mount Parnassus, with part of North Gundagai in view.
Experimentation and Regulation
Pastoralism and Mining, 1850 to 1890

The June 1852 flood in Gundagai occurred relatively early in the process of pastoral expansion, at a time when little thought had been given to the environmental vulnerability of settlement or the government’s response. There was little administrative provision, beyond land sale, for assisting settlers 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. Gundagai, however, had also become a service centre for expanding populations involved in goldmining and pastoral exploration. Goldmining influenced the way water was regulated by governments as well as social and economic relationships that led to government involvement. Water was also a resource critical to pastoralism which, alongside goldmining, emerged as an economically important and geographically dominant industry from the 1860s. By 1870 wool had eclipsed gold as Australia’s most lucrative export.1 In contrast to government regulations around the use of water on goldfields, pastoralists’ water use was largely unregulated by governments. There was an element of tension or parallelism between the central regulation of miners’ water use and a much more fragmented approach to pastoralists’ water use.

This chapter tracks pastoralists and miners as they followed the rivers inland through New South Wales and Victoria between 1850 and 1890, particularly those who travelled through Gundagai. Floods presented a significant environmental challenge to pastoralists and miners. The combination of drought and flood together presented the

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greatest challenge to those industries that relied on a consistent or predictable water supply. Pastoralists and miners sought to mitigate floods and simultaneously to harness and store floodwater to sustain them during dry periods. These aspects of settler experiences were framed by government regulations and legal frameworks around water use. I argue that this politically-charged and differential approach to the use of water by goldminers and pastoralists contributed to the emergence of two distinct understandings of floods and rivers. In the case of mining, the government prevailed and increasingly relied on expert knowledge, the issuing of water entitlements, and a system of regulations that coordinated individuals' activities; while in the case of pastoralism methods based on experience and formed by trial and error were favoured, and led to arrangements for storage and diversion of water as well as individuated methods of water supply.

Government regulation over miners’ water use was so great that historian Clem Lloyd has argued that, ‘the experience of the diggings influenced the course of public water policy in New South Wales’. It was government ‘provision of water for the goldfields... [that] raised for the first time splendid visions of comprehensive water conservation schemes which were not fulfilled until the twentieth century’. Lloyd has made similar arguments about Victoria. Goldmining in this period profoundly influenced the way water resources were to be managed. Also within those government water regulations for goldmining lay the seeds of future approaches to water, rivers, and floods, including a centralised management framework that aimed to optimise settler use of limited water resources. Further, governments increasingly sought knowledge of the rivers from experts with scientific and specialised perspectives. In the 1860s governments introduced a system of ‘water privileges’, later ‘water rights’, on the gold fields. This new system created a way to coordinate competing demands on river water, but it also produced a system of privileged access for certain industries. Government regulations over water therefore attempted to ensure a level of economic and environmental security for particular industries.

By contrast, pastoralists’ water use and diversions were largely unregulated by governments. The differing approach by governments to goldmining and to pastoralism must be seen in a wider political and social context. In this period the New South Wales

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3 Lloyd, Either Drought or Plenty, p.80.
and Victorian governments formulated policies and laws, such as the 1860s Selection Acts, to promote small-scale farming and agriculture in many areas that were held by pastoralists. The lack of regulations was a way of limiting pastoralists' rights to water and other environmental resources in areas planned for these small selections. Water regulations would have been difficult to enforce because the pastoral stations were widely dispersed and remote from government centres. Pastoralists preceded government surveyors and explorers in many areas, taking up land that was often unstudied by government officials and far from administrative centres. While these factors limited the development of water regulations for pastoralists, the continued lack of regulations that could give pastoralists 'rights' to water and coordinate their storages and diversions also reflected government reluctance to fully support the industry.

The lack of regulation did provide pastoralists with opportunities to innovate in methods for water storage and diversion. In their trial and error experiments, for example with different techniques of diversion and storage sizes, they caused considerable deterioration of environments. Knowledge gained through experience, especially of droughts and floods, became highly valued by pastoralists, whilst governments increasingly valued 'expert' knowledge. Pastoralists developed complex and localised knowledge of, and relationships with, floods, which were often seen as positive occurrences because they rejuvenated pastures.

Pastoralists, faced with problems associated with private dams and tank-sinking, however, also sought government intervention to coordinate competing demands on river water and to establish laws to protect water storages. These arguments amounted to demands for the establishment of 'water rights'. Pastoralists also became advocates for more holistic management of inland rivers.

This chapter analyses the important roles that pastoralism and goldmining played in determining the way in which rivers and floods in the inland were managed and understood in this significant period. It also explores the way floods shaped water regulations around mining as well as pastoralists' farming methods. Out of this period emerged concepts of rights, risks and regulations that were to significantly shape future water management and settlers' relations with rivers and floods.

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Mining: Weathering the Fields

Mining often began with rivers because panning for gold was the easiest way to find it. Later, as they followed gold seams into the riverbanks, miners used the river for sluicing the seams. River courses and vegetation, and entire environments, changed significantly under mining regimes. Early goldminers mostly mined surface reefs. Surface or alluvial gold was found in and along rivers. River flow brought sediment from mountain ranges (in eastern Australia, from the Great Dividing Range), depositing the heavy metal in valleys or gullies as the gradient levelled. Rivers further exposed gold deposits by eroding the gravel and sand that covered them. Alluvial gold was extracted directly from the riverbed or from shallow pits, which were dug on the banks. Common methods for extracting gold were through panning and the use of rocking cradles and puddling tubs. Richer leads, however, were buried beneath old riverbeds, sealed by layers of alluvium or lava. Deep leads required miners to build shafts and then haul quantities of quartz to the surface. At the surface, gold-laden quartz was crushed and puddled, then sifted to isolate the gold. Both surface and deep lead mining required large quantities of water to extract the gold as well as to wash away discarded material.

The relatively easy access to alluvial gold allowed large numbers to gather around rich deposits. The number of miners on the Victorian goldfields surged from 20,000 in 1851 to 150,000 in 1858. Miners worked limited areas in small groups, described by historian Stuart Macintyre as typically the size of a boxing ring, in small groups. While mining was in this sense democratic, large populations along the rivers strained water (and other environmental) resources. Later, goldmining companies that mined deep leads were to experiment in tapping artesian water. The expense of boring for, and pumping, artesian water largely limited the practice of this method to companies, creating a commercial inequality in water-dependent mining. Artesian water supply was employed mostly from the 1870s, enabled by emergent technology.

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5 Macintyre, A Concise History of Australia, p.87.
6 Lloyd, Either Drought or Plenty, p.72.
7 Macintyre, A Concise History of Australia, p.87; Lloyd, Either Drought or Plenty, p.72; and, Powell, Watering the Garden State, p.49.
8 Lloyd, Either Drought or Plenty, p.72.
9 Lloyd, Either Drought or Plenty, p.72.
10 Lloyd, Either Drought or Plenty, p.72.
11 Macintyre, A Concise History of Australia, p.87.
12 Macintyre, A Concise History of Australia, p.87.
Most of the initial gold discoveries were made in Victoria.\textsuperscript{13} At the diggings, miners mostly lived in cramped quarters, with tents erected close together or in dugout, underground rooms. Miners invested little in localities they planned to leave, instead putting their money towards licensing claims.\textsuperscript{14} Mining radically altered local environments. Thousands descended on concentrated areas, often for a brief, exploitative, time — possibly only weeks or months.\textsuperscript{15} Environmental destruction was extreme. Miners felled acres of trees to line workings and provide fuel for batteries and pumps.\textsuperscript{16} Deforested riverbanks eroded during floods and storms, stripping the land and causing dislodged rocks and soil to clog up waterways. As a result, storm water would dam up during floods, rising higher than it otherwise would have.\textsuperscript{17} Sewerage and chemicals also polluted waterways.\textsuperscript{18} Lloyd noted that waterways were so polluted, ‘[v]ery often, [drinking] water had to be carted to the goldfields where distribution was irregular and prices high’.\textsuperscript{19} Miners also used hydraulic sluices, where water was forced through a nozzle at high pressure to erode compacted earth and rocks, carving away chunks of riverbed and rock face, washing more ‘sludge’ into watercourses. Hydraulic sluices also required large amounts of water and often relied on substantial water reserves.\textsuperscript{20} The environmental impacts of mining were permanent and, as J.M. Powell has argued, interrupted hydrological cycles so completely that the full impacts have yet to be played out.\textsuperscript{21}

Early miners’ dependence on river water, as a technology as well as for domestic supply, together with the location of their dwellings on riverbanks, also made them vulnerable to the effects of droughts and floods.\textsuperscript{22} Lloyd has argued that ‘[t]he cycles of drought and flood exacted a cruel toll on the goldfields from the beginning’.\textsuperscript{23} Indeed, at some diggings floods came almost immediately. Lloyd gave an example of the Turon diggings, where floods in early 1852 (that followed on from the 1851 floods in Gundagai and preceded the June 1852 flood there) washed out miners only a few months after its

\textsuperscript{13} Victoria had separated from New South Wales in 1851.
\textsuperscript{15} Powell, Watering the Garden State, p.46.
\textsuperscript{17} Powell, Watering the Garden State, p.49 and pp.75-76.
\textsuperscript{18} Macintyre, A Concise History of Australia, p.91.
\textsuperscript{19} Lloyd, Either Drought or Plenty, p.77.
\textsuperscript{20} Lloyd, Either Drought or Plenty, p.78.
\textsuperscript{21} Powell, Watering the Garden State, p.45 and p.49.
\textsuperscript{22} Lloyd, Either Drought or Plenty, p.72.
\textsuperscript{23} Lloyd, Either Drought or Plenty, p.73.
establishment (see chapter one). Miners (including the Gormly brothers), had worked claims from late 1851, contending with smaller floods that, as Lloyd noted, had 'washed away cradles and tools, filled shafts with water, and taken lives'. Floods in January and February 1852 were the breaking point for miners, many of whom sold off their claims at a fraction of their worth.

The loss of labour following the 1852 floods on the Turon was coupled with the loss of living quarters: 'The frail tents of hundreds' were damaged or washed away. The clearing of trees for erecting shelters and working claims may have exacerbated the floods by increasing erosion and sediment buildup, thereby increasing the height of the flood, as occurred elsewhere. As rain continued, conditions at the diggings deteriorated. Disease set in. Four men died during the floods and dysentery killed at least twelve more soon after.

After further floods in 1853 the Turon field was all but deserted – from the 'hundreds' of miners that endured the 1852 flood, there were just 30 counted in a newspaper report in February 1853. Floods destroyed other gold fields, such as Bathurst Point and Sofala in 1852. Floods in Araluen and Braidwood in 1859 and 1860 left the fields in a state of 'desolation and ruin'. Lloyd noted that recurring floods also hindered miners' efforts to begin working claims. At Kiandra 'recurring floods undid much of the preparatory work needed to mine the riverbeds'. In Victoria too, miners experienced floods that presented similar problems.

Miners were also greatly affected by water scarcity. Lloyd described how in 1861 drought caused a near riot at the Lambing Flat diggings. Unable to work their claims without water, diggers turned on each other. European miners attacked Chinese miners, blaming them for being wasteful in their gold washing techniques. Drought was a common threat to the survival of mining communities. Other weather conditions, such as snow in high altitude fields, where in winter watercourses could freeze over, also forced miners to move on. Lloyd has argued that the effects of weather, particularly drought and

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24 Lloyd, Either Drought or Plenty, p.73.
25 Lloyd, Either Drought or Plenty, p.73.
26 Maitland Mercury, 7 February, 1852, p.2.
27 Maitland Mercury, 7 February, 1852, p.2.
28 Maitland Mercury, 7 February, 1852, p.2.
29 Maitland Mercury, 5 February, 1852, p.4.
30 Robyn Maddrell, quoted in, Lloyd, Either Drought or Plenty, p.73.
31 Lloyd, Either Drought or Plenty, p.73.
32 Powell, Watering the Garden State, p.46.
33 Lloyd, Either Drought or Plenty, p.73-74.
flood, ‘were as much responsible for the incessant movement from field to field as were the vagaries of chance, and the choice of new fields was influenced by access to water and protection from floods’.34

It should also be noted briefly that floods and droughts also aided the quest for gold. For example, gold deposits were uncovered in Adelong Creek by floodwaters in 1852. The floods eroded gold-laced sand and gravel, which diggers mined the following year, and which became the centre of a small mining camp.35 Drought along the Turon, just prior to the 1851 floods, allowed diggers to mine the bed of the river. Similarly, fires that tore through the Victorian ash forests in 1851, aided by drought, revealed gold deposits and allowed miners to access them easily. Environmental historian Tom Griffiths has speculated that goldminers may have deliberately lit these fires to uncover gold deposits as well as clear the site for working.36 Goldminers exploited Australia’s environment and weather conditions including droughts, floods, and fires, as much as the continent’s mineral wealth. However, the windfalls miners gained from transient weather could be hazardous, creating dangers that outweighed benefits. While drought had exposed the bed of the Turon, floods subsequently destroyed the claims. Miners were tied to rivers that did not provide the most essential ingredient in mining — consistent water supply — and this limited their opportunities.

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Mining: Water Regulations

Miners attempted to combat the effects of drought and flood in a number of ways. They built races (artificial channels) to divert floodwater, such as those at Bathurst Point in 1852 and the Snowy River Diggings in the 1860s, and dammed rivers and creeks in order to create permanent water sources.37 A correspondent for the Mining Record reported 50 dams around the Grenfell diggings in New South Wales.38 Deep lead mining usually relied on water conservation dams, while alluvial miners only required a running stream.

34 Lloyd, Either Drought or Plenty, p.73.
35 Maitland Mercury, 5 February, 1853, p.4.
37 Lloyd, Either Drought or Plenty, p.73.
38 Lloyd, Either Drought or Plenty, p.74.
However, dry periods often forced alluvial miners to dam gullies and streams. Indeed, miners diverted whole watercourses into new channels to feed dams in order to simultaneously mitigate floods and store water, such as at the Snowy River diggings in the 1860s. Miners also diverted and dammed streams to expose riverbeds for mining. For example, miners often dammed each end of a horseshoe bend in order to mine its riverbed.

As miners continued to maximise water supplies and mitigate floods, colonial governments were forced to intervene, implementing a system of 'water privileges' (later termed 'water rights') to coordinate competing demands on rivers. It was the first time that a system of codified rights to water (resembling current systems) was contemplated in Australia. Lloyd noted that, in New South Wales, the Gold Fields Acts of 1861 and 1869 implemented the most significant regulations over miners' use of water. In Victoria similar regulations were passed by legislation in the 1860s. The Gold Field Commissioners, who had been figures of authority on New South Wales and Victorian fields from 1851, was to administer the new regulations.

In New South Wales, for example, the 1861 Act gave miners 'water privileges' over a specified quantity of water for mining purposes, either through approved race lines or from the river channel. There were detailed conditions around water privileges, which were monitored and measured using sluice-heads, placed at the head of each channel. Perhaps in order to guard against hoarding, the Act ruled that water 'privileges' could be lost if they were not used for a certain period. The system of 'privileges' reflected popular ideas about water running to 'waste', if not used for what were considered productive settler purposes, and instated them in policy. Those who registered water privileges first were protected from potential infringements on their water supplies and water rights from later applications. The Gold Field Commissioners could also grant rights to miners to construct new races and dams, or take over existing ones. Miners could also transfer their water privileges to another claim. Thus, through the Act, water was separated from land, as something to be managed and conceived of separately.
The 1869 Act replaced ‘water privileges’ with ‘water rights’, but was in most ways similar to the preceding Act. Additions included the issuing of rights to miners to construct races to funnel run-off into water storages and to mitigate floods. These regulations recognised the damage floods could cause on unprotected fields. They also encouraged miners to mitigate floods and control flows, so as to create more consistent water supplies for their use. Other new regulations mainly aimed to institute more sanitary conditions on the goldfields, such as separate rights to water for domestic use, where possible from a separate water source.⁴⁷

Through the implementation of specific water regulations, mining gained a privileged position in terms of government support. The industry was part of a colonial vision of intensively worked land that generated wealth. The system of ‘water privileges’ and then ‘water rights’ was a new component in water regulations developed especially for the mining industry. It gave added security in access to water by regulating and coordinating competition. By limiting ‘water rights’ to mining, such ‘rights’ were simultaneously withheld from others (either in response to demands for water rights or by omission), such as pastoralists, as well as other settlers and Aborigines. The system of ‘water rights’ meant that the government could now grant or deny ‘rights’ to water to individuals or groups. River water, an essential and valuable asset, became both a subject and means of control. Water rights were a means for exercising political and social exclusion, as well as acquiring economic advantages. Large-scale dams in the twentieth century were an extension of this kind of privileged access to water that supported certain industries at the expense of other groups (see chapter seven). Allocations of water ‘rights’ are current sources of concern for many ethnic groups, academics (including historians), advocates of environmental justice, some politicians, industries, individuals, and other ‘stakeholder’ groups in Australia and around the world.

Government water regulations were, Lloyd noted, ‘effective enough’ when ‘water was plentiful’.⁴⁸ The Acts in both New South Wales and Victoria provided frameworks through which miners could independently work claims and maximise water use. ‘Water privileges’ and ‘water rights’ ultimately instituted a system of maximum water exploitation for a particular industry. The goldfields were riddled with constructions for funneling water and mitigating floods. During droughts, however, water scarcity continued to be a problem. Rivers and dams dried up after prolonged dry weather and miners were left with

⁴⁷ Lloyd, Either Drought or Plenty, p.74.
⁴⁸ Lloyd, Either Drought or Plenty, p.75.
little option but to leave or wait out the drought. At other places such as Mount Browne, west of the Darling River, it was simply too dry to mine effectively.\textsuperscript{49} Further, entrepreneurial settlers continued to exploit the system of race lines to sell water to others — a practice the new regulations had attempted to end.\textsuperscript{50} The regulations firmly positioned river water as a public utility managed by centralised government, which nevertheless imbued certain individuals with 'rights' to particular quantities in order to promote government agendas as well as to coordinate constructions for private water diversion.

Allocations of quantities of water were based on expectations about the total amount of water that rivers carried. It was expected that river flow would be able to fulfil the quantities of water that were allocated. Such expectations were rooted in assumptions about 'available' river flow at all times. Yet there had been little government investigation into river flow at mining sites. The government regulations also seem to have ignored previous settler experiences of droughts. Allocations of certain amounts of water were fixed and did not allow for variations in flows or for drought. They created a false certainty that allocations could be met. While government knowledge of the rivers is today very detailed, current water allocations similarly work with a calculated average amount of water that denies the variable nature of river flow in Australia.

The 1871 New South Wales Gold Fields Royal Commission raised a number of issues about water supply and water rights. One was that the Commissioners could obtain little reliable information about river heights and flows to assess how effective the current regulations and how realistic estimates for future water supply were. No levels had been taken or other inquiries conducted to 'establish the facts'.\textsuperscript{51} Similarly, Victorian engineers and others argued for greater study and monitoring of river flows by meteorologists and hydrologists.\textsuperscript{52} The government had allocated water rights based on rough estimates and without adequate studies by trusted 'experts'. Some of the information from government officials proved to be highly inaccurate. For example, when the Commissioners attempted to formulate a way to deliver water to the Young field from the Murrumbidgee, they found that their information failed to take account of the principle of gravity, noting that

\begin{itemize}
\item \textsuperscript{49} Lloyd, Either Drought or Plenty, p.77.
\item \textsuperscript{50} Powell, Watering the Garden State, p.50.
\item \textsuperscript{51} New South Wales Gold Fields Royal Commission, 1871, quoted in Lloyd, Either Drought or Plenty, p.75.
\item \textsuperscript{52} Powell, Watering the Garden State, p.85.
\end{itemize}
water supply from the Murrumbidgee would be impossible, 'unless the Murrumbidgee River has the astonishing peculiarity of running up hill'.

While the Commissioners cast doubt over current government information, they also indicated the kind of knowledge that would be valuable, primarily 'facts' accumulated by government investigation. There was an element of denial or doubt about the value of knowledge held by those who had lived on the fields. Indeed, information and ideas offered by miners and other settlers were often dismissed as suspect, inaccurate, or impossible. However, arguments for expert studies also reflected the growing trend within government (evident from the 1840s) for 'scientific' knowledge as the pre-eminent form for understanding and managing environments. By elevating government and 'expert' knowledge, other kinds of knowledge, such as local and Indigenous knowledge, were suppressed; or, as Tom Griffiths noted for the twentieth century, dismissed as 'unlearned'.

After encountering problems in obtaining river information and establishing the costs of construction, the New South Wales Royal Commission considered handing the problem of water supply over to private companies – something the Victorian government also experimented with. The Victorian government encouraged the construction of water storages on goldfields by issuing subsidies. Private companies, such as the Bendigo Waterworks Company, undertook the largest of these constructions, from the 1870s. The Victorian government was further able to provide water supplies for goldfields by constructing government-funded water supply channels, for which miners paid a much resented maintenance fee. However, the government encountered a number of problems in the construction of water supply infrastructure, such as sediment buildup in the artificial channels. Another problem was obtaining adequate 'expertise' to construct the complex water supply networks, which the New South Wales Commissioners had also noted as a limiting factor to government works. In Victoria, however, the limits of colonial expertise were encountered in the process of constructing a water supply scheme. In the 1860s the Victorian government had embarked on a massive and expensive scheme to supply water to goldfields, as well as to towns and for irrigation. It was planned that miners and others would pay for water and so repay the cost of the scheme. The infamous Coliban scheme or Brady scheme (after its designer,

53 New South Wales Gold Fields Royal Commission, 1871, quoted in, Lloyd, Either Drought or Plenty, p.75.
54 Lloyd, Either Drought of Plenty, pp.76-77.
J.M. Brady) was conceived as a network of dams and channels along the Coliban River. The scheme’s construction was beset by political turmoil that focused on the (in)adequacy of the colony’s engineering expertise, machinery, and workmanship.\footnote{Powell, Watering the Garden State, pp.76-84.}

In 1871, when large parts of the scheme had been built, the government called on the expertise of Lieutenant-Colonel Richard H. Sankey from the Corps of Royal Engineers in India, to advise on the scheme’s completion, or whether it should be abandoned altogether. Indian engineers, with experience in manipulating river flow and an established tradition of engineering expertise, were part of wider Empire networks that Australian governments drew upon to monitor and advise on hydraulic projects. Sankey heavily criticised the Brady scheme on a number of points. He argued that the workmanship was variable, engineering expertise was not specialised enough, and that not enough preliminary investigation had been made before construction. Sankey argued that in order to ensure specialised expertise the government should have a branch dedicated especially to ‘waterworks’, much like the Indian Public Works Department which focused on hydraulic engineering and controlling river flow.\footnote{Powell, Watering the Garden State, pp.80-84.}

All Australian colonies had appointed engineers and meteorologists by the 1860s. However, Australia’s large distances, emergent educational institutions, and the rapidly changing fields of engineering and meteorology combined to work against the immediate establishment of an organisation resembling India’s water administration. It was not until 1881 that Victoria created a specialised water department. The Water Conservation Act of 1881 was inspired by a number of factors, including the need for systematic knowledge gathering, carrying out plans for irrigation development, and drought during the 1870s, which increased pressure for formulating new systems for water supply. The 1881 Act, however, inaugurated decentralised waterworks trusts, rather than a centralised water department as in India. The trusts were based on a system similar to the method that had been administered for mining towns and fields.\footnote{Powell, Watering the Garden State, pp.94-104.}

Although Australian governments sought expertise, local engineers were criticised for their lack of skill. A number of leading engineers on the Brady Scheme were dismissed when the scheme ran into unforeseen, technical difficulties.\footnote{Powell, Watering the Garden State, p.82.} In his report, Sankey commented that many of these technical problems had a common root in the fact that the engineers did not know enough about either the rivers or the land. The Australian
colonial governments sought expertise of a standard promoted within the Empire. The highly respected British engineers in India were theoretical, mathematical, specialised, and elite. This breed of specialised engineers in the Imperial government had gradually replaced more generalist knowledge from the 1840s. Such generalist knowledge, which recognised and valued local Indian networks and knowledge, was increasingly criticised and repressed by the government, new scientists, and engineers in favour of ‘expertise’, which was defined against ‘unlearned’ knowledge, such as that of Indians. However, without substantial knowledge of local environments, theoretical principles collapsed. The Brady Scheme was eventually completed in 1877 after more than a decade of construction and controversy.

New South Wales did not attempt anything so comprehensive. Although each goldfield presented particular problems in Victoria, in New South Wales this was amplified by the extreme diversity of the environments of each goldfield and their geographical dispersal. As a result, Lloyd argued that, ‘each goldfield [in New South Wales] had to be considered in isolation and a means of water supply found that would meet the idiosyncratic requirements of that field at least expense’. The particular topographies of each place had to be considered by the Commission to find a solution that accounted for rainfall, river flow, hills, and so on.

The scheme of ‘water rights’ was challenged by both drought and flood, which made inadequate river knowledge apparent. The full exploitation of gold was limited by both variable river flow and insufficient government knowledge. The opening up of new fields in the late 1860s and early 1870s, which lacked water to sustain mining, seemed to need even more government regulation. Miners and settlers presented ambitious plans to the Commission to divert rivers and drain wetlands in order to feed water to gold sites. For example, one suggestion was to divert the Tumut River to the Adelong goldfields. Such schemes, while ambitious, built on past achievements. Miners at the Hanging Rock diggings, for example, had diverted water from the Barwon River through races 20 miles long.

The Commission considered a number of ideas presented by miners and other settlers, but rejected those lacking government or expert information about the rivers.

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61 Powell, Watering the Garden State, p.50 and pp.76-84.
62 Lloyd, Either Drought or Plenty, p.76.
63 Lloyd, Either Drought or Plenty, pp.75-78.
Rejected schemes reflected the Commissioners’ doubts about the miners’ logistics and the costs of the schemes. The Commission did note that there were suitable sites for reservoirs near goldfields along the Great Dividing Range and suggested private companies might be willing to build the necessary dams and then sell the water (or access to the water) to miners. Indeed, the Commission was to recommend the construction of dams and tanks by private companies generally as a solution to water supply on goldfields. The cost of water storages, which were required for future goldmining (mostly deep lead mining as alluvial deposits dwindled), and the realisation that there were large gaps in government knowledge, went against intervention. In effect, this opened an era of mining companies, which constructed huge reservoirs to feed mining operations, and placed large amounts of water under private control. In the first decades of the twentieth century mining companies began dredging riverbeds for gold, causing massive changes to riverine environments.  

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Selection Acts of the 1860s

Macintyre has described the goldfields as ‘the immigrant reception centres of the nineteenth century’. Gold attracted many immigrants to Australia but large numbers looked to settle in Australia beyond the rush and a nomadic existence. Towns that had sprung up around goldfields became permanent homes for some; however, many sought land for agricultural farming and economic independence. A campaign began in the late 1850s to ‘unlock the land’ from the hold of squatters who had taken up large tracts of land in Victoria and New South Wales along river frontages.

In the 1820s and 1830s pastoralists had established runs that covered much of the Riverina (between the Murrumbidgee River and Murray River). They had extended north from Port Phillip and south into Victoria from New South Wales. They moved west of the Lachlan, along the Darling River and its north-eastern tributaries, and north into Queensland. North-west of Sydney, in areas around the Namoi and Macquarie Rivers, there were also long-established runs.

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64 Lloyd, Either Drought or Plenty, pp.75-80; and Macintyre, A Concise History of Australia, p.91.
65 Macintyre, A Concise History of Australia, p.91.
From the beginning, the need for grazing land had pushed pastoralists to the fringes of settlement. They had ignored the restrictions on the ‘limits of settlement’ (imposed in the 1830s), taking stock, under the care of managers or owners, into the inland. Historian David Denholm wrote that pastoralism, spurred by ‘the natural reproductive rate of cattle and sheep’ and food and water to sustain them, ‘gathered the momentum... to outrun survey’ – and the law. Pastoralists followed the rivers inland, taking up river frontages first and then exploring the less well-watered back-blocks. Lloyd noted that the importance of rivers and river frontage meant pastoralists ignored government riparian restrictions that determined river frontage could only be one third of a run’s length. Some runs stretched for tens of kilometres along rivers. One of the largest was Ben Boyd’s ‘100-mile frontage’ on the Murrumbidgee. Colonial laws were impractical for pastoralists in the poorly watered inland. Pastoralists also exploited the lack of monitoring and enforcement of riparian rights by governments in claiming wide river frontages. By the time the campaign to ‘unlock the land’ began in earnest in the late 1850s, pastoralists had been advancing their hold on the inland for forty years or more.

The Free Selection Acts were passed in 1860 in Victoria and 1861 in New South Wales. The Acts allowed selectors to purchase small lots (up to 250 hectares) of vacant Crown Land or land under pastoral lease. The desire of the newly formed colonial governments to raise land revenue through the sale of Crown Lands followed the formation of responsible government and led to the Selection Acts. As Denholm argued, ‘governments harnessed popular opinion to seek a future for yeoman farmers’, appealing to a popular ideal in order to turn opinion against squatters and so release their land for sale.

While the establishment of small-scale farms gained immediacy from the need to raise government revenue, the Selection Acts were also the culmination of long-held government visions to replace pastoralism with small-scale agriculture and mixed farms. From the 1830s colonial governments had been determined to install small-scale yeoman farmers in many localities. Pastoralism was not seen as a desirable long-term industry and officials planned that it would give way to small farming settlements. London’s colonial

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67 Denholm, The Colonial Australians, p.60.
68 Lloyd, Either Drought or Plenty, p.52.
70 Macintyre, A Concise History of Australia, p.99.
71 Denholm, The Colonial Australians, p.66. See also, Macintyre, A Concise History of Australia, pp.97-98; and, Rickard, Australia: A Cultural History, p.81.

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office also pressed for small-scale farms, arguing for intensive cultivation as well as the ‘civilising’ influence of well-defined settlements. Powell has argued that these ideas were harnessed into policies in the 1830s and 1840s, under the influence of Wakefieldianism; however, ‘most of the official strategies grossly underestimated the importance of livestock grazing as a viable and long-term enterprise’. Pastoralism was more viable and became more entrenched than colonial governments and Imperial officials foresaw.

The Acts failed to break the squatters’ grip on the inland. Pastoralists bought the most fertile and well-watered portions of their land or used underhand means, such as bribery and mock selections, to retain them. Experiences of drought and flood and knowledge of rivers, runs, and surrounding areas meant that when the Selection Acts were implemented many pastoralists knew which areas were most valuable and fertile during wet and dry periods. Some used this knowledge simply to retain land that was most useful for raising stock. Others used it to push out competition by strategically holding land adjacent to key water sources, leaving only badly watered sections for selectors. For example, one pastoralist obtained a number of small lots (totalling 27,000 acres) along a river, blocking out all others from accessing adequate water supply, thereby effectually claiming a much larger area.

Selectors on the other hand struggled to make a living from their farms. The land was often unsuited to agriculture and many selectors lacked the necessary farming expertise. Many others did not have the capital to invest in equipment for developing their property and possessed limited means of transport. Macintyre has noted that struggling selectors formed a new rural ‘underclass’. The Selection Acts expressed a vision of yeoman farmers where the land and rivers could be moulded to suit particular agendas and imaginings. This land and its rivers could not support such intensive cultivation. The Acts also underestimated the environmental knowledge and cunning of pastoralists. Indeed, the idea of yeoman farmers seemed to have developed into policy (and the Acts) that denied the grip pastoralists had on the land and their experiences of drought and flood.

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72 Powell, Watering the Garden State, p.41.
73 Macintyre, A Concise History of Australia, p.99.
74 Lloyd, Either Drought or Plenty, p.52.
75 Macintyre, A Concise History of Australia, p.99.
76 Macintyre, A Concise History of Australia, p.99.
Pastoralism: Innovations and Limitations

In general terms, pastoralism in the inland faced environmental challenges broadly similar to goldmining, but very different legal contexts and industry needs applied. In terms of similarities, pastoralists, like miners, sought to guard against droughts. Both pastoralists and miners experienced floods and droughts within particular local environments, with distinct hydrologies and geographies. In all regions, the effects of drought could be devastating. For example, during the years before the 1851 floods, pastoralists in what was to become the Riverina, experienced a drought that killed many stock and they expected to lose many more. One pastoralist claimed that the floods of 1851 saved many of their stock because it encouraged the growth of pasture.77

Pastoralists had complex relationships with floods, influenced by personal circumstances and local environments. Many floods were seen as beneficial; coming mostly after drought, they replenished water sources and stimulated vegetation growth. Pastoralists were able to move stock and so avoid extensive losses. It was mostly when floods rose higher than expected – beyond previous experience in a particular region – that settlers and stock became significantly endangered on runs, such as during the 1864 and 1886 floods along the Darling River.78 Floods could also wash away dams. However, Lloyd has observed that many of these dams were temporary and were perhaps no great loss.79 Pastoralists did attempt to mitigate the adverse effects of floods whilst still reaping their benefits, usually by ensuring that their stations had a mixture of high and low land. They also constructed embankments and channels to divert floodwater into tanks and dams to lessen flood damage and to use the stored water during dry periods.

Aside from immediate losses and benefits, floods could have long-lasting negative effects. Floods eroded the land and riverbanks. By the 1850s pastoralists in some regions recognised that erosion was exacerbated by land clearing and the tracks made by cattle and sheep.80 John Robertson’s station in south-western Victoria deteriorated under intensive pastoralism. He wrote to the government in 1853 describing soil erosion, land-

77 Maitland Mercury, 12 May, 1851, p.4.
78 See: Argus, 28 May, 1864, p.5; The Courier, 11 April, 1864, p.2; The Courier, 17 June, 1864, p.5; The Courier, 9 April, 1864, p.3; The Courier, 4 September, 1886, p.6; The Courier, 19 August, 1886, p.3; The Courier, 9 December, 1886, p.6; Argus, 8 January, 1886, p.6; The Courier, 29 January, 1887, p.6; and, Argus, 29 January, 1887, p.10.
79 Lloyd, Either Drought or Plenty, p.64.
slips, vegetation deterioration, and salting.\textsuperscript{81} Erosion changed the course of rivers and floods and disrupted hydrological systems. In localised situations, compacted earth trampled by cattle and sheep could also increase flood heights, such as was argued to be the case in the town of Wagga in the 1850s.\textsuperscript{82} Compacted earth, however, seems to have had less of an effect on flood heights on pastoral stations. The environmental impacts of pastoralism were evident from the 1850s and became an increasingly debated topic into the 1880s.

The publication of G.P. Marsh's \textit{Man and Nature} in 1864 influenced Australian debates about the connections between tree-felling and reduced rainfall (though less than elsewhere).\textsuperscript{83} However, in the 1880s attention turned to the environmental effects of overstocking sheep during 'good seasons'. To combat environmental (and economic) fluctuations between drought, flood, and 'good seasons', pastoralists stocked paddocks heavily when the weather was favourable. This method was criticised by a number of scientists who were concerned about the destruction of native plants after years of over grazing. The ethics of allowing large numbers of sheep to perish if rain failed was also hotly debated.\textsuperscript{84}

Pastoralists tested the limits of the land and rivers, as well as pastoralism itself, in the process causing substantial environmental deterioration. It was a different kind of environmental exploitation to mining — more about trial and error and requiring larger areas — but it was similarly based on individualised opportunism. In pastoralism such individualised opportunism was perhaps heightened by the fact that there was little regulation over pastoralists' activities, particularly regarding water.

In contrast to government legislated regulations around mining, pastoralists' constructions such as dams, tanks, and channels were largely unregulated. In part, such lack of regulation may have been due to the expansion of pastoralism into the inland before government surveys, so that governments found it difficult to control pastoralists' early activities. The geographical spread of pastoral stations made enforcing regulations nearly impossible.

Another reason to avoid regulation was that governments planned for pastoralism to give way to small-scale farms and intensive cultivation. Pastoralism was not meant to

\textsuperscript{81} Powell, \textit{Watering the Garden State}, pp.45-47.
\textsuperscript{82} Lloyd, \textit{Either Drought or Plenty}, p.66.
\textsuperscript{83} Rickard, \textit{Australia: A Cultural History}, p.64.
Pastoralists held no ‘rights’ to water. Water was identified as critical early on but remained unregulated as far as pastoralists. Indeed, pastoralists were left so much to their own devices that where laws did exist, such as riparian rights, they were commonly broken with no recrimination. Riparian rights dictated that landholders must not impede river flow (through, for example, dams and water diversion) to downstream users. Although this law could have been tempered through legislation, as was done for mining, it was not substantially altered for pastoralism in this period.85

The lack of regulation around pastoralists’ water use fostered the separate, or distinct, development of the industry’s approach to water. Powell has argued that ‘two distinct systems’ of land settlement emerged in this period: limited or bounded settlements of intensively worked land that governments concentrated on and encouraged, and pastoralism which pushed out into areas difficult for governments to control.86 Powell’s argument can be extended into an explanation for the very different approaches to water, evident in pastoralism and government regulated goldmining in this period. The two systems were perpetuated by a combination of pastoralist expansion into distant areas and governments’ lack of regulation over the industry. By withholding a system of water ‘rights’ to pastoralists and not legitimising their water diversions, governments further perpetuated the two systems and ensured that pastoralists had few claims over land and water that was intended for the development of small-scale farming. Further, the two systems developed distinct kinds of knowledge bases. In this period pastoralists’ knowledge was largely gained through processes of trial and error and the development and dissemination of local knowledge. In the 1860s the Pastoral Times expressed the importance of trial and error in the development of grazing techniques; it wrote that pastoralism in Australia was a ‘progressive art which had been nurtured by bitter experience’.87 Governments increasingly valued specialised expertise.

While the lack of water regulations in some ways reduced government support for pastoralism, it also created a situation where pastoralists could innovate in methods of water storage and diversion, free from government restrictions. Pastoralists innovated and experimented with manipulating river flow, floodwater, and run-off, largely driven by

86 Powell, Watering the Garden State, p.49.
87 Pastoral Times, quoted in, Lloyd, Either Drought or Plenty, p.51.
drought and the problem of supplying water to areas far from watercourses. Pastoralists tested different techniques and designs for water supply, such as dams, tanks, and water channels. Although they often broke riparian laws, these schemes were publicised as possible new technology. Pastoralism, at first seen as undesirable, became an industry of innovation and governments kept a curious eye on its developments in water conservation and irrigation systems, which could potentially support small-scale farming.

Lloyd has described some of James Tyson’s experiments with different techniques for conserving water. On his Lachlan River properties Tyson cut channels from the river to fill natural depressions, which he called ‘lakes’. He experimented with the gravitational flow and lengths and depths of the channels. Through the channels he aimed to harness floodwater, which already spilled over his property, into deliberate conservation. Floods were a crucial source of water for Tyson. If it were not for floods, and his harnessing of their flows, Tyson claimed he would have been ‘starved off the country’. Tyson’s innovations, which broke riparian laws, were only possible because the government did not enforce those laws. He discovered useful techniques for harnessing floodwater that later inspired other irrigators. Lloyd noted that Tyson’s ‘lake’ systems, developed for pastoral water supply, had ‘an affinity’ with later irrigation systems, such as those constructed by Sir Samuel McCaughy and ‘the public enterprise irrigators of the twentieth century’.

Tanks were a common way for pastoralists to conserve water. Environmental historian Heather Goodall has persuasively argued that British settlers probably brought the technology to Australia from India. Tanks were excavated depressions that worked to conserve run-off from higher land. Siting tanks to capture run-off was important. Pastoralists experimented with designs, especially to increase tank capacity. Lloyd noted that many tanks in inland Australia were very successful; however, some failed or were left half finished due to poor siting, cost, siltation, or because the sites were difficult to access or had little water supply for the workforce and horses (which were used to cart dirt out of the tanks). Pastoralists also built dams across rivers and creeks, and tapped artesian

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88 Lloyd, Either Drought or Plenty, pp.51-52.
89 Lloyd, Either Drought or Plenty, p.53.
90 Lloyd, Either Drought or Plenty, p.54.
92 Lloyd, Either Drought or Plenty, pp.50-52.
93 Lloyd, Either Drought or Plenty, p.70.
supplies by sinking wells. Well-sinking was expensive, as it required an extensive workforce, machinery, and potentially a lot of time as finding artesian water was a matter of trial and error. Indeed, wells became symbols of wealth. Pastoralists also sometimes cooperated to construct more complex networks of water conservation and diversion. For example, a group of pastoralists in the Riverina shared the costs of constructing a 12-mile channel from the Murrumbidgee River to Yanko Creek to increase water supply to their properties on the Yanko, Billabong, and Colombo Creek system.

Although pastoralists experimented, innovated, and sometimes cooperated in order to ensure steady water supplies, the lack of regulation and coordination also created a situation of highly individuated opportunism.

Pastoralists stored water in private dams and tanks, thereby reducing water flow to downstream stations. The result was often conflict between upstream and downstream pastoralists over access and rights to water. For example, on Billabong Creek in the late 1850s, angry downstream landowners armed themselves to confront dam owners, and cut (or destroyed) a number of their dams, arguing that the dams significantly impeded water flow downstream. One dam owner, William Brodribb (who had established a punt at Gundagai in 1838 and moved to Billabong Creek in 1855), took his case before the courts. He had had two of his dams cut. The bench ruled, against Brodribb, that the principles of riparian rights held. Some pastoralists nevertheless rebuilt their dams and hired armed watchmen to stand guard; and so a stand-off developed between upstream and downstream pastoralists. Downstream landowners maintained their rights were being infringed. Dam owners argued that their dams were necessary to make their properties pay. Their runs were otherwise too dry. Dams were also cut in other parts of New South Wales. Lloyd described the practice of dam-cutting as ‘common’ from the 1860s. The government remained largely uninvolved in the Billabong Creek controversy.

Clearly the principle of riparian rights did not work effectively for pastoralists in the inland who relied largely on surface water for water supply. Riparian rights worked in places such as England where more regular and substantial river flows meant there was less need for individual dams. In Australia, aridity and intermittent river flows led pastoralists to seek individual water security through illegal (and legal) dams. Riparian

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94 Lloyd, Either Drought or Plenty, pp.60-61.
95 Lloyd, Either Drought or Plenty, p.54.
96 Lloyd, Either Drought or Plenty, p.56-58.
97 Lloyd, Either Drought or Plenty, p.57-58.
98 Lloyd, Either Drought or Plenty, p.58.
rights prevented water diversion or damming on upstream properties, without which pastoralists would likely fail economically. The Billabong Creek controversy demonstrates the incompatibility of riparian rights with pastoralism in inland Australia. Lloyd wrote of the Billabong Creek conflicts that, '[t]he existing system set neighbour against neighbour'. Riparian rights were an environmentally and socially impossible system in inland Australia. Pastoralists competed with each other for water.

The many claims on river water seemed to suggest that an overarching system of regulation be established along rivers to mediate the interests and needs of upstream and downstream landowners. However, no regulation or legal provision to solve pastoralists’ needs for water was attempted until the 1880s. This was despite the colonial governments’ regulations over water use and flood mitigation on goldfields. Indeed, Lloyd has shown that pastoralists along Billabong Creek, 'envied what had been done to give miners some rights over their water resources'. By establishing a system of water rights for miners the government had inaugurated a new legal framework that both controlled water use and diversion and also provided some level of protection to miners from competitors for water. It also gave the assurance of certain amounts of water supply to individuals, however much of an illusion this proved to be during dry periods. Pastoralists sought similar centralised coordination, certainty, and protection as an alternative to the inadequate laws of riparian rights and personal conflicts. However, ‘rights’ and coordination were withheld from pastoralists. Although pastoralists enjoyed a kind of freedom through a lack of regulation, they were also limited by it, as individual interests were largely uncoordinated.

99 Lloyd, Either Drought or Plenty, p.57.
100 The doctrine of riparian rights and common law was imported from England by the colonial government. This system of law held the definition of ‘a river’ which carried over to colonial government water regulations. This definition did not reflect the behaviour of many Australian rivers nor was adequate for addressing legal issues of river flow and altered river flow (for example flooding, changed flood flows through dams and floodplain development, or reduced river flow from, for example, dams). The definition of ‘river’ in riparian rights and common law was a significant issue in colonial government regulation and settler compliance with the law, and as Mark Patrick Taylor and Robert Stokes have argued, continues to be a problem in Australia today. Mark Patrick Taylor and Robert Stokes, ‘When is a River Not a River? Consideration of the Legal Definition of a River for Geomorphologists Practising in New South Wales’, Australian Geographer, 36; 2, July 2005, pp.183-200, especially pp.187-188.
101 Lloyd, Either Drought or Plenty, p.74.
In 1884 William Brodribb tried to bring the ‘two systems’ of pastoralism and government together.\textsuperscript{102} He put forward a bill in the New South Wales Legislative Assembly that would provide legal mechanisms to protect private dams for pastoral use. The \textit{Dams for Pastoral Purposes Bill} set out guidelines for the construction of dams, such as a limited dam wall that allowed water to flow over and regulations that aimed to prevent damage to neighbouring properties, such as resultant flooding.\textsuperscript{103} In effect this bill argued for a degree of rights for pastoralists over water resources. It presented a legal system where pastoralists had the right to store and use certain amounts of water. It also presented a way of coordinating disparate claims over water. Brodribb argued that the bill was necessary, ‘to render a great deal of our country capable of being profitably operated’.\textsuperscript{104} The bill gained the support of Attorney-General William Dalley. Dalley stated that, ‘the storage of water is undoubtedly one of the questions which in this country is of absolute primary importance’.\textsuperscript{105} Despite this support, Brodribb’s bill was defeated in the Legislative Assembly. Water rights were again denied to pastoralists. The legal and knowledge gulf between the ‘two systems’ was perpetuated.

Early government regulations around water use for mining significantly shaped future water management in Australia. Centralised regulation offered coordination of disparate individual interests, as well as government resources to address the challenges of drought and flood. Such resources included the knowledge of experts, particularly government engineers and meteorologists. Experts, however, largely set themselves apart from ‘unlearned’ forms of knowledge (such a local knowledge). They also faced the problem of gaining understandings of regions that had been little studied by governments. Regulations around miners’ water use and government provisions for addressing flood and drought embedded a utility approach to water in government management. In this period water entitlements were issued which gave a degree of security to miners, but simultaneously excluded or denied rights to others. In contrast, water use for pastoralism was largely unregulated by governments fixed on visions of small-scale farms. Far from government centres, pastoralists also relied on knowledge

\textsuperscript{102} In 1880 William Brodribb was elected to the New South Wales Legislative Assembly as the representative for Monaro. He had sold his Billabong Creek property in 1861 when selectors claimed parts of his property, and retired to a life of politics, entering the Victorian Legislative Assembly the same year. Janette Finch and Ruth Teale, ‘Brodribb, William Adams (1809-1886)’, \textit{Australian Dictionary of Biography Online}, \texttt{http://www.adb.anu.edu.au/biogs/A030222b.htm?hilit=Brodribb}, accessed 4 October 2008.

\textsuperscript{103} Lloyd, \textit{Either Drought or Plenty}, p.59.

\textsuperscript{104} William Brodribb, quoted in Lloyd, \textit{Either Drought or Plenty}, p.59.

\textsuperscript{105} William Dalley, quoted in Lloyd, \textit{Either Drought or Plenty}, pp.59-60.
gained from trial and error. While pastoralists enjoyed relative freedom to innovate in methods of water supply, government coordination offered a way to overcome disputes over access to water, and pastoralists sought government intervention.

This period indeed saw the development of forms of water policy that were to dominate in the future, particularly river engineering, industry privileges, and centralised administration. However, these were to be held in tension with other ways of understanding and relating to rivers and floods as well as changes in government policies.
Bourke 1890
The Birth of Engineering

Driving towards Bourke in the early hours of the morning, the dense vegetation suddenly opened into grassland and the soil changed from a brilliant red to an ashen black under the wheels of the car. I was on the floodplain. I remembered what Heather Goodall wrote of these Darling River floodplains: ‘Graziers constantly refer to the blacksoil areas of their land as ‘the flooded country’, not ‘flood-prone’ but ‘flooded’. The floodwaters are always present in the imagination of the observers, even when there has been no flow for years beyond the banks’. ¹ The floods remain, their presence lingering in the landscape, marked on the land by black silt deposits of previous inundations. The black soil and grasslands stretched out on either side of the road and into the horizon, the flatness relieved only by a solitary mountain: Mount Oxley. I had read that the mountain during floods would sometimes be an island. I was, in an unconventional sense, in the bed of the Darling River.

I was travelling to Bourke to do further research on a flood that occurred in 1890. I had read about the town, river, and floodplains, but this was my first trip to the Darling River. Arriving in Bourke and stopping at the Darling River, which runs through the town, I stood on the high bank and looked across the green-brown water. The river was calm, reflecting the tall red gums growing along its banks. The opposite bank was thickly vegetated with red gums and coolabahs, distinctive of the floodplains. Coolabah trees typically germinate at the edge of floodwater. Red gums grow closer to the river, on land

that is more regularly inundated. Signs of past floods were everywhere, revealing the story of the river.

The Darling River begins at the confluence of the Barwon, Culgoa, and Bogan Rivers, between the towns of Brewarrina and Walgett in New South Wales. The rivers meet about 200 kilometres upstream from Bourke, feeding water from the Great Dividing Range into the Darling. Before reaching the Darling they receive water from other rivers and creeks (including the Macintyre, Macquarie, Namoi, and Gwydir) whose headwaters are also in the Great Dividing Range and stretch from southern Queensland regions of the Range into northern New South Wales. The Great Dividing Range tributaries water more fertile, higher altitude areas before flowing through the lower, flat, western regions, bringing with them the black silt. The Darling River’s flows are largely determined by the amount of water carried by these rivers and creeks, along with that of the Warrego and Paroo Rivers, which join the Darling downstream of, or just south of, Bourke. Areas adjacent to the Darling receive little rainfall. When they do, the rain contributes to local changes and variations in river flow (‘freshes’), vegetation growth, and animal behaviour.²

It is a land of boom and bust. The Darling has the most variable river flow in the world and many native plants (for example the red gums), fish (such as the golden perch) and other animals rely on its intermittent flows for both health and reproductive cues. During floods water spills onto the floodplains and it can stay high for months, the silt staining the earth as water soaks into the land. In the upper Darling floodwater soaks into the earth and replenishes the underground aquifer of the Great Artesian Basin. The Darling drifts south, feeding Menindee Lakes and joins the Murray River at the town of Wentworth. The southwest gradient of the land is slight and floodwater drains away slowly. The Darling rarely experiences ‘flash floods’; they more often rise in increments, built by the tributaries’ water and the washing away of snags and blockages in waterways. In 1890 all of the feeding tributaries of the Darling River flooded.

In March and April that year, paid workers sent from Sydney by the government, along with residents of Bourke, built an embankment (or levee) around the town to protect it from the threatening flood. As the floodwater slowly rose, media reports increasingly became focused on the strength and height of the embankment and whether it would prevent the town’s inundation. If the wall was breached, the town would flood. Although built quickly, within a month of the flood’s peak the embankment was

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intended as a permanent structure, one which would protect the town from future floods. The construction of the embankment was financed by the colonial government, in response to petitions by representatives of Bourke to protect the township, which was of particular cultural and economic significance to the colony and nation.\(^3\) In addition, and at the request of those in the town, the government contributed other aid by sending boats from Sydney, aiding the evacuation of a large number of residents, and providing various facilities to help the flood effort. The flood was reported widely in urban newspapers and the embankment gathered symbolic importance in these reports. The embankment came to symbolise Bourke’s ‘battle’ against the flood and the hard work of the citizens, aligning with contemporary traits of a cultural identity rooted in rural Australia.

The high degree of media attention the flood event received hints at the importance of Bourke to the cultural identity of New South Wales, and the nation, at the time. By 1890 the town had come to connotate ‘the bush’. In 1890 Bourke was the largest trade centre for the wool industry in rural New South Wales, and Australia, a symbol of the success of settlement and industry in the inland. As Tim Bonyhady has noted, when the flood occurred, ‘public attention was fixed on town not country’, despite the land being heavily stocked with record numbers of sheep and stock losses running into the millions.\(^4\) Bourke was the immediate focus of the colonial government and urban media.

The 1890 flood in Bourke and along the Darling River was unprecedented in colonists’ experience. Its impact was more devastating because government meteorologists did not (or were unable to) forewarn colonists of its likely severity. A previous large flood, in 1864, had caused some damage to the town, but many had thought this flood to be an exceptional occurrence. The 1890 flood revealed that it was not and that large floods could periodically threaten the town. Meteorologists’ predictions, reliant on limited records of rainfall and river flow, were not enough to protect the settlement.

The government-funded embankment signalled colonists’ calls for new forms of flood protection by the government. The colonists turned to engineers to guard against flooding as faith in meteorologists waned. Abstract long-range forecasts and emergency

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\(^3\) Edmund 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, 8, 1890, p.3. The Western Herald indicated total government grants toward the construction of the embankment may have reached as much as £5,500 pounds. Western Herald, 2 July, 1890, p.2.

aid did not guarantee the safety of the townspeople and future of their town — a guarantee that they sought from the government. Following the 1890 flood the people of Bourke requested more funds for the construction of a more solid embankment.

This chapter explores the role of government science in trying to come to terms with, and manage, floods for the sake of cultural identity and the economic future of Bourke, the inland, and the colony. It examines who had a stake in protecting Bourke, both during and following the flood, focusing on the town’s position as an important symbol of cultural identity for urban dwellers in New South Wales and more widely in Australia. I also explore the colonial government’s investment in the town as the centre of western New South Wales’ wool industry; the role of government meteorologists; and the interests of the townspeople. Protecting Bourke from flooding, and preventing both industry and individual losses, became invested with a level of importance that distinguished it from other threatened towns and regions in the colony. In 1890 there was widespread flooding throughout New South Wales. Bourke received more media attention and government funds than any other place.

This chapter also explores the tensions and changing relationship between the government and the town, during and following the flood, that stemmed from ambiguities and negotiations over who was responsible for ensuring that Bourke was secured against floods. I will examine the power plays between the government and local authorities as they negotiated this changing relationship, which was complicated further in 1890 by the effect government-built works had on increasing the flood’s height.

In the aftermath of the flood, and against a history of successive floods and drought in the inland, colonists looked to the colonial government for permanent solutions to the erratic flows of the rivers. Colonists argued for engineering works such as permanent levees, flood mitigation, water conservation structures, and irrigation, that would provide greater environmental security and bring the hostile rivers to order.

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Bourke and the Darling

Bourke was laid out in 1862 at the 18 Mile Point from ‘Fort Bourke’ in order to service the increasing number of pastoral properties that began to be established in the area in
the late 1850s. Surveyor-General Thomas Mitchell had established Fort Bourke barricade (named after Sir Richard Bourke) in 1835, to protect his exploring party from attacks by Aborigines. It is the country of the Ngemba language group. At that time Mitchell commented that it would be a good place for a future town. In the 1850s pastoralists requested a town in the Fort Bourke area. The land Mitchell recommended however, had since been taken-up by a pastoral prospector. The only available land, large enough for town growth and on the Darling River, important for produce transport and water supply, was the 18 Mile Point from Fort Bourke. Further, two public buildings had already been erected at 18 Mile Point. Surveyor J. Glean Wilson marked out lots, which began to be sold in 1863. 

After its establishment, Bourke quickly became an important trade and export centre. By 1890 Bourke had a population of approximately 3,000 and was 'the largest wool-loading centre in Australia', serving an industry which counted well over 15 million sheep in the region. The Central pastoral Division of New South Wales exceeded the Western Division's sheep numbers by 10 million, however Bourke (located in the Western Division) was also the centre of trade for the Central Division's wool industry. Within Australia, New South Wales had early dominated the wool industry, with a total of 59 million sheep by 1890, as compared to Queensland's 20 million and Victoria's 14 million.

The economic booms of the 1860s and 1880s saw good wool prices and increased British (and to a lesser extent domestic) investment in pastoral properties. In the 1880s sheep numbers in the Western Division rose to 9 million, eclipsing the number of cattle. Sheep were increasingly preferred because they required less water and fewer rotations for grazing. Many farmers also switched from cattle to sheep because of the ease of transporting wool (rather than droving cattle overland). Cattle were moved to wetter niches, such as the Macquarie Marshes and Narran Lakes.

5 Bourke and District Historical Society, Bourke: A History of Local Government, (Surry Hills, NSW: Wentworth Books for the Bourke and District Historical Society, 1978), pp. 22-23. The site of the current town was originally called 'Fratenville' by early settlers.

6 Bonyhady, 'The Flood in the Darling', p. 286; Fosbery, et al., 'Floods in the Town and District of Bourke', p. 2; Sydney Morning Herald (SMH), 28 April, 1890, p. 8; and, 'Western Division of New South Wales. Royal Commission to Inquire into the Condition of the Crown Tenants'. 'Report and Summary of Evidence. Part I', New South Wales Legislative Assembly, Votes and Proceedings, 4, 1901, p. ix. Bonyhady estimates Bourke's population at the time to have been 2,500. However, the government Inquiry into the flood and the SMH put the population at approximately 3,000.

Paddle steamers were an important part of the wool economy, the chief means for transporting wool and delivering supplies to towns and stations. One can still see the port on the Darling River at Yanda Station (now part of Gundabooka National Park) where delivery-boats docked. Paddle steamers preceded the establishment of a township, the first steamer was recorded in the area in 1859. Paddle steamers plied the rivers to and from Adelaide and Echuca, on the Victorian side of the Murray River, and then on to Melbourne. Echuca was the largest port on the river system, servicing the wool industry in New South Wales and the gold fields in Victoria. When Bourke township was laid out, a wharf was hastily established (and a bigger wharf built in the 1890s). Although the river flows were erratic, paddle steamers proved faster and more reliable than coach transport which could take up to a year to complete a return trip from Sydney. The Great Western Railway, which reached Bourke in 1885, added to the town’s importance as a trade and supply centre.

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Steady Rain and Breaking Banks

Steady rain across Queensland and New South Wales in 1889 continued in 1890 and the south-western Queensland rivers swelled. The Paroo, Warrego, Culgoa, Balonne, Condamine, and Macintyre rivers broke their banks in late February and were in full flood in mid-March, inundating Cunnamulla, Inglewood, Warwick, and Toowoomba. The local newspapers in each township wrote of record flood heights that caused ‘The Calamity of the Age’. In 1864 and 1887 floodwaters had come down the Queensland rivers and many looked to these floods as the largest possible. The 1890 flood, however, surpassed even these heights in most towns.

As the floodwaters moved southward through the Queensland rivers, the large flows attracted the attention of the media to Queensland towns. While stations and towns to the north were recovering from the floods and counting stock losses, the local press in Bourke ran stories expressing fears of what could happen when the high waters

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8 Painter, The River Trade.
9 Darling Downs Gazette, 15 March, 1890, p.4.
finally reached Bourke. Live sheep and export wool from the largely pastoral south west Queensland were sent via Bourke, to be shipped on paddle steamers to Adelaide or Echuca, or transported by rail to Sydney. On 14 March 1890 the Sydney Morning Herald (SMH) reported that '[m]any old residents predict that should further rains occur up river high floods must ensue. In 1864 the water was 4 ft. in the town [of Bourke]... should the same volume of water come down, either miles of railway will be swept away, or Bourke will be entirely demolished as the railway embankment would force the waters to a great height and cause a very strong current'. Human changes to the landscape changed the behaviour of floods and experienced colonists suspected these changes would be to Bourke's detriment. The government-built railway embankment, constructed along one side of the town in 1885, had reduced the width of the natural floodway from 12 to two miles. It was predicted early in the flood that the railway embankment would act as a dam, forcing floodwater back and into the town.

On the Queensland and New South Wales coastal rivers heavy rainfall was causing floods too. Brisbane and Rockhampton flooded in March and the Hunter and Clarence Rivers flooded in the same month. The New South Wales coastal rains moved inland and the Namoi and Barwon Rivers, the far north-east feeders of the Darling River, were in flood by mid March. There were widespread floods across the colonies, drowning 500,000 sheep and cattle, and damaging crops of maize worth half a million pounds on the Barwon, Culgoa, and Narran Rivers. Nevertheless media attention remained fixed on Bourke.

Wool and the National Imagination

Bourke's significance for the wool industry marked it as a cultural icon and as symbolic of 'the bush'. The media's focus on Bourke's plight in 1890 drew on (and reinforced) the town's significance for the cultural identity of New South Wales and, indeed, other colonies in Australia. By the 1880s, with a largely Australia-born population, Australians

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10 Toowoomba Chronicle, 27 March 1890, p.3; Toowoomba Chronicle, 14 April, 1890, p.3; and, Darling Downs Gazette, 2 April, 1890, p.3.
11 SMH, 14 March, 1890, p.6.
12 SMH, 14 March, 1890, p.6.
searched for a source of national identity, looking away from empire and Britain, into the nation.  
Debates about federation spurred on the search for national identity, as Australia sought independence from Britain. National industries and development, while ensuring national economic security, were also sources of identification for colonial Australians. As an important rural industry, wool production became a focus for such ‘nation-building’.

Tom Roberts’ painting *Shearing the Rams*, for example, reflects this search for national identity in the wool industry. The painting (made on his visits to Brocklesby station in the Riverina) was first exhibited in 1890 and was part of Roberts’ ‘attempt to develop a national art’ through explorations of pastoral and agricultural practices that centred on ‘strong masculine labour’. The painting, which depicted a scene in a shearing shed, soon ‘came to be considered the definitive image of an emerging national identity’. Roberts was part of the Heidelberg School of painters which produced some of the most self-consciously ‘national’ images of the 1880s and 90s. The painters sought to create an art movement that was Australian rather than European and they did this largely through local content, while drawing on European impressionist techniques. They aimed to create popular works that gave Australians a source of identity. Their artwork remains a strong point of reference for Australians today. The artwork as a whole is rural in focus, reflective of the nationalistic ‘Sydney and the bush’ ideas of the same period.

For the first time in settlement history Australia’s population was largely urban, but the urban, coastal dwellers looked inland to ‘the bush’ for markers of national distinction. In the 1890s urbanity was inflected with negative ideas of low living standards and ill health, while ‘the bush’ stood for robust good health and masculine vigour.

The pastoral economy of ‘the bush’ also held symbolic importance for urban dwellers as a nostalgic link with earlier frontier life in the inland. Historian Richard

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17 Powell, *An Historical Geography of Modern Australia*, p.15.
18 R.A. Gollan, ‘Nationalism, the Labour Movement and the Commonwealth, 1880-1900’, in Gordon Greenwood (ed), *Australia: A Social and Political History* (Sydney: Angus and Robertson, 1955), pp.145-193, p.145. Between 1880 and 1900 ‘the Australian people became fully conscious of their nationhood’. By 1881, the number of Anglo-Australians born on the continent outnumbered immigrants. Australia’s population comprised 61 percent Australia-born residents, compared with 34 percent born in the United Kingdom. By 1901, the number of Australia-born had reached 77 percent.
Waterhouse has described representations of ‘the bush’ made by, and for, urban dwellers as ‘a culture of nostalgia’ that referenced the height of the gold rushes and bushrangers.\textsuperscript{19} The wool industry offered a link with the past and with characters such as shearers, swagmen, and shepherds of the 1860s and 1870s. Frontier conflict and settler relationships with Aborigines were also incorporated into nostalgic portrayals of bush life.\textsuperscript{20} The pastoral industry had changed significantly since the 1860s. For example, more shearers were married and there was more travel between rural regions and urban centres through the expansion of railway networks.\textsuperscript{21} Such a ‘culture of nostalgia’ also promoted the idea that the simplicity of rural life was imbued with the core values of egalitarianism and mateship.\textsuperscript{22}

Bourke’s importance extended nationally. It had become, in the minds of urban Australians, representative of ‘the bush’. The town was where Henry Lawson, poet and shaper of a rural national identity through portals of ‘the bush’, was sent by the \textit{Bulletin} in 1893-4 to experience the ‘outback’. His experiences in Bourke and in the surrounding towns and country formed the substance of much of his work. He wrote of ‘the bush’ as a harsh environment of drought and flood, creating stoic white men. Despite his dark picture of ‘the bush’ the stereotypes he depicted shaped identities of settler roughness and struggle against a hostile environment.

The 1890 flood in Bourke occurred against this background of national self-consciousness, national development, and the fascination of urban dwellers for ‘the bush’. It also occurred at the height of a pastoral boom, where high wool prices were attracting the attention of city investors.

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Building the Embankment

In mid March 1890, about a month before its expected peak, fears about a serious flood in Bourke were reported in many newspapers, although its height remained uncertain. The Bourke town Council had held a meeting in early March, deciding it was necessary to

\textsuperscript{20} Waterhouse, \textit{The Vision Splendid}, pp.170-174.
\textsuperscript{21} Waterhouse, \textit{The Vision Splendid}, p.169 and pp.177-179.
\textsuperscript{22} Waterhouse, \textit{The Vision Splendid}, p.166.
build a flood embankment (or levee) around the entire town. A smaller levee had been built to protect some parts of the town when a flood threatened in 1879 (the cost of which was supplemented by a £150 grant from the government). While effective against that flood (which proved to be small), it was thought that this flood could be much higher.

Building a levee was, at first, considered a precautionary measure. In mid March, as the town Council and community discussed how to finance a levee, some people speculated that a very large flood was unlikely. They reasoned that the Darling would need to rise another 7 feet (reaching a total height of 38 feet) before floodwater would enter the town. Since the flood in 1864, ‘there has been none high enough to do much damage in Bourke, except that of 1873, when the water found its way round to the old court house, where the police barracks now stand’. Further, Bourke’s streets had since been raised. It was thought that even if this flood gained in magnitude such changes to the town would be sufficient to prevent damage to buildings and infrastructure.

The metropolitan and local newspapers reported on 14 March that news had been received from Walgett that the river was over 40 feet there. The height of the flood in Walgett was thought to be some indication of how high the flood in Bourke might be; but, as one paddle steamer worker noted, ‘all the important feeders of this river [the Darling River] fall into it below Walgett... every one of which are bankers [full to their banks], and out of which will come four times as much water as... comes out of the Barwon and Namoi at Walgett’. Continued rain in March and new waves of floods in the tributaries caused sceptics to believe what they had previously thought unlikely: a big flood was inevitable. The town’s safety now depended on the embankment. But was it going to be built fast, high and solidly enough to keep the flood out? It was widely predicted that the town had four weeks to prepare.

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23 SMH, 14 March, 1890, p.6; SMH, 19 March, 1890, p.9; SMH, 21 March, 1890, p.8; and, Western Herald, 15 March, 1890, p.4.
24 Western Herald, 15 March, 1890, p.4; and, Western Herald, 2 April, 1890, p.2.
25 Western Herald, 15 March, 1890, p.4.
26 Western Herald, 15 March, 1890, p.4.
27 SMH, 14 March, 1890, p.6; SMH, 19 March, 1890, p.9; and, SMH, 21 March, 1890, p.8; and, Western Herald, 15 March, 1890, p.4.
29 Western Herald, 26 March, 1890, p.2.
The predictions and knowledge of 'old residents' of Bourke, who had experienced past floods, often provided newspapers with perspective on the potentials of the current flood. Comments such as, '[m]any old residents predict that should further rains occur up river high floods must ensue', were common. Expectations of a large flood in Bourke were supported by the forecasts of 'old residents' and information passed on through telegraphs, letters, and newspapers about upstream and tributary river rises and rainfall.

In anticipation of a large flood, the Bourke Council requested and was granted £750 pounds from the government towards the embankment in late March and another £1000 pounds in early April when the amount was found to be insufficient. When requests for further funds continued, the government advised the Bourke Council to spend whatever was needed to protect the town at the colonial government's expense. Total government expenditure for the embankment was to reach £3,500. These were the only amounts granted by the colonial government for embankment works anywhere in New South Wales that year. The local newspaper, the Western Herald, reported that the grants were a sign that 'the Government appears to acknowledge the importance of Bourke, and to have some idea of the extent of damage that would ensue if the town were flooded'.

The embankment was planned as a permanent structure, not only to protect the town from the immediate threat but to guard against similar floods in the future. Twelve contracts were let for separate sections of the embankment work, the workers digging up the town common for soil. Two hundred and fifty 'unemployed navvies' were brought from Sydney to build the embankment and who, after sunset, laboured under electric lights that had been ordered by the Council, from Sydney, especially for the embankment work. Proprietors and homeowners built levees around their own properties. The SMH reported that this was because people did not have 'faith in the

30 SMH, 14 March, 1890, p.6.
31 Western Herald, 26 March, 1890, p.2; Western Herald, 5 April, 1890, p.4; and, Western Herald, 21 June, 1890, p.2.
32 Western Herald, 21 June, 1890, p.2.
33 Western Herald, 5 April, 1890, p.4; and, Fosbery et al., 'Floods in the Town and District of Bourke', p.3. The Western Herald indicated total government grants toward the construction of the embankment may have reached as much as £5,500 pounds. Western Herald, 2 July, 1890, p.2.
34 SMH, 21 March, 1890, p.8; SMH, 15 April, 1890, p.7; and, Western Herald, 5 April, 1890, p.4.
35 Western Herald, 5 April, 1890, p.4.
36 SMH, 21 March, 1890, p.8.
37 SMH, 15 April, 1890, p.7; and, SMH, 19 March, 1890, p.8.
38 Western Herald, 24 May, 1890, p.2. The electric lights were paid for by the Council and cost £718.
outer embankment’. There was some speculation that local soil, ‘peculiar to this neighbourhood’ of ‘very fine vegetable silt’, used to build the embankment, would be eroded by the lapping floodwater and that the levee would not hold. The embankment’s strength could be further undermined by the speed with which it was being erected; if it were not compacted properly the loose foundations would be more prone to seepage and erosion.

From 9 to 19 April, the flood approached its highest level around Bourke. During this period urban newspapers reported extensively on the town’s crisis. Although the 1890 flood extended into western Queensland and most of New South Wales where the coastal rivers were also in flood, the fate of Bourke occupied a special place in newspapers and popular imagination. Bourke’s position as an important wool loading centre and its location near the junction of the flooding tributaries gave it colonial, and national, significance. The *Town and Country Journal* wrote on 19 April 1890 that, ‘[i]t was at once realised that Bourke, the chief and the historic town of the wild west, was in imminent danger’. Journalists from around the country descended on Bourke in April to report first hand the suspense of the unfolding drama; the behaviour of the water, animals and people.

In late March the SMH had reported that ‘the biggest flood in the history of the colony is expected at St George, Bourke and other places’, with the ‘ground so saturated... every shower runs off and helps to make up the flood-waters, and the rivers everywhere are becoming surcharged’. Pastoralists reported that foot rot was affecting their sheep, and rumours of heavy stock losses on stations reached the town by 1 April; but these reports remained ‘unconfirmed’. As the flood peaked in the north-eastern tributaries, the water was reported as ‘20 miles wide at places’. Floodwater isolated towns from surrounding country, and stations were separated from towns and each other. The flood created boundaries, allowing newspapers to focus almost exclusively on Bourke’s plight rather than those of the pastoral stations, as communication with outlying areas was limited or non-existent.

By 10 April the river at Bourke had reached a height of 38 feet and 10 inches. ‘The greatest anxiety and alarm prevail’, one journalist wrote. That week women and

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39 SMH, 10 April, 1890, p.8.
40 *Western Herald*, 29 March, 1890, p.4
41 *Australian Town and Country Journal (ATCJ)*, 19 April, 1890, p.12.
42 SMH, 25 March, 1890, p.8; and, SMH, 1 April, 1890, p.8.
43 SMH, 14 April, 1890, p.8; SMH, 16 April, 1890, p.7; and, ATCJ, 19 April, 1890, pp.12-13.
children were urged to leave Bourke. Two hundred took free rail passes issued by the government, and a further one hundred reduced rail fares, to Nyngan, many continuing on to Dubbo and Sydney, to stay with relatives. Although evacuees were initially required to declare themselves 'paupers' to receive free passes, as evacuations became urgent this requirement was removed. The Bourke Council relied on government aid for the costs of building the embankment, rail passes for residents and embankment workers, and boats. The Council, already £7,500 in debt before the flood, was unwilling (or unable) to expend money on the costly environmental event. It had turned to the government: the safety of residents and the 'honour of the town was at stake'.

Many residents who had decided to stay in the town went to North Bourke, a plot of high land with a small settlement, where an encampment had been established. With the bridge to North Bourke submerged, the only way from the town to North Bourke was by steamer, and the only way into and out of the town itself was by rail, the train line having been built on an embankment that remained above the floodwater.

Bourke's plight attracted the attention of the Governor and his wife, Lord and Lady Carrington, who visited the town by train, offering their sympathy and support and reportedly staying on the train in order to ease the pressure of organising their visit. The visit by the Governor and his wife raised Bourke's standing in the 'public mind' within both the colony and throughout Australia. The Governor had singled out the town for attention and had not visited any other flooded areas that year. As the head of the colony (and representative of the Queen) the Governor had offered Australia-wide and Imperial support and bestowed an 'official' significance on the town.

On 15 April the SMH reported that the workers building the embankment had taken part in 'something like a strike' and the Mayor called on the citizens to replace the strikers and complete their work. The 250 workers had been offered one shilling an hour or eight shillings per day. Unhappy with the pay, many refused to work. The workers from Sydney had, no doubt, been exposed to, or involved in, the groundswell of unionism and political action of the labour movement that sought better pay and conditions for trade workers. The labour movement, based on growing conflict between

44 SMH, 14 April, 1890, p.8; SMH, 16 April, 1890, p.7; and ATCJ, 19 April, 1890, pp.12-13.
45 SMH, 16 April, 1890, p.7.
46 Western Herald, 5 July, 1890, p.2.
47 SMH, 24 April, 1890, p.8.
48 SMH, 10 April, 1890, p.8.
49 SMH, 16 April, 1890, p.7; and, SMH, 17 April, 1890, p.7.
trade union members and employer organisations, gathered momentum in 1889-90 as trade unions took steps towards the creation of the Labor Party. The New South Wales Trades and Labour Council approved an election platform for candidates in April 1890 as the embankment workers went on strike. In August that year maritime workers went on strike, beginning an intense four-year period of conflict between workers' unions and employers. Indeed, in the year following the flood, Bourke became an important centre of the conflicts between the Amalgamated Shearers' Union and the employers' Pastoralists' Unions.50

Although there was a general strike by the embankment workers an unspecified number continued to work; and citizens joined them, filling the labour gap produced by the collective, union-like action. A SMH reporter wrote: 'It thus happened that to-day [sic], which was regarded as a critical time, some of the most well-to-do merchants, clerks, and bank assistants were to be found taking the place of the ordinary navvy in building up the entrenchments which were to save the township'.51 The strike had occurred at a crucial moment in the building of the embankment. The report continued:

The town, which lies between the river Darling on one side and the railway on the other is about 720 acres in extent. It is simply a flat... the water in some instances is 6in. from the top of the wall, and at the time of writing it is reported as still rising. It thus became a matter of fighting the floods. This is being done inch by inch... For every inch the water rises an inch of soil is placed on the embankments'.52

The reporter was describing the scene to those unfamiliar with the town and the effort to save the town was now a battle by the citizens against the water. Two days later the paper reported:

... the town is an island, level almost as a billiard-table, there being an entire absence of hills.... The citizens are making, as they say, one big effort to save the place. Neither time, money, nor energy is being spared... the main road is being cut and the soil utilised. The town is a mass of small barricades and entrenchments, and looks as though preparations are being made for war... as the dam continues to stand, increased confidence is felt in

51 SMH, 15 April, 1890, p.7.
52 SMH, 15 April, 1890, p.7.
it... The other floods [in the Darling] have risen in a different way, and there are so many conditions regulating the flow of water into the Darling River towards Bourke, that it is almost impossible to gauge the extent of mischief likely to be done.\textsuperscript{53}

Bourke was receiving floodwater from all of the Darling's upper tributaries simultaneously and there was also the as yet untested potential damming effect that the railway embankment might have. By mid April the embankment was 10 feet high and 30 feet wide in places. 'So long as the dams hold, the town is safe'.\textsuperscript{54}

Map 3.1
Map of Bourke showing the levee built in 1890 in anticipation of the flood peak. The levee is indicated by the solid dark line.
[From: Edmund 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, 8, 1890, Appendix D.]

\textsuperscript{53} SMH, 16 April, 1890, p.7.
\textsuperscript{54} SMH, 16 April, 1890, p.7.
Meteorology and the Rise of River Engineering

While the 1890 flood in Bourke was framed in terms of cultural identity, it was also conceptualised within scientific paradigms, especially with reference to the theories and pragmatics of government science. The local Bourke newspaper, the *Western Herald*, reported on the flood in terms of longer weather fluctuations and the predictions of government meteorologists, particularly in relation to the effects of the flood on the wool industry. Before the flood reached its record height, the *Western Herald* argued that the benefits of floodwater could outweigh any damage. Despite the losses of stock, crops, and human life, and damage to private and government buildings, it claimed that reparation work after the water subsided would create jobs. It also argued that the floods might result in a pastoral ‘good season’ that would benefit communities and businesses. It was unclear, however, whether floods in Queensland and other parts of New South Wales would lead to a string of good years, or years of drought.

The *Western Herald* turned to the predictions of Charles Egeson, an assistant meteorologist at the Sydney Observatory. Egeson’s predictions were based on a theory of 33-year weather cycles. He had arrived at 33-year increments through past rainfall data, ‘which’, the *Western Herald* editor wrote, ‘to say the least was absurd, because authentic records of the rainfall and climatic influences, could only be obtained for one period of that number of years’. Nevertheless, his theory was deemed to be so detrimental to business that he had been ‘restricted from publishing any more of his theories’. Although ridiculed by both metropolitan and regional press (including the *Western Herald*) as well as other Government Astronomers (whose duties encompassed meteorology), the *Western Herald* urged pastoralists to consider Egeson’s predictions before the peak of the flood. Some of his forecasts had not been fulfilled in the past, the editor wrote, but he had predicted the current flood. Further, according to Egeson a three-year drought would follow. The editor was not fully convinced that a drought would occur, but warned that ‘nothing will be lost by being prepared, as fully as possible’, by conserving floodwater, ‘should a drought... come’ and Egeson be proved correct.55

55 *Western Herald*, 15 March, 1890, p.4.
56 *Western Herald*, 15 March, 1890, p.4.
The *Western Herald* contributed to the ongoing national debate about rivers and how to manage their unpredictable flows. As meteorologists attempted to predict droughts and floods, the benefits of engineering, as a way of mitigating these environmental events, were discussed within government and newspapers from the 1880s. Suggestions for ‘locking the Darling’, to trap floodwater in order to sustain pastoralists during drought and to potentially support an irrigated agricultural industry, were raised and argued in newspapers during the 1880s, intensified by drought in 1879 and again in the mid 1880s.

The debates had attracted high profile figures such as the Anglican Bishop of Melbourne, James Moorhouse, who was credited with, but denied, coinage the phrase, ‘Don’t pray for rain, dam it’. Moorhouse thought that the prayer for rain in the Book of Common Prayer was a futile plea to God and that the remedy lay with colonists in building dams. He wrote and preached a new prayer that asked forgiveness for breaking ‘Thy natural laws’ by letting floodwater disappear into drought and ‘chastisement, that we may bestir ourselves to conserve and employ Thy precious gift of water, to the fertilising of our fields, the relief of our necessity, the replenishing of our land with prosperous and happy people, and the glorifying of Thy holy name’.57 Despite widespread support for trapping floodwater in New South Wales in the 1880s, the Government had deemed it too expensive. The 1890 flood renewed calls for such schemes.

Some colonists declared that meteorologists’ incomplete rainfall data was not enough. What was needed was more attention to the hydrography of a river, such as the study of the Darling River presented by F.B. Gipps in a paper to the Geographical Society in 1885.58 Others, such as a former member for the Water Conservation Commission, Frederick Franklin, thought enough study had been done and it was time ‘the conservation of water along the main rivers of this colony... be practically dealt with’.59 New South Wales Government Astronomer, chief meteorologist at the Sydney Observatory, and Egeson’s superior, Henry Chamberlain Russell, also advocated an engineering solution to drought and flood.

At the height of the Darling River flood, Russell wrote a letter to the SMH:

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58 SMH, Letter to the Editor, 18 April, 1890, p.6.
59 SMH, Letter to the Editor, 8 May, 1890, p.5.
Since the commencement of the present flood I have been collecting every available fact in reference to it with a view to publication, but I hope... the engineer will be sent into all that country, and told to store up the flood waters and make them a blessing, and not a terror, to mankind. At present... all the forces at work are tending to make the floods worse, but as soon as people wake up to the advantages of the complete system of irrigation, means will be found to turn them to our advantage...  

This was one of few places where Russell set out his views on water conservation. Russell’s words reflected the growing call in the late nineteenth century for engineers to mitigate floods and droughts through dams, which would also support irrigation. He seems to imply that in the absence of ‘scientific’ data through which meteorologists could comprehensively understand the river’s flows, it was time for action.

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Meteorologists Compromise: H.C. Russell and the Darling River

In Bourke, warnings of the 1890 flood that moved from western Queensland rivers into the Darling in February, came from newspaper reports, ‘old residents’ and local communication such as telegrams sent from town to town. The Darling River had been studied by government scientists and hydrographers since the 1870s. However, in 1890 Government Astronomers were still struggling to comprehend the behaviour of Australian rivers and climate. Government Astronomers looked for patterns or cycles in the erratic weather and river flow of the Darling, and throughout Australia. If such a cycle could be found, floods and droughts could potentially be predicted years, even decades, in advance. Deciphering a wet/dry cycle would, it was hoped, give settlers environmental and economic security against drought and flood, and aid government planning. In the face of the 1890 floods, however, colonists questioned the value of meteorology as a means to protect them from environmental events. Despite government meteorologists’ influence in shaping environmental knowledge in colonial Australia, its practitioners, especially long-range forecasters, were not fully accepted as ‘scientific’.

In March 1890 the Sydney Bulletin published a cartoon, depicting the New South Wales Government Astronomer, Henry Chamberlain Russell, and his assistant at the

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60 SMH, 16 April, 1890, p.7.
Sydney Observatory, Charles Egeson, as ‘soothsayers’, playing on the ‘weather prophet’ title popularly given to long-range forecasters at the time. The two were shown standing in the rain, in a conspiratorial pose, laughing. The caption read: ‘It was said in ancient times that two soothsayers could not meet without laughing outright. Here is depicted a meeting of the Prophet Egeson and Astronomer Russell’. The cartoon appeared in the Bulletin as floodwater moved from the Queensland and New South Wales tributaries towards Bourke, threatening the town and large portions of western pastoral land. The 1890 floods put meteorologists under the media spotlight.

Both Russell and Egeson had predicted the 1890 floods through long-range weather forecasts. Their forecasts projected which years floods would occur based on recurring weather cycles. That 1890 fell into their formulated systems of cycles, the cartoon insinuated, was a coincidence or fluke, rather than the result of scientifically defensible investigation. The laughter of meteorologists-cum-soothsayers was because of their success in fooling the public of the validity of their theories and convincing them that meteorology was a science, and thus useful to settlers. While the 1890 flood could be used as proof of their theories, the Bulletin was sceptical. The cartoon raised the question

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61 Bulletin, 29 March, 1890, p.11.
of whether the two meteorologists were really ‘weather prophets’ or merely corrupt fortune-tellers out for easy fame and money?

Russell and Egeson had forecast the floods through different theories. Egeson had predicted the floods through a theory of 33-year weather cycles based on rainfall records. Russell's prediction was made from his theory of 19-year cycles based on rainfall, river flow records, and lunar cycles. The differences in the theories no doubt contributed to settlers' reservations about the predictions they proposed. Further, colonists were suspicious of their theories as they did not appear to be supported by lengthy data sets.

While the Bulletin published the 'Weather Prophets' cartoon, the editor of the Western Herald wrote that the usefulness of Egeson's theory was compromised by the lack of rainfall records in the colony. Russell's theory suffered similar criticisms. Australian colonies lacked the crucial element in long-range weather forecasting and in ascertaining climatic averages - data, accumulated over decades and centuries, of suitable ‘scientific’ quality, which meant: consistent observations by reliable observers. Settlers may have also been suspicious of Russell's theories because of the unorthodox methods of data gathering which he used to supplement 'scientific' records.

Russell's approach needs to be understood within the broader context of the position and practices of meteorologists in this period. Practitioners of meteorology provided a means for environmental interpretation for settlers and governments in colonial Australia. By the mid 1860s all colonial governments in Australia included departments that studied meteorology - departments that usually encompassed astronomy and post and telegraph duties. Meteorology was not a discrete discipline. It was a new branch of science that drew on established fields such as astronomy. Meteorology also included some geography and hydrology, forming a meeting ground of skills, which aided the colonies' search for environmental knowledge. It also relied on new technologies such as telegraph networks, which fed information from regional areas to key hub observatories.

62 Western Herald, 15 March, 1890, p.4.
63 In 1859 Georg Balthasar von Neumayer was appointed Government Astronomer in Victoria. Neumayer, a magnetician by training, was convinced of the importance of meteorology in studying environments; and meteorology was a key duty in his government role, which he combined with hydrology and astronomy. In South Australia, Charles Todd became Government Astronomer and Superintendent of Telegraphs in 1855. His department was responsible for meteorological observations, establishing observing stations as telegraph networks were expanded in New South Wales, Victoria and Darwin. See, W.J. Gibbs, Origins of Australian Meteorology, Metarch Papers No.12 (Melbourne: Bureau of Meteorology, 1998).
Meteorology developed as a discipline anchored in modernity. Technologies that provided the ability to quickly communicate data from observation out-posts to a central observatory, for example telegraphs, invented in the 1830s, became a determinant of the practice of meteorology, allowing regional forecasts from a centralised hub. Charles Todd declared in 1893 that the telegraph, ‘is to meteorology what the telescope is to the astronomer’.64 Regional climates took on abstract forms through isobar maps and statistical evaluations of weather, based on data collected from throughout the colony, around the nation, and sometimes from other countries. Environmental historian Kirsty Douglas has observed that the use of telegraphs, ‘enabled meteorological workers to build a synoptic view of prevailing weather on a regional scale, assisted prognostication and hinted at possibilities for long-range weather forecasting’.65

The potential of meteorology to aid government and settlers by deciphering weather and river hydrology was indeed high. It also answered a call of modernity to know and categorise, and in so doing control, the non-human environment. Douglas has linked meteorology to the project of modernity in useful terms: ‘Modernity as it developed in western Europe gave rise to new notions of human agency. Weather, with its embodied consequences, undermines this autonomy, or demonstrates its fragility. Meteorology, whose practitioners seek to understand, codify, and manipulate weather and climate, is thus in contrast quintessentially modern’.66

Russell’s methods, in many ways, epitomised meteorology’s position as modern. Appointed Government Astronomer for New South Wales on 12 July 1870, he increased the number of observing stations reporting to Sydney.67 In addition, he organised 210 ‘unofficial’ observers (for example, farmers) to report daily rainfall totals to Sydney. By 1898 there were 1600 observers reporting results.68 To standardise results, Russell issued equipment to observers, mostly designed by himself.69 To further ensure comparable data, Russell published an instruction manual for observers, which he updated twice between 1870 and 1885. He also published the first newspaper weather map, which

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69 Walsh, ‘Russell’, ADB Online.
appeared in the SMH in 1877. Through his technical developments and observation guidelines, Russell established standards of investigative methods that aimed at scientific rigour through guidelines for data collection and interpretation. Further, he developed theories of long-range weather forecasting and speculated on the extent of subterranean aquifers. In these ways he tested the potentials of his and others’ meteorological methodologies.

In a paper to the Royal Society of New South Wales in 1879, Russell attempted to explain the dynamics of floodwater in the Darling River as follows: heavy rain could fall in a catchment but a flood could be slight, whereas similar rainfall could occur and cause substantial flooding. Further, rainfall in the headwaters of the Darling watershed did not correlate to the amount of water that flowed past Bourke. Russell calculated that the percentage of rainfall that passed down the Darling was 1.5 percent as compared to the Murray’s 25 percent, although they had similar weather conditions. He theorised that there were extensive artesian aquifers that received Darling river water, reducing the river’s flow as it soaked through the ground.70 His theory was accurate, although little was known at the time about artesian supplies. Further, today’s hydrographers calculate that the aquifers below the Darling watershed need to be saturated and at capacity before a large flood, such as the one in 1890, can occur.

Weather cycles were Russell’s passion. In 1876 he presented a paper to the Royal Society of New South Wales with the following opening quote from (astronomer) Sir Joseph Norman Lockyer’s 1874 text, Contributions to Solar Physics: ‘Surely in meteorology, as in astronomy, the thing to hunt down is a cycle... If there be no cycle, then despair for a time if you will, but yet plant firmly your science on a physical basis and wait for results’. In the same book, Lockyer argued for, ‘the pursuit of meteorology as a physical science, and not as a collection of weather statistics’.72 Cycle hunting, Lockyer suggested, was one way for meteorologists to definitively position themselves as scientists and interpret weather and river hydrology in a meaningful and useful way.

Russell first proposed a theory of 19-year weather cycles in 1870, based on data collected to that time within Australia, and from around the world. It was a theory he

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was to re-visit for the rest of his career. Through this work he made early connections between the weather in India, South America, and Australia, which would later echo in meteorologists’ conceptions of El Niño/Southern Oscillation.

In 1890 suitable ‘scientific data’ for colonial capitals in Australia did not stem back even a century. In most parts of inland Australia meteorological observations had been collected for less than half a century. Russell established the first meteorological observing station on the Darling River, in western New South Wales, in 1871. While ‘scientific’ records accumulated through increased observing stations the lack of data continued to plague meteorologists.

In 1886 Russell had read a paper to the Royal Society of New South Wales, ‘Notes Upon the History of Floods in the River Darling’. The purpose of Russell’s paper was twofold: to set out data in support of his 19-year weather cycle as a way of predicting wet and dry periods, to aid pastoralists and townspeople to prepare for droughts and floods; and to establish the average number of months the river was navigable each year. In his paper, Russell drew attention to the lack of scientific data available to formulate an adequate record of flooding since settlement in the area in the 1840s. He had experienced, ‘insuperable difficulty, in getting such an account of them as to the height and continuance as we require... No record of the state of the river at Bourke seems to have been kept prior to 1871’.

In the absence of meteorological observations before 1870, Russell turned to the observations of pastoralists and paddle steamer skippers, as well as explorers and surveyors – their observations and recollections became his data. These were, in a scientific sense, informal observations, and Russell acknowledged the problem of bringing this data into a scientific paper and the additional problem of some of the accounts being retrospective, stretching back over 20 years. However, for him they were the most reliable available. Anxious not to mislead his audience about the representation of unscientific data in the chart of river heights that he presented, he wrote: ‘I must explain that prior to 1870 it does not rest upon actual measures of river

73 Russell, ‘Meteorological Periodicity’, p.158.
heights, excepting in a few places’. The Engineer-in-Chief for Harbours and Rivers had established a river gauge at Bourke in 1870 to measure the river’s height and ascertain the number of months in a year it was navigable. Russell had established a rain gauge at Bourke in 1871.

The river gauge and rainfall records at Bourke from 1870-71 onwards helped Russell in his quest to understand the Darling River, but his science required lengthy records of river heights that he did not have. Russell sought out not only the observations of explorers and surveyors, but also pastoralists and paddle steamer skippers, who had keen eyes for changing weather and associated changes in river flow.

Early explorers’ diaries, such as those of Charles Sturt and Thomas Mitchell, provided some information on river heights, noted as they passed through an area, but they did not provide continuous data. Russell added the river observations of pastoralists and skippers from about 1850. Such observations were more reliable on the intensive scale that was important to weather warnings. Russell did not include Aboriginal accounts.

Pastoralists and skippers recorded in diaries and logbooks, and recalled directly to Russell in interviews and letters, the condition of the land and river and when there had been droughts and floods. All of the accounts by colonists were linked to experiences of the river, with observations such as, ‘in 1846, again, the river got very low, and could easily be crossed on horseback in many places’. The accounts were peppered with local landmarks that were used to indicate changes in river height and everyday experiences, such as riding horses. They were very different from the rigid calculations and data collections that Russell imposed across the colony on his appointment as Government Astronomer.

It is common in Russell’s collection of observations for colonists to refer to the passage of paddle steamers, or their stranding, as a sign of the Darling River’s height. For example, one colonist observed that the, ‘first steamers up the Darling were the “Albury” and “Gemini”, in January, 1859, the latter going as far as Walgett’. These observations held meaning for the height of the river. Paddle steamers could not pass without a certain amount of water in the river. Russell could roughly calculate the height of the river through these observations.

77 Russell, ‘Notes Upon the History of Floods in the River Darling’, p.156.
Paddle steamers were also carriers of news, including warnings of floods. Manoeuvring the boat themselves to catch the floodwater down the rivers, the crew passed on information of approaching floods, as they often just preceded it. For example, in the river observations made at Cultowa Station in May 1870, the note taker remarked: 'Steamer “Jupiter,” from Bourke, reports river rising fast, the town of Bourke is in danger of flood'. Russell compiled such notes and recollections into tables and graphs, charting the fluctuations of the river. The value of this local knowledge to Russell is clear throughout his paper, indeed it forms the main body of it.

Russell also presented a table of the months of the year showing when the river had been navigable between 1877 and 1886. Some colonists thought the work he was doing was important enough to volunteer information for his study. One wrote, 'As one of the early pioneers of the Darling, I would like to add my mite to the data you are accumulating, and from which I trust you may in time be able to furnish valuable hints to the dwellers in these dry regions'.

The purpose of Russell's paper was to help colonists predict floods and so avoid damage to property and stock losses. From his data, Russell argued that every 19 years the 'general character of the weather returns' and 'if their [squatters' and pastoralists'] intelligent use of the cycle had been at all general... many ruinous losses would have been avoided'. His efforts to compensate for official meteorological records by using settlers' and explorers' observations, however, did not further the acceptability of his theory. As a result, four years later he could be publicly satirised as a 'soothsayer' by the Bulletin. His data did not meet cultural and public expectations of what constituted 'science' and his theory had not significantly aided settlers in preparing for, and combating, the 1890 flood.

Colonists also questioned Russell's knowledge of the current hydrography of the Darling River. Changes wrought by European settlement brought a new dimension to the river's natural variability. Some of settlers were aware of this. In the 'Discussion' of Russell's paper on flooding in the Darling River, John Frederick Mann, an explorer and surveyor, raised this issue:

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81 Russell, 'Notes Upon the History of Floods in the River Darling', p.177.
82 Russell, 'Notes Upon the History of Floods in the River Darling', p.156.
83 E. Morely in Claremont, quoted in, Russell, 'Notes Upon the History of Floods in the River Darling', p.171.
... the theory of nineteen years, as stated by Mr. Russell, would be greatly modified by the number of cattle in the flood district. The beds of the rivers have been filled up and made sand beds by cattle tracks. Cattle on their way to water invariably make tracks; after heavy rains these tracks become water-courses, and eventually a gully is formed. Immense gorges have thus been cut, and if this is carried on to any great extent it must affect the flooding... 

Russell had not accounted for human and non-human changes to the floodplains and rivers that could alter the course of floods. In 1890 such changes to the floodplains, such as the damming effect of the railway embankment, were to impact on the flood in Bourke.

Russell’s attempts to understand flooding in the river reveal some of the difficulties Australian meteorologists faced in the last two decades of the nineteenth century. They attempted to decipher patterns in the continent’s variable weather through scientific methodologies. It was an essentially modern field, engaged in the scientific quest for knowledge of the non-human world. Yet meteorologists faced the problem of few lengthy data sets through which to interpret weather patterns and codify environmental knowledge in modern scientific terms. As meteorology’s practitioners strove to establish their field as a scientific discipline, the recency of western scientific practice in Australia hindered their attempts. So too did the many variables influencing the course of floods. The impacts of stock and farming practices were radically altering the hydrology of the inland rivers. In 1890 settlers openly questioned the usefulness of the government science to protect them from floods.

Environmental historian Tim Bonyhady has argued that in the last decades of the nineteenth century and early twentieth century, ‘[m]ost settlers judged the seasons by economics as much as meteorology’. The material effects of floods and droughts were a way of judging their severity. In 1890 many pastoralists along the Darling and its tributaries suffered severe stock losses. The flood occurred when sheep numbers in western New South Wales had reached unprecedented heights and pastoralism was booming. And yet we have only sketchy reports of ‘stock losses’ that reveal little of the effect of the flood on pastoralism in the district. Bourke’s economy and growth as an

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important trade centre was, however, determined by the resilience of the industry it serviced.

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Yarawa Station: ‘Your Sheep Are All Drowning’. 87

There were few newspaper reports about experiences of the flood outside the town and, although those that know the country can show you today the height of the flood, there are few surviving written records from 1890. The diary entries from a sheep station called Yarawa, located on the New South Wales side of the Barwon River and approximately 300 kilometres from Bourke, are an important historical rarity, offering insight into rural experience and the impact of the flood on the wool industry. The Barwon flows into the Darling from Queensland. The river peaked on the station on 1 April 1890, over two weeks earlier than the flood at Bourke. Yarawa lost a third of its 60,000 sheep in the flood, either by drowning directly or later suffering starvation and exposure. 88

The diary was kept by the owner of the station, Adrian Wentworth Bucknell, one of four sons of a grazier and a first generation Australian. Yarawa was the only station Bucknell owned in his lifetime. 89 Yarawa was about 70,000 acres in area, divided into twelve paddocks. With an estimated 60,000 sheep it was heavily stocked at a rate of one sheep to 1.7 acres. Although the property had three ridges of high land (one, Gidde Ridge, 20 feet high), it was flooded by three main watercourses: the Barwon River, which adjoined the property, as well as the Boomi River and Gilgill Creek which ran through it. The homestead was located close to the Boomi River which rose rapidly and on 6 March Bucknell ‘glave up hope of keeping water out of the house’ and of finishing the dam

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88 Bucknell, diary entry, Friday 4 April, 1890, ‘Diary of Part of Year 1890’, p.12.
89 Adrian’s father, William Charles Bucknell, had arrived in Australia with his wife as free settlers in 1820. They had brought with them a flock of sheep. However the sheep had been thrown overboard during a storm to lighten the ship’s load. William Bucknell leased Elms Hall, a 1000-acre station on the Paterson River. Three of his sons went on to become pastoralists in the Barwon River area, including Adrian. One of his other sons, Adrian’s brother Theo, features in Adrian’s diary entries as they helped each other move stock and warned of river rises. A History of Mungindi (Mungindi: Mungindi and District Historical Society Book Committee, 1988), pp.39-40 and p.114; and, Bucknell, diary entry, Tuesday 18 March, 1890, ‘Diary of Part of Year 1890’, pp.14.
around it, as water reached the stairs to the front door. The water eventually reached three feet and six inches inside the house. He turned his attention to the sheep and horses, swimming them onto high land. A few days later he wrote this entry: 'At dark on Saturday night, heard a call at the Sandridge, I replied 'who's there' and the answer came loud and clear over the water, 'Frank Carmody with a letter, your sheep are all drowning'.'

Over the next 10 days, as the flood peaked, sheep were selectively saved from his own and a neighbour's (Carmody's) selection, with the help of station hands. Some sheep were 'too far gone to trouble over'. They tried to save stud rams and ewes that were still on dry land either by swimming them to higher ground or loading them into a flat-bottomed punt they had made. In one voyage they took 26 sheep but 'left the rest, about 40, to drown'. The water rose quickly and on the day of the peak Bucknell estimated it rose '10 inches in less than three hours'. The land lost its familiarity as landmarks and vegetation went under water: 'I found it difficult to know the country, it all looked so different'.

The need to move sheep to safety became ever more pressing. The sheep did not always cooperate. After receiving the news that his sheep were 'all drowning', a messenger brought another letter from a station hand working with a flock, saying that some sheep they had moved to higher land had 'left the ridge... and they were then between a walk and a swim, and he could not get them back onto dry land'.

Leaving his own property to help his neighbour, Carmody, he describes ruthlessness born of the urgency of the situation. They were moving a flock of 1,900 sheep with 14 men, and decided to swim the sheep across a body of floodwater in small groups. Swimming sheep in groups of 100 to 300 sheep in single file, five workers shepherded them across. They were,

...constantly working from head back to tail giving each sheep a poke with a long stick as he went by, and any sheep that showed decidedly that it would go no further was ruthlessly pulled to one side to make room for those that would move... at 10 a.m. five

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90 Bucknell, diary entry, Thursday 6 March, 1890, 'Diary of Part of Year 1890', General File: HF 2519. Yarawa. p.3.
91 Bucknell, diary entry, Saturday 22 March, 1890, 'Diary of Part of Year 1890', p.4.
92 Bucknell, diary entry, Wednesday 26 March, 1890, 'Diary of Part of Year 1890', p.6.
93 Bucknell, diary entry, Tuesday 1 April, 1890, 'Diary of Part of Year 1890', p.9.
94 Bucknell, diary entry, Tuesday 1 April, 1890, 'Diary of Part of Year 1890', p.7.
95 Bucknell, diary entry, Saturday 22 March, 1890, 'Diary of Part of Year 1890', pp.4-5.
men would be seen about 1½ miles from the dry ground with 200 sheep [sic] three hours later the same five hands would be seen 100 yards nearer the longed for haven with 170 sheep, the remaining 30 showing the dismal track, some dead and dying, and so this hopeless task kept on... we could see that what we were doing was profitless.96

Whether he was writing about the death of the sheep or the economic failure of the station is unclear. The flood had exceeded any in their experience. Stock losses in the area were so great that in order to salvage some of the economic losses, settlers plucked wool from dead sheep, which became so common, ‘men would hire themselves as professional ‘pluckers’”.97

In his final entry in his flood diary on 4 April, Bucknell wrote that urban newspapers, ‘did not mention the Mungindi District [in which his station was located] where... of my knowledge, 400,000 sheep were drowned within 100,000 miles... Bourke town suffered, but the water was a month going from Goondiwindi to Bourke, and people had time to dam the water out of the towns’.98 As settlers along the Darling tributaries experienced unprecedented flooding, and pastoralists attempted to mitigate the effects through moving stock, the floodwater rose around the fortified site of Bourke.

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‘The Bursting of the Embankment’99

On 18 April the levees around Bourke gave way. The correspondent from the SMH described it:

The gallant efforts made by the citizens of Bourke to keep the water out of the town have proved in vain... The break which has now inundated the town took place at a quarter-past 4 o’clock... The break occurred quite unexpectedly. In its neighbourhood 70 men had been working. They had just laid down their shovels, everything appearing all right, and were enjoying a smoke on the bank... Suddenly a portion of the wall gave way... The men rushed to the spot, calling all available hands to it, and in five or six minutes there were 75 labourers there [including citizens and hired workers]... The men made desperate

96  Bucknell, diary entry, Sunday 23 March, 1890, ‘Diary of Part of Year 1890’, p.5.
97  Bucknell, diary entry, Thursday 27 March, 1890, ‘Diary of Part of Year 1890’, p.6.
98  Bucknell, diary entry, Friday 4 April, 1890, ‘Diary of Part of Year 1890’, p.13.
99  SMH, 19 April, 1890, p.9; and, ATCI, 26 April, 1890, p.32.
attempts to stop the breach. They rushed into it in a body with water up to their waists, and even had their backs up against it to prevent it coming in. The force of the water, however, was too strong for them, and threatened to upset them. 100

Tarpaulin, then sandbags, and finally steel drums packed with sand were used in turn to try to heal the breach while 4 foot high water that had been held up, rushed through. The 15-yard breach could not be closed and slowly grew. Two thousand spectators gathered and cheered those trying to stop the water from flowing through, saying '[d]on’t let it go without a struggle'. 101 Steadily the town was flooded. As levees encircling individual buildings gave way, brick structures began to crumble as their mortar became saturated. The thousands of pounds of stores they contained were lost. 102

Both the *Australian Town and Country Journal* and the SMH dramatised this moment as the ‘Bursting of the Embankment’. 103 The *Australian Town and Country Journal* published a picture depicting the imagined scene as water rushed through the breach, with men, shovels in hand, running in a desperate attempt to stem the flow and redeem their efforts to build a strong embankment. 104

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100 SMH, 19 April, 1890, p.9.
101 SMH, 19 April, 1890, p.9.
102 SMH, 19 April, 1890, p.9.
103 SMH, 19 April, 1890, p.9; and, ATCI, 26 April, 1890, p.32.
104 ATCI, 26 April, 1890, p.32.
The ‘Bursting of the Embankment’ was choreographed to capture the urban imagination. It was the flood’s equivalent to ‘Fighting the Fire’ or the ‘Breaking of the Drought’. It became a threshold moment, a turning point that changed fortunes. Although the flood peaked the same day the embankment gave way, the loss of the wall was the symbolic moment. Such moments signified rural Australian environments and settler relationships to them, reflecting economic change in fortunes and local experience. The lived experiences of Australia’s fickle environments were perceived as punctuated with dramatic and historic moments such as the first showers that signalled the end of a drought, the change in wind direction that swept fire through scrub and homes, and the bursting of the flood embankment that inundated the town. These moments have become iconic of life in the inland. They govern economic windfalls and losses, and create waves of boom and bust. Rural experiences, in turn, became part of larger national iconography.

Fighting fires, droughts breaking, and flood embankments bursting are experienced in many countries and cultures, but have become markers of an Australian experience, for both rural and urban Australians. The ‘Bursting of the Embankment’ became the ending of the story about the flood in Bourke as told by urban newspapers during 1890; it was a story of Australian significance with a moral for the country:

The story of all this... may fairly rank as unique in the history of the colony. The one thing that stands out clearly is the pluck and determination exhibited by the men of Bourke in what their junior member not unjustly has termed their darkest hour. This is a fitting climax to the long fight they have made against adverse odds so long. They have all shown real Australian grit all through this trying time, and if they have not achieved success, they have perhaps done better, in a certain sense by deserving it.

The rhetoric of stoicism was invoked, tying the moment to the nation.

The town’s embankment had been the frontline of the ‘never-to-be-forgotten-fight’ of ‘man versus water’. The wall was the human-built defence of the town, a structure for controlling the floodwater as well as an exertion of power and coercion over the river. Within this language of war, the water was the victor, and the breach revealed

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106 SMH, 19 April, 1890, p.9.

107 Central Australian and Bourke Telegraph, 25 April, 1890, p.1.
vulnerability in the defences of the settlement. Settlers were determined that such vulnerability would be overcome, and soon looked to re-establish Bourke through the building of a stronger, more permanent embankment.

On 25 April the Central Australian and Bourke Telegraph stated: ‘Bourke will be a great inland city, the Chicago of the West, its financial position not only restored, but on a solid basis, a high wall forming a carriage drive round the town and ensuring the protection of life and property’. The Legislative Assembly member for Bourke, William Nicholas Willis, spoke in a similar vein in a speech to residents encamped at North Bourke, as he and other representatives were about to depart for Sydney, and parliament: ‘When the water broke over us... I thought Bourke was lost, but out of the ashes... will rise the Chicago of the colony’. His words resonate with some of the stories of survival and resilience that those in the town told one another. It was their futures, as well as the place of the town within the economic and cultural milieu of the colony, and nation, that was at stake. Bourke’s significance, however, would aid the townspeople’s attempts to secure their own futures. Willis promised he would ‘insist upon the Government building a wall around the town that would keep out the greatest flood ever known by man, either white or black. Their case was in good hands, as Australia would help them’.

Willis’ words also reveal the particular kind of security settlers sought at that time, namely built works and engineered structures. Meteorologists’ limited data sets did not stretch back far enough to provide sufficiently comprehensive records of the potentials of the river and how to protect the town. For those in the town, the bursting of the embankment became the reason for seeking permanent protection from floods through a stronger, ever-present, and ever-ready embankment as it was only through such on-the-ground defences that Bourke could be ensured against floods and its future secured. Calls for a permanent embankment to be funded by the government became an undercurrent in media reportage during the immediate aftermath of the flood, which described the effects of the flood on the town.

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108 Central Australian and Bourke Telegraph, 25 April, 1890, p.1.
109 SMH, 26 April, 1890, p.12.
110 Western Herald, 15 March, 1890, p.4.
The Immediate Aftermath

The flood in Bourke was reported in terms of stoicism in the face of environmental adversity. 'Battling the elements' became a catchcry for national identity, perhaps partly through this event. What is told through the articles is a story of the townspeople's fight against the river, which in the end was lost, but not because they failed to 'battle' the hostile elements. In the aftermath, stories of survival were also important, as the community faced the challenge of rebuilding its town. Other stories relate the ongoing struggle with the floodwater. The railway station and North Bourke were the only dry places in the town and reporters described both places in detail, as people and animals, including bullocks, horses, goats, and 'a solitary camel' crowded on the rail platform to live, sleep and receive rations. Food was running short and meals for the people were reduced to bread and meat. One hundred and thirty people left Bourke after the embankment burst, escaping the effects of the floodwater as private levees continued to give way and buildings periodically collapsed. In the days following the flooding of the town, the question became '[w]hose building will go next'.

North Bourke, or 'Canvas Town' as it was dubbed, housed a large group, comprised of 600 children, 200 women and 150 men. Alcohol was flowing and the Mayor's visit to boost morale was met with loud cheers. The water presented an obstacle to the reporters too, one writing the day after the embankment broke, '[t]he pursuit of art had to be made under difficulties, and I admire the perseverance of several photographic artists who with their apparatus were 4ft. deep in water'. Journalists travelled by train with evacuees, and one travelled part of the way by boat with a Legislative Assembly member, who was on his way to Sydney to request aid at the sitting of parliament.

No longer needed, the embankment workers from Sydney and elsewhere were urged to leave. With 'fully 400 strange men in the town' because of the embankment

111 SMH, 19 April, 1890, p.10.
112 SMH, 19 April, 1890, p.10.
113 SMH, 24 April, 1890, p.8.
114 SMH, 26 April, 1890, p.12.
115 SMH, 26 April, 1890, p.12.
116 Fosbery, et al., 'Floods in the Town and District of Bourke', p.3; SMH, 23 April, 1890, p.8; and, SMH, 26 April, 1890, p.12.
117 SMH, 21 April, 1890, p.8.
work, '[a]n effort is being made to get rid of the navvies'. They were paid and driven out of the town, 'but they take it good humouredly', although forced to walk along the rail lines to leave.

Boats, sent by the government, did rounds through the town. The boats were an important means of connecting people in the flooded town, being described as 'like angels', visiting 'the few and far between'. Privately owned boats were rented for as much as £3 a day. The government boats were used to take the doctor, who was 'giving his professional services for free', from house to house and were also used to rescue those stranded in flooded dwellings. One report detailed the personal dramas of rescues: 'In one case the inhabitants of a cottage had taken to the roof, in another an old couple were found in a wooden house the floor of which had 3 ft. of water upon it. They were clinging together in the dark.'

Illustrations from the Illustrated Australian News, 1890, shortly after the flood embankment burst and Bourke was inundated.

Figure 3.3 (left): 'The Inundation at Bourke. (From photographs specially taken for the "Illustrated Australian News.")' picture. 1 May, 1890. Accession Number: IAN01/05/90/1. Image Number: mp006012. State Library of Victoria.

Figure 3.4 (right): 'Sketches at Bourke During the Inundation. From photographs specially taken for the "Illustrated Australian News" picture. 1 May, 1890. Accession Number: IAN01/05/90/4. Image Number: mp006013. State Library of Victoria.

118 SMH, 19 April, 1890, p.8; and, SMH, 21 April, 1890, p.8.
119 SMH, 21 April, 1890, p.8.
120 Central Australian and Bourke Telegraph, 25 April, 1890, p.1.
121 Central Australian and Bourke Telegraph, 25 April, 1890, p.1.
122 SMH, 21 April, 1890, p.8.
This was reportage for an urban audience which gave stories and detail, plotting individual events within the larger story of the flood. The detail of the descriptions, along with illustrations, created scenes for readers far away, who had perhaps never been to Bourke. Although the articles were event-oriented in their purpose of reporting the floods, they are also in many ways part of a longer tradition of reporters from urban-based newspapers recreating life in the inland for their readers.

Henry Lawson, himself part of this tradition, wrote a short monograph, 'The Great Flood of '90', when he was in Bourke in 1893. In this work he drew attention to the extensive press coverage of the flood in Bourke, and the journalists’ dramatisation of the town’s crisis:

The press reporter has caused numbers of his unfortunate fellow men to be gaoled, flogged, and hanged in Australia and yet he isn’t satisfied. He wants to drown the entire country. He wants to wash Australians off the face of the earth. As a boomer of murders, rapes, and fires he rises supreme; but when he is turned loose on a flood, he beats the United States of America... Bourke had a flood in 1890, and the newspaper reports were enough to frighten Noah’s ghost.¹²³

For Lawson the press reports of the flood were extensive enough to warrant comment. The influence on the newspapers’ urban readership, he wrote, was that ‘we were reasonably impressed’ by the experiences and hardships of Bourke’s townspeople.¹²⁴ According to Lawson, however, those in the city had been duped. Having seen remains of the embankment and spoken to locals, he felt that the reports had exaggerated the impact of the flood. Rather than being drowned by water, Bourke’s major threat was a drought of alcohol: ‘the chief danger’, he wrote, ‘was the liquor would give out – the water having gotten into some of the pub cellars’.¹²⁵ His cynicism is in keeping with his well-known position of depicting a harsh, brutal rural Australia that created rough and roguish men (as opposed to ‘Banjo’ Paterson’s romantic portrayals).

Journalists, Lawson argued, had exaggerated the flood’s height and impact to incite the empathy of unwary city folk. He claimed that the town had barely been flooded at all and ‘[o]nly one small brick house collapsed’:

We believed that some chaps did start to drag a boat through Mitchell Street, in order that they might say they had rowed though the principal street of the town during the flood — which they say, and which they still tell jackeroos. But the boat bogged all the way; so they gave the job best and sent the craft back on cart.\textsuperscript{126}

Photographs of the flood tell a different story, but Lawson’s point, that newspapers geared their reports to an urban audience, is noteworthy. It was the drama and symbolism of the town, not the detail of the story, that sold newspapers.

The descriptions in the press were mainly of flooded rural scenery, written by people unfamiliar with the town, for people who had never been there. Reportage of the 11 who died at Bourke and were buried in a plot of crown land because the cemetery was flooded, was brief. However, the emotional pull of the 'struggle of Bourke' is revealed by the fact that so much money was raised through donations from across the eastern states that government relief was not needed for the townspeople.\textsuperscript{127}

This is despite the fact that an inquiry into the flood, conducted while the town was still flooded, confirmed citizens’ claims that the government-built railway embankment had aggravated the flood. The ground swell of national feeling that the flood in Bourke produced became starkly apparent in the attention it received from around Australia and the amount of aid the town received in the form of donations, perhaps in no small part due to the reportage of the aftermath.

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{image.png}
\caption{Photograph of Bourke during the 1890 flood. [Arthur Laycock, 1881-1960. 'Looking down Richmond Street, Bourke, during 1890 flood' [picture]. 1890. nla.pic-an24668307. National Library of Australia.]
\end{figure}

\textsuperscript{126} Lawson, 'The Great Flood of '90', quoted in, Burrows and Barton, Henry Lawson, p.41.
\textsuperscript{127} Fosbery, et al., 'Floods in the Town of and District of Bourke', p.3.
Relief Funds and Government Grants

In this era before private flood insurance, colonists relied on charitable donations to recuperate from individual losses or else they repaired damage at their own expense. Although district councils sometimes sought financial assistance from the colonial government to aid individuals, councils more often looked to the colonial government for grants towards repairing infrastructure such as roads and railways. Charitable donations to aid those who experienced property losses and damage in 1890 were coordinated by relief funds, often organised by town mayors. Regions and towns across the colony had experienced floods in the first months of 1890. The way that relief and aid was organised and distributed is important, as it reveals the degree to which Bourke’s crisis was elevated above the needs of other districts. Bourke not only received more aid from the government than other areas, but charitable organisations were clearly biased towards the town, perhaps due to the extensive media coverage of the flood in Bourke and the town’s cultural status throughout the colony and the nation.

Journalists estimated the damage in the town, immediately following its inundation, to be £40,000. The government estimated the damage to real property in the town at £300,000, exclusive of damage to government buildings (which they valued at £48,000) and merchandise and other goods. The government report was not made public until May 1890; however, journalists’ more conservative estimates of the damage in Bourke were sufficient to attract widespread support. But the unpublicised plight was similar in other districts.

In New South Wales, in 1890, charitable relief funds were secular, non-denominational organisations which collected subscriptions from those in the shire (rather than parish). They donated money to nominated flood-affected areas, often through organisations that were formed in a council meeting precisely for the purpose of relieving financial stress in a particular town or region.

In 1890 locally formed relief funds were given the option to be further coordinated by a central relief fund based in Sydney, chaired by the Sydney Lord Mayor. If shires wished, rather than selecting an area to donate to, they could donate to the

128 SMH, 14 March 1890, p.6.
129 SMH, 30 April, 1890, p.5.
general relief fund in Sydney (called the ‘central relief fund’), which would distribute money to a variety of flooded areas.\textsuperscript{132} However, most local relief funds chose to operate independently. Flooded areas also established relief funds, chaired by their mayors, to distribute donations that the town and surrounding area received from individuals and charitable funds.\textsuperscript{133}

In 1890 shires overwhelmingly elected to donate to Bourke rather than to other flooded areas such as the Hawkesbury River district or towns like Walgett, Brewarrina, Mungindi, and Yetman. The town of Bourke received donations from Orange and Bathurst, and from Adelaide and Melbourne with amounts ranging from £70 to Melbourne’s £1,135 17 shillings 6 pence. The Argus established its own relief fund for Bourke, raising £2,814 for the town and £77 for the Darling River generally.\textsuperscript{134} In a letter to the SMH it was suggested that unused money raised for relief during a past flood in the Hawkesbury River area be donated to Bourke.\textsuperscript{135} The Hawkesbury fund was re-mobilised but the new secretary argued that the money was needed for ‘the Hawkesbury and other districts’.\textsuperscript{136} Sydney’s general relief fund was more even-handed, distributing the total raised, £2,000, equally between the Hawkesbury and Darling River flood areas.\textsuperscript{137}

There was obvious public bias towards Bourke’s predicament. The publicity Bourke received had the effect of reducing donations to relieve pastoralists. The lack of coverage of pastoral losses, because they were isolated by water, perhaps contributed to inaccurate measures of losses, and meant they were not high profile cases. Perhaps pastoralists were even further removed from public attention than other townships, as many stations remained isolated for months after the flood, and their losses were still not fully known at the time relief funds were donating the money they had raised. Government commissioners, appointed to inquire into the flood in the Bourke municipality, although unsure of the amount of damage to pastoralists (not having visited them), thought they, ‘would appear to be inconsiderable, as ample time was afforded for removal [of stock]’.\textsuperscript{138}

\textsuperscript{132} SMH, 10 April, 1890, p.8.
\textsuperscript{133} SMH, 25 April, 1890, p.6.
\textsuperscript{134} SMH, 21 April, 1890, p.8; SMH, 23 April, 1890, p.8; SMH, 24 April, 1890, p.8; SMH, 25 April, 1890, p.6; and, SMH, 29 April, 1890, p.7
\textsuperscript{135} SMH, 19 April, 1890, p.10.
\textsuperscript{136} SMH, 21 April, 1890, p.8.
\textsuperscript{137} SMH, 25 April, 1890, p.5.
\textsuperscript{138} Fosbery, et al., ‘Floods in the Town and District of Bourke’, pp.2-3.
The minutes of council meetings of shire relief funds were published in newspapers, detailing the balance of the funds and the sentiments behind them. There was a swell of national feeling for the rural New South Wales town. At a meeting of the Sydney fund, the Mayor’s speech was reported, which further intensified national sentiment for Bourke:

...the telegrams he [the Mayor] had received from all parts of Australia, alike demonstrated the fact that the citizens desired an opportunity of testifying their sympathy with the sufferers of the late disastrous floods. (Cheers.) All of them had watched the noble conduct shown by the men of Bourke, who had done all that men could do to save their town... the people of Sydney now, as in times past, were ready to nobly do their duty, and show practical appreciation for the heroic conduct of the men of Bourke. The conduct of these men argued well for the future of Australia, proving that Australians were not unworthy descendants of the grand old stock from which they had sprung.139

The national imagery the Mayor conjured made Bourke ‘men’ the connotative and ideal Australians, and Bourke a symbol of the nation. An anonymous Queensland donor sent £50 to Bourke, wishing only ‘to be known as “An Australian”’.140 The stories and discussions that revolved around the 1890 flood were infused with conceptions of nation, foreshadowing and shaping the formal declaration of Australian nationhood in 1901. Aspects of the flood, such as the attention Bourke received as a township that characterised qualities of all Australians and the flood’s spotlighted position in water conservation debates, were part of a larger political, social, and economic context: that of national consolidation as the momentum for federation grew. The inland became a focus for national consolidation and the 1890 flood interwove with this context.

There was some criticism of the attention and aid that Bourke received. A letter to the editor in the SMH urged that although the flood in Bourke was a 'national calamity', 'it will not be out of place to call public attention to the fact that there are many persons who have suffered floods in other districts of the colony besides this one on the Darling... they have equal claim on our sympathy and practical aid'.141 The writer listed the regions of Maitland, Narrabri, Walgett, and the Clarence River, but many others could be added to this list.

139 SMH, 25 April, 1890, p.5
140 SMH, 16 April, 1890, p.7.
141 SMH, 24 April, 1890, p.8.
Shire councils sought government grants for repairs to road and bridge infrastructure and, to a lesser extent, to compensate individuals. Repair work, such as road mending, could provide work for farmers and labourers who would be unemployed for some months while their fields were flooded. For example, Coraki on the Richmond River applied for £1,000 with such a plan: To support farmers with damaged maize crops and stock losses by providing an alternative source of income, in the form of flood reparation work for the shire. Bourke received a comparatively large amount of aid, with government grants associated with the flood totalling £7,080; £3,550 for the embankment work, and the remainder for rail passes, government boats and food rations.

* * *

The Government and ‘Emergencies’: Possibilities for Centralised Control

The financial involvement of the colonial government in the 1890 flood in Bourke in part led to a government inquiry into the effect of the flood on the town. Three high-level government officials travelled to the town soon after the flood peak to investigate how government funds had been spent, as well as to assess damage to government buildings, the prospect of future floods, and the situation of the townspeople. Edmund Fosbery (Inspector-General of Police), Whittingdale Johnston (former Commissioner in Charge of the Western Gold District), and Stephen Perdriau (surveyor) arrived on 22 April — after the embankment had been breached and water still pervaded many streets and buildings. They met with the Mayor, ‘and other prominent citizens’, on their first day

142 Individuals, for example, at Kempsey: see, SMH, 2 April, 1890, p.8.
143 SMH, 18 March, 1890, p.8.
144 SMH, 24 April, 1890, p.8; and, Fosbery, et al., ‘Floods in the Town and District of Bourke’, p.3. The Western Herald indicated total government grants toward the construction of the embankment may have reached £5,500 pounds. Western Herald, 2 July, 1890, p.2.

Whittingdale Johnston was Commissioner in Charge of the Western Golf Fields from 1866 until the position was abolished in 1874. His position/employment at the time that he was inquiring into the 1890 flood in Bourke is unclear.
in order to gain insight into the local uses of government funds and facilities, including the railway and three government boats that had been sent from Sydney.\(^{146}\)

The local figureheads approached the meeting as a means to directly communicate with the government. They requested more boats be sent from Sydney to ferry citizens to their homes and businesses (to watch for looting) and to establish police patrols of the streets. Fosbery (who chaired the inquiry) told the meeting that no more government boats were available and that it seemed to him that government boats currently in the town were sufficient — they were just not being used effectively. He argued that to maximise the use of boats by the townspeople, the boats should be placed under police supervision, with one policeman in charge of each boat. The lack of coordination of government facilities by town leaders was a sign of their greater disorganisation managing the effects of the flood. He declared that, ‘[a]t present everything appeared in the utmost confusion’.\(^{147}\)

In their final report, the officials suggested that the colonial government could learn from the way that flood support had been managed in Bourke. They suggested that in future ‘emergencies’, government involvement should be extended to placing explicit conditions on how utilities and funds were managed in the local community. Further, the officials recommended that the government appoint individuals to assume responsibility for the local response. They wrote:

> 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.\(^{148}\)

In essence their recommendations argued for direct government involvement in the internal workings of communities faced with ‘emergencies’. Government direction, they suggested, could overcome local politics. Further, a single authority figure could control resources and people in a more efficient manner than a variety of local leaders. To illustrate their point, the officials noted that funds had been applied for, and spent, by a number of different individuals with, they implied, little coordination. The officials

\(^{146}\) SMH, 24 April, 1890, p.8.

\(^{147}\) SMH, 24 April, 1890, p.8.

\(^{148}\) Fosbery, et al., ‘Floods in the Town and District of Bourke’, p.3.
identified the Mayor, the Police Magistrate, the Commissioners for Railways, and the local members of parliament as each having independently claimed funds. ‘Even the boats provided by the Government’, they wrote, ‘were placed under such divided and indefinite authority that many of them were diverted by irresponsible persons from the service of the public, and the sufferers for whom they were intended’.149

The report suggested that government ties to community ‘emergencies’ through financial grants and physical aid not only made local authorities accountable for the spending and use of those resources, but that those connections and dependencies in effect transferred power from the townspeople and local officials to the government to direct how situations were approached. The government’s distance from local upheavals, they argued, made government agents less self-interested decision-makers in community ‘emergencies’.

In the aftermath of the flood, however, decisions made by some colonial government agents caused tension with local authorities. Willis (later a Commissioner in the 1900-1901 Royal Commission into Crown Tenants in the Western Division) criticised the actions and decisions of the Chief Commissioner of Railways to the Legislative Assembly in May 1890.150 The Chief Commissioner had visited Bourke to make arrangements to employ local workers, and left a number of officials to direct the workers and supply them with food rations. According to Willis, the Chief Commissioner had stayed only ‘ten minutes or a quarter of an hour, surrounded by a lot of officials’ giving ‘directions left and right’ like ‘the Czar of Russia’. Willis argued that in the short time the Chief Commissioner was in Bourke ‘[h]e had not time to review the situation’ and so had not given adequate instructions to those left to organise the workers and distribute food. The Chief Commissioner, Willis continued, also chose officials who were incapable and whose actions amounted to ‘imbecility’. The officials had withheld food rations from the workers; in fact, the workers had been left ‘starving’. The workers received no breakfast, although there were ‘thousands of loaves of bread, carcasses of meat, and tinned fish sent there by the Government and other people’.

Willis’ account is full of frustration about the unquestioning obedience of colonial government officials to a (then) distant master who did not know the extent of the local situation; and depicts the Chief Commissioner as an insensitive official visiting

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149 Fosbery, et al., ‘Floods in the Town and District of Bourke’, p.3.
Bourke at a time of local upheaval. This was not the only criticism Willis and other Bourke parliamentary representatives made against the Chief Commissioner of Railways.

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Responsibility and Blame: The Railway Embankment

Another key matter raised by representatives of Bourke in the Legislative Assembly was the damming effect of the railway embankment on the floodwater. Bourke was the terminus (or railhead) of the Great Western Railway, completed in 1885. The new rail line created a highly anticipated overland transport link between major sheep farming regions in New South Wales and Sydney. It added to Bourke’s importance as a trade centre, but in 1890 it had become a liability. The railway terminus skirted the eastern and southern edges of Bourke. Raised on an embankment to limit the effects of erosion and other forms of damage and weathering, the railway line became a dam wall in parts of the town during the 1890 flood.

Willis claimed he had warned the Railway Commissioner ‘[long before the floodwaters were approaching Bourke’, that the railway may increase the flood in the town. Having consulted ‘some of the principal residents of Bourke’, Willis telegraphed the Railway Commissioner, pointing out that the culverts through the embankment were too narrow to let floodwater flow out of the town. Willis told the Legislative Assembly that the Railway Commissioner had ignored these early concerns: ‘I received the usual stereotyped answer to my telegram, to the effect that the matter was receiving attention... The embankment was allowed to remain as it was, to block the water, and submerge and destroy one of the most beautiful towns in the colony’. Willis argued that the Commissioner and his colleagues were not fit to govern the railways and they ‘should be put on trial for a criminal proceeding’.

The potential effect of the railway embankment was discussed in newspapers a number of weeks before the flood peaked in Bourke and continued to be a topic of discussion after the levee was breached.\(^{151}\) There was little doubt that the embankment had caused the town to be more severely flooded than if it had not been there or its culverts had been larger. The government officials, who conducted the inquiry into the

\(^{151}\) SMH, 30 April, 1890, p.5.
flood in Bourke, agreed that the embankment had raised the height of the water: 'there was an additional 9 inches of water in the town owing to this cause'. Others maintained that the embankment had raised the water 12 inches or more. The most densely built parts of the town were trapped between the flooded river to the north and the embankment to the south. When the levee was breached the floodwater was confined in the town by the railway embankment.

Some argued that as the building of the railway embankment was a colonial government initiative and design, the government was partially responsible for damage to property in Bourke and should now ensure the railway embankment would not dam floodwater in the future. Willis claimed that even as the embankment was being built, 'it was constructed despite the entreaties of the people of the district, that the line should be made on piles'. It was argued that because of the effects of the embankment, Bourke now had a 'special claim' on government funds. The government incurred further responsibility in the view of one member, as the 'township also was a Government one, and the land sold as dry land, not as the bed of an inland sea'.

Those in Bourke, and those who represented the town in parliament, looked to the government to provide money to secure the town against future floods. Legislative Assembly representatives argued that the railway embankment, which itself required repairs, should be rebuilt on pylons, or with widened culverts, or as a loop line to form a flood barricade around the town. Further, Thomas Waddell, also a representative of Bourke, put forward a motion in the Legislative Assembly to request government funds of up to £20,000 (in addition to the £7,080 already granted for flood relief), to be used to build a permanent flood embankment around the town.

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152 Fosbery, et al., 'Floods in the Town and District of Bourke', p.2.
153 Torpy, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 1 May, 1891, p.132.
154 Willis, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.148.
155 O'Sullivan, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.155.
156 Willis, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.148.
157 Waddell, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.145.
Engineering Solutions: Permanent Levee

Waddell argued that a government grant for the building of a permanent, more solid embankment was necessary for the town's protection and economic future. He argued that without protection against floods investors would not buy there and property prices would plummet. Bourke's current status, and future, as 'one of the most important inland towns in New South Wales', demanded it.\(^{158}\) Willis reiterated this point, arguing that, '[i]f some action is not taken to protect the town against future floods, what man will speculate there?'.\(^{159}\)

There was already some evidence that property prices in Bourke were falling. Soon after the levee burst, a SMH journalist, travelling with a friend by boat in the town, came upon a sign that read 'This Land for Sale'; 'my friend assured me', he wrote, 'that the price would now be considerably reduced'. The journalist speculated that most properties, especially town allotments, would be reduced by as much as one-half, for which 'up to now very fancy prices have been asked'.\(^{160}\) The 1890 flood revealed that the town could periodically severely flood. Past floods, such as the 1864 flood, had been seen as exceptional, while others, such as in 1870, had not entered the town. The 1890 flood shook established environmental knowledge by demonstrating that large floods could happen intermittently and at any time. Further, the fact that Bourke was located on floodplains had now been 'well advertised' by newspapers.\(^{161}\) Besides these arguments, there was also the question of current residents' future safety from floods. Those in the town considered a permanent levee necessary to protect them from future floods: 'the citizens have set their hearts upon one thing and that is that the Government must build them a dam'.\(^{162}\)

Waddell and Willis argued that the government had a responsibility to flood-proof Bourke, as it was the government built railway embankment, 'which has done all the damage'.\(^{163}\) Willis suggested that the government construct a railway loop-line around

\(^{158}\) Waddell, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.146.
\(^{159}\) Willis, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.148.
\(^{160}\) SMH, 23 April, 1890, p.7.
\(^{161}\) SMH, 25 April, 1890, p.5.
\(^{162}\) SMH, 26 April, 1890, p.12.
\(^{163}\) Willis, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.148. See also, Waddell, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.146.
the town, which would double as a levee. It would further fulfil the government’s responsibility to mend the damming effect of the current rail line.164

Waddell argued that flood-proofing the town was in the government’s direct interest. There were government buildings in Bourke and it was likely more would be built. Bourke ‘is situated at the extreme end of the Great Western Railway, and is likely to be the terminus of that railway for many years... a great deal of money will be spent there by the Government in erecting buildings, in addition to the large number of buildings that have been, and will be, erected there by private individuals.’165 Before the flood the town had been an important site of investment as well as trade: government investment, in terms of infrastructure, services, and administrative branches followed the town’s expansion and added to its potential for growth. The flood had compromised the interests of all who had a stake in Bourke’s future. A permanent embankment, Waddell argued, would secure the future of the town as well as government interests there, including buildings and revenue earnings (from custom duties, land sales, industry development, and so on).

Despite these arguments to support Bourke’s ‘special claim’ to government aid, there were those who opposed Waddell’s request. Some members of the Legislative Assembly, representing other regions, disputed Bourke’s claims on the grounds that ‘towns should protect themselves [from floods], and the Government should not always be appealed to’.166 Willis argued that Bourke’s appeal to the government was not in substitute of self-reliance, but of necessity; and the funding of an embankment would represent a partnership between the town and the government. He stated that:

... the Bourke people have shown an example in the past of trying to protect themselves. Now, when they come here, through their representatives, and ask the Government to protect their own property, as well as the property of the citizens, they should receive something more than sympathy... This is a Government town. The Government have acres and acres of unsold land there, which must be protected. The Government land, which is now of no value at all, must be made of commercial value, and whilst they are

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164 Willis, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.148.
165 Waddell, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.146.
166 Copland, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.153.
doing that in the interests of the country, I think the least they can do is to raise this wall around Bourke, and protect the property of the people as well.\textsuperscript{167}

While Willis argued that the government should build an embankment around the town, representatives of other regions argued that Bourke was attracting favour because of its place in 'the public mind' and that other areas and towns in New South Wales were equally, if not more, damaged and deserved at least comparable treatment.\textsuperscript{168} Legislative Assembly members were not free from bias toward the cultural significance of, and reports of distress in, Bourke. One member cautioned that 'the question now before the House seems to me to be one which necessitates the disconnection of the head and the heart'.\textsuperscript{169} If the government bound itself to funding the embankment, the parliamentarian continued, it would create a precedent for many towns and regions to apply for similar funds for embankments.

James Gormly, who had been rescued during the 1852 flood in Gundagai and who in 1890 represented Wagga, argued that the government should deal holistically with flood protection, and address towns' and stations' safety across the colony. He thought, however, that damages in Bourke were 'greatly exaggerated'.\textsuperscript{170} Others asserted that 'no great loss comes from these floods'; rather, there were significant advantages as the flood would 'irrigate the land, and next year the people will recoup themselves tenfold for losses now sustained'.\textsuperscript{171} Many who spoke (including Gormly) said that they would not support Waddell's motion, and he eventually withdrew it.\textsuperscript{172} He received a number of assurances, however, that some government money would reach the town for embankment works through 'municipal bodies'.\textsuperscript{173}

Indeed, shortly after these parliamentary debates, town representatives and the government began negotiating for the building of a permanent embankment. By July

\textsuperscript{167} Willis, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.148-149.
\textsuperscript{168} Bruce Smith, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.147.
\textsuperscript{169} Bruce Smith, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.146.
\textsuperscript{170} Gormly, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.152-153.
\textsuperscript{171} Copland, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.153.
\textsuperscript{172} Copland, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.157.
\textsuperscript{173} Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.157.
\textsuperscript{174} Copland, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.157; and, Hassall, Parliamentary Debates. Legislative Council and Legislative Assembly. Session 1890. 6 May, 1891, p.154.
1890 the government had submitted two plans for an embankment for consideration by the Bourke Council. One plan (echoing Willis’ suggestion) was to create a partial railway loop-line around the town, with earthworks completing the loop; the other plan was to build earthworks to encircle the town, joining with the current railway, which would form one edge of the embankment. The government agreed to pay half the construction costs of the plan that the Council selected. The government also agreed to loan the Bourke Council the money for their share of the embankment work, but only if such a loan was deemed legal by government lawyers. At a meeting of the Council and rate payers to consider the building of an embankment, the costs involved, and the two schemes, Willis argued in favour of the earth embankment, which was the cheaper option. While the town would have to pay half, the government had agreed to lend the town this amount. According to the Western Herald’s report of the minutes of the meeting, Willis insinuated that it was not necessary to honour such a government loan. The newspaper reported Willis’ argument with the following, subtle phrasing: ‘The people would have to pay their share (£3000), but the Government would lend the money and (ironically) ‘they would pay it back.’ (Laughter.).’174 The Council, along with ratepayers, agreed to proceed with the second option, of an earth embankment. This plan was estimated to cost a total of £6,000, less than half that of the £14,000 estimated for the alternative plan of extensive railway works.175 This, however, seems to be as far as the embankment came to being built.

It appears to have come down to finances. The government withdrew the offer of a loan a few days after the plans were submitted to Bourke’s Council.176 Perhaps the government’s lawyers had found such a loan illegal. Bourke’s existing Council loans, totalling £7,500, had reached the legal limit before the flood. This maximum amount of deficit was determined by the total value of five years’ worth of rates.177 Perhaps, also, those in government were aware of Willis’ comments insinuating that the money might not be repaid.

Following the withdrawal of the loan offer, the Council and ratepayers met to consider the government’s decision. The aldermen’s motions to seek alternative loan arrangements were defeated by unenthusiastic ratepayers (whose taxes would repay the

174 Western Herald, 2 July, 1890, p.2.
175 Western Herald, 28 May 1890, p.2; Western Herald, 28 June, 1890, p.2; Western Herald, 2 July, 1890, p.2; Western Herald, 5 July, 1890, p.2; Western Herald, 9 July, 1890, p.3; and, Western Herald, 16 July, 1890, p.2.
176 Western Herald, 5 July, 1890, p.2.
177 Western Herald, 5 July, 1890, p.2.
loan). One person at the meeting suggested that ‘it would be better for the ratepayers to remain as they were than being burdened with a heavy rate’. Another said that those in the meeting had ‘better let the matter slide’, and wait ‘until another flood actually threatened to inundate the town’. The meeting carried only one motion: for the government to finance the entire embankment. The motion was put in the following terms: ‘That considering the present state of the town, and the indebtedness of the Council, the ratepayers were not in a position to bear any more rates, and that the Government should bear the whole of the expense of the earthworks to protect the town.’

The Mayor thought the motion ‘a splendid one, if the Government would only lend the money... But the Government had refused, no doubt because it would be forming a precedent’. One individual argued, ‘[b]ut... [other towns] are not half so important as Bourke’. The government, it seems, did not agree with the Council’s resolution and did not alter its earlier decision. In August the Council formed a sub-committee to investigate the exact costs of building a permanent earth embankment, but, the Western Herald noted, the lack of enthusiasm shown by the ratepayers was likely to quash plans for its construction. The matter did indeed slide, and the permanent embankment did not materialise.

The tension between the local representatives of Bourke and the government over the funding and building of a permanent embankment to protect the town was, in essence, a contention over who was responsible for protecting (and paying for the protection of) towns and regions from floods. There was general agreement in the Legislative Assembly that the government was partially responsible for the flood in Bourke. Did this make the government responsible for the town’s protection from future floods? On this point the Legislative Assembly was divided. Some argued that towns should be self-reliant and erect (and finance) their own protective works. Others argued that the government should, at least, partially fund the building of a permanent embankment.

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178 Western Herald, 5 July, 1890, p.2.
179 Western Herald, 5 July, 1890, p.2.
180 Western Herald, 23 August, 1890, p.2.
181 The issue of the permanent embankment was raised in later Council meetings, but without a final decision being made. Some argued that either the remains of the temporary embankment must be removed or a permanent embankment erected. As both would cost money, some thought it better to build a permanent embankment and have something to show for the expense. However, nothing appears to have come of this. The costs appear to have been too great and the embankment sub-committee concentrated on repairing the damages caused to individuals’ properties when the original embankment was built. Western Herald, 4 March, 1891, p.2; and, Western Herald, 25 March, 1891, p.2. See also, Bourke and District Historical Society, Papers Presented by Members of the Bourke and District Historical Society, 1964-1966, on the History of Bourke, 1, (Bourke: Bourke and District Historical Society, 1966), p.101.
embankment. However, if the Legislative Assembly had voted for the government to fund embankment works in Bourke (or, as was alleged later, if the government funded the scheme through municipal channels), a precedent would have been created, allowing other regions and towns subject to floods to apply for similar grants (or council funds). Many towns that were built on floodplains were government surveyed, and it could be argued that these also had a claim to government finances. This would place responsibility for individual townships’ flood protection largely with the colonial government.

The initial agreement between the government and Bourke’s Council, of each funding half the cost of a permanent embankment, was a financial compromise. It also seemed to divide responsibility between the town and government for protecting the town; however, even this moderate responsibility created an increased role for the government in mitigating against floods in Bourke.

Besides these issues of responsibility there was the issue of dependency. Bourke’s Council, already in significant debt before the flood, was financially dependent on the colonial government to at least partially fund the cost of a permanent embankment (but, as Willis and others argued, hopefully all of it). Further, the Council was dependent on colonial government aid during the flood event, for facilities (such as boats), as well as for finances (to build a temporary embankment). The Council’s need for government support indicates that it had not budgeted for such an extensive, unforeseen expenditure.

The town’s financial and material dependence on the government and requests for government aid had created a particular kind of relationship between the town and government during, and in the aftermath of, the flood. Financial requests by the town also created an avenue for direct government involvement in local affairs during ‘emergencies’. This potential was reflected in the recommendations of the government officials who conducted the inquiry into the flood. As unexpected and unbudgeted environmental events, floods created circumstances in which centralised governments could potentially assume direct control over dependent local authorities. For example, it was colonial government departments which designed the permanent embankment in Bourke.182 In the aftermath of the flood, representatives of Bourke negotiated a new relationship between the town and government, where the government was directly

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182 There were three colonial government departments involved in the two alternate designs for a permanent embankment. These were: The departments of Works, Roads, and Railways. Western Herald, 2 July, 1890, p.2.
involved in mitigating floods through engineering works. However, the government was not willing to take total responsibility and the Council’s failure, or inability, to raise its share of the costs for the permanent embankment in some ways released the government from even partial responsibility and financial support for mitigation.

The calls by the Bourke Council, Legislative Assembly representatives, and the townspeople for a permanent embankment joined the growing chorus of calls, from other regions that experienced flood and drought, for a permanent solution to the erratic flows of the rivers. These calls for expensive engineering infrastructure were directed at the colonial government, since they required more resources and financial capital than local authorities could raise. Engineering solutions to combat fluctuating river flows in 1890 were configured amid a backdrop of debates over, and government investigations into, water conservation in the 1880s. The 1890 flood re-ignited the debates over water conservation, and/or damming the rivers to drought-proof the inland, mitigate floods, and improve the navigability of the rivers.

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Engineering and the Government

Henry Chamberlain Russell’s argument for a ‘complete system of irrigation’ as set out in his letter to the SMH in 1890, probably referred to medium sized storages recommended in the reports of the 1885-87 Royal Commission on Water Conservation (or Lyne Royal Commission), to be built along the Darling and Barwon rivers. Russell had presented his paper on floods in the Darling River at the same time that the Commission was investigating possibilities for conserving water on the inland rivers of New South Wales. The dams recommended by the Royal Commission, headed by (Sir) William Lyne, were for irrigated agriculture on the inland rivers, diverting and conserving the water at the expense of navigation. Russell was no doubt aware of the Commission’s activities, and of their report, and had perhaps also been influenced by their recommendations for water conservation and closer settlement schemes.\(^{168}\)

The Royal Commission had been initiated by the arguments of Lyne, in the Legislative Assembly in 1884, for government investigations into methods for conserving

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\(^{168}\) Closer settlement was the settlement of people on the land at a high density, usually with the aim of increasing farming production through defined and limited farming plots within defined areas of settlement.
rainfall, exploring the potential of underground aquifers, and the practicalities of a system of water conservation storages to guard against drought. Parts of the colony were in the midst of drought, including the inland regions, and the New South Wales government formed the Royal Commission the same year.\(^{184}\) The Commissioners conducted extensive research to determine the potentials of the inland rivers for irrigation networks and water conservation storages, interviewing many landholders. They travelled to the Darling River when it was flooding in 1886. The Commission’s photographer, Charles Bayliss, photographed extensive tracts of flooded land. The flood may have further revealed to the Commissioners the possibilities of trapping floodwater in creeks and ‘natural depressions’ to form ‘permanent lakes’, which they had reported on in the previous year.\(^{185}\) While the Commission generally recommended that there were many sites suitable for water storages on the Darling and other inland rivers, both to mitigate floods and for water supply, they made no specific recommendations for particular sites.\(^{186}\)

The Chief Engineer for the Commission was Hugh McKinney, a Northern Irencher who had worked in India before arriving in New South Wales. McKinney argued for the role engineers could play in water conservation: ‘No one is more entitled to be heard on the general principles of water supply of a country than an engineer, who has practical experience of both of the value of good laws, and the mischief caused by bad ones’.\(^{187}\) The Commissioners’ recommendations were accompanied by a draft bill (of new laws) that aimed to overturn the constraints of common law riparian rights (that prevented large irrigation works). Common law caused ‘mischief’ for advocates of irrigation. The recommendations hinged on the draft bill which was, however, not accepted by parliament. Historian Clem Lloyd has suggested that the bill was ‘too ambitious’ for the young colony. He speculated that if it had been passed into law it would have ‘transformed the evolution of water policy and administration’ by developing decentralised water administration, based on local water trusts.\(^{188}\) The decentralisation of administration advocated by the draft bill did not survive as an idea, although other aspects of the bill are evident in New South Wales’ 1896 Water Rights Act and 1912 Water


\(^{185}\) Royal Commission, 1885, Report 24, quoted in, Lloyd, *Either Drought or Plenty*, p.173.

\(^{186}\) Lloyd, *Either Drought or Plenty*, p.173.

\(^{187}\) Quoted in, Lloyd, *Either Drought or Plenty*, p.121.

\(^{188}\) Lloyd, *Either Drought or Plenty*, p.123.
Act which, together with the Constitution, unravelled common law doctrines of riparian rights and introduced statutory water rights.

The 1885-87 Royal Commission did, however, have significant policy implications. It had focused almost exclusively on the potential for water conservation on the inland rivers of New South Wales. Although the Commission conducted substantial research into some coastal rivers, such as the Clarence and Richmond, and to a lesser extent into others, it remained largely concerned with inland hydrologies. It did not exclude coastal rivers by design; this was, rather, a result of the Commission's budget, which confined its scope. Lloyd has argued that 'an important, although perhaps unintended, consequence of the Commission's investigations was the irrevocable separation of the coastal rivers from the western rivers in policy terms... it failed to develop even a basic policy rationale for the coastal rivers; its focus was on the river basins of the interiors'. The Royal Commission had put the inland rivers on colonial government policy agendas, with a focus on the potentials for developing the inland through engineering. In some ways this foreshadowed the partitioning of the inland rivers from those on the coast, in terms of policy, post-Federation with the creation of the River Murray Commission. McKinney's appointment to head a new Water Conservation and Irrigation Branch of the Department of Public Works in 1891 is evidence of the colonial government's commitment to investigate engineering as a way of managing flood and drought, while also developing new irrigative industries. However, Bonyhady has argued that McKinney's new government branch was instead a concession to advocates of water conservation and irrigation, serving as a 'sop' to their arguments. Bonyhady's argument is supported by the fact that the colonial government remained uncommitted to water conservation and irrigation throughout the 1890s.

The 1890 flood not only demonstrated the vulnerability of the inland to the erratic flows of the rivers, but also revealed the potential for trapping vast amounts of floodwater. In the aftermath of the 1890 flood colonists discussed the benefits of an engineering approach by the government to mitigate floods and impound water for future use. Some wrote to newspapers to make their case. For example, one colonist, in a letter

189 Lloyd, Either Drought or Plenty, p.171.
190 Lloyd, Either Drought or Plenty, p.172.
191 Lloyd, Either Drought or Plenty, p.176.
to the SMH in May 1890, urged that anabranches along the Darling, which now
overflowed, should be dammed so that the water did not 'run to waste'.

Representatives of Bourke had suggested to the government officials who were
conducting an inquiry into the flood in the municipality the 'necessity of having a flying
survey made with a view of determining if the water could be preserved in dams or
utilised in any way'. Although the town was recovering from the flood, experiences of
drought had attuned colonists to opportunities for water supply. Further, the
representatives suggested, 'information might be obtained relating to irrigation, which
would be very valuable in the future'. The government officials said that 'this was beyond
the scope of the commission'. However, the request of the local representatives is
telling. Their statement that information on irrigation would be valuable in future
indicates an undcurrent of anticipation for irrigative industries. At the time, irrigation
was linked to larger themes of consistent river flow and water supply (to mitigate the
effects of drought and flood, and supply irrigation channels), as well as associated
engineering infrastructure for water conservation, such as dams.

In the 1880s and 1890s the Murray River was also receiving significant attention
from the South Australian, Victorian and New South Wales governments, with a view to
establishing irrigation and improved navigability. By 1890 the Chaffey brothers had
established two irrigation settlements on the river: Mildura in Victoria and Renmark in
South Australia (both in the late 1880s). Both colonial governments had backed the
Chaffey Brothers' company and had implemented special legal arrangements to overcome
common law restrictions for these 'trial' settlements (see chapter four 'Federation,
Engineering, and a 'Watershed' Perspective, 1890 to 1956'). Some thought these
settlements heralded a new future for the inland rivers. An article published by the
Western Herald in August 1890 captured this sense of anticipation and desire for engineers
to control the waters of the two large river systems:

Proposals for locking the Murray and Darling rivers [sic]... have been made from time to
time, but up to the present time no active measures have been taken to give effect to any
schemes of this kind. Reports have been prepared and pigeon-holed, awaiting a more
favourable opportunity, when freedom from political complications shall enable a strong

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193 SMH, 6 May, 1890, p.9. See also, SMH, 16 May, 1890, p.7.
194 SMH, 24 April, 1890, p.8.
and vigorous Government to place measures of utility before those of convenience... information which will hereafter be of use is accumulating. 195

This writer was generally in favour of river control through engineering; but his sentiments also reflected some people's reservations about the effect of such diversion and associated structures. 'There are some people in South Australia', the article stated, 'who object to the Chaffey irrigation colonies on the ground that there will soon be no water left for navigation'. Some, especially those in the pro-navigation colony of South Australia, saw irrigation and navigation to be competing uses for the waters of the Murray. The article provided another argument against engineering, detailing plans to barrage the mouth of the Murray from the sea, to prevent salty tidal inflows and preserve fresh water in Lake Alexandrina and Lake Albert. The Engineer-in-Chief who proposed the scheme forewarned that the barrages would be likely to accumulate silt, affecting their operation and efficiency. 196

Such reservations also extended to proposals for flood mitigation structures on the Darling after the 1890 flood. Some argued that water conservation structures would increase floods on the Darling, rather than mitigate them. A colonist (who had experienced the 1864 flood) on the Darling wrote to the SMH, in the aftermath of the 1890 flood, that his views, 'once comprehended, overthrow all theories relating to the damming-up of the Darling waters'. He continued: 'I don't care what obstacle, from stone wall to wire fence, is thrown across the waterway, it impedes the flow, and the result is that the water rises higher' and potentially spills through openings or over the dam, 'with unnatural velocity, thus adding to the danger'. 197 Such reservations, however, seemed to be overshadowed by calls for government action to protect towns and rural areas against floods, through engineering works.

Arguments for engineering structures to mitigate floods were made in relation to other areas that had been flooded in 1890. The Grafton Borough Council, on the recently flooded northern New South Wales coast, passed a resolution in June to lobby the colonial government to ensure flood protection along 'all the rivers of the colony'. The need for protective structures to be built by the government, the Council wrote, was 'both necessary and expedient'. The Grafton Council indicated that the means by which

195 Western Herald, 30 August, 1890, p.2.
196 Western Herald, 30 August, 1890, p.2.
197 SMH, 3 May, 1890, p.9.
the government should ensure safety from floods were through different forms of engineered flood mitigation. It asked for: Direct action to prevent erosion to riverbanks, embankments to protect towns, and the impounding of floodwater in channels away from settled areas:

... a measure should be framed and introduced by the Government for the approval of Parliament for the purpose of making provision for general and approved systems of protecting the banks of all the rivers of the colony from erosion after floods, for the construction of embankments, or to open up additional and alternative channels to confine floodwaters, and thereby prevent the loss of life and destruction of property caused by the immense spread of water in times of flood, and for keeping out as far as possible floodwaters from towns and villages in these districts... if these were protected, [they] would be at all times available for profitable and safe occupation.\(^{198}\)

The Grafton Council further resolved to request other councils across the colony to 'adopt a similar resolution'.\(^{199}\) The resolution is significant as it argues for the colonial government to ensure safety from floods across New South Wales through engineered manipulations of river flow, and for the government to take responsibility for protecting towns from floods. The Council argued that such flood protection works were important for the ‘profitable and safe’ development of settlements and economies in regions affected by floods.

Calls for engineering works in Bourke, along the Darling, and in other places in New South Wales signalled a new demand on government science. Bourke and other regional centres requested greater government involvement in protecting settlers from floods and controlling the fluctuations of river flow and weather more generally, through engineering. This marked a shift from the more distant role of government meteorologists, who tried to predict environmental events, but whose duties did not encompass intervention in flood flows through ‘on the ground’ mitigative works. Discussions and plans for building a permanent levee around Bourke indicated the changing role of government science, as it tried to come to terms with floods for the economic future of Bourke and the colony. It was with Federation, however, that

\(^{198}\) Western Herald, 18 June, 1890, p.2.
\(^{199}\) Western Herald, 18 June, 1890, p.2. In the aftermath of the floods in Queensland, settlers were also discussing the need for water conservation and flood mitigation. See, Darling Downs Gazette, 2 April, 1890, p.2.
possibilities for river engineering were liberated from the legal constraints of common law and the financial limitations of colonial budgets.
Federation, Engineering, and a ‘Watershed’ Perspective, 1890 to 1956

The birth of the nation was in many ways also the birth of large-scale river engineering in Australia. This was no coincidence. The potential uses and benefits of the Murray River, and its tributaries, to New South Wales, Victoria, and South Australia for navigation, water conservation, and irrigation were a significant impetus to Federation in 1901, because intercolonial collaboration was essential to river planning.\(^1\) Many political leaders, bureaucrats, and settlers hoped that the fluctuations of floods and droughts could be overcome with engineering. The question arose as to whether the Murray’s limited river flow should be harnessed for navigation or irrigation. Trapping floodwater and snowmelt to augment river flow was a significant part of these contested plans. Post-Federation river engineering projects were to profoundly change flood regimes and the wider ecology of the Murray River and its tributaries.

The Murray was the focus of several engineering projects following Federation. The intense interest shown in water conservation, irrigation, and improved navigation on the Darling River during the 1890 flood had waned. As politicians debated a constitution that paved the way for water conservation and irrigation settlements during the 1890s, the important sheep-farming district of the Western Division, through which the Darling flows (and where Bourke is located), slid into economic decline. In 1895 the eastern states entered a period of intense drought, which was to span approximately seven years and which is now known as the ‘Federation Drought’. It is still one of the worst droughts on

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Although drought catalysed the decline of pastoralism in the west, other factors also contributed. In 1900 the New South Wales government established a Royal Commission to investigate the reasons for the economic depression in the Western Division. Pastoralists gave testimony to the Royal Commission. They described a combination of causes for the depression, including falling wool prices, changes to the environment from graziers’ farming practices, the effects of introduced plants and animals on the land and rivers, a flawed land rental scheme, and a succession of floods and droughts. Through the farmers’ stories, and the Royal Commission’s recommendations, there came a strong sense that pastoralism in the region, along with the land, could never recover. The 1890 flood held promise for irrigation and water conservation along the Darling at the time, for those in towns and cities, but just 11 years later farmers told the Royal Commission that the flood had compounded, and in some cases triggered, their economic decline and the deterioration of the land (in conjunction with other factors). The 1890 flood led to stock losses in the short term; while longer term effects included vegetation growth and the spread of prickly pear, which contributed to the spiralling decline of the wool industry. The Commissioners in 1900, investigating the possibilities for closer settlement in the region recommended against it, in consideration of the deteriorating condition of the land, erratic river flow, scarce rainfall, the experiences of pastoralists, and South Australian experiments in closer settlement. The Commissioners ruled that closer settlement was just not feasible in western New South Wales.

The shared waterway of the Murray became the focus of the question of riparian of rights for the three colonies that shared it (New South Wales, Victoria, and South Australia). While drought had detracted attention from water conservation, irrigation, and improved navigation on the Darling, it became a prime motivator for engineering works on the Murray. It was argued that a national government could mediate disputes between the colonies over water rights and the competing uses of the Murray River for navigation (to aid the wool industry and the transportation of other goods) and irrigation (to support the agricultural industry). The Murray and its upper tributaries were widely perceived to be able only to support either navigation or irrigation along the main channel. There was not enough water for both.² Navigation and irrigation, while in competition, both depended on river engineering to ensure more consistent and available

river flow when and where the water was needed. Flood mitigation did not figure significantly in these pre- and post-Federation debates. While small and large floods occurred in the Murray and Darling river systems, it was drought that politicians, bureaucrats, and settlers sought to mitigate through river engineering. Floods that occurred in this period tended to be catalysts for debate about drought mitigation through water conservation, irrigation, and improved navigation, as floodwater could be harnessed and river flow regularised, rather than the water being ‘wasted’ or left to damage property and endanger lives. Large floods occurred, for example, along the Murray in 1917 and 1927, the northern Darling River tributaries in 1909, western Victorian Murray tributaries in 1909, and the Murrumbidgee in 1900 and 1925. In the midst of intense drought, water supply remained the focus of debate. The lack of attention to floods themselves, in terms of mitigation, general river management, and data collection, shaped settler perceptions of later floods, especially the 1956 floods on the Murray River, which were regarded as a failure of engineering to know and control river flow.

The constitution and federal bureaucratic frameworks created new opportunities for the states to invest in river infrastructure and to work collaboratively, sharing the costs of expensive dams and locks with each other and the Federal government. Federation liberated the possibilities of large scale engineering politically, legally, and financially. The new constitution abolished many of the remaining common law restrictions on manipulating river flow. A national political framework also fostered a ‘watershed’ view of river systems necessary for large scale river engineering, rather than purely sectional interests in relation to parts of rivers that flowed within administrative boundaries. The overarching Federal government allowed for a cross-border perspective and provided a mediating framework between the states. However, after Federation the states remained deadlocked over decisions as to the most appropriate works for the Murray. Settlers along the Murray and Murrumbidgee pressed for a resolution.

In response to intense drought, the River Murray Main Canal League – an umbrella organisation for a number of smaller leagues mostly comprised of Riverina graziers – initiated a convention held in Cowra in 1902, in order to lobby decision-makers to provide greater security from erratic river flows. The Cowra convention led to

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3 Murrumbidgee floods: see, Cliff Butcher, Gundagai: A Track Winding Back (Gundagai: A.C. Butcher, 2002), p.84.

an interstate investigation into improved navigation and potential water storage sites on the Murray. The interstate committee catalysed large-scale engineering on the Murray and established the pre-eminence of irrigation over navigation.

This chapter focuses on three issues in turn. First, New South Wales’ shift in interest from the Darling to the Murray, in terms of river engineering and land settlement agendas. Secondly, the rise of intercolonial, and then interstate, engineering on the Murray as influenced by environmental factors and changes to the political frameworks around rivers, which created administrative space and opportunity for large-scale, interstate river engineering. Thirdly, the international influences on engineering approaches and bureaucracies in Australia.

In addressing these themes and arguments I begin by examining the decline of pastoralism and the environmental deterioration in the Western Division of New South Wales, focusing on the 1900-01 Royal Commission, particularly in regard to the combined effects of the 1890 flood, successive droughts, and the deterioration of the land. Pastoralism had reached, and exceeded, its environmental limits. The Royal Commission and other government inquiries reported that the Darling’s erratic flows, dramatically demonstrated in the intense drought, would not support irrigation nor justify expense on navigation infrastructure, which was simultaneously declining in importance with the expansion of railways.

Next I consider the eastern colonies’ (later states’) focus on the Murray River for engineering works and river development in the context of intercolonial cooperation in the lead-up to, and after, Federation. Unlike the Darling, the Murray offered significant topographical and hydrological opportunities for water storage, irrigation, and navigation works. Fed by snowmelt, the Murray’s flows were also more regular. After Federation a permanent, watershed-focused administration was established for a large portion of the Murray and Darling river system, the River Murray Commission (RMC). The RMC, formally established in 1917, comprised state and federal representatives and focused its energy almost exclusively on the Murray and its upper tributaries for the next seventy years.

Finally, I consider the international links and influences on the development of the RMC watershed bureaucracy in Australia and subsequent river engineering projects, focusing on influences from British India and the United States.

This period saw the establishment of major political frameworks for large scale engineering in the Murray and Darling river systems, which were to facilitate the next 80
years of dam-building, immigration programs, agricultural production, hydro-electric schemes, and profound changes to floods and floodplains. The frameworks that were established in this period were to have other far-reaching effects: a focus on the Murray saw massive transformations on that river and many of its tributaries, but was also to leave the upper Darling and its tributaries open for development by New South Wales and Queensland until the 1980s.5

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Royal Commission

The 1900-01 Royal Commission to Inquire into the Condition of Crown Tenants was established to investigate the reasons for the extensive economic failure of pastoralists in the Western Division of New South Wales. The Royal Commission was held in the midst of a seven-year-long drought across rural New South Wales, now known as the ‘Federation Drought’, and after a decade-long economic depression in the eastern colonies. The number of sheep in the Western Division had fallen by 10 million since 1890, from fifteen and a half million to less than six million.6 In the process of its investigation the Royal Commission conducted a series of interviews with a variety of people connected with the pastoral industry in the Division, many of whom had lived in the area for over twenty years. The Commission concluded with recommendations that it deemed would ensure the region’s economic recovery. Pastoralists’ testimony to the Royal Commission lent weight to arguments for water conservation. Their experiences of fluctuating river flow seemed to indicate that such environmental uncertainty could be mitigated by water conservation structures. However, pastoralists recognised that the land had radically changed and many accounts contained in the Royal Commission conveyed a sense that even these means of water security could not redeem its pastoral value or secure small-scale farming, which the Commissioners had also been instructed to investigate.

5 In 1996 Queensland joined the Murray-Darling Basin Initiative (which had replaced the RMC in 1993 with a tripartite structure, which included the Murray-Darling Basin Commission as the ‘public face’ of the Initiative).

In the Royal Commission's minutes of evidence, as Tom Griffiths notes, 'there was a recognition that European settlers had disrupted earlier Aboriginal systems of habitation and management and tipped the land into an escalating instability'.

The Commission's report stated, 'the pastoralist entered upon the period just ended with the country in its virgin condition. He enters upon the coming period with the country immensely depreciated'. Following the pastoral expansion of the 1860s and 1870s the land had drastically altered under the changed system of use. The introduction of hoofed animals, such as cattle and sheep, had caused erosion and compacted soil. These animals also tore out shrubs and grasses by their roots, preventing the regeneration of vegetation. Land clearing had caused erosion; rabbits, sheep, and cattle had aggravated erosion; woody weeds had invaded denuded paddocks; and native plants and animals had

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7 Tom Griffiths, 'One Hundred Years Of Environmental Crisis', Rangeland Journal, 23, 1, 2001, pp.5-14, p.5.

Chapter 4 - Federation, Engineering, and a 'Watershed' Perspective, 1890 to 1956

retracted from the damaged lands. Together with such destructive by-products of European settlement, the 1880s and 1890s saw a succession of droughts and floods: a flood in 1879, a drought in the early-mid 1880s, a flood in 1886, the 'centennial drought' two years later, flood in 1890 and 1893, and then the long 'Federation Drought' that intensified just as the Royal Commission commenced.

The appointed Commissioners included both current and former district representatives, some of whom, such as William Nicholas Willis, had land holdings in the Division and were directly affected by the drought and depreciation of the land. The interviews with pastoralists read as a retrospective of environmental, and concurrent economic, boom and bust. Pastoralists told stories of struggles for economic survival in an unpredictable environment shaped alternately by scarcity and abundance of water, as well as a realisation of the damage that they, the new occupants and their animals, were doing to the land. The 'booms' were good seasons, allowing pastoralists respite from previous droughts. But these 'good seasons' could be undone by devastating floods as in 1890, and long droughts.

The 1890 flood figured in many of these interviews. Some identified it as the beginning of their troubles. It was, William J. Dickson stated, 'the turning point'. Initial stock losses caused pastoralists to suffer financially and borrow heavily. Those who spoke of the direct effects of the flood numbered their stock losses, or their neighbours', at between 7,000 and 50,000 sheep. The ewes were lambing at the time and many lost between 3,000 and 25,000 lambs as well. One pastoralist from the Walgett district, John Archibald Campbell, lost a total of about 70,000 sheep and lambs. Some sheep drowned and, as his property was still flooded in August, many isolated sheep starved. He explained that he had also 'lost the whole of the lambing.... I felt that for five years... I lost the use of their wool. I had to keep old sheep to breed with.... Which I was getting little

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11 These figures were obtained from a selection of six interviews in the Royal Commission's minutes of evidence with pastoralists and Homestead lessees. The interviews were with: William J. Dickinson, pp.186-188; John Archibald Campbell, pp.289-291; Colin Sinclair, pp.628-632; Thomas Clark, pp.636-637; Richard William Chase, pp.651-653; and, William Godfrey Ferris, pp.685-686. 'Royal Commission to Inquire into the Condition of the Crown Tenants'. 'Minutes of Evidence, Appendices, and Returns'. Part 2.
wool from'. However, Campbell predicted he would not have made a profit even without the flood, because of drought and other economic and environmental pressures.

Whilst pastoralists identified the flood as a trigger of decline, they did not attribute their overall economic failure to it; drought was the bigger enemy. William J. Dickson told the Commissioners that while the 11,000 sheep and lambs he lost in the flood (about 96 percent of his stock on his small 10,240 acre property on the Culgoa River) was his 'first loss', his overall situation was attributable to, '[u]ndoubtedly... the drought'. He stated that if the sheep he lost during the flood had not died, they would have died in any case from starvation and dehydration in the subsequent drought. He had not carried that many sheep on his station since. After the flood, drought put additional pressure on farmers who carried fewer stock when those stock died from starvation. Another pastoralist, Colin Sinclair, when asked to explain the 'non-success' of his holding, answered: 'In the first place there are the droughts; secondly the land is subject to floods, and that means disastrous losses... What with floods and droughts I have not made anything out of it at all...'. Pastoralists were trapped in an unrelenting sequence of droughts and floods.

Pastoralists also drew attention to the 1890 flood's ongoing environmental effects. The flood caused long-term vegetation changes on the floodplains. It had caused a 'wheat-field' to become 'water grass', which stock would not eat when it was dry. 'Noxious growth' also became a problem. Sinclair stated the flood had brought prickly pear to his property by washing seed onto the floodplain. For Richard William Chase, who had been at Llanillo Station for over 19 years, the flood of 1890 had damaged the country by bringing increased amounts of native Coolabah. Sheep could not be seen amongst the

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trees and scrub, and many pastoralists could not afford the expense of clearing the land. Pastoralists also spoke of the impacts of rising rabbit numbers and overstocking on the land and vegetation. Stock had added to the vegetation changes, grazing saltbush until it was scarce and 'will never recover'.

For the pastoralists, the vegetation in many areas had substantially changed for the worse, lowering the value of their stations. Some pastoralists saw the country as having suffered irrecoverably, through climate and the impacts of stock and humans. Chase thought that even with extended leases, pastoralism in the Western Division would remain 'a risky business', and that the environment was permanently damaged. Others, however, maintained hope that they would be able to make their stations profitable and that the land would recover. Despite these differences, almost every pastoralist interviewed argued for larger runs and extended leases of 42 years. Pastoralists, often heavily in debt, were tied to their stations through debt. Longer leases and extended grazing areas would help them absorb the costs of bad seasons and give them an opportunity to recover financially, if the drought broke. Many were on the verge of bankruptcy and if the government did not allow longer leases to absorb the costs of bad seasons, their properties would be resumed by creditors.

In the period from 1890 to 1901 ten leaseholds in the Western Division were abandoned and sixty-three resumed. Some of these areas were re-leased at much reduced rates. For example, Boulka Lake's annual rental dropped from £1,314 to £420 and Brewarrina Downs from £116 to £12 15s. The rent was determined by an assessment of the stocking capacity of the land, which had fallen so dramatically that the rents attached to the original leases could not be met.

The reappraisals reflected the Western Division's changed pastoral value under settler and environmental pressures. It also indicated a weakness in the rental system. The Commissioners reported on the disjuncture between the rental system and environmental fluctuations. They argued that land appraisals which occurred every seven years, to determine rent for the next seven years, were an abstraction and did not take into account...
account that the stocking capacity could change dramatically in this time. This meant that
the rent inaccurately reflected the real value of the land and locked pastoralists in to
rental payments that they may not be able to meet.\textsuperscript{25}

The 1901 Royal Commission came at a time when closer settlement and
agriculture were under scrutiny from the Victorian and New South Wales governments,
which were each investigating the possibilities for irrigation along the inland rivers. The
Commissioners were instructed to investigate 'areas of land suitable for agriculture' and
closer settlement in the Western Division. Pastoralists widely rejected the notion that the
country may be suitable for closer or small settlement and agriculture. Land that was
claimed for closer settlement would reduce the sizes of pastoral runs and reduce graziers'
opportunities to earn a profit. When asked if it would be harder to move stock during
floods if the country was fenced off into smaller areas, a pastoralist gave the wry reply
that, 'I do not think people would hesitate to cut fences if they were moving their sheep; I
know I would not...'.\textsuperscript{26} The Commissioners recognised the bias that pastoralists had
against closer settlement and wrote in their report that they avoided 'altogether evidence
given by pastoral lessees, whose minds might be regarded as somewhat biased on the
question [of closer settlement]'.\textsuperscript{27}

The Commissioners themselves, however, also rejected closer settlement.
Homestead Leases that divided the land into small blocks of no more than 16 square
miles had been offered in the region. The Commissioners interviewed Homestead lessees
from the Western Division and other districts. The lessees stated they had, at best, made a
'bare livelihood' and that the Homestead scheme overall was a failure.\textsuperscript{28} The
Commissioners also sought advice from South Australia, which had embarked on
irrigated closer settlement. Interviews with members of the Pastoral Board and farmers
from that state gave more negative opinions on closer settlement for western New South
Wales. In the view of the Commissioners, the land in the region could be parcelled into
blocks not smaller than 150 square miles, but preferably much larger.\textsuperscript{29} The

\textsuperscript{25} McMaster et al., 'Royal Commission to Inquire into the Condition of the Crown Tenants'. 'Report'. Part
1, p.xiii.
\textsuperscript{26} William Godfrey Ferris, pp.685-686, 'Royal Commission to Inquire into the Condition of the Crown
Tenants'. 'Minutes of Evidence, Appendices, and Returns'. Part 2.
\textsuperscript{27} McMaster et al., 'Royal Commission to Inquire into the Condition of the Crown Tenants'. 'Report'. Part
1, p.xvi.
\textsuperscript{28} McMaster et al., 'Royal Commission to Inquire into the Condition of the Crown Tenants'. 'Report'. Part
1, p.xvi.
\textsuperscript{29} McMaster et al., 'Royal Commission to Inquire into the Condition of the Crown Tenants'. 'Report'. Part
1, p.xvii.
Commissioners instead recommended extended leases and reduced rents for pastoralists that included significant conditions. These recommendations aimed to reinvigorate pastoralism in the Western Division by making grazing more economically and environmentally sustainable.

The Commission resulted in the Western Lands Act 1901 and the establishment of an independent Pastoral Board, each of which carried through the recommendations of the Commission almost unaltered. The Western Lands Act 1901 remains in force to this day, albeit with many amendments.

Earlier government reports on the use of inland rivers for irrigation and improved navigation had also recommended against development on the Darling. In 1896 the New South Wales government had commissioned a report on the potential for irrigation and improved inland river navigation in the colony from a retired British Indian Army Colonel, Frederick J. Home. He concluded that most of the inland was unsuited to irrigation as river flow was too erratic. Historian Clem Lloyd described Home's view of the Darling: 'Assessing the Darling as a whole, Home rejected any suggestion that public money could profitably be spent on it for irrigation, and market forces were continuing to move against the river trade'.

The extension of railways through the New South Wales, and the continent, had made long distance river trade less necessary and less attractive to pastoralists, in terms of commerce. Moreover, low river flow often stranded paddle steamers making rail carriage a more reliable form of transport between industry and colonial centres. Paddle steamers remained important to the wool industry as a form of transporting wool between pastoral stations and railheads, particularly along the upper Darling. The decline of the wool industry and intense drought, however, even threatened the survival of local river trades.

Government and settler interest in 'developing' the Darling had radically altered in less than a decade. International assessment had brought to the fore the financial and hydraulic difficulties of water conservation, irrigation, and improved river navigation in the region. To this, the 1901 Royal Commission added its report, which detailed the dire condition of pastoralism, the land, and the rivers in the Western Division. The effects of the 1890 flood and the 'Federation Drought' in Bourke and along the Darling River

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highlight the deep vulnerability of settlements and settlers in the region, as their lives and livelihoods were tied to the erratic river flow of the Darling and its western tributaries. Such vulnerability continued, and will be explored in the final case study of this thesis (chapter seven).

An experimental lock and weir built on the Darling at Bourke in 1895-97 still stands, testimony to the plans that were once held for the Darling in this period. It was the first navigation lock in the colony, built to test the financial and construction possibilities of improving navigation along the river. While the weir was not replicated on the Darling, it demonstrated that navigation locks could, as Lloyd wrote, 'be built at a reasonable cost'.

The New South Wales government was already turning its attention to the Murray in the 1890s. In his 1896 report, Home had advised that irrigation projects on the Murrumbidgee and Murray rivers were viable, noting that as the Murrumbidgee was completely inside New South Wales' boundaries it was a simpler choice. Home's report reiterated recommendations made by New South Wales government engineer Hugh McKinney in 1886 for water conservation structures on the Murray and Murrumbidgee.

The Murray's flows were the most consistent of the inland rivers. The river was characterised by seasonal high flows or small floods fed by spring snowmelt from the Great Dividing Range. These seasonal inflows largely insulated settlers along the river (more than other inland rivers) from the long-term effects of droughts. In making the case for extensive water conservation and irrigation works along the Murray in 1900, McKinney wrote that, 'the Murray is by far the most regular of our rivers in flow, and a good discharge can always be depended on during the later half of the year', after the snowmelt. The regular, annual rhythm of the river led meteorologist William Stanley Jevons to liken the Murray to the Nile in 1859, an analogy that was to gain increasing political currency in the nationalist and progressionist inter- and post-war years of

33 See, Lloyd, Either Drought or Plenty, pp.176-187, especially p.177.
34 Lloyd, Either Drought or Plenty, p.178-179.
extensive river engineering. The analogy perhaps also gained a degree of engineering boosterism when the Nile was dammed by the British at Aswan in Egypt in 1898-1902. The ‘Federation Drought’ and the drying-up of the Murray in the 1920s spurred popular and government support for the construction of dams.

Lewis Ronald East, chairman of the Victorian State Rivers and Water Supply Commission (SRWSC) from 1936 to 1965, concluded a 1939 pamphlet, The River Murray Waters: Harnessing the Nile of Australia, by drawing attention to the wider political, social, and economic goals of river engineering. Engineering structures, he wrote, ‘are destined to play a very important part, in fact, possibly the most important part in the future development of rural Australia... we all look forward to the time when there will be in the Murray Valley a great and increasing population utilising to the full extent our greatest national asset – the waters of the Murray’. Hydraulic engineering was a means to increase population and production by controlling the river and ensuring environmental security.

The Murray offered a kind of redemption for the inland rivers in the Federation years of intense and prolonged drought. Yet, the idea of regular rhythms on the Murray was a generalisation that not only disguised regional variations and intricate hydrological/biological relationships but was occasionally undermined by dramatic, river-long changes in flow; for example by a small snow fall and therefore reduced river flow (that could be exacerbated by little or no rainfall), which led to the Murray almost completely drying up in the mid-1920s; as well as large floods fed by high snowmelts and rainfall, such as in 1852, 1870, 1917, and 1927.

The snow-fed Murrumbidgee, although recognised as more erratic than the Murray, also presented opportunities for irrigation in New South Wales. McKinney and Home argued that floods along the river (and there had been many floods through the river system between settlement and 1890) could be harnessed for government-funded irrigation through building a canal below Yanko Creek and that there was also a number

40 East, The River Murray Waters: Harnessing the Nile of Australia, p.10.
of suitable dam sites.\footnote{McKinney, ‘Intercolonial Water Rights as Affected by Federation’, pp.237-239; and, Lloyd, Either Drought or Plenty, pp.178-9. Flood along the Murrumbidgee: see, Butcher, Gundagai, p.84.} However, the costs involved in such works as well as the changeability of the watercourse (from accumulation of flood silt) presented significant limitations to New South Wales’ pursuit of irrigation projects in this period of economic depression, and then recovery, before Federation.\footnote{McKinney, ‘Intercolonial Water Rights as Affected by Federation’, pp.237-244; and, Lloyd, Either Drought or Plenty, p.179.}

Federation brought new possibilities for cooperation and jointly funded engineering projects along the Murray (and complicated potential irrigation along the Murrumbidgee). In the period leading up to Federation, and indeed throughout the drafting of the constitution, the south-eastern colonies debated the relationship between, and hierarchy of importance of, irrigation and navigation in the future of the Murray.

*(Dis)unity: The Murray River and Federation*

Before he was Australia’s official war historian, C.E.W. Bean wrote about the inland, in part focusing on the synergy between the wool industry and the Darling River in western New South Wales. He was writing in the first two decades of the twentieth century, at a time when government and national attention was fixed on irrigation and the Murray River. Yet, at the same time settler identity was rooted in the wool industry, floods, and droughts. Bean was self-conscious about this national context and wrote in order to describe the kind of living heritage of pastoralism in the west and the erratic flows of the Darling River, to urban Australians.\footnote{C.E.W. Bean, ‘Preface’, The Dreadnought of the Darling, second edition, first published in 1911, (Sydney: Angus and Robertson, 1956), pp.vii-viii. Bean was brought up at Bathurst until the age of 10 (when his family moved to England) and was educated at Clifton and Oxford. After missing out on first class honours at Oxford he studied law, and arrived back in Australia at the age of 25. Not yet settled in a career he tried journalism, writing for the Evening Standard and London Spectator. Although Australia-born, Bean considered himself a ‘new chum’ in Australia. At the time he wrote the newspaper articles that were later to be published as the books On the Wool Track and The Dreadnought of the Darling, he was a journalist for the Sydney Morning Herald and Sydney Mail. K.S. Inglis, C.E.W. Bean: Australian Historian (University of Queensland Press: St. Lucia, 1970), p.9.} Floods figured in Bean’s accounts, especially in the series of newspaper articles that later became his book The Dreadnought of the Darling.\footnote{Bean, The Dreadnought of the Darling, p. 155.} Bean invoked floods and droughts as fundamental to Australian pioneering identity formed over the previous century and urged Australians to remember their past and the
pastoralists. Bean linked the fortunes of pastoralists to the fluctuations of river flow, as well as the survival of river navigation at a time when irrigation looked to supersede it as a profitable use of river water.

Navigation and irrigation were associated with two different types of settlements and industries. In essence, debates over navigation and irrigation were about which kinds of settlements and industries should be supported by governments through interstate river engineering. Navigation was linked closely with pastoralism and especially the wool industry, while irrigation promised the expansion of irrigated agriculture but within defined settlements, especially vegetable, fruit, and grain production (but also dairy farming).

In the 1880s and 1890s the Victorian and South Australian governments were expanding irrigated agriculture, establishing the irrigation settlements of Mildura in 1886 and Renmark in 1890 on the Murray (in partnership with the Chaffey brothers). Victoria had transferred its water rights to the Crown in the 1886 Irrigation Act in order to avoid the strictures of riparian law (imbedded in common law) and develop irrigation settlements. New South Wales waited to see the outcome of Victoria’s move and followed suit in 1896 by passing the Water Rights Act. Despite this legal action, New South Wales was not wholly committed to irrigation. At a Constitutional Convention in 1898 New South Wales delegate (Sir) Joseph Carruthers declared that, ‘I pay little attention to the discussion today on the subject of irrigation, because irrigation is one of those things that may perhaps come in the distant future. At the present it does not present its possibilities to my mind with any great force’. 46

Throughout the 1890s New South Wales remained uncommitted to irrigation and while it considered navigation important, it was not wholly committed to it either. Along with the effects of drought and the expansion of railways, inland river trade routes also worked against New South Wales government support for improving river navigation. Inland river trade routes had traditionally taken goods either to Victorian or South Australian river ports and out of the colony. Although agreements over intercolonial custom duties somewhat mitigated the financial losses to New South Wales from export revenue, New South Wales ultimately had little to gain from improved river navigation.

45 English common law was implemented in Australia in 1824. It was based on both legislation and the application of legal precedent. Through common law, riparian rights were established to give riparian landholders rights to ‘reasonable use’ of water, but it was illegal for them to impede the flow to downstream users.
46 Quoted in, Lloyd, Either Drought or Plenty, p.154.
navigation. The improvement of river navigation was, however, supported by sectors of the population, such as the politically influential Riverina graziers.

Victoria’s plans for irrigation and South Australia’s interest in navigation led these two colonies into heated and lengthy debates with New South Wales over the use of Murray River water for seemingly incompatible industries. Both sought New South Wales’ support and leverage against the other colony. The main channel of the Murray was entirely within New South Wales’ jurisdiction, excepting only the southern end of the river in South Australia. When the boundaries of the colonies had been established, the Murray had become the border between New South Wales and Victoria, but New South Wales had retained sole rights to the river’s water, which it frequently reminded Victoria about at intercolonial meetings.

The development of the Murray for irrigation and/or navigation was a contentious issue during intercolonial discussions. At the many Constitutional Conventions of the 1890s engineering works to regulate river flow along the Murray loomed large as a future issue between the federated states. Development of both the navigation and irrigation industries through river engineering required agreement and cooperation between the (future) states over development programs and the projected effects of changed river flows. South Australia and Victoria clearly favoured different industries. New South Wales increasingly supported irrigation, although it did so behind a veil of ambiguous arguments and uncooperativeness.

Lloyd has described New South Wales’ position on navigation during the Constitutional Conventions as ‘ambivalent’ while its ‘political leaders differed remarkably in their attitudes to irrigation’. New South Wales appeared to keep ‘its options open’ on navigation and irrigation, which frustrated both Victoria and South Australia: ‘In the circumstances New South Wales’ attitudes were often hard to follow, and Victoria and South Australia were perplexed by its frequent lack of logic and bellicose outbursts’.

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47 See, SMH, 21 April, 1890, p.7. The battle between New South Wales and Victoria over the Murray early on focused on the proportion of river trade custom duties that went to each colony. For a summary of the history of this debate between New South Wales and Victoria and also South Australia over custom duties, see, Wright, 'The River Murray: Microcosm of Australian Federal History', pp.277-280. Territorial debates between the riparian states were also linked to ownership of Murray waters. See, Lloyd, Either Drought or Plenty, pp.152-154
48 Lloyd, Either Drought or Plenty, p.153.
49 Lloyd, Either Drought or Plenty, p.152 and p.154.
50 Lloyd, Either Drought or Plenty, p.154.
51 Lloyd, Either Drought or Plenty, p.154.
New South Wales refused to cooperate with Victoria over irrigation and with South Australia over navigation, giving little ground at intercolonial meetings.

Yet, senior New South Wales government officials made detailed investigations into the way irrigation development might play out after federation, as well as how water use along the Darling River system might be affected by federation and interstate rights. Large scale river works required a 'watershed' perspective, as tributaries, along with the main channel flows, would need to be secured, harnessed, and controlled. Hugh McKinney, a pro-irrigation engineer, director of the New South Wales Water Conservation Commission, and Commissioner-in-Charge of the Murray River from 1890, is widely credited with compiling the first map of the Murray-Darling Basin.\(^{52}\) The map was, however, titled the 'Drainage Area of the Murray River'. Terms such as 'the Murray river system' and 'the Murray river basin' came into common use in this period, and for decades afterwards referred to the whole Murray and Darling river system – which historian J.M. Powell noted, reflected 'the spatial drift of the debate' about river engineering.\(^{53}\)

The map, although compiled by 1891, was first published in 1900, as part of a paper by McKinney in the proceedings of the Royal Society of New South Wales, titled 'Intercolonial Water Rights as Affected by Federation'.\(^{54}\) McKinney had been instructed to compile the map by the Premier of New South Wales, Henry Parkes.\(^{55}\) In his paper, McKinney cautioned that the unified depiction of the basin 'was likely to give a very incorrect impression regarding the quantity of water which might be expected to flow off', which would vary from season to season, and year to year.\(^{56}\) The map also hid the variation in discharge rates between rivers. McKinney attempted to overcome the shortcomings of his map, shading in parts of rivers to indicate greater average discharge. The map also concealed the political limitations of managing the river system as a whole.


\(^{53}\) Powell, *The Emergence of Bioregionalism in The Murray-Darling Basin*, p.64.


\(^{55}\) McKinney, 'Intercolonial Water Rights as Affected by Federation', p.234; McKinney, 'Map shewing the drainage area of the Murray River'. Parkes was Premier of New South Wales from 1872 to 1875, in 1877, 1878 to 1883, 1887 to 1889, and 1889 to 1891.

\(^{56}\) McKinney, 'Intercolonial Water Rights as Affected by Federation', p.234.
Map 4.2
H. G. McKinney's 1891 map of the Murray and Darling river systems.
The dimensions of the original map are substantial (each of the four panels measures
approximately 2 × 1.5 metres). Here, digital images of the panels have been cropped in order to
give a sense of the whole map. As a result, sections of the map may not be to scale.

[Top left, top right, and bottom right panels:
H. G. McKinney, ‘Map shewing the drainage area of the Murray River’ [cartographic material].

Bottom left panel:
H. G. McKinney, ‘Map shewing the drainage area of the Murray River’ [cartographic material].
McKinney’s paper analysed the likely effects of federation on the development of the rivers, especially the probable amplification of tensions between the need to treat the river basin as a unit for the development of irrigation and the political fragmentation of the basin. McKinney argued in favour of irrigation and proposed that navigation could be simultaneously ‘augmented’ by irrigation water storages.57

McKinney further raised issues around federation as well as plans to establish an interstate commission. He argued that federal and interstate management of the inland rivers presented opportunities for New South Wales to pass on costs of works along the inland rivers, such as snagging and any navigation locks built along the Darling. Indeed, McKinney argued that the difficult question of improved navigation along the Darling could be passed entirely to the Federal government.58 He also raised some scenarios, however, about how interstate and federal management could limit the way New South Wales used the water from its rivers. New South Wales river waters, while flowing entirely within jurisdictional boundaries, were linked with the basin’s river networks. Whilst admiring of Victoria’s irrigation schemes, McKinney also pointed out the complications they presented for establishing interstate water rights. Victoria, and to a lesser extent South Australia, had established irrigation infrastructure and sanctioned water extraction from the Murray itself, and in Victoria’s case large extractions along many Murray tributaries (such as the Loddon, Campaspe, and Goulburn rivers).59 These extractions would need to be factored into equitable water rights for each state.

Although few interstate disputes had as yet arisen over the Darling and political attention focused on the Murray, McKinney foresaw potential problems that centred on the important role of floods through the Darling system: ‘The very important part played by the Queensland tributaries in supplying floodwater to the river Darling and maintaining the facilities for navigation will render it necessary for the Inter-State Commission to watch the steps which may be taken to utilise these rivers to the greatest advantage’.60 Indeed, McKinney devoted much of his paper to the role of floods as a source of water supply for irrigation along many of the rivers within the basin.61
Engineering development of the rivers, including the Murray, would need to harness flood flows and drastically alter the hydrology of the rivers in order to achieve the goals of closer settlement irrigated agriculture.

As Powell has argued, interstate debates over the Murray in the lead-up to Federation had 'degenerated into a muddle of 'pettifogging quibbles'' in which state government 'parochialism triumphed time and again'.62 No definite resolutions were made about the Murray for post-Federation works. In the final form the Constitution took, Section 100 gave the states ultimate rights over rivers and waters within their boundaries, with Sections 51(i) and 98 placing navigation under federal control. However, New South Wales and Victoria were concerned that if state usage of the waters for conservation and irrigation impeded navigation the clause may be invoked, in effect giving the Federal government power over irrigation. The New South Wales Governor, George Reid, moved to temper the federal navigation power, so it 'shall not abridge the rights of a State or its citizens to the use of the waters or rivers for conservation and irrigation'. As Lloyd points out, it was South Australia, the colony at the tail end of the system, that inserted the word 'reasonable' before 'use'.63 Section 100 was inserted to preserve the rights of the states.64

Section 100 defined how the water could be legally used and thereby shaped scientific enquiry into, and public perception of, the rivers. Further, the Constitution dismantled English common law in Australia, with the 1912 Water Act completing this action with respect to water rights in New South Wales. In so doing the Constitution made way for an era of 'private water exploitation under public licence' and large interstate engineering schemes.65

The Constitution also made provisions for an interstate commission, as anticipated by McKinney. Section 101 stated that: 'There shall be an Inter-State Commission, with such powers of adjudication and administration as the Parliament deems necessary for the execution and maintenance within the Commonwealth, of the provisions of the Constitution relating to trade and commerce, and of all laws relating

63 Lloyd, *Either Drought or Plenty*, p.162.
thereunder’.66 This section did not specify relevance to the use of river water, but as a source of both ‘trade and commerce’ related directly to it.

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The RMC: Engineering and the Murray River Watershed

Historian Don Wright has noted that ‘[t]he paradox of the Murray.... was that it did not only divide. It also united’.67 Although a political boundary and source of intense debate between New South Wales, Victoria, and South Australia, the Murray often united those who lived along its banks.68 The drought which had crippled the pastoral industry along the Darling had also severely affected farmers along the Murrumbidgee and Murray. Towards the end of 1901, the drought intensified, prompting farmers to take matters into their own hands. Small lobby groups emerged along the Murray and Murrumbidgee, who campaigned for engineering works to ensure steady water supply to their drought-stricken properties. The smaller groups soon united into the pro-irrigation River Murray Canal League.69

In order to lobby decision-makers directly, the League organised a conference and invited parliamentary representatives from districts in New South Wales and Victoria as well as state Premiers and the Prime Minister. At the conference, held in Cowra in April 1902, the League delegates, mostly ‘practical farmers’, called for action to ensure a stable water supply for both navigation and irrigation and for the states to overcome their differences.70 The conference resulted in the governments of New South Wales, Victoria, and South Australia establishing an interstate commission to investigate possibilities for water storages, irrigation, and improved navigation on the Murray.

The interstate commission consisted of representatives from the three states. Despite the potential for the commission to implode through disagreements between the state commissioners, it finally established the primacy of irrigation over navigation. There was neither enough trade nor water to warrant the predominance of navigation. Although

69 Lloyd, Either Drought or Plenty, p.181.
the needs of irrigation would be put first, the commission also recommended navigation locks be constructed along the Murray. It also recommended various dam sites for water storages to feed irrigation, with the cost of the structures to be shared between the states.\textsuperscript{71}

Wright noted that another important and lasting resolution of the commission regarding the Murray was that, ‘the whole river system must be treated as a unit under the joint management of the three States’\textsuperscript{72}. However, the subsequent River Murray Waters Agreement and RMC rather consolidated a watershed administration around the Murray. Further, the upper Darling and its tributaries remained outside interstate policies. The Commission had discussed the basin in holistic terms, including the Darling and its tributaries. Its focus, though, remained on the Murray. The eventual River Murray Waters Agreement and RMC created a political and administrative gulf between the Murray and Darling systems, dividing the basin rather than uniting it. In 1915 the governments of New South Wales, Victoria, and South Australia signed the River Murray Waters Agreement and two years later formed the RMC. Queensland and the upper tributaries of the Darling were not included in the Agreement or the RMC. Queensland had little development on, or future plans for, the Darling tributaries within its boundaries and its involvement seemed negligible. Further, New South Wales government reports had strongly advised against putting money towards expensive and fruitless irrigation projects and improved navigation on the Darling River. The upper Darling and its tributaries were treated merely as inconsequential Murray feeders, thrown into the shadows by the intense focus on the Murray itself.

In some ways the focus of the RMC on the Murray River was a recognition of the hydrological differences between the Murray and Darling river systems. Although the two river systems shared a common river mouth, they were fed by seasonally different rainfall patterns, local weather, and other hydrological conditions. In part these differences led to the exclusion of the highly erratic upper Darling and its tributaries from the RMC and its focus on the Murray. However, the limited focus of the RMC also left the upper Darling and its tributaries open for both state-funded and private irrigation works in New South Wales and Queensland, unmediated by the interstate commission. This eventuated in the 1960s and 1970s (see chapter six). In 1996 Queensland joined the RMC, which had been re-named the Murray-Darling Basin Commission in 1993, largely in order to address

\textsuperscript{71} Lloyd, \textit{Either Drought or Plenty}, pp.181-183.
\textsuperscript{72} Wright, ‘The River Murray: Microcosm of Australian Federal History’, p.281.
basin-wide rising soil salinity (that mostly stemmed from changed flood and river flows due to dams and water diversions for irrigation).

Perhaps another consequence of the upper Darling’s and its (especially western) tributaries’ erratic flow and exclusion from the grand vision of the New South Wales government, was that local knowledge of floods developed in these areas over the next decades and the custodians of such knowledge were relied on by settlers, rather than state or federal knowledge gathering and flood warning networks. Such government resources were concentrated elsewhere. After New South Wales centralised flood aid and emergency responses in the 1970s, local residents and regional governments were to clash with state government officials over how to approach threatening floods (see chapter seven).

Lingering disputes between competing use of the Murray for navigation and irrigation were resolved when the relevant states agreed, after 1917, to the canalisation of the river, as this would ensure irrigation supply without restricting navigation. Although New South Wales had not fully committed to irrigation in the lead-up to Federation, Victorian success, the possibility to establish a broader production base (with the prospect of more exports) and the potential to attract immigrants gradually brought the state more in line with its southern neighbour after Federation. Lloyd has argued that ‘[a] crucial factor in the development of irrigation [in New South Wales] was the political drive for closer settlement... The period from 1902-03 to the outbreak of war in 1914 was very much the era of closer settlement in New South Wales’. A blossoming of irrigation settlements along both sides of the Murray and many of its tributaries followed Federation, including the establishment of the Murrumbidgee Irrigation Area in 1906 in which McKinney was heavily involved.

In Victoria, the establishment of closer settlement irrigation was spearheaded by Elwood Mead, an American engineer who migrated to Victoria in 1907 to head the State Rivers and Water Supply Commission (SRWSC). The SRWSC was established in 1905. It abolished the regional Irrigation Trusts (with the exception of the Mildura First Irrigation Trust) which had managed localised water supply and were financially in debt to the government. Rural water supply was centralised by the creation of the SRWSC. Mead was an expert on irrigation with an international reputation and his work on

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74 Lloyd, Either Drought or Plenty, p.184.
irrigation settlements was regarded especially highly by Australian engineers. He was given the task of developing Victoria's water administration and engineering capabilities, in order that state policies of irrigated closer settlement could be fulfilled. Mead used the Commission's reach to resolve inefficiencies in water management and initiate and expand irrigation settlements. Under his leadership the SRWSC strengthened the links between closer settlement and irrigation in Victoria, aided by the 1904 Closer Settlement Act. Mead returned to America in 1915, where he later drew on his Australian experience, for example in his role in planning Californian government irrigation settlements.76

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American Connections

After Federation, Australia increasingly looked to American irrigation and water management expertise to harness river flow, especially along the Murray, its tributaries, and (other) snow-fed rivers. Mead's employment by the SRWSC was part of an effort to learn from America's innovations in irrigation and water conservation technology and techniques, as well as ideas about the role of small irrigation settlements as a way to, as Powell wrote, 'further settlement expansion into marginal country'.77 Previously, India had been Australia's primary international source of water management and engineering expertise.78 Colonial hydraulic engineers with experience in India were invited to Australia to consult on river engineering and were also hired into government water management departments. For example, McKinney had a decade of experience as an hydraulic engineer in India before his migration to Australia in 1880.79

77 Powell, Watering the Garden State, p.150.
78 Historian Ian Tyrell also explored Australia's turning away, in terms of international influence, from predominantly British Indian, to American expertise from the 1880s. See, Ian Tyrell, True Gardens of the Gods: Californian-Australian Environmental Reform, 1860-1930 (Berkeley: University of California Press, 1999), p.121.
Wales' commissioning of Colonel Home to report on government irrigation and river navigation is another example.

Alfred Deakin, Australia's 'Father of Irrigation', was enamoured of the status of the British engineer in India as 'a ruler of men'. However, it was American irrigation developments and management techniques that inspired his shaping of Victoria's 1886 Irrigation Act. This Act overcame many limitations of common law on the development of irrigation and facilitated the establishment of the Mildura Irrigation Colony on the Murray in the same year by American entrepreneurs, the Chaffey brothers. While Deakin admired the status of British engineers in India, by the 1880s they had become recognised figures of colonial autocracy and local repression. Historian Ian Tyrrell noted that emulating irrigation in India would undermine the public support required for government irrigation in Australia, needed to 'justify the expenditure of large sums of money'. Further, connections between Australia and western America were made, especially with California, as they shared similarities both in climate and in their colonial histories of land use. They were perceived by experts to face similar problems in developing irrigation, such as the exacerbation of soil salinity, and to be able to gain much from each others' experiences and expertise.

After the First World War, Australia drew even more on the United States of America (USA). Tyrrell has argued that Australia’s increased modelling of the USA’s irrigation and water conservation techniques from the 1930s was influenced by a closer convergence of government organisations. The establishment of the RMC in 1917, which facilitated federal intervention administratively and financially, made the country closer to the USA’s system, where federal intervention had seen the development of large engineering river projects that coordinated states’ interests, such as the Mississippi River Commission (MRC) and later the Tennessee Valley Authority (TVA). Similar

81 Lloyd, Either Drought or Plenty, p.175; Tyrrell, True Gardens of the Gods, pp.121-143; Powell, Watering the Garden State, pp.104-135; and, Proust, 'Learning From The Past For Sustainability: Towards an Integrated Approach', pp.153-163. McKinney brought knowledge and ideas about the connection between irrigation and soil salinisation as well as the opportunities for irrigation in Australia, from India. See, Powell, The Emergence of Bioregionalism in the Murray-Darling Basin, p.80; and, Hugh McKinney, 'Irrigation In Upper India', Journal and Proceedings of the Royal Society of New South Wales, 17, 1881, pp.139-148, especially, pp.146-8.
83 Tyrrell, True Gardens of the Gods, pp4-5.
bureaucratic systems, Tyrrell implied, fostered exchanges of knowledge and techniques.\(^{84}\) Further, during the inter- and post-war period the USA embarked on massive dam building projects for water supply, irrigation, flood control, and hydro-electricity that clearly marked it as the international leader in modern river engineering by the 1940s. Closer political alliances between the countries through the two world wars, and after, also favoured greater synergy over technology, expertise, and crops.

Mead in turn applied his Australian experiences to America on his return. Ideas about water management and irrigation development did not flow one-way across the Pacific. For example, Powell has suggested that the SRWSC influenced the bureaucratic structure of the TVA, created in 1933.\(^{85}\) The watershed focus and interstate mediatory role of the RMC perhaps also influenced the TVA. The RMC's role had not been limited to particular issues, such as navigation and flood control (as the MRC's had), and it was able to coordinate (albeit in a somewhat makeshift manoeuvre) responses to inter-war concerns over the interrelationship of floods, erosion, deforestation, and salinity, which the TVA also aimed to address.\(^ {86}\) The TVA (as well as other large hydro-electric and irrigation supply dams in the USA) influenced the Snowy Mountains Scheme, and American engineers (along with engineers from other countries, such as Norway, Italy, Czechoslovakia, and Germany) were contracted to work on the scheme.

In the inter-war and Cold War period Australia and America shared similar management frameworks and goals of government-backed irrigated closer settlement and, through that, national self-sufficiency. National food supply, population growth, land settlement, and power generation for manufacturing underlay the drive of both countries towards extensive irrigation programs and large water supply and hydro-electric projects. Both America and Australia created centralised watershed bureaucracies to foster irrigation and dam construction. Australia's connection to America can, however, be over-stated. Australian state water bureaucracies and the RMC continued to draw on a wide range of irrigation, water conservation, as well as flood management and warning

\(^{84}\) Tyrrell, True Gardens of the Gods, pp.172-173.


\(^{86}\) Powell, The Emergence of Bioregionalism in the Murray-Darling Basin, pp.35-37.
technologies and techniques from many countries, including Britain, France, Italy, Egypt, The Netherlands, and, of course, India.  

Further, post-war immigration brought people with a variety of skills, environmental knowledge, and expectations. Post-war immigration programs, that aimed to bring 70,000 new immigrants each year, were designed to increase Australia’s national security through population growth and to increase the labour force. Programs targeted Europeans, many of whom had been uprooted by war. Immigrants from a variety of countries, such as The Netherlands, Italy, Germany, Poland, and Greece were placed or sought work with reconstruction projects in Australia such as the Snowy Mountains Scheme and as farmers in irrigation settlements.

After the two world wars, which delayed major river works, irrigation along the Murray and many of its tributaries was boosted and secured by ambitious water storage schemes, including the Snowy Mountains Scheme. These major works were a result of joint funds and federal coordination. Through its mediatory role and involvement in irrigation and water supply, the RMC also emerged as an important research organisation and authority on the Murray River.

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Australia began the new century and its nationhood with the germs of large-scale river engineering built into its very foundation. By the 1950s the Murray had become a highly regulated river. The Hume Dam, Lake Victoria Reservoir, Snowy Mountains Scheme, five barrages on Lake Alexandrina blocking the Murray mouth, and 14 locks spanning the Murray were completed between 1915 and 1974, and all were at least under construction by the mid 1950s. In the 1950s faith in engineering was at its zenith. Australia and other nation-states emerged from two world wars with nation-building programs that

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aimed at national security, including military weapons testing, increasing immigration, and water and food security. In the post-war era, technological skill worked hand-in-hand with national security and advancement, within a context of fragile, global Cold War politics. State and national governments channelled money to the Snowy Mountains Scheme, which also promised to catapult Australia into international recognition for its engineering achievements and expertise. It was a national development project of unparalleled proportions. Engineers seemed to be rapidly moving towards the creation of the long desired stable river and nation. At the height of the engineering boom, their success was challenged by one of the largest floods since settlement.
Mildura and the Murray River 1956
The Failure of Engineering

In 1956 Ted Lawton photographed the Murray River in flood from the air. In his photographs irrigation farms are partially submerged by floodwater, the straight lines of agricultural growth just visible by the tops of citrus trees and vines protruding through the water. The places where levee banks hold back floodwater from farms and towns are clearly visible sharp edges. Lawton’s aerial photographs are of the extensive floodwaters around the towns and irrigation areas of Mildura, Buronga, and Gol-Gol in north western Victoria and south western New South Wales. These areas are in the irrigation region known as Sunraysia, reliant on regular river flow for irrigation water supply. The photographs were taken in late-August, as the floods peaked.

Lawton was not a professional photographer, but a Commonwealth Scientific and Industrial Research Organisation (CSIRO) employee who had access to a camera through his work. He took the opportunity to photograph the floods.¹ His photographs are now valuable records, and part of a tradition of important work undertaken by CSIRO employees in their spare time.² Lawton’s photographs appear throughout this chapter. Along with his aerial photographs, Lawton documented the floods around Mildura and Red Cliffs on the ground. Many of these photographs are of Council workers and volunteers, who were building up levee banks in order to hold back the floodwater from homes, orchards, and machinery. These photographs were taken between one and two

weeks before the flood peaked in the area. There is an air of urgency about the work being undertaken, the scale of the job at hand clearly evident in the masses of earth being moved to raise and reinforce the levee banks. The other main subjects of Lawton's photographs were the irrigation pumps and generator at Red Cliffs. The pumps fed irrigation farms in Mildura and Red Cliffs and became an important focus for local levee-building efforts. If the pump and generator flooded, the irrigation season would be lost. They were a clear priority for a district reliant on irrigation. For many who lived along the Murray River, the 1956 floods were experienced as a local threat. They were also perceived as a failure of government engineering to create a stable river and to manage floods.

Figure 5.1
Aerial view of flooded Murray River in the Buronga area (New South Wales), near Mildura, 1956.
[Ted Lawton, 22 July, 1956, Mildura Library.]

In 1956 settlers experienced the first, and to date the only, basin-wide floods since colonisation. The Darling and Murray rivers and their tributaries all flooded in that year. Pulses of water were sent through the catchments for ten months, with final peaks in the Murray in July and August, and the Darling in late August and early September. The floods along the Murray created social and political upheaval that came to focus on the effects of regulation on river flow, responsibility for the floods, and future flood
mitigation and management. Occurring in the post-war development era and at the height of national faith in engineering, particularly in hydraulic engineering, the flood shattered expectations of successful harnessing and control of the inland rivers.

The 1956 floods were seen as a failure of engineering on the Murray and exacerbated tensions between government and settlers over responsibility for flood mitigation and expert knowledge, river flow, and aid. Regulation shaped settler conceptions of the rivers. Those along the Murray were experiencing one of the most dramatic inter- and post-war environmental interventions, the regulation of the Murray simultaneously for drought mitigation, navigation, irrigation, and hydro-electricity. Dam building was part of an almost world-wide post-war pursuance of progressionist development that provided employment for the unemployed and immigrants, new production bases and symbols of nationalism. It was underwritten by a renewed faith in human ability and technology.

The 1950s was a crucial decade of change in Australia. Political and environmental historian Nicholas Brown has argued that this decade bears 'a particular weight as a point of separation between an old and a new Australia'; from 'an Australia of class, hardship, Empire and assertive nationalism' to 'the cultural diversity, the 'quality of life' issues, the protest movements and the liberations of the 1960s'. This chapter adds environmental weight to Brown’s analysis of the 1950s. It was not a period in Australian history that was conservative and static. Rather, the evidence of this chapter supports his argument that it was a decade of transition.

The Murray had been dammed and diverted by settlers since the 1850s. However, twentieth century engineering projects had a significant impact on the river, transforming it into a 'regulated river' in just one generation. By 1956, watershed management systems heralded a new kind of relationship between settlers and the rivers. The seasonal flows of the Murray River were reversed for irrigation needs and eastward flowing rivers turned westward by the Snowy Mountains Scheme. The fearless ideologies of control and management that underlay the construction of river engineering had expression in the construction of dams and irrigation planning and farming. Such ideologies were rooted in ideas of holistic, watershed manipulation. It was an era when large-scale enterprises,
'bigness', commanded national and international respect — both in the size of dams and control over entire river systems. Big achievements promised 'great rewards'..

The scale and financial cost of the projects on the Murray — with costs shared between the relevant states and the Commonwealth — drew on an important aspect of Federation: Commonwealth funds and federal mediation between the states. Cooperation to construct engineering schemes, involving the three states that laid claim to parts of the Murray (Victoria, New South Wales, and South Australia) and its tributaries, was facilitated by Commonwealth coordinated organisations with state representatives. The River Murray Commission (RMC) and Snowy Mountains Hydro-Electric Authority (SMA) were both joint federal/state organisations. One of their primary interests was to ensure water security to state government-backed soldier and closer settlements along the Murray and its tributaries, which were mainly irrigation settlements. The dams were built to control and secure river flow, to ensure there was water in the river at the right times for citrus and vine cultivation (and for other irrigation crops) and to minimise the effects of drought.

Drought mitigation was a dominant environmental imperative behind the construction of the Hume Dam and other regulatory structures built on the Murray and its tributaries in the inter- and post-war periods, ensuring water supply to planned irrigation settlements and (initially) controlling Murray water levels for navigation. Harnessing snowmelt and small flood flows was an important aspect of controlled water supply on the Murray, but no specific flood mitigation strategy was included in any dam designs before 1956. Although the Murray River had flooded periodically (such as in 1870, 1917, and 1927), it was rather experiences of drought and the possibilities for irrigation (including increased population and production), that dominated settler and government desires for engineered works. Flood mitigation was not included in the designs for the Hume Dam nor, later, for the Snowy Mountains Scheme. The 1956 floods revealed to settlers on the Murray and to Federal and state governments flaws in engineering; indeed, the 1956 floods on the Murray River were seen as a failure of engineering.

6 In referring to Murray River tributaries in this thesis, the Darling (sometimes seen as the major Murray tributary) and its tributaries are excluded and will be referred to as 'the Darling and its tributaries'.

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In an era of ‘bigness’, the 1956 floods conformed. A later RMC report estimated that the floods in the Murray watershed covered approximately 1.75 million acres (as in the floods of 1870 and 1917) – it was one of the largest floods along the Murray in terms of peak heights and submerged area.\(^7\) Government investigations into flood mitigation following the 1956 floods concentrated on possibilities for mitigating large floods; however, the floods also became intertwined with other issues of flood management, including emergency aid and river management.

Even in its failure, the engineering that scaffolded the river became the frame through which the 1956 floods were understood and reflected upon. Settlers were concerned not only that mitigation now be addressed but that a watershed-wide ‘flood control authority’ be established, that addressed mitigation through dams and other methods, issued warnings, and provided immediate aid. The key question is: could engineering, a watershed approach, and a more centralised management framework, provide security against floods generally, and large floods in particular?

I focus on the Victorian state government’s response to the Murray River floods. Victoria had larger areas under irrigation than either New South Wales or South Australia and was using the most Murray water for irrigation. Settler and newspaper accounts from the irrigation district of Mildura on the lower Murray, and retrospective memoirs, provide the key sources, along with the Mildura regional newspaper, the *Sunraysia Daily*. Mildura was (and remains) the heart of the largely irrigated fruit-growing district of Sunraysia, which spans parts of north-western Victoria and south-western New South Wales. Mildura, located on the Victorian side of the Murray and near the river’s junction with the Darling, was at a crucial convergence point for floodwaters. There, settlers experienced floods from both rivers. The town was a centre from which farmers lobbied state and Federal governments after the flood. Mildura, then, provides a uniquely cross-jurisdictional perspective into different aspects of the flood. The photographs taken in Mildura and Sunraysia are also important for this analysis.

I explore how the floods were experienced as a failure of engineering by settlers on the Murray who relied on (and expected) the security of a controlled river; and by Federal and state governments which funded, constructed, and controlled major engineering infrastructure. Settlers blamed the governments for not delivering the environmental security promised by dams, irrigation, and government river regulation authorities. Most

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dramatically, settlers as well as members of parliament called into question the effectiveness of the Australian constitution to adequately manage a river system that crossed borders. State governments were seen not to have provided sufficient mechanisms to protect settlers from erratic river flow and many looked to hand flood control to the Federal government.

In order to better understand the context in which the 1956 floods occurred, I begin with a brief account of the establishment of Mildura and the nearby townships of Red Cliffs and Merbein, some of the philosophies behind the establishment of irrigation settlements and dams and the role of government water management bureaucracies, particularly the Victorian State Rivers and Water Supply Commission (SRWSC), River Murray Commission (RMC), and Snowy Mountains Hydro-Electric Authority (SMA).

* * *

Mildura, Irrigation Settlements, and River Management

Mildura is a small town situated on the Victorian bank of the Murray River. Two satellite towns, Red Cliffs and Merbein, are located near Mildura, to the east and west respectively. Together they form the centre of a large irrigation and pastoral district associated with the Murray in north-western Victoria. This area also forms part of the regional, irrigated fruit-growing and manufacturing district of Sunraysia, which also includes part of south-western New South Wales (including Wentworth). Each of these townships was established as an irrigation settlement and together they represent successive approaches to irrigation by the Victorian government. The Chaffey Brothers Irrigation Company, a government-supported private enterprise, laid out Mildura on a grid site plan as an irrigation community in 1887. The American brothers had earlier succeeded in establishing profitable irrigation settlements in California. Encouraged by Victorian politician Alfred Deakin, they founded Mildura and also Renmark in South Australia in 1886. The Chaffey Brothers experienced near bankruptcy in 1893 following a drought, economic depression in the eastern colonies and a Royal Commission into operations at Mildura, after which settlers ran Mildura irrigation and finances regionally,
under the *Mildura Irrigation Trust Act*. Merbein was established by the SRWSC in 1909 as an Irrigation Trust settlement under the highly influential *Water Act 1905* and *Murray Settlements Act 1907* (that aimed to provide a legal mechanism for the establishment of closer settlements in the Mallee region). Red Cliffs Estate was established as a Soldier Irrigation Settlement in 1919-20.

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Under the Water Act 1905 the SRWSC was created to coordinate existing Irrigation Trusts, create new irrigation settlements, and manage rural water supply in Victoria. Irrigation settlements called for a particular type of engineering which involved district planning as well as hydraulic engineering. Mildura, although a planned irrigation settlement, did not fall into this category of government district irrigation planning as it was established earlier, though many of the same principles still applied. Merbein and Red Cliffs were, however, included. The SRWSC became the ‘author’ of distinctly engineered industrial landscapes in parts of rural Victoria, designing Closer and Soldier Settlement irrigation schemes, including Merbein and Red Cliffs. State governments, as well as being key players in the erection of dams, played a significant and related role in developing irrigation, including the establishment of closer and soldier settlement schemes in New South Wales, Victoria and South Australia. States were active participants in what J.M. Powell has termed ‘landscape authorship’.\footnote{Powell, Watering the Garden State, p.177. See also, R. Wright, The Bureaucrat’s Domain: Space and the Public Interest in Victoria, 1836-84 (Melbourne: Oxford University Press, 1989).} Settlers built canals and installed pumps according to state surveys and planning authorities, authoring distinctly engineered landscapes divided into blocks within a mood of national faith in progress and engineering.

The SRWSC worked closely with interstate and federal dam construction and regulatory organisations such as the RMC and SMA. The relationship between dams and irrigation settlements was an important consideration in holistic river system regulation, particularly as soldier settlements were being established in the inter- and post-war periods when construction of regulatory dams, such as the Hume (completed in 1936), were being initiated on the Murray River. Irrigation settlements were also river regulators, as they controlled the flow of water into blocks for prime seasonal timing. Irrigation effectively meant that parts of the land were artificially flooded, regularising inundation. The SRWSC was responsible for formulating adequate irrigation networks that would not damage the water channels, yet cater for growers’ requirements. What was formulated was effectively an irrigation settlement template that took into consideration the type of crop, administrative capacity, rainfall, temperature, and soil type.

SRWSC mechanical and civil engineer Robert Allan Horsfall published a paper in 1950 titled ‘Planning Irrigation Projects’ in the Australian journal of the Institution of
Engineers. At the time Horsfall was assistant chief designing engineer with the Commission and his Australian Dictionary of Biography entry notes that he 'exerted considerable influence in the investigations and designs branch'. In his paper he brought together SRWSC data from 1940 to 1950, presenting a study of the logistics of irrigation planning in Victoria. Horsfall selected eight settlements as comparative examples of irrigation planning in different regions of the state, one of which was Red Cliffs. The kind of crops grown in the settlements determined the size of the blocks and their seasonal water requirements. In Red Cliffs in 1950, 94 percent of irrigated crops were vines, requiring a fairly consistent water supply with a couple of breaks for harvesting (in June/July and late February/early March). Red Cliffs, Mildura, and Merbein were all described in this article as 'compact irrigation systems', formed from smaller blocks, which would support viticulture.

Red Cliffs, with an average block size of 16 acres, was unusually compact, with the 1950 planning for vine-growing in the area using 20 to 25 acre block dimensions as a rule. Engineers aimed to balance block sizes (for the maximum number of settlers) with the water capacity of channels. Therefore, despite variations in crops and environments, general rules applied and it was these that interested Horsfall.

One of the rules for irrigation settlements Horsfall described, was that they were divided into self-contained sections under supervision of a bailiff, and then into subsections of irrigation canal networks. The planning rationale was that each bailiff could only oversee a certain amount of irrigated land and settlers, and so the settlement plan was in part administratively determined. The subsections, linked by canals, served to spread out water extraction as each subsection (labelled A, B, C and so on, or 1, 2, 3) took its turn extracting water from the main channel on a rotational basis.

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12 Wright, 'Horsfall, Robert Allan', ADB Online.
14 Horsfall, 'Planning Irrigation Projects', p.130.
Figure 5.2
Two irrigation templates by R.L. Horsfall, including farming sections and bailiff's sub-sections. The plan on the left is for the cultivation of dried vine fruits (common in the Sunraysia region) and the one on the right is for dairying and fruit growing.

[R.A. Horsfall, 'Planning Irrigation Projects', *The Institution of Engineers, Australia, Journal*, 32, June 1950, pp.129-139, Figure 7 [left] and Figure 8 [right], p.138.]

Figure 5.3
Measuring the water consumption of irrigation areas.

[Horsfall, 'Planning Irrigation Projects', Figure 2, p.133.]
Settlers in each section could then receive the necessary water within the small windows of about 21 days allowed for extraction by dam releases. Each section was planned to support 75 to 100 settlers, depending on block size and crops. In the 1880s, the Chaffey brothers used a similar method of planning their Mildura and Renmark settlements, laying them out in A, B, C (and so on) blocks which were self-contained sections. While the principles were not new — indeed the administrative model was not unlike ancient systems in China — the technology was, and irrigation water was now delivered along the river as dam-controlled releases. Irrigation and dams, along with navigation locks, changed the Murray into a regulated river, altering the riverine environment as well as engineering the authorship of industrial landscapes, which altered local floodplain environments.

Dam controlled irrigation was seen as a way of combating erratic rainfall, as well as a way of increasing settlement. Horsfall wrote in support of irrigation:

The important point, which is not always fully appreciated, is that irrigation supplies are available at regular intervals throughout the season, and, in general, the correct amount of water can be supplied when it is most needed. On the other hand, rainfall tends to be either a feast or a famine, and, in fact, 12 inches depth of controlled irrigation in eight months is likely to be much more effective than the same amount of rain falling at regular intervals over the same period.

Engineering could ensure regular water supply and overcome the uncertainties of rainfall variation. Irrigation networks and dams established systems of carefully controlled water usage and distribution. The precise amounts that were needed (factoring in evaporation and loss to vegetation) could be calculated from dam to settler. Droughts were further factored in to the long-term calculations for water storage as the Snowy Mountains Scheme (which began construction in 1949) planned to connect the Snowy River to the Murrumbidgee as well as other headwater streams and the Murray, so that water could be distributed evenly between the rivers by opening or closing the dams.

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15 For example in Robinvale, Horsfall, 'Planning Irrigation Projects', p.138.
Since the 1930s the Hume Dam has been the primary regulatory structure for irrigation releases along the Murray. Initiated in 1919 and completed in 1936, the Hume was built as a joint venture between the Victorian and New South Wales governments. Construction was overseen by the RMC. The RMC was also responsible for the operation of the dam and, therefore, for the release of the majority of irrigation water for downstream Victorian and New South Wales farmers. The RMC was the earliest Australian federal/state cross-border, watershed-defined, bureaucracy. While not specifically a construction authority, the RMC required the states to submit plans for engineering structures within the Murray catchment (including the Murrumbidgee) for approval. Through the expertise and research of its members and its watershed focus the RMC also became an important authority on the hydrology of the Murray watershed. The Commission installed river gauges at different points along the Murray to monitor its flows and was involved in research into other aspects of hydrology, such as soil erosion. Indeed, the commission issued many of the flood warnings in 1956, although such warnings lay outside its formal duties.

The Snowy Mountains Scheme, which began construction in 1949, was envisaged as an engineering masterpiece of post-war reconstruction: an intricate system of dams would feed the Murray and Murrumbidgee irrigation industries and harness the regular seasonal snowmelt for hydro-electricity. Hydro-electricity would supply an increasingly consumer-oriented society with electricity and power for the production of new materials, such as aluminium (used in aeroplanes). Historian George Seddon has drawn attention to another underlying motive for the massive engineering scheme: to utilise Australia’s water resources to the maximum. The use of water resources on the dry continent needed to be maximised. Post-war Australia aimed at national security, including food production, and the Snowy was an integral part of this plan as it would create a stable river for agricultural farming. Whilst a product of post-war anxiety, it was also part of the 1950s self-conscious drive towards modernity, following the examples of America’s massive water diversion and hydro-electric projects, such as the Hoover Dam, dams along

22 George Seddon, Searching for the Snowy: An Environmental History (St Leonards: Allen & Unwin, 1994). See also, Powell, Watering the Garden State, pp.248-249.
the Mississippi River and the Tennessee Valley weirs.23 Indeed, the Snowy Mountains Scheme’s Commissioner, Sir William Hudson, recruited experienced hydro-electric engineers from America.24

The project was vested with national pride. Hudson articulated the importance of the scale of the project, which was ‘teaching us... to think in a big way... to be proud of big enterprises’.25 Seddon likens the impact of the Scheme to the Gallipoli myth in the rhetoric of heroism that surrounded it. It was also similar in the public unity and support it generated, and sense of national pride.26 Environmental historian John Merritt recently recalled that in the 1950s ‘[v]irtually every Australian knew something about the dams and tunnels in the mountains that would boost the country’s electricity supply and make the Riverina a vast food bowl – even, as the author can attest, school children in far off Western Australia’.27 The Scheme also attracted international attention for its ‘complexity and size’.28 It was a symbol of post-war prosperity and is still referred to as ‘the greatest engineering scheme in Australian history’.29

Within this highly engineered landscape that aimed to produce a more predictable, stable river, and within a mood of national faith in techno-culture, the 1956 floods amorphously moved through the Murray and Darling river systems, over dams, threatening irrigation areas.

Rivers, Rain, and Flow

Flooding in 1956 was caused by a series of floods that cumulated to cause an optimal peak in each area. All the rivers and tributaries of the Darling and Murray rivers were in

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23 Ian Tyrrell has documented early Australian and American (especially Californian) exchanges of irrigation techniques, water management bureaucracy, knowledges, and engineers. See, Ian Tyrrell, True Gardens of the Gods: Californian-Australian Environmental Reform, 1860-1930 (Berkeley: University of California Press, 1999).
26 Seddon, Searching for the Snowy, p.36.
27 Merritt, Losing Ground, p.59.
28 Merritt, Losing Ground, p.59.
flood during 1956. Each tributary experienced localised floods and also, in most cases, a series of peaks. If the total area of the Murray and Darling systems is taken into account, floods were occurring from January until November, with the major peaks in the Murray in August and in the Darling in September. The floods were nebulous, spreading, peaking and pulsing through the watershed in irregular bursts and cumulative waves. Rainfall in April along both major rivers dramatically increased river heights, contributing to higher floods in August and September. In January 1956 the rivers and their tributaries were already high from heavy rainfall and flooding throughout the Darling and Murray watersheds in 1955, so that relatively little rain in 1956 could cause them to rise.\textsuperscript{30} The story begins not when the river broke its banks in Mildura, but when the rain began to fall, in Queensland.

1955 had been a wet year in Queensland. Rain had flooded parts of the state several times in the first half of that year, including the central west. In the last weeks of January 1956, a monsoonal trough moved southward, swelling the already full McIntyre and Condamine rivers. By February the McIntyre and Condamine catchments were so waterlogged that the Bureau of Meteorology (BoM) recorded a 100 percent runoff rate, causing increased flooding from relatively minor amounts of rain (25 to 100 millimetres). Each rain burst over the watersheds sent pulses of water down the rivers so that three flood peaks were recorded at Goondiwindi on the McIntyre River in one month, on 7, 11, and 20 February.\textsuperscript{31}

Rain in Queensland extended west in February and was still falling in July when reports reached the BoM that the Warrego was 13 kilometres wide at Cunnamulla, while the Paroo and Balonne were also in serious flood. Evacuations were already underway on the Warrego in April, though many pastoralists stayed to save isolated stock.\textsuperscript{32}

The water moved southward with the gradient, towards New South Wales and the Darling River, where the Queensland rivers combined. With water flowing down the rivers in irregular bursts, towns in northern New South Wales experienced several floods over a number of months. The February rains from the north flowed past Bourke in


March, and the Darling peaked in the town on 22 and 23 March at 45 feet 1 ½ inches. More water flowed from Queensland, combining with rain in the new host state to cause two more flood peaks in Bourke before the year ended, in June (about 39 feet) and early August (about 45 feet).

The water flowed west over the floodplains, as well as south. The Darling River, drifting westward from Bourke, enters country with even less gradient and the floodwater slowed, spreading out to fill lagoons carved by past idle floods. The flood peaks gained on each other, and water spread across the floodplains so that Menindee, unlike Bourke, experienced two smaller flood peaks, one in April at 33 feet, the other on 2 September at 33 feet 4 ½ inches.

With a flood crisis threatening Menindee, a developing irrigation town (that housed a number of soldier settlers) within the Sunraysia district, the Darling flood entered the pages of the *Sunraysia Daily*, published in Mildura. On 23 April the newspaper reported that roads between Wentworth and Menindee had been cut and that: 'Rising Darling River floodwaters are threatening to isolate Menindee, 100 miles north of Wentworth'. With a rise of six inches in 24 hours around Menindee, due to high river flow and local rain, the newspaper reported that in the town '[m]ore than 15 families have been forced from their homes' to live in ‘tents and lean-to buildings on high ground'. The article described the water's transformation of not only social conditions, but also of the landscape: ‘Water to the east of Menindee now spreads over that country in a huge sheet more than 10 miles wide’, also filling large lakes to the south. The water kept rising, though more slowly, putting pressure on levee banks built around homes on the outskirts of the town until, on 30 April, water broke through, forcing more evacuations. More banks were breached on 3 May. The water kept moving south but there was still enough time to prepare for the Darling flood entering the Murray; however, those on the Murray were preoccupied elsewhere.

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36 *Sunraysia Daily*, 23 April, 1956, p.2.
37 *Sunraysia Daily*, 25 April, 1956, p.3.
The Murray River Floods

The Murray was flooding independently, irrespective of water entering the lower parts of the river from the Darling. The Murray, as well as the Darling, had flooded in October 1955 and the river and its tributaries were still high.\(^{39}\) By April 1956 the Murray was flowing past Mildura at seven times its 'normal flow'.\(^{40}\) Rainfall had continued over many parts of the Murray in the first months of the year and in May heavy rain over the watershed further increased the flows of the already swollen rivers. An atomic bomb test on Monte Bello Islands (130 kilometres off the northern Western Australian coast) on 16 May was thought to have affected the weather on the mainland, changing the movement of weather fronts and increasing rain. The test created a radio-active cloud that drifted north towards the continent, before dispersing into the atmosphere.\(^{41}\) The *Sunraysia Daily* reported on the following day that the bomb’s impact may be speeding weather fronts towards Mildura. The Weather Bureau in Melbourne had predicted the depression to move over Mildura at 9am on 17 May, ‘however’, the newspaper reported, ‘indications... were that the front would be here well ahead of that time’.\(^{42}\) The following month a report by researchers at Adelaide University indicated that rain across South Australia had tested radio-active (radio-active rain was recorded as far away as Brisbane). However, the South Australian government argued it to be ‘impossible’ that the recent atomic test was the cause.\(^{43}\) An opinion column in the *Sunraysia Daily* in July reveals continuing concerns over the effects of the May test, and a subsequent test on 19 June (also at Monte Bello Islands), asserting that ‘[t]hroughout Australia, people are asking whether the A-bomb tests have anything to do with the weather’s behaviour’. Despite the assurances of politicians and many scientists, the writer of the article thought that ‘the masses... will... blame the atom-bombs every time it rains and we plough through ankle-deep mud in our streets’.\(^{44}\)

By 14 April floodwater from the upper Murray was reported to be travelling past Euston, posing a threat to the renovation of the Red Cliffs water pump pipes operated by

\(^{40}\) *Sunraysia Daily*, 17 April, 1956, p.3.  
\(^{41}\) *Sunraysia Daily*, 15 May, 1956, p.1; and, *Sunraysia Daily*, 17 May, 1956, p.1. The Monte Bello tests were conducted by British authorities with Australian assistance.  
\(^{44}\) *Sunraysia Daily*, 9 July, 1956, p.4.
the SRWSC which, along with a State Electricity Commission (SEC) generator, distributed irrigation water to the district.\textsuperscript{45} Engineers had removed parts of the Mildura navigation lock, succeeding in lowering the river’s height by 8 inches at the pump and generator site. It was hoped that the removal of parts of the regulatory structure (which acted as a dam, raising the height of the flood) would help to reduce the flood height around Red Cliffs, and avoid damage to the important irrigation infrastructure. However, the \textit{Sunraysia Daily} reported, ‘[t]here was a danger that the level of the Murray River could not be dropped sufficiently to avert flooding at the Red Cliffs pumps, Mildura lockmaster (Mr H. J. Phillips) said last night’.\textsuperscript{46} The SRWSC engineer at the pump asserted that it was now up to the RMC to order the closure of the Euston lock to save the pump works, or he would have to build a levee bank.\textsuperscript{47}

Lockmaster Phillips was also concerned that releasing more water from the Mildura lock by opening valves or removing the remaining sections, while potentially lowering the water locally, could increase the overall flood at Wentworth, a town located downstream at the junction of the Darling and Murray rivers. He was quoted as saying, ‘[w]e couldn’t put too big a stream on top of Wentworth because they’ve got a big Darling running and we didn’t want to flood them out by dropping another foot of water on them’.\textsuperscript{48} Regulation of the Murray put people in this flood in a very direct way, where they were partially responsible for the direction and height of large amounts of floodwater. Flooding at the pump was averted, for the moment, with the river level stabilising, albeit at a high level, in the following days.

By 17 April anxiety over the rising Darling and Murray water, and a merging of the floods, was building. The \textit{Sunraysia Daily} drew attention to the precarious position of Wentworth, located at the junction of the rivers (Map 5.2). Wentworth was, in a sense, being cornered on each side by floods. At the same time further large floods were being predicted on each of the two rivers. The Darling was receiving almost continuous run-off from rain throughout the watershed. The Murray was also taking on water from the flooded Lachlan and Murrumbidgee rivers, which entered the Murray between Euston and Swan Hill. In addition, a system of marshy wetlands, Billabong Creek (connected to

\textsuperscript{45}\textit{Sunraysia Daily}, 14 April, 1956, p.2.
\textsuperscript{46}\textit{Sunraysia Daily}, 14 April, 1956, p.2.
\textsuperscript{47}\textit{Sunraysia Daily}, 14 April, 1956, p.2.
\textsuperscript{48}\textit{Sunraysia Daily}, 14 April, 1956, p.2.
the Murray at the same place) was flooding. With all the rivers high and the land water-soaked, water was not being absorbed.

On 27 April, RMC Executive Engineer Geoff L. Harrison announced that the remainder of Mildura lock would be removed, along with locks at Wentworth and Euston, to ‘flatten out’ the river and release water pressure. The removal of the three weirs aimed to reduce flood heights along that stretch of river. It was also preparation for increased Murray flows in two weeks’ time. The weirs remained out of the Murray and the river peaked, fell, and peaked again.

By 10 May the Darling flood was entering the Great Anabranch and attention turned to getting ‘the approaching high water through the [Great] Anabranch without breaching any of the dams across the stream’. All dam gates had been opened over the previous months in preparation and officials made plans to divert floodwater into large lakes to reduce the overall flood peak. However, dams blocking the entrance to Pepie and Yellow lakes could not be saved and ‘were expected to break’. The lockmaster at Mildura assured readers of the Sunraysia Daily that ‘it was unlikely that the Darling water would have any effect on the Murray upstream’. Knowing that the floodwater was coming, graziers along the Great Anabranch moved their stock to higher ground.

Aerial surveys of the rivers revealed the extent of the water, being described as an ‘inland sea’ in a newspaper report published on 23 June. The report described a pilot’s experience of western New South Wales and Victoria. The pilot was Alan D. Matthews, chief pilot of Sunraysia Air Taxi Service. He was hired by graziers to carry out searches for lost and stranded stock from ‘the floods of three rivers’, the Darling, Murrumbidgee and Murray. Matthews had carried out searches for 14 graziers from the Balranald area in the past week. With the Murrumbidgee ‘40 miles wide in places’ and the Murray and Darling in flood, ‘thousands of acres of grazing country was now ‘an inland sea dotted by small islands which in normal times were grassed sandhills’. These pockets of high land became

49 Sunraysia Daily, 17 April, 1956, p.3.
50 Sunraysia Daily, 25 April, 1956, p.2; Sunraysia Daily, 28 April, 1956, p.2; and, Sunraysia Daily, 10 May, 1956, p.3.
51 Sunraysia Daily, 25 April, 1956, p.2; Sunraysia Daily, 28 April, 1956, p.2; and, Sunraysia Daily, 10 May, 1956, p.3.
52 Sunraysia Daily, 28 April, 1956, p.2.
54 Sunraysia Daily, 10 May, 1956, p.3.
56 Sunraysia Daily, 16 May, 1956, p.3.
57 Sunraysia Daily, 17 May, 1956, p.3.
filled with both domestic and wild animals. Matthews described the scene: 'It became common to see 30 or 40 wild pigs, together with a similar number of emus and kangaroos, sharing the islands with sheep and cattle'. The graziers and Matthews agreed that as long as there was enough grass on the islands all would be well between the different species, and the stock could stay there until the flood fell. Some islands were bare, however, and in one case 300 hundred sheep were rescued by boat so that they did not starve. Similarly, 20 to 30 head of cattle were found and swum through the flood to land with more vegetation. The aerial taxi service enabled graziers to locate stock relatively easily and to judge their welfare. The article reported that neighbouring graziers, 'some who had no idea of the extent of the flooding on their own properties', pooled their resources, going up 'three at a time to do aerial surveys of their properties'.

The RMC later advised that undeveloped floodplains were beneficial in reducing the amount of water being channelled by the rivers. Floodplains (such as Barmah Forest), billabongs, lakes and anabranches were seen as successful areas of 'temporary storage' for floodwater and it was recommended these not be built in by levee banks or other flood mitigation works.

Although Mildura was not yet declared to be officially in flood, the Sunraysia Daily told of distant and nearing devastations. The Murray continued to rise with many places in the upper regions experiencing prolonged inundation, causing damage and dangerous conditions. In Ballarat, the Sunraysia Daily told regional readers, a Maryborough policeman perished while attempting to save sheep from the water. He had overturned a boat, throwing others in his group into the turbulent water. The others reached shore but Constable W. J. Harnetty was last seen being swept downstream caught in a current.

In New South Wales, the Murrumbidgee River was in high flood by June, and 2,000 people were evacuated from Wagga to a nearby evacuation centre that month. The New South Wales State Emergency Services (SES) were stationed in the town, organising and distributing supplies to evacuees, while Army 'ducks' did rounds of the town to rescue stranded residents. By 2 July the water was receding in the town, but many people remained homeless.

The floods, while slow in rising in a cumulative sense, at some places arrived in localised bursts. In Charlton in mid-May muddy water from the ‘raging Avoca River’ swirled across pavements and into shops and homes. Although some residents had sand-bagged their properties the water seeped through. The town prepared to build levee banks in anticipation of further flooding. Pastoral losses were believed to be ‘minimal’ as stock had already been moved to higher ground.63

On 19 and 20 May, river flats between Mooroolbark and Shepparton on the Murray flooded severely and eight Aboriginal families (40 people) were rescued by police. Shepparton itself flooded on 21 May.64 However, the Sunraysia Daily reported that prospects of large floods at Wentworth had lessened.65 There was ‘no cause for concern’ as the town was protected by permanent levee banks and the Wentworth Town Clerk pointed out that, ‘provided the river rose no higher than the 1950-51 peak no part of Wentworth was exposed to danger’.66

All the rivers continued to rise and predictions of the peak heights of the cumulating floods were reassessed. By the end of June, Wentworth’s situation once more appeared critical. The National Emergency Services regional officer stated that, ‘[w]e have to get the [sand] bags and build levee banks now while we still have time’, the flood at Wentworth now being predicted as ‘the worst... for 25 years’.67 On 20 June a photograph of Wentworth, taken by Mildura photographer Frank Zaetta from the air, appeared in the Sunraysia Daily. The town was entirely surrounded by water, ‘isolated’.68 The floods were turning out to be more serious than predicted a month earlier. In the same edition the newspaper reported that, contrary to earlier predictions, the Murray was likely to flood to the 1955 level, although the ‘peak date [was] uncertain’.69 By July the levees that protected Wentworth were beginning to crumble and volunteers were engaged in a ‘battle’ to hold the embankments.70

That month the flooded Ovens River created an ‘inland sea’ around Wangaratta.71 Other major Murray tributaries, including the Mitta Mitta, Goulburn, Edward, Avoca, and Lachlan rivers, and Billabong Creek, continued to feed floodwater

64 Sunraysia Daily, 21 May, 1956, p.1.
65 Sunraysia Daily, 22 May, 1956, p.2.
66 Sunraysia Daily, 22 May, 1956, p.2.
into the main river, as rain kept falling over many parts of the catchment. Along the Murray many towns, including Echuca and Nathalia, were evacuated by the Army as levees broke and floodwater entered residential areas. In irrigation regions, such as Swan Hill, thousands of acres of farm land went under water. By 18 July, 1,100 families in New South Wales, South Australia, and northern Victoria had been flooded out of their homes.

In the irrigation settlement of Robinvale settlers reinforced levees, attempting to save their homes, crops, and the irrigation pump from the rising water. Within the district the timber huts of several Aboriginal families were flooded. Fourteen tents were borrowed from the Army to temporarily house the families. These tents were eventually bought by the Victorian Flood Relief Committee (established in September 1956) and given to the families. Downstream, Lockmaster Phillips warned Mildura residents in June that ‘[t]here’s so much water on the way that it is difficult at this stage to say just how much we will get here, but there is every possibility that we will reach last year’s peak.

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Mildura, Red Cliffs, and Merbein

The floods were building around Mildura throughout April and May, and the region itself received twice the average May rainfall. Although by the end of May water surrounded the nearby township of Iraak 'Island', so nicknamed because of its isolation during even the smallest flood, and in early June pictures of the flooded lawns near Mildura lock were described as a 'familiar sight', Mildura was not declared officially flooded until 14 June. For Mildura to be officially flooded the level the river needed to

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74 Sunraysia Daily, 1 August, 1956, p.5.
76 Sunraysia Daily, 20 June, 1956, p.2.
77 Sunraysia Daily, 2 June, 1956, p.2.
78 Sunraysia Daily, 26 May, 1956, p.2; and, Sunraysia Daily, 7 June, 1956, p.1.
reach was 22 feet. On 14 June it reached 22 feet and 2 inches, after sitting just below the mark for several days. By 18 June, in the nearby town of Pomona, flood levels had reached the ‘1931 level’ and the water around Mildura rose steadily. Permanent levees around roads near Mildura, which had been reinforced the previous year, were increased and again reinforced from June by shire workers as water lapped at the base.

On 28 June Murray floodwater, which had received the majority of the Murrumbidgee floods, reached houses in Red Cliffs and ‘[m]ore than six families [were] forced from their homes near the Red Cliffs Pumping Station’. Hail pelted the region the same day, damaging crops and hindering levee work. In the Mildura districts, levee banks and sandbags were seen to be the only possible way to keep floodwater out of properties and infrastructure. It was these walls against the water that shire council workers concentrated on and that began to dominate reports in the *Sunraysia Daily*. The main areas that the Mildura Shire Council aimed to protect by increasing the 1955 levee bank by three feet were the sewerage farm, glasshouses and crops on irrigation blocks, as well as vulnerable parts of the town.

The Council could not meet the expenditure of the new levees because it had ‘not expected a repetition’ of the previous year’s floods. Emergency action in 1955, such as building levees, had cost £4,000, leading the Council to request aid from the state government at the time. By July 1956 the Council was estimated to have spent ‘thousands of pounds’ on levee work for the year. Council workers were being paid ‘big money for working 12-hour shifts, both day and night, in shocking conditions’. Machinery such as trucks and bulldozers wore out, needing maintenance or replacing. Council workers had ‘moved more than 229,000 cubic yards of dirt to build miles of levee banks with equipment that had a plant rate of about £5 an hour’. The question became, ‘who pays for it all?’

While money was an issue, the availability of building materials and labour became more significant. In Mildura, radio appeals for volunteers went out along with requests for Army equipment and sand bags on 8 July, when the water rose dramatically.

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81 *Sunraysia Daily*, 19 June, 1956, p.3.
83 *Sunraysia Daily*, 28 June, 1956, p.3.

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in a matter of days.\textsuperscript{88} The flood had moved from a shire council matter to a community threat. The paper reported a response of 200 volunteers and 1,000 bags, with men working through the night under hurricane lamps to fix a seeping bank and women forming an 'amenities squad' that supplied tea, coffee, and food. Shire employees worked overtime too, operating bulldozers only 'by the light of their headlamps'. Members of the 8/7 Infantry Battalion in the Mildura district also volunteered.\textsuperscript{89}

Army equipment arrived quickly. Personnel set up a walkie-talkie system to coordinate levee building efforts and repairs to breached banks. An Army 'duck', flares, and other equipment were also supplied by the military.\textsuperscript{90} Army jeeps were used to transport sand bags from the Mildura bridge area, where they were filled, to the far end of the bank that protected farms, as the road had turned to mud and become impassable to trucks. The initial support of volunteers dwindled, however, as the weekend call for help was not carried through to the beginning of a working week, with only a reported 50 turning up on Monday.\textsuperscript{91} Over the next weeks reports of the flood reaching record heights brought continual, if reduced, aid from volunteers.

Rain continued throughout July over many parts of the Murray, including Wentworth and Mildura, bringing cold temperatures and causing delays to levee work.\textsuperscript{92} On 11 July the \textit{Sunraysia Daily} reported that 'river men', such as Mildura Lockmaster Philips, were predicting the flood would 'at least equal the 1931 level of 35 ft 3 ins'. At the time of the report the flood was over 33 feet at Mildura.\textsuperscript{93} On 13 July, the \textit{Sunraysia Daily} reported the anticipation of the flood's peak along major stretches of the Murray: 'Vic. Flood Near Peak: Watch On Levees', a headline ran. The Murray would peak within a week from Echuca to Swan Hill and 'close watches were kept on miles of levee banks protecting hundreds of homes', while downstream towns in Victoria and South Australia were starting to flood.\textsuperscript{94} The Murray had still not received all the water from its tributaries and places like Echuca were yet to feel the intake from the Goulburn River, while Deniliquin on the Edwards River was already a tent-town.\textsuperscript{95}

\textsuperscript{90} \textit{Sunraysia Daily}, 10 July, 1956, p.2.
\textsuperscript{91} \textit{Sunraysia Daily}, 10 July, 1956, p.2.
\textsuperscript{92} \textit{Sunraysia Daily}, 12 July, 1956, p.2.
\textsuperscript{93} \textit{Sunraysia Daily}, 11 July, 1956, p.2.
Mildura Migrant Centre was converted to an evacuee centre, preparing to take up to 1,200 people seeking refuge from the flood. Evacuees from surrounding districts were also housed at the centre. Indeed, Mildura became a regional base for Army aid and equipment, such as rescue teams on Army ducks which were deployed to nearby areas, including Wentworth and other New South Wales towns, as they faced crises. Mildura also formed the centre of a Flood Emergency Committee, established in July to coordinate relief within parts of the Sunraysia district. Importantly, the committee was formed to address personal losses and the needs of settlers on both sides of the Murray River, centring on the Mildura and Wentworth shires. The committee, chaired by Mildura Mayor R. R. Etherington, included local members of the Victorian Parliament, representatives of the City and Shire Councils of Mildura, representatives of the town of Wentworth, the Army, the Commonwealth Irrigation Department, the Victorian Education Department, the Victorian Police Department, SRWSC, Australian Red Cross, Country Women’s Association, and other local bodies. The evacuee centre in Mildura was directed by the Flood Emergency Committee, and police worked to transport those flooded from their homes to the centre, which averaged 229 evacuees over four and a half months.

The Committee was initiated on the suggestion of Victorian Assistant Minister for State Development and Decentralisation, Alexander John Fraser, who argued for a cross-border approach in the district on humanitarian grounds: ‘If we have to give assistance to NSW [New South Wales] people it will be done without quibble, and in the spirit of good fellowship – the costs can be worked out later’. An opinion piece in the Sunraysia Daily pointed to another potential benefit. Through the Committee the district could present a united front and ‘be able to speak with one voice when seeking outside assistance’, particularly, the article continued, ‘when dealing with the Government’. The article implied that in the aftermath of the flood, regional solidarity could increase the district’s chance for government financial aid to individuals and reimbursement to the shire

96 Sunraysia Daily, 30 July, 1956, p.2; and, Sunraysia Daily, 10 August, 1956, p.3.
100 Sunraysia Daily, 28 July, 1956, p.3.
council. The formation of the committee reflected the cross-border nature of the flood, as watersheds became an organising principle for response. Further, the Committee was formed by representatives from areas that were bound by industry (irrigated fruit-growing) and vicinity, rather than government districts (states). Indeed, the Committee attempted to override the administrative limitations of state boundaries, as Fraser’s comments indicated in his response to the emergency. The committee was, at the same time, inflected with boundaries of governance, reflected in its membership which was partly based on shires, and included various representatives of state departments and federal (Defence Force) members. In some ways it echoed the interstate and federal cooperation over the Murray watershed for hydraulic engineering and irrigation, formalised and developed over the preceding decades through the RMC and SMA.

Mildura’s airport became an important asset during the floods, allowing the fast delivery of supplies to threatened and flooded districts. For example, the RAAF distributed 13,000 sand bags to Wentworth from Mildura, after they were flown on a Dakota aircraft from Sydney.\(^{102}\) Although water surpassed the 1931 flood level in the Mildura district at the end of July, Mildura township, built on high ground and with several levees, looked as though it would not flood.\(^{103}\) However, Mildura’s tourist industry, the district’s second largest industry after dried fruit production, did suffer. Hoteliers and others who benefited from tourism, faced with cancellations from ‘misleading Press reports’ of the danger posed to Mildura, met to consider ways of marketing the floods to tourists, such as tours of flooded areas.\(^{104}\) Mildura township was an exception, however, as other places in the district faced devastating damage to irrigation and pastoral properties. The New South Wales side of the river experienced worse flooding, as the steep riverbanks near Mildura caused high water rises on the opposite side of the Murray.\(^{105}\)

Directly opposite Mildura, residents of the New South Wales irrigation area of Buronga had built extensive levees around the town, irrigation properties, and glass houses (where mostly tomatoes were grown). Some of these embankments reached up to 20 feet in height and held back 19 feet of water.\(^{106}\) At the end of July major sections of

\(^{102}\) Sunraysia Daily, 2 August, 1956, p.1.

\(^{103}\) Sunraysia Daily, 26 July, 1956, p.1.


levees were breached, and more threatened to topple. Homes and 175 glasshouses, comprising 'half the town' were flooded in the area and crops worth £120,000 were ruined. Before the levees broke, farmers had considered breaching the levees themselves or flooding the glasshouses used for growing tomatoes. They hoped to limit damage to the expensive glasshouses by slowing the velocity of floodwater, which would be greater if the levee was left to break of its own accord under the pressure of the flood or crashed against the fragile, insubstantial glasshouses. It was collectively decided not to breach the levee. This decision was reached through a vote by residents, including glass house farmers and market gardeners, and counting '24 Italians', who were told of the plan through an interpreter. A few days later the levees were breached by the floodwater and, while the force of the water was strong, many glasshouses looked as though they might survive. However, anticipated breaches in remaining levees could release greater force. On 30 July Harrison (RMC Executive Engineer) inspected the area and warned remaining residents to evacuate before more levees broke. He argued that, 'however distasteful it is to advise the abandonment of homes and crops, it is felt that the safety of human lives should be the first consideration'.

Figure 5.4
A worker patrols a levee at Curlwaa, New South Wales, during the 1956 floods. A close watch was kept for breaches and weaknesses in levees. [Ted Lawton, 15 August 1956, Mildura Library.]

Red Cliffs Water Pump and Generator: Protecting Irrigation Infrastructure

The SRWSC water pumps at Red Cliffs which fed the area’s irrigation networks, became an important focus for volunteers around Mildura. The Red Cliffs pump, built alongside the generator, was close to the river. Mildura and Red Cliffs were closely connected in 1956, as Mildura relied on Red Cliffs’ SEC run generator and SRWSC water pump to supply irrigation networks. Although the SRWSC and SEC had been building levees to protect the machinery, sharp rises in the river level meant that there was a renewed danger that the flood would rise faster than the levee could be built. In the last days of July, the SRWSC and SEC requested help from volunteers and the response was immediate. The generator and pump attracted the largest number of volunteers (reaching over 300) in the district during the flood, showing a clear priority for a district reliant on irrigation.

If the generator and pump were flooded, the irrigation season would be lost. Regulation of the river influenced local experiences of floods in this area. The technology of regulation was a focal point of shared community interests. Levee bank building was the favoured way to combat rising floodwater, as shire employees were shuffled from one levee bank to another along the river frontages of Merbein, Mildura, and Red Cliffs. Volunteer labour, however, remained focused on the Red Cliffs generator and pump site. ‘Blockies’, or irrigation block holders, comprised the majority of this volunteer work force. Blockies, so called because of the squares of irrigated land they occupied, invested time, tools, and machinery into building the banks, forming ‘crash gangs’ based on cores of old battalion comrades, now soldier settlers. The initial distribution of where and when each gang was going to work was published in the *Sunraysia Daily*. Efforts towards building the bank became a 24 hour-a-day project in the final days before the peak of the flood, volunteers dividing their time between the communal focus and their own properties.

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114 *Sunraysia Daily*, 3 August, 1956, p.2.
There were about fifteen days between the arrival of volunteers at the pump and generator, and the peak of the flood on 13 August. Volunteers and SEC staff supplied a labour force; however, the availability of machinery and tools became a source of concern at Red Cliffs and along many other parts of the Murray.\textsuperscript{115} In the \textit{Sunraysia Daily} an opinion piece by journalists argued that because each district was facing its own crisis there was nowhere for settlers to turn for help and extra equipment. The article blamed the governments, stating that 'there is no authority in a position to take overall control... It is a fault of the system in providing essential services, and one which all governments must take immediate steps to remedy'.\textsuperscript{116} The opinion piece was validated a few days later when the newspaper reported that in the township of Iraak people thought everyone else was in more trouble than they were and so did not ask for help. ‘Now’, the article stated, ‘floodwater has taken most of their crop’.\textsuperscript{117} Iraak ‘Island’ had gradually reduced in area, from 350 acres to 20 acres by 11 July. Some settlers decided to stay, one stating ‘[a]s long as we get three meals a day, a bed to sleep in, and we can pay our way, we’ll stay’. Snakes sought refuge on the ‘island’, forty being killed in one week. After a child ‘narrowly escaped an attack by a 4ft 6in reptile’, all children but one were evacuated.\textsuperscript{118}

The Army, and by association the Royal Australian Air Force (RAAF) and Navy, became the main point of contact for areas requiring equipment and labour.\textsuperscript{119} Resources usually reserved for battle were common sights in Mildura; camouflage nets being placed down the slopes of the levee banks to cushion the lapping, eroding water; troops setting up walkie-talkie short wave radio communication systems along the line of the banks; and Army ‘ducks’ transporting stranded machinery and live stock to higher ground.\textsuperscript{120} In Renmark, South Australia, where the flood peak was expected to be higher than in Mildura, Army presence was greater, with, amongst other things, a military mobile kitchen brought in to help supply food to those working on the main levees.

Army aid during floods in Australia only began after the end of World War II. It could be argued that Army involvement in relief operations was part of an attempt by the Federal government to find a civil role for an extended military force after the war. In post-war United States of America the government had similarly positioned the Army in

\textsuperscript{115} \textit{Sunraysia Daily}, 1 August, 1956, p.4.
\textsuperscript{116} \textit{Sunraysia Daily}, 1 August, 1956, p.4.
\textsuperscript{117} \textit{Sunraysia Daily}, 9 August, 1956, p.2.
\textsuperscript{118} \textit{Sunraysia Daily}, 11 August, 1956, p.2.
\textsuperscript{120} Mary Chandler, ‘56 Memories Flood Red Cliffs (Mildura: Sunnyland Press, 1996), p.9, p.12, and p.31.
civilian life by placing river regulation under the control of the Army Corps of Engineers.\textsuperscript{121} Australia did not exactly follow the American example in terms of river management. With a surplus of well-trained personnel and innovative equipment, however, the Army was used for civil welfare in situations that were not strictly military. In New South Wales, the State Emergency Services (SES), established as a volunteer organisation for Civil Defence during the Cold War, was mobilised to aid threatened regions. Post-war security networks, already organised for emergency response, became important sources of aid in other kinds of 'national disasters', particularly floods (and also during bushfires). Victoria similarly had a civil defence organisation, the Civil Defence Directorate. However, in the 1950s the Directorate remained small and, unlike the New South Wales organisation, remained focused on mobilisation in the event of a war until the 1960s.\textsuperscript{122} This may be the reason why it was not involved in the 1956 floods.

The Mildura district received substantial aid during the flood. The Army, along with the SRWSC, SEC, and Commonwealth government prioritised the highly productive irrigation area, diverting equipment from other places to help protect the pump and generator and the irrigation season.\textsuperscript{123} The SEC sent employees from around Victoria to ensure technical support to local staff. The SEC dedicated its August-September Journal to the Red Cliffs-Mildura attempt to save the generator.\textsuperscript{124}

Indeed, the plight of Red Cliffs pumping station attracted the attention of the Chairman of the SRWSC, Lewis Ronald East. In a memorandum distributed on 2 August to SRWSC officials, East made it clear that protecting the pumps was of the highest priority for the Commission during the floods. The district generally was to receive special attention. East emphasised 'the importance of safeguarding pumping stations' and instructed 'any mechanical plant required for levee construction or levee strengthening at Red Cliffs, Merbein or Robinvale... to be made available from other works regardless of the effect of taking such plant on the progress of these works'. The Red Cliffs pump received even more favour. East explained to his colleagues that he had


\textsuperscript{123} Sunraysia Daily, 3 August, 1956, p.3; Sunraysia Daily, 7 August, 1956, p.1; and, Sunraysia Daily, 8 August, 1956, p.2.

\textsuperscript{124} 'S.E.C Men Help Save a City', Journal of the State Electricity Commission of Victoria, August-September, 1956, pp.55-62.
personally telephoned a local SEC employee, Eric Larsen, at the pumping station at Red Cliffs. East told Larsen that 'the Commission regarded the protection of the pumping plants as having the highest priority... The Commission was prepared to send to Red Cliffs whatever equipment and resources might be needed'. Larsen, the memorandum went on, had then asked for 'four (4) bulldozer drivers, four (4) front end loader drivers, and six (6) truck drivers' as 'the men at Red Cliffs were becoming exhausted'.  

The levee was not a success, despite efforts to bolster the equipment and workforce protecting the pump and generator. Wind caused erosion and water seeped through the bank, undermining its strength. Volunteers and some employees worked on the banks 24 hours-a-day, while others patrolled those already built, watching for breaks and raising alarms for emergency repairs. Towards the end of July and in early August, as the floods neared their peak, some levee banks in the Mildura area gave way. On 23 July the main levee protecting Mildura was breached. As a section of the levee gave way, just upstream from the Mildura Bridge, five feet of water rushed through, flooding homes, the

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Sunraysia Brick Kilns, citrus groves, and vineyards between Mildura township and Nichol’s Point. The *Sunraysia Daily* reported that the noise from water rushing through the breach ‘could be heard miles away’ and woke nearby residents in Cureton Avenue, who had been warned that if the levee broke they would need to evacuate.\footnote{Sunraysia Daily, 24 July, 1956, p.1.} Gradually other levees were breached, including the one built to protect the River Road between Mildura and Merbein.\footnote{Sunraysia Daily, 8 August, 1956, p.1; and, Sunraysia Daily, 26 July, 1956, p.2.}

When the river stabilised at a height of 37 feet on 13 August, the Red Cliffs pump and generator were safe.\footnote{Sunraysia Daily, 14 August, 1956, p.2.} Orchards, vineyards, houses, farm equipment, and sheds had been flooded, with over 200 acres of citrus orchards inundated in Sunraysia, five percent of the region’s citrus crop.\footnote{Sunraysia Daily, 26 July, 1956, p.3.} Growers harvested crops by boat. However, there was some concern that the hardy fruit trees, and ‘even gumtrees’, may drown from such prolonged flooding.\footnote{Sunraysia Daily, 7 August, 1956, p.4.} Cold temperatures and hail had also affected various crop yields. By the end of July the Victorian and Federal governments had developed emergency financial relief packages for individuals’ and farmers’ losses, including a £1,050,000 Commonwealth grant to the Victorian government for distribution, a portion of which was earmarked for dried fruit growers.\footnote{Sunraysia Daily, 26 July, 1956, p.3.} The Australian Dried Fruits Association (based in Mildura) later estimated that 63 percent of the raisin crop, 22 percent of the currant crop, and 27 percent of the sultana crop had been destroyed.\footnote{‘Severe Dried Fruit Losses’, Riverlander, January 1957, p.29.} Further, the floods had caused the water table to rise, endangering crops with highly mineralised water.

![Figure 5.6](image.png)

*Figure 5.6* Floodwater engulfs a house and vineyard in Mildura, 1956. [Ted Lawton, 11 August 1956, Mildura Library.]
Irrigation and Salinity

In the irrigation fruit-growing districts of northwest Victoria the researchers at the CSIRO station in Merbein were watching the effects of the floods on their salinity research. Control experiments on the effects of irrigation on salinity took a new turn as the already raised water table broke the surface of the soil. Irrigation, and then floods in 1955, had raised the water table, increasing salt levels in the already salty soil. The 1956 floods raised the salt level further. In Mildura, the exacerbation of soil salinity through irrigation was recognised as a problem soon after it was first established as an irrigation area. Water in unlined irrigation channels leached alkaline minerals from the soils and raised mineralised underground water tables, which further mobilised salt contained in deep mineralised layers of the soil, contaminating surface soils. In addition, the use of heavily mineralised, sometimes alkaline, artesian water for irrigation in the past had aggravated soil salinity. Many trees, including citrus trees, could not survive in the highly alkaline soil.

The officer in charge of the CSIRO research station warned the Commonwealth that releasing irrigation water (due in September) on top of this, would cause toxic levels of salt. Open cut drainage canals were dug to bleed the mineral ground water and salt from the soil in badly affected irrigation districts. The officer estimated that the irrigation area of Renmark in South Australia could lose up to 500 acres of plantings, and Curlwaa in New South Wales up to 200 acres (from a total of 2,000 planted acres) from soil salinity.

In a Commonwealth Parliament session during late October 1956, the Minister for National Development, W.H. Spooner, was pressured by the Senate to investigate.
solutions to seepage and drainage in the Murray Valley, especially in South Australia, which was most affected by increased salt levels. The Minister played down the floods’ effect on salinity, placing irrigation and salinity in one category, and high water tables and floods in another. However, the interrelatedness of the factors and their impact on citrus and stone-fruit growers became evident in his subsequent explanation. The Minister said: ‘In the areas previously affected by seepage due to irrigation, drainage was already inadequate to prevent injurious effects’. The situation was serious and he warned that ‘[i]n applying irrigation water this season, tree and vine safety will be a greater consideration than crop yield’. 137 Irrigation had exacerbated flood damage.

In Mildura the raised water table, rain, rising floodwater and seepages in the levee combined to make the soil turn into sticky, slippery mud or, in resident Jack Bate’s words, ‘a muck heap’. 138 Mary Chandler, then a twenty-year-old returning to Mildura after finishing university in Melbourne, recalled delivering food to the levee bank volunteers: ‘It was pitch black, freezing cold and the mud squelched as the truck I was in slithered along from place to place’. 139 The biggest delay in building the levee was caused by tractors bogging or falling from the top of the levee banks.

The soil in some places seemed to be more water than earth. Kevin Webb recalled that ‘the ground was so saturated... [that] in the switch yard you could push a 4 x 4 red gum straight into the ground over four foot just like that’. 140 The electricity pylons supporting large cables in the SEC compound threatened to fall, because they were floating in the water-mud. All that could be done was to prop them up by timber ‘pigstyling’ and hope they would stay upright. 141

After the flood peaked in Mildura, Red Cliffs, and Merbein, and the pump and generator were safe, the Sunraysia Daily focused on the high floods peaking at Wentworth and Renmark. 142 In Wentworth, the Murray peaked at 32.1 feet on 15 August. The Darling floods had been feeding into the Murray since April but its main peak was not experienced at Wentworth until early October. The unexpectedly low August peak in Wentworth was explained in a later RMC report, which claimed that most of the Darling

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139 Mary Chandler, ’56 Memories Flood Red Cliffs, p.13.
140 Mary Chandler, ’56 Memories Flood Red Cliffs, p.16.
142 Sunraysia Daily, 16 August, 1956, p.2.
flood had bypassed Wentworth. The report noted that below Menindee (peaked on 2 September at 33 feet 4¾ inches) the Darling flood had divided into the main channel and the Great Anabranch. The Great Anabranch took a substantial amount of water from the Darling River, rejoining the Murray below Wentworth and reducing the peak around the town. Water also flowed into breakaways (floodplains or flood ways) near Pomona, further reducing the amount being carried by the Darling. The breakaways rejoined the Murray below Wentworth as well, after taking water an estimated ‘1,000,000 acre feet outside the main channel of the river’.\(^{143}\)

The twists and turns of the river held one last surprise. At the height of the Murray River flood in August, water had broken away and joined the Darling from Tuckers Creek. ‘Thus’, the RMC report asserted, ‘of the 22,000 cusecs entering the Murray from the Darling, only 13,000 cusecs were from the Darling Catchment’. While the rivers appeared to be flooding at similar heights simultaneously in August, it was almost half Murray water flowing into Wentworth from the Darling.\(^{144}\)

While most of the Darling flood missed Wentworth, Renmark in South Australia received the full brunt. The Murray peaked first in Renmark in August, with the tributaries’ floodwater in tow, causing large, damaging floods in the low lying district. The water was still high as the Darling flood peak reached the Murray and inundated the town in October. Renmark was the worst hit area during the 1956 flood, later receiving the largest proportion of both state and federal aid.

* * *

Damage and Relief: Federal Responsibility for Aid

The 1956 flood tested state bureaucratic avenues for flood relief, emergency aid, and reparation. The flood stretched municipal and state budgets and each state in turn applied to the Commonwealth for assistance. States argued for the Commonwealth to take increased financial responsibility for the damage.

One year after the flood, the RMC assessed the total damage in the Murray and Darling watersheds to be £5 million. Damage to private property, in New South Wales, Victoria, and South Australia combined, was estimated to be £1.5 million, two thirds of


which was in South Australia. The remaining portion of the estimate referred to damage to infrastructure and other government works and facilities.\(^\text{146}\) In 1997 Emergency Management Australia (EMA) estimated the 1956 floods, between May and December, to have cost £30 million ($840 million, 1997 values) in New South Wales, Victoria, and South Australia, increasing the initial assessment by £25 million. EMA listed 650 buildings as damaged and 200 destroyed; however, a large proportion of the overall cost was attributed to losses in agricultural production.\(^\text{146}\)

States argued for Commonwealth funds to reimburse municipal councils for expenditure on flood response and prevention, such as the cost of building levees, as well as to aid state governments in repairing damaged infrastructure and to supplement aid to individuals. Early in the flood, the Victorian government had promised municipal councils at least partial financial reimbursement. Municipal councils, such as Mildura, were adamant that such relief be made available; if not from the state government, then from the Federal government. In July 1956, the Mildura Mayor stated that the Council would seek full reimbursement for expenditure on flood control. He argued the point on the grounds that such costs should not be the responsibility of ratepayers: ‘We don’t know what we will be called on to spend, and it is not fair that the financial responsibility should fall on our ratepayers... This is a Federal matter — we are not responsible for the River Murray’s behaviour’.\(^\text{147}\)

The responsibility of the Commonwealth to contribute towards state relief, reparation works on roads, emergency action, municipal expenses, and personal losses, was contested. Federal ministers argued that all flood aid and costs were state responsibilities and that any money contributed by the Commonwealth would need to be part of a loan scheme.\(^\text{148}\) Dairy farmers and cane growers, however, had successfully lobbied the government in 1955 to provide flood relief under its unemployment benefits responsibility. In 1956, shadow ministers criticised the Commonwealth for having inconsistent fire and flood relief policies that varied from state to state and event to


\(^{147}\) Sunraysia Daily, 13 July, 1956, p.2.

event. One Senator also queried the Commonwealth government's dedication to soldier settlers who represented a large proportion of those affected and who the government had helped to settle. Under pressure from state governments, local councils, and settlers, Prime Minister Menzies standardised aid for New South Wales, Victoria, and South Australia in this flood with a 'pound for pound' contribution that was not to be repaid. Victoria distributed combined state and federal funds, as well as private donations (a total of £72 from three donors), to settlers and councils through a government committee, the Victorian Floods (1956) Relief Committee. By 1957 Municipal Councils throughout Victoria together claimed expenses of £70,000 for flood protection work in the previous year's floods. Personal applications for aid, submitted to the committee, reached 533 claims, amounting to £819,093. The total amount awarded by the committee for personal claims was £77,483, delivering financial aid to 452 of the claimants. Residents of Mildura shire made the highest number of applications, reaching 136 (the next highest claiming shire was Swan Hill, with 76 applicants), with 127 of the claimants receiving financial grants.

Private donations were also made directly to flooded areas. However, the sources of flood relief in 1956 contrast with those in the 1852 flood in Gundagai and the 1890 flood in Bourke. In the aftermaths of the earlier floods, financial and material relief to individuals and municipalities were mostly financed by private donations. By 1956, government responsibility for financial assistance had dramatically grown. It signalled the beginnings of humanitarian ideas towards flood response within government.


152 Letter from F. Kenny (Secretary, Victorian Flood Relief Committee) 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.


bureaucracies. The environment was acknowledged as a state responsibility, particularly where its vagaries interfered with national aspirations.

In 1956, states were required to request financial aid from the Commonwealth, and relief was regarded as a government donation, rather than, for example, an absolute Federal government responsibility, or a loan scheme. In some ways Federal government aid remained uncodified. Perhaps such a stance by the Commonwealth also avoided constitutional restrictions on federal intervention in state matters. The government, occupying a position of benefactor, held almost no responsibility for the rivers—except for its regulation through the Hume Dam and the Snowy Mountains Scheme.

* * *

Flood Warnings

While towns on the floodplains of both rivers received intermittent RMC warnings, and so could prepare to some extent, no-one knew how high the eventual peak of the flood would be. As it became clear that flood heights were exceeding the predictions, attempts to increase and reinforce levees in the final days before the peak were common. Predictions had kept increasing and towns had little time to build or reinforce levees, or evacuate. Mildura Shire Council received a revised warning of the Murray peak that indicated a 'very sudden rise' over the initial estimate, just over two weeks before the full force of the floods arrived. Residents in Mildura became embittered as trusted authorities were seen to have failed to provide accurate or timely warnings. One resident commented, forty years after the flood, that settlers had depended on the 'authorities who blithely made statements down-grading level peaks, leaving everyone unprepared for what did eventuate'. In the view of settlers, the 'authorities' had not given adequate warnings and, according to the quote above, had in fact given inaccurate warnings. The 'authorities' were blamed for the lack of preparation in many areas. Perhaps one reason that river management authorities such as the RMC (which settlers expected to have

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156 Warnings from Executive Engineer of the RMC, G.L. Harrison, were intermittently reported in the press. See, Sunraysia Daily, 22 May, 1956, p.2; Sunraysia Daily, 16 July, 1956, p.2; and, Sunraysia Daily, 30 July, 56, p.1. Some also followed the predictions of long range forecaster Lennox Walker. See, Sunraysia Daily, 31 July, 1956, p.2; and, Sunraysia Daily, 24 April, 1956, p.3.

157 Mildura City Council Minutes, 'Special General Committee 29/7/56', in Chandler, '56 Memories Flood Red Cliffs, p.3.

158 Chandler, '56 Memories Flood Red Cliffs, p.20.
responsibility for warnings and knowledge of the rivers, as well as networks of employees and gauges to issue warnings) did not issue the expected warnings, was that flood warnings were not the responsibility of any particular government commission or department at that time.

The RMC had no official duty to issue flood warnings. Many river gauges along the Murray, however, had been established and operated by the RMC and so it had access to information that could provide some indication of changed river levels. The RMC voluntarily communicated information on river rises to settlers during the floods, but flood warnings were not systematic. The federal BoM was not responsible for flood warnings either, because of legislation made the previous year. When a Designing Engineer of the SRWSC forwarded a copy of the recently amended Commonwealth Meteorology Act 1955 to the Chief Designing Engineer in November of that year, he attached a memorandum which brought attention to a point of difference between the old and new Acts. The new Act, the engineer explained, ‘differs from the previous Act in that no reference is made to the display of “flood signals”. It still does not give the Bureau specific power to issue “River Reports” as river levels cannot be construed as “weather conditions”’. Floods, which moved over the land, the memorandum implied, had no place in a Bureau based in an atmospheric science. The engineer concluded the memorandum with assurances that, despite the change in the Act, ‘the Deputy-Director (Mr. Lilywhitem) [of the Bureau] does not contemplate any change in their practice in this respect’.

The Bureau did not, however, have any actual or ‘official’ responsibility to issue warnings in 1956 and it apparently issued few, and these were based on rainfall (rather than stream gauge) data. Rainfall did not directly correlate to floods, as rainfall in one area could cause floods in another. The amount of water forced onto floodplains by the velocity of floodwater and topography also influenced the height, depth, and velocity of floods locally and downstream. Further, run-off from rainfall, which fed floods, was affected by the amount of rainfall that was absorbed by the land and depended on the type of soil, moisture already contained in the earth, and so on.

There was no federal body with responsibility to issue flood warnings, nor indeed at a state level in Victoria, in 1956. In that year of disastrous floods there were very few

159 Harrison, ‘Report on the River Murray Flood Problem’.
warnings as the environmental event was an administrative anomaly. Further, the flood heights broke settler records in many areas, rising to unexpected and unexperienced heights which meant that residents' and officials' estimates of flood peaks may have been lower than the eventual peak heights. The floods were also unprecedented in their duration, the area they covered, and the frequency of peaks along the Murray River.

By taking river administration out of the official duties of the BoM, the legislation helped to pave the way for state departments, centred predominantly on hydraulic and irrigation engineering, to assume management and control of the rivers. Meteorology was being limited to the atmosphere and bureaucratically positioned to support engineering. In Victoria, the SRWSC had become an avenue for the development of engineering works on the Murray and its tributaries. In 1957, the SRWSC and regional bodies took responsibility for gathering river data for flood warnings in Victoria and transmitted the data to the BoM, which reassumed official responsibility for issuing flood warnings.\footnote{\textquoteleft\textquoteleftThe Flood Report\textquoteright, \textit{Riverlander}, November 1957, p.7.}

Settler disappointment in the 'authorities' for not providing adequate flood warnings reflected an underlying grievance that floods in the Murray watershed had not received enough government attention. In an era when state, interstate, and federal organisations were putting extensive resources towards developing river schemes, settlers called for more government attention to floods. The 1956 floods revealed to settlers that government flood management was inadequate. Government failure to take account of such environmental events that could devastate irrigation communities, threaten livestock and livelihoods, and ruin infrastructure and engineering works, generated a backlash from settlers, who called for a 'flood control authority' to be established.

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Central Flood Control Authority

During and after the 1956 floods, settlers expressed concern over the lack of 'flood control' along the Murray and its tributaries and many argued for a single control authority to be established for the Murray watershed. In May, the Murray Valley Development League (MVDL) invited Harrison (Executive Engineer of the RMC) to Mildura to hear its concerns. The League proposed that 'a single authority make a study
of flood control for the Murray and its tributaries'. The League argued for 'coordination' and 'uniform' flood control, rather than individual settlers having to take 'their own precautions'. A single flood control authority could also, it was argued, monitor the erection of levee banks, with one member of the League noting that levee banks could increase the damaging effects of floods by restricting floods to the river channel and causing 'aggravated flooding in other places because the river level was raised'. The League member mentioned Buronga as an example of where this could happen. However, it was settlers in Nichols Point who later claimed that levees built in Mildura and Buronga had increased floods in the region, as these levees formed a 'bottle-neck' and so increased the height of the floodwater by blocking its flow. Building new levee banks along the Murray without government approval was illegal, as flood levels could be artificially raised. Levee building, however, was regulated under the imperative of interstate (rather than intrastate) relations.

An interstate agreement between New South Wales and Victoria made in 1923 aimed to regulate the building of new levees along the Murray. The agreement decreed that new levees could only be built with government approval, as indiscriminate levees could push water across the river and raise flood heights. The agreement attempted to avoid liability and conflict between the states for intervening in or exacerbating floods; although existing levees could be reinforced and raised, as they had been in Mildura. The erection of new levees, the League member argued, was not well monitored. The League member stated that the lack of control over levee building was a symptom of a general lack of responsibility in governments regarding flooding: 'authoritative control of

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163 *Sunraysia Daily*, 5 May, 1956, p.3. The MVDL had also written to the RMC in 1955 requesting a centralised flood control authority be established for 'the Snowy River, the Murray River and all its tributaries, excluding perhaps the Darling and its tributaries'. Letter from G.V. Lawrence (Organising Secretary, MVDL) to W.S. Kent Hughes (President, RMC). 12 April, 1955. 'River Murray Flood Control'. Item 55/22730. VPRS 6008/P009/20. Public Records Office Victoria.

164 *Sunraysia Daily*, 5 May, 1956, p.3.

165 *Sunraysia Daily*, 5 May, 1956, p.3.


floods seems to be nobody's business'. A single flood control authority, it was argued, could provide a government mechanism for regulating levees.

On the same day, an article on the front page of the local Mildura newspaper argued that floods could cause damage to the Snowy Mountains project if not addressed soon. The article concentrated on the opinions of the Federal Secretary of the Australian Primary Producers' Union, K. L. Waight, who criticised the governments for giving 'insufficient thought' to floods in the establishment of dams and weirs on the Snowy River. Waight referred to the policy of the Federal Land Use Committee regarding the Snowy River, which was that dams had been erected and designed on the river without consideration of the wider catchment context, including floods, the effects of large levees and 'the conserving of this most important of all Australian Catchments'. She urged a federal responsibility for flood control and rivers generally (then under state authority in Australia), based on catchment areas as in America: 'The U.S.A. has a special committee appointed to advise the President on the general control of the resources of the land, and this committee advises on flood control... American experts from this advisory committee... would surely be able to coordinate the various plans and schemes so that one overall scheme might be arrived at[,] applicable to any area'.

Currently, she argued, 'there are unfortunately too many differing authorities'. Complex state bureaucracy and a divided state and federal authority, she implied, obscured a catchment-wide perspective. She argued that interstate collaboration over rivers centred on engineering programs, like dams, which 'ignored the essential treatment of the catchment areas serving the river courses' and avoided wider environmental contexts.

At the height of the floods, residents in Robinvale similarly argued for a single flood control authority. They urged, however, that a single authority be established to direct 'emergency' situations, rather than total catchment management. A single flood emergency organisation, residents argued, could provide a point of coordination, levee planning, and an identifiable institution from which they could request aid, equipment, and additional labour. An opinion article in the Sunraysia Daily argued that the floods had revealed a 'fault in the system': 'As the flood position in huge areas of the Murray Valley grows more acute, the urgent need for some controlling authority becomes more

169 Sunraysia Daily, 5 May, 1956, p.3.
173 Sunraysia Daily, 18 July, 1956, p.6; and, Sunraysia Daily, 1 August, 1956, p.5.
and more obvious... there is no authority to whom they [settlers and communities] can turn in their hour of desperate need... there is no authority in a position to take overall control, organise maximum assistance and then channel it immediately to danger spots'.

These arguments for an 'emergency' organisation, along with Waight's and those of the MVDL, were imbued with a sense that state and Federal governments had failed to address floods, provide adequate responses to the emergency or establish mitigation techniques. The arguments addressed engineering, either as a solution or problem in insuring settlers against floods. All looked to increased government regulation that addressed floods, to be clearly centralised to a state or Federal government.

Current river authorities, focused on irrigation and drought mitigation, had failed to protect settlers from floods. There was 'a fault in the system'. Floods were, in a sense, outside the system, in terms of engineering and bureaucracy. The impacts of the 1956 floods were not only under-provided for, in the view of many settlers, but they also represented an 'uncontrolled' danger currently outside physical or bureaucratic regulation. In the aftermath of the 1956 floods in the Murray and its tributaries, government engineers and parliamentary representatives argued about ways in which large floods could be brought into the system. The arguments centred on mitigation, administrative mechanisms (including emergency response and aid), and increased monitoring of the rivers. Each of these aspects became entangled with others, as politicians, lobby groups, and engineers attempted to negotiate flood mitigation and management within complex state and federal relationships. Federal involvement in the Murray watershed through engineering projects and the RMC saw the Commonwealth embroiled in arguments about flood mitigation through dams, regulation of floodplain use, and improved warning systems. River regulation had tied the Commonwealth to the Murray.

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174 Sunraysia Daily, 1 August, 1956, p.4.
Bordering the National: Federal Responsibility for Rivers

Politicians in the House of Representatives, like their constituents, argued for greater coordination of flood management. The possibilities for hydraulic engineering to mitigate floods loomed large in these debates. Many argued for federal takeover of 'flood control'. The Commonwealth was called on to finance flood mitigation dams or to use existing dams (and those under construction) for mitigation. The cost of building new large mitigation structures, as well as the extent of the floods (covering four states), suggested to some parliamentary representatives that it was necessary and logical for the Commonwealth to take control of mitigation and flood management generally and they argued that a watershed approach was needed. The RMC, Hume Dam, and Snowy Mountains Scheme also indicated to some the success of Commonwealth interventions in what were, constitutionally speaking, strictly state matters. It was argued that dams could lessen the heights of large floods and in this way limit the potential for extensive damage and bring floods into a management framework. Such proposals urged centralisation in order to manage floods holistically in the eastern states. Further, they indicated a faith in engineering and human ingenuity to control the rivers completely and to make them predictable enough to fit within bureaucratic management. Large scale engineering projects that had aimed to increase agricultural production and secure settlers against drought and erratic rainfall, had failed to consider floods. Parliamentary representatives now argued to engineer 'manageable' floods.

Winton George Turnbull, representing the Mallee district in Victoria, opened the debates over government action in response to the floods in the House of Representatives in August 1956. Turnbull was enthusiastic about the MVDL's proposals and referred to their arguments extensively. He supported 'to the hilt' their proposal for 'a co-ordinating authority for the protection and development of the Murray Valley'. Such an authority, he argued (in line with the League) should be preceded by an inquiry from a 'high-level technical committee... such as that which investigated the Snowy Mountains project prior to the setting up of the Snowy Mountains Authority', appointed by the Commonwealth, Victoria, New South Wales, and South Australia. Turnbull further supported another major recommendation of the League, which aimed to limit the impact of grazing on flood velocity and erosion in the Snowy River catchment: the elimination of fire above

the 4,750 foot contour. Graziers regularly used fire to stimulate new vegetation growth for
cattle grazing. Allowing vegetation to grow, by banning regular burns, could help prevent
erosion and siltation and reduce run-off during floods.\textsuperscript{176} This aspect of the League's
proposal, and others, were also taken up by Victorian Premier, Henry Bolte.

Turnbull further argued that 'a central controlling authority' be 'authorised to
order the release of water from main structures in advance of expected intakes and so
increase the capacity of structures to delay flows'. Current dams as well as storages in the
Snowy Mountains Scheme (which were under construction) could mitigate large floods
through controlled releases of stored water in anticipation of flood flows. Turnbull did
not propose to eradicate floods downstream, as '[o]ne cannot stop a river like the Murray
from flooding'. However, he argued that using irrigation and hydro-electric dams could
limit the impacts of large floods. This type of mitigation, he reasoned, would reduce flood
heights a 'few inches' — those few inches were important as they were the ones that broke
levee banks.\textsuperscript{177}

Others also advocated the use of current dams (and those under construction),
designed for other purposes, for flood mitigation in this way.\textsuperscript{178} However, Harrison
(Executive Engineer of the RMC), was reported to have told the MVDL in June that 'no
government would use irrigation storages to control floods' as they 'could not take the
risk of emptying storages'. Further, this method did not substantially reduce flood
heights.\textsuperscript{179} Others argued that new engineering structures should be built, such as dams or
pondages, to mitigate floods and store the water for use during drought. Charles Edward
Griffiths, representing Shortland, New South Wales, thought that unmitigated floods
were not only damaging but were also a 'waste of water'.\textsuperscript{180} Hugh Stevenson Roberton
(Minister for Social Services), representing the Riverina, urged that '[i]t is the prime
duty of every self-respecting nation to undertake responsibility of controlling its own
waterways'. Roberton argued that the topography of the Murray and Darling rivers was
ideal for mitigation works, implying a scheme such as a system of storage pondages: 'the

\textsuperscript{176} Turnbull, Parliamentary Debates. (Hansard). Session 1956. Commonwealth of Australia. House of
Riverlander, January 1957, p.25 and p.29; and, 'League General Council and Flood Inquiry' Riverlander,

\textsuperscript{177} Turnbull, Parliamentary Debates. (Hansard). Session 1956. Commonwealth of Australia. House of

\textsuperscript{178} Parliamentary Debates. (Hansard). Session 1956. Commonwealth of Australia. House of

\textsuperscript{179} Sunraysia Daily, 2 June, 1956, p.3.

\textsuperscript{180} Griffiths, Parliamentary Debates. (Hansard). Session 1956. Commonwealth of Australia. House of
topography lends itself to treatment of the mitigation of such a disaster'. Sir Earle Page, representing Cowper, urged the building of dual-purpose dams — for flood mitigation and hydro-electricity, which could additionally be used for water supply. He stated that '[w]e, in Australia, cannot afford these terrible, uncontrolled floods... [w]e cannot afford to lose millions and millions of acre feet of water in this, the driest continent in the world.' Page suggested that history had caught up with Australia: 'We have had 100 years of disastrous floods in this country, and it is time we did something about preventing them'. Flood mitigation could be used for drought mitigation and power generation and put to service in the wider project of national development. Page advocated, along with many others, a national approach to engineering as, he argued, states had not provided adequate mitigation against floods and that a 'change in the Constitution is inevitable if the Commonwealth is to have power to deal with this problem'. Dams, initially established for irrigation, were now looked to for mitigation and the Federal government looked to take over mitigating engineering works.

Arguments in favour of dams and other mitigation structures were made in conjunction with 'cross-broader' arguments for handing flood management along the Murray and its tributaries to the Federal government. The floods proved to some politicians that frequently inundated rivers, which crossed borders, needed a flood management authority that also crossed borders. Some politicians argued that Australia's Constitution, which placed rivers under state authority, was not adequate to manage the rivers and floods and called for it to be changed.

Reginald Thomas Pollard, representing Lalor, took suggestions of Commonwealth coordination to this level: 'some alteration to the constitution [is necessary] so that such matters become a national responsibility'. Griffiths also supported direct Commonwealth intervention and long-term responsibility for floods. Griffiths' argument, in a synopsis submitted to the Minister for National Development (William Henry Spooner), was described in the following terms: he 'pointed out that a national

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approach to the problem is the logical one, because rivers flow through several states'. The environment, the rivers, by crossing borders promoted a national approach that wrested control of mitigation from states and could stretch along rivers unhindered by political boundaries.

Under the constitution the states had primary responsibility and autonomy within their jurisdictions. Even Commonwealth relief was a possible threat to this. In the Synopsis of the Adjournment Motion on Floods in the Senate, submitted to the Minister of National Development, Victorian Senator Gordon’s position was outlined as follows:

In praising the Commonwealth’s action in flood relief he referred to the constitutional difficulties. He pointed out, however, that as these floods transcend State boundaries, the Commonwealth’s constitutional position is therefore different, and he proposed that the Commonwealth should consult with its legal advisers, to see if the constitutional limitations could be overcome.

While all the states affected by the floods applied for Commonwealth funds to supplement their expenditure, there was a fine line between aid and interference that the Commonwealth was careful not to cross. Financial relief could threaten state autonomy and impinge on the constitution. Commonwealth involvement in building mitigation structures would be an even more direct intervention into state matters, as mitigation was part of infrastructure works as well as river management, both of which were firmly within the power of states. Section 100 of the Constitution explicitly placed rivers under state control. However, the states continued to argue for Commonwealth built mitigation and flood management with an unwilling Federal government.

The Secretary to the Minister of National Development, Harold George Raggatt, summarised the August parliamentary debates for the Minister, outlining some suggestions for flood management. He brought attention to frequent calls for Commonwealth funds to establish flood mitigation structures, claiming to the Minister that these were ‘essentially State responsibilities’. Raggatt also indicated that state regional representatives were arguing for direct Commonwealth intervention into local affairs,


normally undertaken by state and local governments. However, he warned that ‘[i]ntervention of this sort is not welcomed by the States as a rule’.\textsuperscript{188} Commonwealth flood relief, aid, and management were politically sensitive under a constitution that had only existed for half a century and had not yet been tested by an environmental, cross-border event of this magnitude.

The floods were seen as a failure of engineering to incorporate mitigation into dam design. Two years after the floods, and following further inundations along the Murray River, the \textit{Border Morning Mail} (Albury, New South Wales) published an article written by an Albury resident outraged that the Hume Dam had only been constructed for irrigation with no capacity for flood mitigation. That the river could flood, in his opinion, was a failure of engineering to properly regulate the river:

> These water schemes have involved the nation in considerable expenditure, and in return the people are entitled to anticipate every possible benefit. But under the prevailing River Murray Commission policy one section of people [irrigators] receives benefits while other people who could be benefited [others on floodplains] are not even considered.\textsuperscript{189}

River regulation had not just seen the establishment of dams but also of expectations of the river as a carefully controlled stream, along which irrigation water releases were timed with precision. In the same article the Albury resident criticised the RMC’s policy of only operating the Hume Dam for irrigation, where it was filled to capacity for the irrigation season and so could not catch any additional water for flood mitigation. With increased calls for flood mitigation from 1956, however, it seemed to many that although engineering was what had failed, the problem could be fixed by more engineering.

While a strong argument in parliament for Commonwealth assumption of flood control was that the rivers crossed borders, it was also clear that there was another benefit; the cost of engineering works could be deferred from states by making mitigation a Commonwealth responsibility. Financial motives were not the sole reason, nor the most dominant in parliament for proposals of Commonwealth intervention, but they cannot


be underestimated given the position of the states. Griffiths put it plainly, suggesting that a committee should be established to investigate flood control ‘with Commonwealth funds to implement its findings’, even if this meant introducing a special tax. Australia’s drive toward national development had also led the states into more fragile economic territory. The financial demands of development projects, including dams and irrigation infrastructure, along with increased immigration, limited the capacity of states to address immediate consequences of the flood and to commit to long-term projects to prevent future large floods. Pollard, in arguing for greater Commonwealth assistance to states for immediate repairs and federal assumption of flood management, invoked the financial position of the states: ‘I make bold to say that because of immigration and of the very rapid capital development of this country, the States are much worse off financially than they have been on the occasion of any other national disaster, short of war’. States were struggling to meet the financial costs of immediate emergency and repair work, let alone financing new mitigation constructions. William Edmonds (Member for Herbert) argued that the federal ‘compensation of £1-for-£1 is completely inadequate. The states cannot raise their shares, and instead of Government aid, there are voluntary organisations appealing to the public for donations for flood relief. Some solution to the problem must be found’. Pollard suggested the solution of three pounds of Commonwealth funds for every pound of state aid. The financial implications of the floods infused politicians’ debates in the House of Representatives, as unexpected expenditure threatened precariously balanced budgets.

The Constitution did not fit the rivers, and further, engineering seemed to have failed constitutionally, or perhaps the Constitution had failed engineering. River engineering was a state responsibility unless a special agreement was reached, but the cost involved in erecting adequate structures for flood mitigation saw many parliamentary representatives demand extensive Commonwealth intervention and finances. States could not incur the expenditure of erecting dams. If they did nothing, however, their electorates

would potentially lose confidence in them. Further, hydraulic engineering followed rivers rather than state boundaries and so, in considering mitigating works, politicians argued that the Commonwealth needed to handle this cross-border responsibility. Government engineers, however, took another view of the potential to mitigate large floods through hydraulic engineering.

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Flood Mitigation: The Views of Engineers

Both Harrison (Executive Engineer of the RMC) and East (Chairman of the SRWSC and Victorian representative to the RMC) considered that mitigating large floods through hydraulic engineering was unlikely to eventuate and, indeed, for several reasons, was impossible. They both argued that the financial outlay required to construct dams or pondages, and the large area needed to impound sizeable flood flows, meant that mitigation through hydraulic engineering was to a degree physically and financially impossible.

In 1954 East had noted, in an address to the Old Collegians' Conference at Wesley College, Melbourne (later published in Aqua, the official journal of the SRWSC, and then re-printed as a pamphlet), that attempting to mitigate large floods on the Murray was illogical and in some ways impossible. He wrote that 'it would be impracticable to find storage basins large enough to hold them, even if it were financially possible to face the cost'. He gave the examples of the 1934 floods in the Latrobe, Bunyip, and Mitchell basins, arguing that the floods 'exceeded by far in volume the capacities of all the possible storage basins in their catchments. Similarly on the Murray'. Further, East argued, if large storages were built to trap floodwater for mitigation and use during dry periods, much of the water would be lost through evaporation and the impounded water would drown fertile, productive land, 'for practically all storage basins [large enough] are unfortunately on fertile flats'.

The 1956 floods did not change his view. 'Great floods on the Murray cannot be prevented or, to any appreciable extent, controlled', he wrote in a letter to the Victorian Minister for Water Supply in August. East had been asked by the Minister (Wilfred John

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Gibbs) to (in East’s words) prepare notes ‘dealing with the flood problem along the Murray River’. East argued that the topography of the river system and limitations of engineering meant that large floods could not be mitigated through dams. He argued that many tributaries fed the Murray floodwater simultaneously. The amount of water that accumulated was immense. He noted that in the first seven months of 1956 this was 12 million acre feet and ‘[t]he provision of great flood detention storages to store such vast quantities of water is quite out of the question’. In similar terms to those in his 1954 paper, East also pointed out that ‘the cost would be fantastic and the damage done by the submergence of fertile valleys in the upper reaches of the river would be much greater than the damage done by uncontrolled floods’. East also advised against constructing continuous levees along the river. Such an attempt ‘would lead inevitably to disaster’. He cited the ‘disastrous breaches in the levees’ along the Po, Yellow, and Mississippi Rivers. Nevertheless, he thought that these levees, although causing problems, were justified as they were built to protect productive lands that offset the cost. Along the Murray, he implied, construction and maintenance expenses would not be recouped. Further, he argued that in comparison with the areas that these rivers could inundate, the ‘areas flooded by the Murray are insignificant’.

Instead East suggested that local levees, regulated through the 1923 interstate agreement, were the best method of flood mitigation for the Murray.

Indeed, a number of years previously East had recommended that decentralised water boards be established state-wide for flood prevention and control as well as river improvement and drainage. The water boards would be regional organisations coordinated by the states, but focused on local problems. By July 1956 the Rivers Improvement Bill was drafted. However, it was shelved following heavy criticism that it was an ‘engineers’ approach’, treated ‘Victoria’s flood problem’ purely as a matter of drainage, and merely passed costs to those living in rural areas. The Country Party refused

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The official report on the 1956 flood by the RMC, written by Harrison and released in 1957, focused on techniques for mitigating large floods, particularly 'flood detention storages', which Harrison considered the 'most effective method of flood control, where applicable'.\footnote{Harrison, 'Report on the River Murray Flood Problem', p.6.} Such structures, used in the Tennessee and Ohio Valleys in America, manipulated the topography of the river to trap water in existing flood ways. Like hydro-electric and water supply dams, detention storages were expensive. Harrison estimated that they would need to impound 15 million acre feet of water at a cost of £220 million. Further, such expensive works would be no guarantee against floods as large floods would be reduced, but not prevented. In light of the cost, and 'the infrequency of high floods', Harrison argued that detention storages 'could not be justified on economic grounds'.\footnote{Harrison, 'Report on the River Murray Flood Problem', pp.6-7, and pp.23-34.}

Harrison argued, much like East, that regional or local methods of mitigation, such as 'river improvement' (snagging and dredging) and levee banks would be more effective, if used in accordance with government regulation and with caution. 'Catchment improvement' was also considered by Harrison as a means of mitigating large floods, which (like the MVDL proposal) was a more holistic approach and included techniques for soil conservation and re-forestation to increase the possibilities for floodwater absorption into riparian land. However, he argued that during large floods such measures were useless and would not affect the high velocity and run-off rate generated by the swelling river.\footnote{Harrison, 'Report on the River Murray Flood Problem', p.7 and p.23.} Indeed, Harrison was (to a degree) pessimistic about all forms of mitigation when it came to large floods. His official RMC report presented no blanket solutions to flooding and hinted at the sense of impossibility he felt for any river or catchment-wide approach to mitigation. Localised mitigation, which Harrison seemed to advocate in the report, he criticised elsewhere.

For example, he told the MVDL and Wentworth shire there was very little chance of state or Federal governments acting on the calls of the League for a single flood control authority or mitigation. The *Sunraysia Daily* reported Harrison's candid rebuttal of the MVDL's and Wentworth Shire Council's 'proposal that a single authority make a study of...
flood control for the Murray and its tributaries", in Mildura in June 1956. Harrison, however, was to later write this very report after the RMC was pressured to investigate the 1956 flood and report on flood mitigation through the Murray river system. Addressing the Mildura meeting in June 1956, Harrison came very close to declaring that there was nothing anyone could do, stating that those who lived along a river that had flooded for 'thousands of years... [had to] expect trouble'. Harrison played down any chance of mitigating the then impending flood, or future large floods. He argued that mitigation through existing dams was unlikely because they were designed for irrigation and governments were unlikely to use them for anything else: 'The Government will never allow Hume Reservoir to be used for flood mitigation'. He told the meeting that there were three methods of effective flood mitigation: catchment improvement, storages, and levee banks. He then eliminated all three as impracticable on the Murray during large floods. Catchment improvements were unlikely to affect the floods, storages were too expensive, and levee banks (which many councils, companies, and individuals had set about building) held too much potential for raising river heights. 'We don’t want levee banks. They only make the river level higher as they get higher', he said. In his later report, Harrison acknowledged that '[m]any vital areas such as pumping stations at Red Cliffs and Waikerie and towns such as Wentworth and Renmark were saved from inundation' by levees banks. Perhaps local efforts had changed his mind to a degree; or perhaps placing his view on official record tempered his arguments.

During the meeting Harrison further made clear that the RMC was not the organisation to approach as the desired 'single authority' on floods — he asserted that 'flood control' was constitutionally a state concern. Further, the RMC did not have enough power, he argued, to be such an authority — for example it had no authority for construction (the RMC's involvement in the construction of the cross-jurisdictional Hume Dam was an exception reached by special agreement). The RMC merely monitored state construction by reviewing designs. Complex bureaucracies that specified precise departmental and commission duties and expenses, as well as interactions

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201 Sunraysia Daily, 2 June 1956, p.3. Also reported in, 'If You Can’t Avert Floods You Can Ease Floods', Riverlander, August 1956, p.13 and p.43.
202 Harrison, 'Report on the River Murray Flood Problem'.
203 Sunraysia Daily, 2 June 1956, p.3.
205 Sunraysia Daily, 2 June 1956, p.3.
between topography and floodwater, and the sheer amount of water, all worked against the mitigation of large floods.

For both East and Harrison a catchment-wide approach to flood mitigation beyond government regulation of local activities seemed impossible. In terms of built structures, the engineers argued that local works were the best method. Hydraulic engineering, which was looked to by governments and settlers to provide environmental security and national development on a grand scale, could not stop the damaging effects of large floods. East and Harrison made it clear that local, smaller scale engineering and attention to catchment environments were the only means for limiting the damage caused by such occurrences.

While mitigation through engineering was given significant attention by East and Harrison as well as by parliamentary representatives, it was but one aspect of potential government action. There were also the matters of flood warning and emergency response. For settlers and politicians the factors generally seemed to suggest a watershed approach — including warning networks, emergency response, and engineering (despite East’s and Harrison’s arguments). As the MVDL and Wentworth shire had looked to the RMC to take up ‘flood control’ generally, so too did Victorian Premier Henry Bolte.

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The River Murray Commission

The RMC seemed perfect as a potential interstate ‘flood control body’. As an already operative body with unparalleled expertise on the Murray and its tributaries, covering a larger geographical scope than other interstate river management bodies (such as the SMA) and already implicated in dam construction (as states needed to submit designs for approval) and operation (being responsible for such structures as the Hume Dam), it already had much of the necessary expertise and bureaucratic mechanisms. The RMC further had state (New South Wales, Victoria, and South Australia) and Commonwealth representatives, but was federally financed. The Commission was targeted by states, who urged that the RMC not only be used as an administrative channel for Commonwealth flood mitigation, but also as a body to monitor the rivers by improving stream gauge numbers and quality.
Parliamentary debates spilled into newspapers, as the address of the Assistant Minister for State Development in Victoria to the MVDL was made public. The Canberra Times headlined an article, 'Bolte Seeks Support For Murray Scheme', about the Assistant Minister’s speech in which Victorian Premier Henry Bolte was revealed to have approached the Acting Prime Minister and Premiers of South Australia and New South Wales to support transferring ‘full responsibility of flooding in the Murray Valley’ to the RMC.\textsuperscript{206} It was reported that the scheme involved: the RMC establishing mitigation dams as well as ensuring the ‘elimination of fire from the catchments; elimination of grazing above the 4,750ft. contour; the discouragement of building within the inter-levee zones; diversion of water to natural pondages or lakes when a flood is in progress’. The last of these plans included a suggestion to channel floodwater into artesian basins in New South Wales for storage.\textsuperscript{207} Under the proposal the Commonwealth would finance dam construction and would, presumably, also bear responsibility for any adverse effects of such regulation.

Indeed, East was somewhat implicated in this manoeuvre. In his letter to the Minister for Water Supply, dated a few days before the meeting, he addressed the issue of flood warning. He wrote that a ‘feature of the recent floods has been the lack of sufficient information to enable anything more than an approximate prediction to be made... [regarding] flood peaks... from Euston (near Robinvale) to Wentworth’. He argued that although the SRWSC had ‘organised very effective flood warning systems for many Victorian Rivers’ and was addressing the needs on the Murray, the Murray was outside Victoria’s borders. East suggested that the RMC was the best organisation to recommend what action should be taken towards establishing a flood warning network on the Murray, as it could ‘consult with all bodies concerned’.\textsuperscript{208} The RMC’s intermediary role between Victoria and New South Wales was called upon.

The Minister for National Development, William Henry Spooner, responsible for Commonwealth representation on the RMC, asked his secretary for arguments against

proposals by the states for the RMC to take on any increased role as a result of the floods.\textsuperscript{209} The strongest argument for the Minister was that the RMC could investigate river monitoring but ‘[s]ince flood prevention is a State responsibility, the initiative lies with the States’ or is simply ‘a State matter’.\textsuperscript{210} The RMC retained its position as an advisor to states, producing a report on the ‘River Murray Flood Problem’ but nothing more.\textsuperscript{211}

In 1958 tension again surfaced over who was responsible for flood control. Harrison made another public declaration in the \textit{Border Morning Mail} that the ‘River Murray Commission is not a flood control authority and operates its structures for the benefit of irrigation, and, in a lesser degree, navigation’.\textsuperscript{212} Floods were not within the sphere of power of, nor a priority for, the RMC, which continually rejected such responsibility (and liability).

It was not just the Commonwealth that was pushing for states to take constitutional and practical responsibility for the 1956 flood and future floods. Though most in the House of Representatives in August 1956 called for increased Commonwealth assistance, one politician, Jeff Bate, representing Macarthur, argued that Commonwealth intervention of any sort was unnecessary, perhaps fulfilling Raggatt’s opinion that federal aid would be unwelcome in states. His argument was summarised by the Secretary as:

\begin{quote}
N.S.W. had established a national emergency service, which operates in times of disastrous floods. The State Government also controls the police and most other departments which are involved. It would be foolish for the Commonwealth to duplicate these services. Relief in past floods has been on generous terms and areas affected have been put on a proper footing again.\textsuperscript{213}
\end{quote}

\begin{flushleft}


\textsuperscript{211} Harrison, ‘Report on the River Murray Flood Problem’.


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Bate's comments also indicate that, in his view, New South Wales' bureaucracy had come to terms with periodic flooding. He saw the states as having developed successful avenues of relief, emergency aid, and reparation for mobilisation during floods. The firmness with which he rejected Commonwealth intervention, though phrased as 'foolish' duplication of state mechanisms, was also an assertion of state autonomy. The Commonwealth could help states financially with 'generous' donations, but otherwise could keep its distance from New South Wales' rivers. Many Commonwealth Ministers also argued that states should address floods as a constitutional necessity.²¹⁴

In light of the flood, many politicians and settlers were concerned that Australian officials did not know enough about the flood potentials of the inland rivers, especially the Murray River. Expectations of consistent, controlled river flows on the Murray, the feat of engineering, were disappointed; engineers were seen to have failed to know the river and control it. While arguments for increased physical and bureaucratic regulation to solve the immediate 'flood problem' were common, equally so were those for increased monitoring of the rivers.

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Monitoring and Regulation: Knowing a River

Scientific investigation into the hydrology of Australia's inland rivers began early. By the 1850s meteorologists such as William Stanley Jevons were attempting to decipher patterns of floods and droughts and the relationship between river flow and adjacent alluvial land. In the 1880s New South Wales Government Meteorologist Henry Chamberlin Russell extended the meagre rainfall observing stations in that state to 50 in 1882, with 210 'unofficial' observers. However, local rainfall was not the only factor that influenced floods in the Murray and Darling river systems, as run-off from tributaries also contributed to river heights. Recognising this factor, hydraulic engineer John Baillie Henderson began installing river gauges along western Queensland rivers in the late 1890s with a view to creating flood warning networks. River observation and measuring had passed from meteorologists to engineers by the turn of the century. While both

meteorologists and engineers before Federation had pursued knowledge of the rivers for the sake of scientific inquiry, both were allied early to the government. Their role as government employees set an agenda for research into rivers that invariably centred on land settlement through irrigation and navigation. Navigation became a secondary consideration by the early 1900s as frequent droughts stranded vessels and railway networks increased, providing a more reliable means of transporting stock, produce, and people.

Settlement dominated engineers' investigations into rivers and by the 1950s it was tailored towards two main drought mitigation techniques: dams and irrigation networks. Stream gauges were established along major watercourses to monitor the effects of dams and to gather data for prospective regulation. To a lesser extent floods also motivated gauge reading. Drought, however, was seen as a bigger threat to pastoralists and agriculturalists than inundation and so irrigation, not flood mitigation, was the primary focus.

In 1950, Senior Designing Engineer for Water Reserves, SRWSC, K.D. Green, wrote the prefacing article to a collection on 'The Utilization of River Flow', in the Australian journal of The Institution of Engineers. Green's article, 'River Gaugings', and expertise provide an insight into the 1950s culture of engineering. The priority of river engineers was to maximise the use of river flow for settlement. Gauging results, '[a]s far as the State Rivers and Water Supply Commission is concerned', Green stated, 'will normally be used in the design of a dam or diversion weir which will utilise the waters of that stream'. 215 Gauging was part of a repertoire of engineering technology that ultimately aimed for optimum use of river water.

Green began his article with the poignant comment: 'The ultimate development of any community is usually limited by its water resources.... This is true of both country and urban development: for industry: for gardens: for irrigation: and for rural stock and domestic supplies'. Green's list of areas and industries dependent on water supply is a checklist of who and what would benefit from gauging. He continued that 'systematic stream gauging is the only answer to the problem. Without reliable statistics of any kind... any developmental project may be considerably in error'. 216 Gauged data was a way of

knowing a river, where the quest for knowledge was pivoted towards ‘developmental’ projects. Failure of engineering and regulation was, then, a failure to know the river.

Where did flood monitoring fit into Victorian engineers’ research into rivers? Perhaps the most telling sign is the placement of technically advanced automatic gauging machines. Of the 35 instruments installed between 1934 and 1950, only four were placed on rivers in such a way as to monitor floods for mitigation works, compared to the 12 placed on irrigation channels and 14 for gathering data to ‘use in [connection with] existing or proposed storage schemes’. Only one was located on the Murray River. Green’s opinion was that although some gauging was done for floods, there was ‘not as much as desired’.

Map 5.3
River gauging stations in Victoria, 1947.
[From: K.D. Green, ‘The Utilization of River Flow: River Gaugings’, The Institution of Engineers, Australia, Journal, 31, April-May 1950, pp.77-85, Figure 3, p.78.]

Information on river rises and flood peaks was made even scarcer because the older ‘staff’ method, where a pole was placed into the river to record the height, proved impractical and other forms of gauges were unable to be reached by recorders (often local residents) during floods. Further, ‘quick rises and falls’ along with lack of warnings of flood peaks to gaugers, contributed to the rarity of accurate flood data, as measurements were not taken when the flood was at its highest. To remedy this problem, engineers used logarithmic extrapolation, slope area or velocity-area methods to project what the data would have shown. These methods, Green wrote, were considered ‘reasonably accurate’.

The responsibility of engineers to build reliable regulatory structures was felt keenly in the profession. A.F. Ronalds, Principal Investigating Engineer for the Snowy Mountains Hydro-Electric Authority, wrote an article, ‘Regulation of River Flow’, in the same set as Green. He concluded with these warning words for engineers involved in regulation: ‘With the rapid expansion of water supply works — provided to permit increased primary production — and the consequent, increasing dependence of various communities on those works, any complete failure of supplies during an irrigation season would prove a national calamity’. The surge in irrigation settlements under closer and soldier settlement schemes, combined with pastoral reliance on irrigation, meant that dependence on regular river flows was greater than it had ever been. While engineers were guarding against drought, the magnitude of the 1956 flood was underprovided for; engineers were preparing for more severe dry periods than the ‘phenomenal’ 1902 and 1914 droughts, though unprecedented flooding was not given the same attention.

Following the 1956 floods, Green and Ronalds would perhaps have taken personally a politician’s argument that, ‘there is not available in this country at the present time sufficient technical information upon which to base plans for flood mitigation’. Engineers’ careful quest for knowledge of the rivers, to secure settlers with

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220 Green, ‘The Utilization of River Flow: River Gaugings’, p.82.
assured regular flows, had failed, it could be argued, because governments privileged irrigation.

In 1956 debates in the Senate turned to long-term plans for provision against floods, where monitoring the rivers was a part of that process. State and regional representatives urged a Commonwealth or interstate commission to be appointed to make long-term plans for flood prevention in the Murray, for the collection of ‘necessary technical data on flood control’ and with ‘a long-term plan for flood control’ that included Commonwealth financed ‘research into flood mitigation’.225 The MVDL also argued for further investigation of flood flows before mitigation structures were built, while the RMC considered extending existing gauge networks.226 Not all Ministers and state and regional representatives were convinced that long-term strategies were what parliament should be debating. The bluntest opinion was recorded from a Senator: ‘the approach to the River Murray floods must be with a short-term outlook, because floods cannot be prevented entirely, and measures must be taken to deal with the immediate situation’.227 For the Senator, while the water was still high the immediate, largely financial, effects of the floods overshadowed plans for long-term measures. Such an opinion was an exception, however, with most arguing for improved knowledge of floods. Improved data sets, it was believed, could become a basis of future flood mitigation to protect settlements along the rivers and hold the water back from already highly engineered landscapes on the Murray.

Although mitigation may have been a consideration in dam design, it was not a primary intention of the dam designers or governments. The dams were almost solely built to store water for irrigation and guard against drought, with the exception of the Snowy Mountains Scheme. The 1956 flood tested the new infrastructure, in a way perhaps not intended by the designers. Flood mitigation quickly became a priority for engineers working on dams.


In 1956, flood mitigation on a watershed scale was considered more seriously than in 1852 or 1890. The floods occurred at a time when the possibilities of engineering had been realised. John Blainey, in Red Cliffs during the floods, was Assistant District Engineer under the SRWSC. In 1962 he was transferred to the RMC and, he reflected, this gave him a 'new' relationship with the floods. Concerns remained about increasing flood mitigation on the Murray as the floods were 'still fresh in people’s minds'. The Hume Dam’s capacity had been increased since the flood and spillway gates built. In Blainey’s words,

This had added a new dimension to the Commissioner’s need to understand the Murray floods. With correct manipulation of the gates, part of the flood could be stored and lesser floods mitigated. But opening the Spillway gates too fast could in itself create a new flood peak... We were determined that... there should never again be a need for an emergency operation such as had been necessary at Red Cliffs in 1956.228

The 1956 floods, in showing the faults of engineering, provided a chance to improve structures and to increase the security they could offer settlers along the Murray. However, as Blainey’s statement indicates, while dams were established to secure irrigators against droughts, there were concerns that dams may increase floods. The Snowy Mountains Scheme, planned as a large system of dams, became a source of anxiety for settlers in 1956 who were concerned that once complete, the Scheme could increase both the size and frequency of floods.

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Increased Floods? The Snowy Scheme and Hume Dam

In the final month of 1956 William Henry Spooner, the Commonwealth Minister for National Development (and Chairman of the RMC), whose department oversaw the construction of the Snowy Mountains Scheme, issued a press statement assuring concerned residents in the Murray Valley that Snowy Scheme water releases would not

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228 Quoted in, Mary Chandler, '56 Memories Flood Red Cliffs, p.8.
increase the flood, nor would future storages of the Scheme aggravate 'severe' floods. Spooner’s press statement, which called on the expertise of Sir William Hudson, Commissioner of the SMA, stated that the Commissioner had had ‘this matter thoroughly investigated’. Hudson and the SMA further defended the Scheme, arguing that once completed it would in fact ‘have a marked effect in reducing flooding in the Murray and Murrumbidgee’ rivers via a system of reservoirs on the upper Tumut and upper Murrumbidgee Rivers. The SMA also revealed plans to enlarge the RMC-operated Hume Dam by a further 500,000 acre feet (half the cost being paid by the SMA), to supplement current works already increasing the dam to two million acre feet, which would also somewhat mitigate floods.

In the following days, the Border Morning Mail (Albury, New South Wales), Advertiser (Adelaide, South Australia), Mercury (Hobart, Tasmania), Ballarat Courier (Ballarat, New South Wales) and Argus (Melbourne, Victoria) carried the story. ‘Snowy Surplus No Danger to Murray River’, read the editorial of the Border Morning Mail on 31 December 1956. ‘With vivid memories of the all-time record flooding of the Murray in the year ending today’, the article read,

... and the tremendous damage to valuable properties that followed and continued for several weeks, it was only natural for those in that famous old stream’s lower regions to ponder upon a greater menace when the waters of the Snowy were ultimately diverted to the Murray its Murrumbidgee tributary.

The effects of regulation in 1956 were imagined problems of the future; what would happen to the river on completion of the Snowy Scheme, rather than in any way

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connecting regulation directly to the floods of that year. The previous year the first of sixteen dams that were eventually built for the Snowy Scheme, was completed; the ball, so to speak, was rolling. Residents, claimed the article, while ‘proud of the immense Snowy River project as they were when the giant Murray was harnessed in 1936’ (when operation of the Hume Dam commenced), had some reservations about engineering and its impact on the river and floods. They were concerned that flood heights could be increased as the Snowy Scheme would divert water from other rivers into the Murray. Spooner had put minds at rest, according to the Border Morning Mail: ‘Fortunately for all concerned their qualms no longer exist’.

Spooner’s and Hudson’s quick response to settlers’ concerns must be seen in the context of the national and international status of the Snowy Mountains Scheme. The Scheme was a symbol of Australia’s development within a global drive towards technical advancement rooted in national and progressionist projects. As the largest engineering project yet undertaken in Australia, it represented the engineering abilities of the nation and was receiving international attention. Environmental historian John Merritt, in his study of the changing political and environmental contexts of grazing in the Snowy Mountains in this period, has drawn attention to the efforts of Hudson to maintain popular support for the project – as it was only through sustained public enthusiasm that the Scheme could maintain its status, avoid controversy, and, indeed, continue. For example, Merritt noted that in response to lobbyists’ claims that the construction of the Scheme could aggravate soil erosion (through building access roads, dams, and tunnels), a soil conservation section was included in the SMA’s scientific division. The potential for political fallout had been significant as irrigators, who would benefit from the Scheme, could potentially join with the lobby groups and ‘embarrass Hudson’. ‘But’, Merritt wrote, ‘no experienced hydro-electricity engineer would willingly allow such a disaster to happen’. Perhaps this was also the case with settler concerns that the Scheme would increase floods. The SMA promised that it would do what Harrison had proclaimed as unthinkable – consider flood mitigation within the scope of dams designed for irrigation and hydro-electricity. The SMA made no pretences that the dams could mitigate large

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234 Merritt, Losing Ground, p.60.
floods (dismissed by Harrison and East as impossible), but they might mitigate future smaller floods.

Anxieties over the effects of the Snowy Mountains Scheme on flood heights that had surfaced in 1956, which may never have been completely eased, resurfaced in 1957. The Victorian Premier, Bolte, raised the issue in a letter to the Acting Prime Minister in May 1957. Prompted by '[r]epeated representations... by landowners along the Upper Murray', who feared increased flooding as a result of the Snowy Mountains Scheme, the Premier put forward concerns of a 'recent' deputation and added some of his own. Those at the deputation, Bolte wrote, 'even now' experienced damaging inundations in the snowmelt months of winter and spring which, he implied, were exacerbated by the year-round increased flows in the river, in turn due to Snowy Mountains Scheme diversions as
more dams came under construction. The river, already carrying additional water because of the Scheme, flooded to a greater height.

While 'present flooding had its problems', Bolte wrote, 'the prospect of additional water flows could be a matter of most serious concern, particularly to smaller land holders who envisaged the whole of their properties being rendered unproductive'. For Bolte, the SMA was clearly liable. However, in referring to the conditions of the Snowy Mountains Agreement of 1949, he was troubled that while the SMA was required to provide against soil erosion and siltation that occurred because of its regulation, it did not include any 'specific reference to flooding'. Bolte was further concerned that settlers were not legally protected because the Agreement authorised the diversion which caused the flooding. In view of the legal situation, where the SMA was under no obligation to prevent flooding caused by engineering, Bolte requested the Acting Prime Minister to extract an 'assurance' from the SMA that it would 'do all that it can to avoid damage being caused... and that, where it is not possible for damage to be avoided, take action to compensate appropriately those persons who may suffer injury as a result of the Authority's actions'.

Whether floods were increased by regulation was a continual source of anxiety for residents along the Murray River, particularly with the completion of the largest regulator on the Murray system and what was to be declared one of civil engineering's 'seven wonders of the world', the Snowy Mountains Scheme, on the horizon.

After further floods along the Murray in 1958 residents became more outspoken on the subject, bypassing government representatives and going straight to the press. This time, though, settlers criticised the Hume Dam as well as the Snowy Mountains Scheme.

In September and October 1958 the Border Morning Mail published a series of articles written by Harrison, by settlers in its readership sphere of the upper Murray, and by newspaper staff. Following the newspaper's report on a 'flood protest meeting' held at Albury on 26 August, prompted by the Murray again breaking its banks, Harrison wrote a letter, published in early September, defending the Commission's operation of the Hume Dam. Harrison denied that water releases exacerbated the flood for those below the dam, declaring that, 'statements that the gates were raised, allowing large volumes of water to escape, or that it was a 'man-made' flood, are inaccurate as no stored water was released'. Harrison argued that floods had occurred 'from time immemorial' and that it was

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perfectly natural for the river to flood ‘over its own floodplain’. He criticised negative press reports that ‘abuse the river (or some convenient authority) for the destruction it has wrought’. The position of the RMC (Harrison, speaking in a public forum using his title, representing the Commission) was that the river would flood with or without the Hume Dam, people should accept this, and the structure had no effect on increasing flood heights. Border Morning Mail reporters and settlers who had experienced the floods saw things differently.

On the day following publication of extracts from Harrison’s letter, a Border Morning Mail editorial rehashed opinions of ‘primary producers’ who had held the protest meeting. The report detailed their calls for an inquiry into the role of Hume Dam releases in causing or increasing the flood, because of concerns that too much water was released by ‘mistake or miscalculation’. The editorial backed the protesters views, adding that when the Snowy Mountains Scheme was completed floods could be further ‘aggravated’.

Accusations that RMC operation of the Hume Dam increased flood heights along the upper Murray kept coming. In early October an article written by an Albury resident, V. A. Krueger, appeared in the Border Morning Mail, which blamed the RMC’s policies as the primary source of increased flood heights. Krueger argued that the RMC policy was to fill the dam to capacity well before the irrigation season in September, refusing to leave it empty to catch floodwater – and thereby possibly reduce flood heights – because of its commitment to irrigators. It was, Krueger described, a ‘no risk’ policy: the RMC would not risk having an empty dam at the start of the watering season. The Albury resident labelled the policy ‘weak and defeatist’ arguing that those who were not irrigators suffered as a result: ‘filling the weir at the earliest no risk is taken with [water] conservation while every risk of flood devastation now falls on the downstream landholders – a full weir will not hold its flood waters’. By maintaining a full dam the RMC was responsible for the flood by neglecting mitigation.

In Krueger’s account the Snowy Mountains Scheme also made an appearance. The Scheme was a source of anxiety, having the potential of increasing future floods

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when it was completed. The Scheme would be used to divert Snowy River water into the Hume Dam in dry years, to supply the Murray irrigation season. If a flood was to then occur, Krueger speculated, the additional water in the Hume weir would cause the peak to be higher than it would have been if the dam had remained without the diverted water. Krueger claimed that: 'Feeding these volumes of water into the [Hume] weir could, under this stringent conservation policy, later become the basis for intensified flooding'.

River regulation, which privileged irrigation, stirred emotional responses from this non-irrigator, who blamed the structures and the RMC for being impartial to his situation and that of fellow floodplain dwellers to the point that engineers would (possibly) risk exacerbating flooding for the sake of irrigation.

The perceived effects of dams on the floods brought forth feelings of injustice, where certain industries were privileged at the expense of others. The states' and Commonwealth government's bias towards irrigation created animosity from non-irrigators, who expressed their sense of injustice at having to suffer floods for the sake of irrigation and full dams. Another non-irrigator, A. Reuss, president of the Albury-Wodonga Milk Producers Association, spoke out on behalf of dairy farmers. He blamed the Hume Dam for more frequent and larger floods. Since its construction 'he had been forced to move his entire herd three times'. Reuss had little faith in 'the authorities'. He was quoted as saying: 'They are completely destroying us and we don't know how long we can stand it from a financial point of view... you can see what the weir has done'. The RMC was specifically targeted, as he claimed 'the RMC is not helping us at all. The man below the weir is not being considered'.

Reuss' strong words reflect his sense of disappointment and betrayal by 'the authorities'.

The dam, the RMC, engineering - all pivoted towards irrigation - failed to provide security against floods and were, in fact, blamed for them. The floods in Gundagai in 1852 saw the government criticised for putting settlers in the path of danger by surveying the town on flood prone land. Now it was dam designers endangering already occupied land. In an era dominated by faith in engineering, both the 1956 and 1958 floods were seen as a failure of the profession and government to control the rivers and protect settlers. The RMC, Hume Dam and the near-complete Snowy Mountains

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Scheme were blamed for destruction caused by floods. Through the blame, comes a strong sense that engineers should have done more to mitigate floods.

In the aftermath of the 1956 floods on the Murray River, less blame was directed at the RMC, SMA, and Hume Dam than two years later. The main source of anxiety for settlers was the future effects of diversions and consequent increased flooding from the Snowy Mountains Scheme, rather than the influence of dams on the current flood, even though the Hume Dam was already built. However, the 1956 floods witnessed the beginnings of suspicion that the bias of engineers and governments towards irrigation meant that flood mitigation had been sidelined and that the large blockages in the rivers and water releases may increase the size of floods. Further, the consequences of not mitigating floods hit home to both settlers and the government in 1956, as both argued for structures to now be built that provided for both irrigation and mitigation. The debates that took place in the pages of the *Border Morning Mail* in 1958 show that those tensions had not disappeared but had, in fact, grown, with settlers connecting existing regulatory structures to the floods they were experiencing. Perhaps continued flooding had made a situation, that was pressing, urgent and settlers, with stretched finances, more demanding. Perhaps, too, the era of technological optimism was drawing to a close.

Technically, the Hume Dam did not increase the 1956 or 1958 floods. The RMC was, as Krueger argued, only implicated in its failure to mitigate the floods, especially in 1958. The Hume Dam became benign in large floods, such as 1956, and tended to slightly reduce the peaks of minor floods, as in 1958. The construction of the Hume Dam, designed as a remedy to droughts, had coincided with a series of wet years and this may explain the causation assigned to the dam by some settlers. Their sense of injustice towards the operation of this dam was felt rather than vindicated. Perhaps non-irrigators' accusations were influenced by a broader sense of injustice, as many grazing licences in the Snowy River area had been suspended in 1958 to stem catchment erosion as the Snowy Mountains Scheme continued construction and lobby groups reacted to the environmental impact of the work.240 The dams may have also become the focus of a sense of loss, symbols of changing government interests and a transforming landscape.

People continued to blame governments. With dams governments became intertwined with river flow: they were, in a very real sense, embedded in the river. Floods were no longer natural disasters in the way they had been and were instead seen to come

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from a river controlled by officials. With dams and other forms of regulation, what was natural or unnatural river flow became increasingly blurred.

The effect of the Snowy Scheme on future floods remained a point of contention. The Snowy Mountains Hydro-electric Power Act was amended in 1958, following outcries by settlers and Premier Bolte that the Agreement did not cover flooding caused or increased by the works of the SMA. An added section stated that `[i]f the owners of land along the Upper Murray or along the Lower Tumut suffers loss by flooding from temporary works of the Authority in relation to that land, the Authority shall be liable to pay compensation to the owner`. The following sections clarified this first amendment, most importantly emphasising that the Authority was only liable for floods caused or increased by `temporary works`, not permanent structures. A further qualification reaffirmed Bolte’s concerns that because the 1949 Agreement authorised diversions the Authority was not liable for aggravating flooding. The clause stated that:

(3D) For the purposes of rights to compensation under this section, where anything has been done by, or under the authority of, the Authority and the doing of that thing was authorized both by this Act and by a State Act, that thing shall be conclusively presumed, as against the Authority, to have been done in the pursuance of this Act.

A ‘thing’ could be a dam and the Authority remained without any real legal responsibility for having an ongoing effect on river heights, other than soil erosion and siltation, remaining largely exempt from compensating settlers affected by the erection of dams, which were designed to be permanent and lasting.

In 1963 the SMA still maintained that floods would not be aggravated by the Scheme, adding an assurance that `[t]he agreement... gives full protection to owners of land along the Upper Murray should any loss of flooding be experienced as a result of the works of the Scheme`. The amended Agreement, though, barely covered dam-exacerbated flooding. Yet the Authority claimed the Agreement was adequate and also reiterated that there would be ‘some mitigation of natural floods’. However, in 1966, on completion of major sections of the Snowy Mountains Scheme, the Authority reported that although the storages would not affect very large floods, floods under 12,000 cusecs would probably

242 Snowy Mountains Hydro-electric Power Act 1949-1973, Part VI, 33 (3B) to 3(D).
be increased by the Khancoban Dam, flooding as much as 2,400 additional acres. Further, this effect would be ongoing. The report considered several options such as individual legal agreements with farmers or buying the endangered land; however, decided for financial reasons to do nothing and address compensation claims 'as they arise'. Bolte's concerns that the Snowy Mountains Agreement exempted, by omission, the Authority and Commission from responsibility for any flooding caused by its works, appears to have remained justified, as the legal mechanisms only covered the effects of 'temporary works'.

Ironically, the nation focused on engineering and irrigation as remedies for drought, had not only forgotten flood mitigation, but possibly created a new 'flood problem', environmental, social, and political. Engineers, in conjunction with states (especially Victoria and New South Wales) and the Commonwealth, had created a new, regulated river with changed flows and fresh unpredictability. The 1956 floods 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 ones, supply enough water to growing populations and industries and in some areas to mitigate floods. Coastal regions in New South Wales had been devastated by floods in 1955 and 1956 and flood mitigation dams were built to reduce future floods, made cost-effective as they protected highly productive regions. New dams in other areas, such as on Darling River tributaries, were also built with flood mitigation capacity. The concerns of residents in Albury over changed flood flows were felt across the nation as the environmental changes caused by dams, irrigation industries' privileged position 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. Large-scale intervention in manipulating river flow made dam designers and operators responsible, and accountable, for rivers, as engineers took control of the water.

Challenging National Development
Dams and Irrigation, 1956 to 1990

In 1958 dairy farmers near Albury protested that dams increased both the height and frequency of floods, one of many negative reactions to dams and river regulation from those who lived in riverine environments. While the dairy farmers were perhaps not vindicated in their particular dispute, they were protesting that government privileged irrigation by providing dams to support annual crop watering. The dairy farmers were not alone in being thrown into the shadows of government policies in an era of technocratic national development.

The town of Tallangatta was moved eight kilometres west in 1952 when the Hume Dam was enlarged to provide greater water storage for hydro-electricity and irrigation. Neighbouring farms were compulsorily acquired. W.H. Ferguson, a resident of the town, expressed a strong sense of injustice at the narrowness of government development regimes and officials' decision-making, that took little account of local attachments to place, and valued national benefits above local losses. In an open letter, just before the town was flooded, he wrote:

Perhaps I should apologise to the public for broadcasting the small affairs of a place unknown to many thousands living in Victoria, but this 'history' is somewhat of an obituary notice, the poor little place is to be drowned, a very beautiful and fertile parish is to be drowned by the Hume Weir Waters [sic]. There are two ways of getting rid of people – fire and water. The Governments in their mercy have adopted water, we are to be merely drowned out; we should be grateful. We are not. We are told for every one of us driven off the land, ten others will be placed upon it, and will live happily ever
afterwards. We grudge no people their happiness, but we dread our removal. Ministers of the Crown put the matter with brutal candour. ‘We won’t pay for sentiment’, saith one; another, ‘You cannot make omelettes without breaking eggs’. We are the eggs, and though we are being forced off the earth we should not squeal. The boasted policy of governments is to settle the people on the land, they are unsettling us off the land... The pioneers of our valleys fought nature; they carved smiling farms out of forests and swamps. They have left their sons a goodly heritage. We must go, but we go with sorrow...  

This sense of injustice towards the government was to pervade many of the experiences of those who lived in flood country over the following decades.

In the years and decades following the 1955 and 1956 floods state governments embarked on extensive programs of dam building. More dams for the Snowy Mountains Scheme came under construction. In Western Australia, the Ord River Irrigation Scheme was initiated and completed. In the eastern states new dams were also built for irrigation, town supplies, and stock watering, and old ones were enlarged. The largest dams on the Murray and Darling systems were predominately built for, or became used for, irrigation.

State and federal water management for inland regions consolidated around dams and irrigation. Government dam building and water management for irrigation was made possible by highly centralised water management. Such a restricted water management focus that privileged irrigation, together with governments’ development ethos and ‘top heavy’ approach, was increasingly challenged by a variety of different people and groups in this period. Indeed, by the 1990s national perceptions of dams and irrigation had altered to include, importantly, environmental degradation along the Murray and Darling rivers caused by changed river and flood flows and toxic chemicals used by agricultural irrigators. The complex social, environmental, and economic milieux that emerged in many regions of the inland following the advent of dams, irrigation, and centralised flood mitigation proved significant issues in future water management; especially as governments attempted to simultaneously address local, national, and international social and environmental concerns.

While government programs for dam building continued, the period from 1956 to 1990 marked a change in government polices around irrigation; from public (or

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government funded) irrigation to that of encouraging private irrigation. This chapter discusses this transition. At the same time as governments built dams for irrigation in this period, they also attempted to improve flood mitigation, which had been shown to be ineffective during the 1955 and 1956 floods. Floods in coastal and inland rivers in these years had caused significant damage to towns and crops. During this period governments began to systematically address flood mitigation for the first time by constructing levee banks. The New South Wales government also incorporated flood mitigation into some new dams along inland and coastal rivers.

Floods changed views of dams and became entangled in bigger disputes about irrigation and its environmental, social, economic and political effects, particularly as they emerged between 1956 and 1990. In this period important changes occurred in settler, government, and industry understandings and management of floods, as well as alterations to flood flows and floodplains. Dams and irrigation caused widespread changes through many river systems and adjacent floodplains as they relied on harnessing flood flows for water supply and permanently alienated river flow from floodplains. Taken together, the changes constituted environmental degradations that reflected on problems and difficulties of the then traditional water management practices and ideologies. This saw the rise of major and divisive, national and international issues such as water security and environmental sustainability. Post-war personal insecurities gave way to broader anxieties over the environmental destruction of landscapes.

Dam building and irrigation were challenged in three ways in this period. First, economist B.R. Davidson critiqued the economic feasibility of dams and irrigation. In the 1960s Davidson and others argued that government expenditure on dam construction and irrigation subsidies rendered irrigation unprofitable. He further argued that irrigation wasted water in such a dry continent — dryland farming should instead be pursued and supported by governments. Secondly, non-irrigators raised concerns that dams, water extractions for irrigation, and flood mitigation dramatically changed river and flood flows in their regions, including along the Namoi and the Macquarie rivers and floodplains, where extensive cotton industries followed the construction of dams. Cotton depended on large amounts of water for 'surface irrigation' and a strict watering regime. Such water intensive techniques for growing crops, which also included rice, were developed

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extensively over large inland areas in this period. Thirdly, the emerging environmental movement altered national conceptions of dams and other 'development' and land settlement projects, seeking changes to government policies and regulations in order to make them accountable for the environmental impacts of development projects, and to value environmental conservation. Although environmentalists, by and large, did not focus on the Murray and Darling systems until the 1990s, in the period here under study they targeted 'development' projects elsewhere, importantly the flooding of Lake Pedder and the damming of the Franklin River (both in Tasmania). National campaigns against large-scale river works changed the national conception of dams in Australia – from projects of national development that were largely unopposed or unquestioned, to being problematic and undesirable.

This chapter will finish with an analysis of the centralised systems that characterised government river and floodplain management in this period. 'Top heavy' water management drove more and more river flows to become directly manipulated by government works, departments, and officials. Emergency responses to floods also became more centralised. Centralised governments, focused on irrigation and dam-building, found themselves incapable of addressing the increasingly complex problems they had helped to create. In the 1980s governments began to develop river management processes to include a broader range of river values and uses as well as to address environmental degradation, but the growing problems of salinity and poor water quality increased the urgency for these new processes of river and floodplain management. Many of the administrative problems from this period remained into the 1990s.

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Dams and Irrigation: Economic Assessment

Throughout the 1960s and into the 1970s New South Wales, Victoria, South Australia and Queensland expanded their water storage and distribution networks. State programs of dam building and storage enlargements rivalled the hydro-electric and irrigation projects undertaken in the post-war period. For example, the combined water storage capacity of government dams in Victoria nearly doubled between 1956 and 1980, from
around eight million megalitres to around fifteen and a half million megalitres.\(^3\) In New South Wales, the government surveyed over 30 sites for new dams and weirs and by the mid-1960s had a 50 year plan for dam constructions worth £700 million.\(^4\) The dams built in this period continued post-war philosophies of national and state development that focused on large-scale technocratic projects and increasing settlement and populations through agricultural irrigation.

In 1963 the Victorian State River and Water Supply Commission (SRWSC) engineer A.L. Tisdall, speaking at a national conference on Australia’s water resources, commented on the continued importance of irrigation in the process of national development: ‘Water conservation is of vital importance in this driest of all inhabited continents... Irrigation development is not simply an isolated business undertaking, and in advanced countries is not so regarded. It is nation-building in the real sense’.\(^5\) Tisdall’s view was typical of many government engineers involved in water management in this period. Dams and irrigation development had become mainstays of government policy, closely linked to land settlement programs and national development.

Established irrigators also supported continued government investment in the irrigation industry. Powell argued that in Victoria in the mid-1960s, '[i]rrigation was... a well-ensconced institutional force...; it was the focus of powerful community interests, family loyalties, organisational strength, and professional identity'.\(^6\) In New South Wales irrigation was gathering a similar status along rivers such as the Namoi and Macquarie. Following the completion of large dams on these rivers in the 1960s, irrigation developed rapidly. In many regions irrigators quickly became dominant and formed powerful groups within local communities. Their interests also heavily influenced river management. However, the financial feasibility of large dams and irrigation began to be questioned by economists as well as some engineers in this period. The previously unquestioned role of irrigation as a national asset was challenged publicly and sustainedly for the first time.\(^7\)

Economist B.R. Davidson led attacks against irrigation and irrigation dams in the 1960s and 1970s. His books, *The Northern Myth* and *Australia Wet or Dry?*, published in

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\(^5\) A.L. Tisdall, quoted in Powell, *Watering the Garden State*, p.248.


\(^7\) Powell, *Watering the Garden State*, pp.248-255
1965 and 1969 respectively, criticised contemporary and past irrigation schemes and their associated dams, as uneconomical in terms of cost-benefit ratios. In *Australia Wet or Dry?* Davidson wrote: ‘If the aim of the nation is to use its resources as efficiently as possible and to give its people the highest possible standard of living, the establishment and continued expansion of irrigation is a mistake’. In crude terms, Davidson’s argument was that irrigation dams cost far more to the state, including capital and maintenance expenses, than was recouped from farmers’ production. Farmers were not taxed for the capital and maintenance costs of dams, nor did they pay interest on the capital invested in dam construction. Instead, water was sold cheaply to farmers who, Davidson argued, wasted the water through inefficient irrigation methods. Many irrigators were also financially supported by government subsidies. Davidson argued that a small area of irrigated land was sufficient for all the necessary vegetable production in Australia and, generally, there was too much land under irrigation. He especially criticised small-scale irrigated dairy farming, which was significantly subsidised by the government. He suggested that dairy farms be amalgamated and used for rice growing, beef grazing, and raising fat lambs.

Davidson argued that irrigation in Australia had been founded on powerful ideas, such as that it was the best way to achieve land settlement, drought mitigation, economic growth, and increased production. The continued logic of these ideas, however, did not stand up under scrutiny and contemporary technology. He argued that the effects of drought were felt more intensely in regions under irrigation as these areas depended on consistent water availability, and that the land settlement imperative of irrigation had also failed, pointing out that greater population densities had been achieved in wheat districts (albeit in townships rather than on small farms). Dryland farming (and improved crop varieties) should instead be developed through government support, since technological

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9 Davidson, *Australia Wet or Dry?*, p.241.

10 Davidson, *Australia Wet or Dry?*, p.240.

11 Davidson, *Australia Wet or Dry?*, pp.240-243.

12 Davidson, *Australia Wet or Dry?*, pp.139-142.

13 Davidson, *Australia Wet or Dry?*, pp.1-5.

innovations made it a feasible alternative. Dryland farming was an economical and water efficient form of agriculture.  

Continued dam building by governments would also create new demands on limited amounts of water. Indeed, Davidson argued that with 90 percent of Australia's stored water going to irrigation, the industry had reduced the water available for other, more lucrative industries such as grazing, as well as for domestic supplies. Further, traditional irrigation crops were becoming less profitable because European markets, which had taken a large proportion of exports, were contracting. The only crops that could be grown lucratively were commercially expensive products such as fruit and vegetables, and even these could be grown in smaller areas and could in part be replaced by more water efficient dryland farming. He concluded *Australia Wet or Dry?* with these words: 'It is the conservation of water for uneconomic irrigation schemes, rather than allowing the water to flow harmlessly into the sea, that has wasted the nation's resources.' Davidson explicitly omitted some forms and areas of irrigation from his general criticisms in *Australia Wet or Dry?*, including the then embryonic cotton industry on the Namoi. In fact, he stated that cotton growers on the Namoi made 'efficient' use of water. There, private irrigation farms were fed by the government built Keepit Dam. Like irrigators elsewhere, Namoi irrigators were not taxed to recover the capital cost of the dam. The cotton industry was also given a starting boost in the 1960s through a cotton bounty. Nevertheless, Davidson was generally more positive about the cotton industry than other types of irrigation because the national and international cotton market was good. He cautioned, however, that cotton irrigation would only prove economically viable in the future if cotton markets improved further and disease did not wipe out cotton monocultures, which were developing in places like the Namoi.

Davidson's work and arguments shaped a 'school' of economists who critiqued the economic basis of irrigation. There was a reaction against them by engineers who presented alternative cost–benefit analyses, that showed the economic advantage of irrigation, and made counter arguments that irrigation did, in fact, achieve drought

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15 Davidson, *Australia Wet or Dry?*, pp.3-4.
16 Davidson, *Australia Wet or Dry?*, p.2.
17 For changing contexts and markets in this period see, Powell, *Watering the Garden State*, p.247.
18 Davidson, *Australia Wet or Dry?*, pp.112-114.
19 Davidson, *Australia Wet or Dry?*, p.245.
20 Davidson, *Australia Wet or Dry?*, p.242.
21 Davidson, *Australia Wet or Dry?*, pp.191-198.
mitigation, increased land settlement density, and other positive outcomes. Engineer C.H. Munro countered Davidson’s criticisms by pointing to the economic success of cotton irrigation in the Namoi valley. For Davidson, irrigation along the Namoi had been the exception, for Munro it was the example. Growers along the Namoi represented a new generation of irrigators who grew lucrative crops. Munro argued that the economics of the government dam at the headwaters of the Namoi had undergone rigorous assessment, and its operation as well as the irrigators’ water use was closely regulated. Munro argued that the debate would only be settled if other dams were as thoroughly assessed as Keepit Dam and the methods of calculation made public (he criticised Davidson for not publishing his methods of calculation). Munro suggested that studies of other dams and irrigated farms would reveal them to be as economically viable as Keepit and the Namoi irrigators.

Davidson’s arguments, and the debates they triggered, raised real and previously overlooked weaknesses of irrigation. In many ways the ‘irrigation controversy’ (as Munro called it) was a long overdue thrashing out of the value of irrigation, the benefits and necessity of which had previously been largely unquestioned. Davidson’s arguments were those of an economic rationalist and their economic aspects were taken up in wider debate. Ultimately, the ‘controversy’ led to an economic reductionist critique and consideration of irrigation. The opportunity for a broader assessment that included the immediate and longer term social and environmental impacts of dams and irrigation, and issues around the social injustice of these works, was missed at this time. Further, Davidson’s arguments, while condemning of irrigation programs that rested on outdated economics and technology, were in some ways rooted in the same narrow development focus that drove irrigation and dam-building programs. Davidson aimed to improve ‘efficiency’ in using ‘resources’. He worked from basic assumptions, such as the need for greater population and land settlement density. As such he worked within traditional development ideologies of his era.

23 Munro, Australian Water Resources and Their Development, pp.208-218.
26 See especially, Davidson, Australia Wet or Dry?, pp.109-117.
Chapter 6 - Challenging National Development, 1956 to 1990

From the late 1970s academic writings, government reports, and international inquiries (for example, by the United Nations (UN)) were to take up issues of the social injustices and environmental degradation caused by dams and irrigation. These critiques began slowly and it was not until the 1990s that a true groundswell of study around these issues began in any sustained way. This growing body of literature revealed, and continues to reveal, long histories of injustice and environmental degradation exacerbated or caused by government dams and public and private irrigation, in Australia and around the world. 27

While the problems raised by Davidson caused substantial debate within engineering and economic circles, programs of dam building and irrigation expansion continued. 28 Irrigation and associated dams had become mainstays of government policies, linked closely to land settlement projects. Such works gained continued currency with politicians and many of their constituents as integral to the ‘national development’ ideals of making a dry land productive. The ideologies that underpinned dams and irrigation were more powerful than Davidson anticipated. 29 However, the irrigation scene was changing as Davidson was writing. Earlier criticism over public (or government) irrigation saw governments instead turn to supporting private irrigation through government dams, such as on the Namoi.

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Dams: Public Schemes, Private Irrigation, and Flood Mitigation

J.M. Powell has observed that there were two types of water projects built in this period: ‘primary development’ works, which created a demand for water by providing reliable water sources, most notably for irrigation and hydro-electric projects; and ‘secondary development’ works, which aimed to meet existing or projected demands, such as water supplies to towns and established industries. While Powell makes this observation for Victoria, it can be extended to all Australian states. Dams were built to meet the needs of growing populations, but also to settle people on the land (as W.H. Ferguson bitterly observed).30

In Victoria, irrigation dominated rationales behind further dam constructions and enlargements in rural areas. These included, for example, Buffalo and Mokoan Dams.31 Powell has noted that the area under irrigation increased six percent between the early 1970s and early 1980s.32 Most irrigation in Victoria occurred within defined ‘irrigation districts’. The districts were fed by government dams and infrastructure. Water diversions to the districts were highly regulated and coordinated with other irrigators in the district. Irrigators, however, farmed individually or through joint cooperatives. In this period there was an increase in the number of private irrigators. ‘Private irrigators’ were farmers who were licensed for water diversions and irrigation but were outside the irrigation districts. Powell estimated that half of these irrigators drew diversions from rivers that were regulated by government dams. The other half either relied on unregulated river flow or constructed large private storages, a trend that escalated in subsequent years, especially in parts of New South Wales and Queensland.33

30 Powell, Watering the Garden State, pp.246-247. Some dams built in this period, including Dartmouth Dam (commenced in 1973 and completed in 1979), were cofinanced between the state members of the RMC and the Federal government. Dartmouth Dam fed the Hume Dam and far exceeded the older dam’s storage capacity. The Hume was also enlarged in the late 1970s with a new capacity of over three million megalitres. Dartmouth and Hume were part of the Snowy Mountains Scheme, providing extra water for irrigation and electricity generation.

31 See, Powell, Watering the Garden State, p.301, ‘Major water storages’. Powell’s table gives a list of major water storages that were completed by the Victorian government up to 1988, and their main uses.

32 Powell, Watering the Garden State, pp.254. The largest irrigator in the state was the dairy industry, with 79.4 percent of the total area under irrigation in the state being used for pasture between 1979 and 1982. The next biggest irrigator was the fruit and vegetable (including vineyard) industries, which accounted for 9.9 percent of the total land under irrigation. Powell, Watering the Garden State, p.255.

33 Powell, Watering the Garden State, pp.254-255; Munro, Australian Water Resources and Their Development, pp.150-151; and, P.J. Hallows and D.G. Thompson, The History of Irrigation in Australia (Mildura: Australian National Committee on Irrigation and Drainage, 1995), pp.41-57.
In New South Wales there was a greater movement towards private irrigation outside the government irrigation areas. As Clem Lloyd noted, public irrigation schemes fell from favour in the New South Wales government following the floundering beginnings of the Murrumbidgee Irrigation Area and Murray Irrigation Districts. Lloyd described the Coleambally irrigation district, established in 1960, as ‘[t]he last major venture into public irrigation in New South Wales’. In the 1960s the government embarked on an extensive program of dam building in coastal and inland regions to promote private irrigated agriculture. The dams were intended to create a demand for water and irrigators to follow their construction. Many of these dams were built in the northern half of the state, above the Lachlan River (although additional dams and weirs were constructed on the Lachlan, Murrumbidgee, and Murray rivers).

Inland dams were also development projects in another sense. New South Wales aimed to capture water along the Darling tributaries within that state, so that it was not ‘wasted’ by flowing out to sea and to ensure that claims were not made on the water by Victoria and South Australia once it reached the Murray. The dams could provide state water security as well as development. Dams were built, for example, on the Macquarie, Namoi, Dumaresq, Macintyre, and Castlereagh rivers, and smaller weirs along those and other inland watercourses. Similarly, Queensland built dams to encourage irrigation by private licence, notably at two sites, near the towns of St George on the Balonne River and near Goondiwindi (and Inglewood) on the Macintyre River, completed in the late 1960s and early 1970s. Smaller weirs were also built along these rivers. These irrigation schemes were in the upper portions of the Darling river system, which were not subject to interstate agreements or monitoring by the River Murray Commission. It could be argued that this was one reason that problems such as the overallocation of water licences occurred. However, given the history of engineering on the Murray, this may have happened even under interstate management.

Another area in which state governments centralised control in an era of ‘top heavy’ government was flood mitigation through levee construction, improved flood

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34 Lloyd, Either Drought or Plenty, p.282.
35 Lloyd, Either Drought or Plenty, p.286.
36 See, Lloyd, Either Drought or Plenty, p.285. In 1968 in New South Wales the crops that accounted for the greatest area under crop irrigation were fodder crops, such as lucerne. Rice was second, and then cotton. However, both rice and cotton were expanding industries in the 1960s and both were to overtake fodder crops in the following decades. In terms of area, irrigated pasture was roughly equal to that used for growing irrigated crops. This was in contrast to the dominance of pasture irrigation in Victoria. Munro, Australian Water Resources and Their Development, p.146 and p.151.
37 Lloyd, Either Drought or Plenty, p.281.
warning systems, and dams. A program of flood surveys and strategic levee building began in New South Wales following the 1955 and 1956 floods. Flood mitigation had long been considered too expensive in comparison with the damage that could be prevented. The damage caused by the 1955 and 1956 floods, however, was so substantial that the expense of flood mitigation works was now justifiable in economic and social terms in some areas.  

Flood mitigation works mostly took the form of systems of levee banks, improved warning systems, and diversion channels. For example, the New South Wales government sent officials into many inland areas, such as the Namoi River valley, to assess flood flows and to establish flood mitigation levees to protect towns and, to a lesser extent, residents living beyond town boundaries. State and Federal governments also began programs to improve flood warning systems through increased river gauging stations – both through the Bureau of Meteorology (BoM) and the State Emergency Services (SES, in the mid-1970s re-named the State Emergency Service), which had independent warning systems in some places, such as along the Namoi. This was the first time flood mitigation was systematically addressed by government. The size of the 1955 and 1956 floods, as well as large floods in the 1970s along tributaries of the Darling River, was in many places unprecedented since settlement. Action to mitigate was in some ways a direct response to a new sense of the threat that floods posed.

Flood mitigation dams were also built, and used to supply water to industry simultaneously. For example, Glenbawn Dam on the Hunter River was built to mitigate floods as well as to supply water for irrigation and mining development. In the inland, Burrendong Dam was built on the upper Macquarie as a flood mitigation and irrigation structure that would also, it was argued, ensure water to the Macquarie Marshes, an important wetland for cattle grazing and bird breeding. Flood mitigation through dams was linked to a development ethos and centralised water management. Responses to 'natural disasters' were also centralised to states in the 1970s. All states passed Acts, following a series of damaging environmental events in the 1970s, which codified centralised responses and financial assistance (to individuals and local governments) during and after natural disasters. This will be discussed further in the next chapter.

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38 Lloyd, Either Drought or Plenty, p.289.
40 Lloyd, Either Drought or Plenty, p.283.
Regional Impacts

The Namoi and Macquarie rivers are tributaries of the Darling River. The regulation of these two rivers through dams and intensive irrigation occurred between 1960 and 1980, as part of the New South Wales government's program of river development to secure the waters of the Darling river system. An exploration of these two specific rivers aims to provide some insight into the complexity of the issues around dams, irrigation, and flood mitigation in this period. While these two rivers share a number of issues related to river regulation, they also have local particularities. The studies of these two rivers, therefore, also explore the ways that larger political processes and issues common to many different places, such as reduced flooding, were articulated in local contexts. This is important to recognise as it was the complexity of local issues and environmental changes that presented the greatest challenges to traditional river management. Centralised governments that focused on dam building and irrigation were unable to address many of the complex local (as well as river and basin wide) issues which they had helped to create. Further, these studies demonstrate the entanglement of issues – environmental, social, and political – that were to dominate management of the inland rivers from the 1990s and shape the futures of residents of flood country and the rivers.

Different issues will be emphasised and explored in the Namoi and Macquarie studies. The issues have been selected because of their dominance in the regions and in order to more fully explore particular challenges to dams and irrigation. The Namoi study concentrates on two issues. First, the social and industrial tensions that resulted from river regulation and irrigation, especially the concerns of graziers as river flow was reduced by irrigators' water extractions. Secondly, the way large floods were exacerbated by the operation of the dams and the erection of private levee banks by irrigators. The Macquarie study focuses on the environmental impacts of dams and irrigation, particularly in relation to the Macquarie Marshes. The marshes, an important wetland located along the lower reaches of the river, were to be significantly degraded by dam releases and irrigation. Local residents challenged irrigation development in order to protect the wetland.

In both these regions extensive cotton irrigation developed after the completion of large dams. The most common method of cotton irrigation was 'surface irrigation' (also called 'flood irrigation') from river water. Flood-irrigated cotton was dependent on
large amounts of water and strict watering regimes. Water intensive crops, such as cotton and rice, began to be grown extensively for the first time in the inland in this period. Each had been grown from early in the process of land settlement, but the area under cultivation increased rapidly as more dams came under construction.\footnote{See, Lloyd, \textit{Either Drought or Plenty}, pp.285-288.} Prior to 1980, water licences were tied to properties so that if the government authorised land for irrigation, irrigators could pump as much water as was required to irrigate that land.\footnote{Pigram, \textit{Issues in the Management of Australia's Water Resources}, pp.191-192.} Some irrigators used artesian water as an alternative or supplementary source of water, which was pumped from underground aquifers.\footnote{Pigram, \textit{Issues in the Management of Australia's Water Resources}, p.190.}

Flood irrigation essentially used artificial channels to funnel water from large on-farm reservoirs to crops, flooding fields during key growth times. The crops needed to be watered in this way relatively frequently, sometimes as often as every 10 days.\footnote{Whyte and Conlon, \textit{The New South Wales Cotton Industry and the Environment}, p.14.} However, irrigators had to be careful not to supply the fields with too much water, as cotton crops are sensitive to water-logging. Control of water availability, both along the river and to irrigation farms, as well as flood mitigation were, therefore, important to irrigators. Further, the dry climate of northern inland New South Wales was favourable for cotton growing. The rivers were regulated largely according to irrigators’ needs. The water needs of cotton growers were, however, at odds with the unregulated flows of the Darling tributaries on which many native species of plants and fauna relied. Ecologies along these rivers had evolved in response to the variable flows of the rivers, including large floods that extended wetlands and cued reproduction for many species of birds, animals, and plants.\footnote{R.T. Kingsford, ‘Review: Ecological Impacts of Dams, Water Diversions and River Management on Floodplain Wetlands in Australia’, \textit{Austral Ecology}, 25, 2000, pp.109-127.} Many non-irrigators also valued and relied on floods. For example, graziers relied on small floods to rejuvenate grazing pastures.
Map 6.1
The Namoi and Macquarie rivers, showing the location of major dams and weirs and the Northern Bypass Channel in the Macquarie Marshes.

[By: Jennifer Sheehan, Cartographic Services, Research School of Pacific and Asian Studies, the Australian National University.]
Namoi River: Industry Tensions, Social Conflicts, and a New Flood Threat

Keepit Dam, built in north-central New South Wales at the headwaters of the Namoi River, was originally intended to supply water for stock raising. Construction of the dam began in the 1940s and, after lengthy delays for a variety of reasons, was completed in 1960. By the time the dam was completed graziers’ water needs had mostly been met through more efficient techniques of using artesian water. The government turned to private irrigators to make use of the dam water. Cotton irrigation soon began near Wee Waa, spearheaded by immigrant Californian irrigators.46

Oral historian Siobhan McHugh has noted that Californian irrigators were attracted to Australia because of the lack of government controls over irrigation and government subsidies to irrigators; and to the Namoi because of the favourable climate for cotton growing and ready source of dam water.47 The Namoi River’s headwaters are in the Great Dividing Range. The Namoi has many tributaries that also flow from the mountains. All have shallow channels. Floods, fed by rain over the rivers’ headwaters in the mountains, tend to spill out of the shallow channels onto the flat floodplains below. Floods bring fertile black silt from the mountains which accumulates on the floodplains and retains water well. Irrigators were planting highly water sensitive crops, but they were establishing infrastructure on land that could flood.48

Cotton irrigation expanded rapidly on the Namoi. By 1965 there were 63 cotton irrigators in the region, 25 of them American.49 Between 1961 and 1969 the area of land under cotton irrigation grew from 38 hectares to 20,000 hectares, and between 1965 and

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47 McHugh, Cottoning On, pp.5-8.

48 Laurie Montgomery and Pettit Consulting Engineers, Namoi Valley Flood Mitigation Study: Volume 1, pp.3-4; and, Water Resources Commission, Restoration of Namoi River Floodplain Waterways (Sydney: Water Resources Commission, 1976), preliminary report, p.2. The Restoration of Namoi River Floodplain Waterways report was published as two sections in one volume – the preliminary report and the final report. The final report was located at the back of this volume and indicated that the final report was to be read in conjunction with the preliminary report. The final report made only minor changes to the preliminary report after consultation with landowners.

49 McHugh, Cottoning On, pp.5-8 and pp.19-20.
1979 the region was the major cotton producing area in Australia.\(^5^0\) Indeed, the success of the Namoi cotton growers boosted the profile of cotton in New South Wales and cotton irrigation quickly developed on other upper Darling tributaries, such as the Macquarie and Gwydir rivers, and later on the Darling itself. Cotton had the advantage of being a 'high-input, high-output' crop.\(^5^1\) It was lucrative, under the right government policies, and the crops produced on the Namoi, and later along other Darling tributaries, were of high quality, which meant even higher profits.\(^5^2\)

The New South Wales Water Conservation and Irrigation Commission (WCIC) was, however, unprepared for the speed at which cotton irrigation developed on the Namoi and the large amounts of river water pumped by the irrigators.\(^5^3\) Officials had envisioned that farmers would only irrigate a proportion of their licensed land, as had historically been the case in Australia. The type of pumps used by farmers in Australia meant that they traditionally had not irrigated all of the authorised land. However, Californian farmers introduced larger and more powerful pumps. These pumps meant they could, and did, irrigate the maximum area of land allowed by their licences. The new pumps meant that government projections of water use were, in fact, underestimates. Government assumptions about pumping technology and past irrigation methods meant more irrigation was authorised than the river could support. River flows were soon overcommitted.\(^5^4\)

A drought in 1965 first revealed the overcommitment of water to irrigators. By 1965 irrigation on the Namoi was booming and a large area of land (6,000 hectares – approximately 15,000 acres) had been authorised for irrigation the previous year.\(^5^5\) The drought revealed that all the authorised land could not be irrigated under dry conditions, which were relatively common in the region. The river and dam threatened to run dry. Downstream graziers were outraged at the effects on the river. Irrigators had exacerbated the effect of the drought by reducing river flow to their downstream pastures. To supplement meagre surface water supplies, irrigators began to pump artesian water for their crops. The interconnectedness of artesian water under the Namoi floodplains meant


\(^5^2\) McHugh, *Cottoning On*, pp.9-11.

\(^5^3\) McHugh, *Cottoning On*, p.25.

\(^5^4\) For further discussion of American irrigation methods, the effects on river flow, and graziers reactions see, McHugh, *Cottoning On*, pp.26-28.

that when irrigators began to pump out large amounts the water table, which fed other bores used for stock watering, dropped and graziers' bores lost the pressure needed to pump the water to the surface.\textsuperscript{56} Indeed, irrigators were to expand their artesian water extractions to such an extent that by 1981 as much as 50 percent of irrigation in the region was from this source.\textsuperscript{57} The reduction in river flow combined with the falling water table led to increasingly bitter sentiments from graziers as the drought continued.\textsuperscript{58} Further, during the drought dam operators continued to favour the interests of cotton irrigators. Government officials saved, released, and allocated water for cotton crops above the needs of others who relied on the river.\textsuperscript{59}

The social and industrial tensions on the Namoi in 1965 were somewhat eased by the establishment of 'water user associations', formed by local industry groups to represent disparate interests to government and each other. One of the key issues identified by the associations was the overcommitment of water from Keepit Dam. Indeed, water management expert John Pigram later estimated that water had been overcommitted by as much as 50 percent.\textsuperscript{60}

The fact that water had been overcommitted to irrigators was acknowledged by the government. The WCIC introduced new limits on irrigators' extractions. An official was appointed to the Namoi region to coordinate and enforce the new limits. However, irrigators began to pump and divert water illegally to irrigate established cotton fields. The government official was reduced to being a kind of irrigation policeman, hunting down law breakers to stop illegal pumping and river diversions. In the 1970s the land authorised for irrigation was again significantly reduced and in 1976 an embargo was placed on issuing additional licences.\textsuperscript{61} Ultimately, the government introduced volumetric allocations of surface and artesian water, after continued agitation for its introduction by water user associations, and to more effectively roll back overallocations of surface water.\textsuperscript{62}

Another source of concern from graziers and other residents (including dryland farmers) was the way in which irrigation and the operation of Keepit Dam changed flood

\begin{itemize}
\item \textsuperscript{56} McHugh, \textit{Cottoning On}, p.28; and, Pigram, \textit{Issues in the Management of Australia's Water Resources}, p.190.
\item \textsuperscript{57} Pigram, \textit{Issues in the Management of Australia's Water Resources}, p.190.
\item \textsuperscript{58} McHugh, \textit{Cottoning On}, p.28.
\item \textsuperscript{59} McHugh, \textit{Cottoning On}, p.27.
\item \textsuperscript{60} Pigram, \textit{Issues in the Management of Australia's Water Resources}, p.193.
\item \textsuperscript{61} McHugh, \textit{Cottoning On}, pp.29-35 and pp.39-40; and, Pigram, \textit{Issues in the Management of Australia's Water Resources}, p.188.
\end{itemize}
flows through the Namoi Valley. Throughout the 1970s tension remained as governments continued to disproportionately favour the interests of irrigators in the regulation of river flows. The operation of Keepit Dam for irrigation water storage and releases, along with irrigators’ extractions, reduced small floods and ‘freshes’ downstream, valued by pastoralists for stimulating vegetation growth and depositing silt. Pastoralists and other residents also argued that the dam’s water levels should be kept low to reduce the height of large floods, while irrigators argued it should be kept full for seasonal crop watering.

In the 1970s a number of large floods swept through the Namoi river system and cumulatively revealed another, more acute issue with cotton irrigation on the floodplain. These floods occurred in 1971, 1974, 1976, and 1977. During each of these floods irrigators’ private embankments, built to divert water to crops and protect their cotton fields from floods, pushed floodwater in unpredictable directions and in many cases increased the velocity and depth of floodwaters by confining the water to narrow channels.

The private embankments changed the behaviour and direction of the floodwaters, increasing crop damage on irrigation and dryland farming properties and the stock losses of graziers, as well as endangering residents. For example, the 1971 floods caused five deaths in the towns of Gunnedah, Narrabri, Wee Waa, and Moree and more than $25 million worth of damages. This included the destruction of over 60 percent of sown cotton crops on irrigation properties around Wee Waa. Similar damage was repeated in the succeeding floods in the 1970s. Most graziers and dryland farmers did not erect levees in order to receive the beneficial effects of floods, and many planned their farming around past flood experiences. However, the effect of levee banks made floods more unpredictable. Some levee banks that had been quickly erected by irrigators also

63 McHugh, Cottoning On, pp.29-35 and pp.39-40; and, Pigram, Issues in the Management of Australia’s Water Resources, p.188.
64 McHugh, Cottoning On, p.37.
67 McHugh, Cottoning On, p.37; and, Water Resources Commission, Restoration of Namoi River Floodplain Waterways, p.3.
68 Pigram, Issues in the Management of Australia’s Water Resources, p.45. During the 1971 flood Keepit Dam was full and provided no mitigating capacity. Indeed, the dam released 2.4 megalitres of water per second as the flood peaked, contributing to peak flood heights of over two metres downstream. Pigram, Issues in the Management of Australia’s Water Resources, p.46.
gave way. The floodwater that had been held back by these banks was released with force across the floodplains, isolating and drowning stock.\(^{70}\) The rapid development of irrigation in the valley (as well as in neighbouring valleys such as the Gwydir valley) and the subsequent expansion of towns such as Wee Waa meant that the potential for damage by floods had also increased.

In 1976 the New South Wales Water Resources Commission (WRC, formerly the WCIC) published a report on the effect of irrigators' private earthworks on flood flows in the 1971 and 1974 floods in the Narrabri–Wee Waa region.\(^{71}\) The report, titled *Restoration of Namoi River Floodplain Waterways*, confirmed the already widely acknowledged impact of irrigators' earthworks on increased flood heights and other changes to flood flows. The detrimental effect on Namoi valley residents and farmers (irrigators and non-irrigators) from the private embankments was significant. Greater velocity meant floods had become not only more damaging but also faster rising — there was less time for residents to prepare for floods as the time between warnings and flood peaks had been reduced.\(^{72}\) Further, as landowners built levees that blocked flood flows to floodplains, neighbours in turn built levees to protect their properties from the increased floodwater in the river channel, which in turn meant other neighbours raised existing levees or built new ones, and so on, 'creating an intensifying cycle of bank construction' and higher and faster floods.\(^{73}\) The report recommended, as the title suggests, that key natural floodways be restored to reduce flood heights created by earth works. The report based its recommendations on research and field surveys, including a comparison of the 1955 and 1956 floods on the Namoi, which occurred prior to extensive irrigation along the river (and which were documented through aerial photography), with the 1971 and 1974 floods.\(^{74}\) The investigating officials compiled map guides, with marks to show where levees needed to remain or be built in order to maximise protection to fields, towns, and properties, and to indicate to landholders which levees needed to be demolished.\(^{75}\)

\(^{70}\) McHugh, *Cottoning On*, pp.36-40; and, Water Resources Commission, *Restoration of Namoi River Floodplain Waterways*, p.3.

\(^{71}\) Water Resources Commission, *Restoration of Namoi River Floodplain Waterways*, preliminary report, pp.1-2. The final report included some adjustments in response to the 1976 flood which occurred after the preliminary report was submitted to the WRC.


preliminary version of the report was commented on by landowners, who suggested some minor adjustments, which were approved by the WRC.\textsuperscript{76}

Although the potential impact of irrigators' embankments on floods had been recognised by government officials engaged in flood mitigation assessments in the Namoi valley in the 1960s, they were prevented from intervening as the government held no power over private levees built on floodplains, only those on riverbanks.\textsuperscript{77} The Water Resource Commission Act 1976 increased water managers' responsibility to include regulation of floodplain development, including 'off-river' levee banks.\textsuperscript{78} However, the expense and labour of demolishing levees and removing excess earth meant that when the 1977 flood occurred many private levees that had been recommended for demolition still remained.\textsuperscript{79}

Another report into flood mitigation on the Namoi, published in 1980 and written by consultants who had conducted similar flood mitigation studies for other river systems in New South Wales, argued that the Namoi had reached a new level of crisis: 'If a hierarchy of river valleys with flooding problems was to be established for the state's inland and coastal rivers, the Namoi Valley would either head the list or be very close to the head'.\textsuperscript{80} The report's authors did not conduct detailed field surveys, instead arguing that the vast area they were briefed to investigate (the entire Namoi valley) limited their report to policy issues, which were nevertheless considerable. Further, the authors argued that the recommendations made by past WRC investigations (such as by the 1976 report) for local areas and individual properties were still current and relevant, and needed to be fully implemented. The authors also consulted with many relevant groups including the SES, BoM, local councils, and landholders.\textsuperscript{81}

The policy issues identified in the report included wider water management and flood policy, including floodplain farming and the need for financial assistance and incentives for landholders to carry out flood mitigation works and levee demolition as directed by the WRC. The authors argued that the recommendations made by the Commission in 1976 remained 'possibly the only practicable way in which the situation

\begin{itemize}
  \item McHugh, \textit{Cottoning On}, pp.36-39.
  \item Laurie Montgomerie and Pettit Consulting Engineers, \textit{Namoi Valley Flood Mitigation Study: Volume 1}, p.1.
\end{itemize}
in that area [the Wee Waa–Merah North areas] could be handled'.\textsuperscript{82} However, they also suggested financial assistance and/or incentives for landholders to participate in joint projects, in order to discourage 'unilateral action’. The authors implied that self-interest, along with expense, had contributed to the failure of landholders to carry out the 1976 recommendations.\textsuperscript{83}

While recommending some courses of direct action, the report mainly identified short- and long-term policy issues with flooding in the region. Despite past investigations and recommendations by the WRC, the 1980 brief was for the consultants to make preliminary outlines that could direct the Commission’s approach to flood mitigation, which was a relatively new responsibility for the WRC (from 1976). The authors wrote that, 'this report... represents part of the response by the [Water Resources] Commission to cope with these responsibilities'.\textsuperscript{84} The need for a broader policy perspective at this time was perhaps also necessary for greater coordination with other government departments, such as the New South Wales Counter-Disaster Organisation (CDO), established in 1972, and the SES (which was now administratively within the CDO).\textsuperscript{85}

The government sought broader policy changes.

One such change came in the mid 1980s when the Water Act was amended to give officials the power to nominate ‘floodplains’. Areas declared as ‘floodplains’ could now be better coordinated and controlled. Landholders in officially proclaimed floodplains were required to gain government approval to build levees. However, many floodplains have not gained official recognition, due to incomplete surveys and lack of funds for detailed studies, and so socially, economically, and environmentally problematic levees continued (and continue) to be built, along with illegal embankments.\textsuperscript{86}

The period from the completion of Keepit Dam in 1960 to the regulation of floodplain development that aimed to re-establish important flood ways in the 1970s and 1980s, marked significant changes to flood flows in the Namoi valley. Developments shaped new understandings of floods for both residents and governments. In this period

\textsuperscript{82} Laurie Montgomerie and Pettit Consulting Engineers, Namoi Valley Flood Mitigation Study: Volume 1, p.9. State and federal government subsidies had been granted to local councils and individual farmers during a coordinated effort towards flood mitigation on northern New South Wales coastal rivers in the 1960s.

\textsuperscript{83} Laurie Montgomerie and Pettit Consulting Engineers, Namoi Valley Flood Mitigation Study: Volume 1, p.99.

\textsuperscript{84} Laurie Montgomerie and Pettit Consulting Engineers, Namoi Valley Flood Mitigation Study: Volume 1, p.1.

\textsuperscript{85} K.D. Whiting, 'The Role of the State Counter-Disaster Organization and State Emergency Service in Disaster Management', n.d. p.2.

\textsuperscript{86} McHugh, Cottoning On, pp.36-39.
the position of the government also changed, from supporting unfettered irrigation development (which was privileged over, for example, the water needs of graziers and dryland farmers) to that of mediating disparate interests. The 1970s and 1980s saw greater centralisation in government flood response and management, which potentially disempowered local knowledge but also provided coordinated management to a region undergoing rapid change and that was home to residents with disparate views over river management.

The issues in the Namoi valley that have been outlined here have focused on social and political concerns, as well as flood events as they related to the expansion of irrigation and changed river and flood flows. However, the environmental and ecological ramifications of irrigation development and dams on undomesticated fauna and flora were also mounting in many river systems. These consequences were gathering prominence among some residents of flood country, the Macquarie Marshes being an area of central concern.

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Macquarie River and Marshes: Environmental Impacts

The Macquarie Marshes, a semi-permanent wetland located along the lower reaches of the Macquarie River, had long been recognised by settlers as an important water source and breeding site for migratory birds. In 1882 part of the lower marshes was declared a water reserve. A portion of the wetlands (40,000 acres) was declared a ‘game reserve’ in 1900.87 In 1919 the marshes were declared a Bird and Animal Sanctuary.88 Later, the birds also had a distant industry role — sugar cane farmers in Queensland came to rely on ibis to eat grass hoppers, which could destroy their plantations. Queensland sugar cane farmers protested against plans to build a dam on the Macquarie River in 1946-8.89

The hydrological underpinnings of extensive tracts of the marshes were also implicitly acknowledged in the limits imposed on the way pastoralists farmed in the marshes. From 1900 to 1943 the land within the fauna sanctuary was divided into five

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89 McHugh, *Cotoning On*, p.75; and, Masman and Johnstone, *Reedbed Country*, p.178.
grazing blocks. In 1943 these 'marsh blocks' were re-surveyed and divided into 21 grazing blocks (having become Crown Land in 1913). There were special lease arrangements for the new blocks that stipulated certain conditions of use. For example, one condition was that the lessees 'take reasonable steps to protect wild birds and animals upon the area'. Other conditions were, for example, the protection of 'non-noxious birds nesting upon the Lease' and of reeds used for nesting. Floods were important in the marshes. Plants, animals, birds, and fish had adapted to flood flows, which cued some species to reproduce in a pattern common to many parts of Australia. Graziers in the marshes also valued floods for stimulating the growth of native grasses for stock grazing.

These early recognitions of the environmental and industrial importance of the marshes were to be overcome by the government's post-war development ethos. In 1896 a weir was built at Warren on the Macquarie River and although larger dams were proposed for the Macquarie River from the early twentieth century, they were extensively debated by government, industry, and residents, and mostly dismissed as injurious to the marshes or too expensive to both supply water and cater for the marshlands. However, small areas along the Macquarie River were authorised for irrigation between 1920 and 1940.

In 1946 the construction of Burrendong Dam was approved. The site of the dam was located near the headwaters of the river and had been mooted as a suitable place for a dam since 1909. The dam was intended to stimulate irrigation development, but after floods in the early 1950s delayed construction, a flood mitigation pondage was added to the dam, capable of storing 470,000 megalitres of water. The dam was completed in 1967 with a total storage capacity of approximately 1,660,000 megalitres.

Anticipating the completion of the dam, cotton growers began acquiring properties along the Macquarie, which were to be authorised for irrigation. In

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90 Masman and Johnstone, Reedbed Country, p.155.
91 Masman and Johnstone, Reedbed Country, pp.161-163 and p.178; and, McHugh, Cottoning On, p.74.
93 Masman and Johnstone, Reedbed Country, p.161 and p.162.
95 McHugh, Cottoning On, p.74.
96 Masman and Johnstone, Reedbed Country, pp.177-178; and, Hallows and Thompson, The History of Irrigation in Australia, p.76.
97 Hallows and Thompson, The History of Irrigation in Australia, p.76.
98 Hallows and Thompson, The History of Irrigation in Australia, p.76.
acknowledgement of the environmental importance of the marshes, the government made provision to release a certain amount of water into the marshes from the new dam for the conservation of fauna and flora.\textsuperscript{99} Graziers, however, opposed the dam from the beginning, arguing it would reduce the small floods and freshes that rejuvenated grasses grazed by cattle even with water releases to the marshes.\textsuperscript{100}

As the dam was being built some residents expressed their concerns that the dam would endanger the marshes and birds that bred there by reducing the number of small floods and freshes. One resident stated that, ‘small freshets [or ‘freshes’] and minor floods which for untold years have maintained or augmented the Marshes water supplies will then be retained in Burrendong Dam’.\textsuperscript{101} The Macquarie Marshes Investigation Committee, formed in 1951 by local residents to lobby the government to protect the marshes after the completion of the dam, stated, ‘[i]f our plans are not put into effect, the Macquarie Marshes will just cease to exist as a breeding ground for birds after Burrendong Dam is built’.\textsuperscript{102} The dam had been widely publicised as securing a reliable water supply to the marshes, yet local residents remained sceptical about the effect of the dam on the wetlands. The year the dam was completed, the National Parks and Wildlife Service (NPWS) was created and management of the marshes was transferred from the Department of Lands to this authority.\textsuperscript{103} The dam began operation and cotton irrigation expanded during a severe drought. Water releases promised for the marshes were put on hold to supply irrigators with water. The already limited water supply to the marshes was reduced by irrigation extractions, irrigators’ ‘off-river’ storages, and water stored in the dam. The wetland began to dry out.\textsuperscript{104} Water releases to the marshes, to ensure bird breeding, were reintroduced in 1969, and in 1971 part of the marshes was declared a Nature Reserve.\textsuperscript{105}

However, farming and the needs of the marshes remained in tension. A bypass channel was completed in 1972, built to speed water supply to downstream farmers whose water supply had been reduced by irrigation extractions (see Map 6.1). The bypass channel meant that water used for farming bypassed the slow network of marshlands,
further reducing the amount of water flowing through the marshes. Irrigation water was also released at different times from traditional flooding. Further, releases caused canalisation and erosion along watercourses. Another effect of the way the river was regulated was that some parts of the marshes were permanently flooded, which injured red gums (reliant on a combination of floods and periods of drying), while other parts of the marshes were often too dry. The canalisation of the marshes meant vegetation no longer purified the water and water quality below the marshes deteriorated. A reduction in the frequency and size of floods also limited bird breeding, as some birds, such as ibis, would only breed in large numbers when the marshes flooded extensively. Reduced flooding also caused a reduction in the quantity and area of reed growth, needed for nesting material by birds. These changes to the marshlands were recognised by local residents from the time the dam began operation.106

Government researchers from the CSIRO studied the effect of dams and irrigation on the wetlands from the 1960s, confirming local residents' observations.107 In the 1980s and 1990s scientists such as Richard Kingsford from the NPWS were to conduct studies on the ongoing effects of reduced and altered water flow on bird breeding and bird populations at the marshes.108 Water birds' habitats and breeding continue to be threatened by reduced flooding. Floods are integral to the ecology of the marshes. Indeed, Kingsford and fellow researcher Rachel F. Thomas used the large 1990 flood to measure the wetlands — the very shape and extent of the marshes is due to floods.109 As Kingsford has argued, the 'alienation' of floods from floodplains and wetlands through river regulation for irrigation has widespread ecological ramifications, including reduced biodiversity and the transformation of wetlands and floodplains to terrestrial ecologies.110

Irrigators have recently argued that although the marshes have become degraded, their on-farm water storages and government dams act as surrogate wetlands. The dams

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106 McHugh, Cottoning On, pp.75-76; and, Hallows and Thompson, The History of Irrigation in Australia, p.77. See also, Kingsford, 'Review: Ecological Impacts of Dams, Water Diversions and River Management on Floodplain Wetlands in Australia', p.117.
are used by birds for breeding and sustain a diversity of wildlife.\footnote{Masman and Johnstone, \textit{Reedbed Country}, p.205.} Indeed, there is a movement amongst farmers, irrigators included, to encourage wildlife diversity in and around some dams through measures such as native vegetation planting. Government and non-government publications encourage farmers to create dams that are ‘wildlife friendly’ — for the conservation of native species of birds and plants, but also for the role certain species can play in industry; for example, the pest control that birds can provide and the water purification qualities of wetland plants.\footnote{See, Stephen Platt, ‘Wildlife on Farm Dams’, Department of Primary Industries, State Government of Victoria, \url{http://www.dpi.vic.gov.au/DPI/nreninf.nsf/childdocs/-9599FBE44B161F63CA256BC800079622-738D5F5AA8EE28A2CA256BC800090A63-6F1B33D2E88612BE4A256DEA002933B4-89D37BDD10F23033CA256BCF00088818?open}, accessed 19 June 2009; Cooral Rawton, ‘Making Your Dam ’Wildlife Friendly’, \textit{Land For Wildlife Note No. 2, Land For Wildlife: Voluntary Wildlife Conservation, April 1999}; Carl Gosper, ‘Creating Habitat for Birds’, \textit{Biodiversity: Darling Riverine Plains, Fact Sheet No.10}, n.d.; G. Barrett, ‘Birds on Farms: Ecological Management for Agricultural Sustainability’, \textit{Wingspan}, 10, 4, December 2000; and, Barry Lewis, \textit{Farm Dams: Planning, Construction and Maintenance} (Canberra: Landlinks Press, 2002).} However, the biological diversity of private and government dams is subject to private interests, and comes second to private and industry needs. In addition, irrigators cannot replace the complex ecologies and biodiversity of wetlands that have evolved over thousands of years.\footnote{See also, Masman and Johnstone, \textit{Reedbed Country}, p.205.}

Many graziers and others who lived near the Macquarie Marshes were outraged at the denudation of the wetlands due to the combined effects of irrigation, the bypass channel, and the dam. They were not only outraged at the effects on their livelihoods but also, significantly, at the effects on wildlife and vegetation which they had taken care to protect, often for generations. In 1983 a draft management plan was developed for the marshes by the NPWS in conjunction with the New South Wales WRC.\footnote{Water Resources Commission and National Parks and Wildlife Service, \textit{Draft Plan of Management for Works in the Macquarie Marshes} (Sydney: Water Resources Commission and National Parks and Wildlife Service, January 1983).} The same year the WRC announced it would issue a 50,000 megalitre allocation of water to the marshes annually.\footnote{Pigram, \textit{Issues in the Management of Australia’s Water Resources}, p.81.} The management plan was finalised in 1986 after consultation with interest groups, including the Australian Conservation Foundation.\footnote{Department of Water Resources and National Parks and Wildlife Service, \textit{Water Management Plan for the Macquarie Marshes} (Sydney: Department of Water Resources and National Parks and Wildlife Service, 1986).} The management plan was, and continues to be, periodically updated in consultation with the Macquarie Marshes Management Committee, formed in 1989 by local residents.\footnote{Macquarie Marshes Management Committee, \url{http://www.macquariemarshes.com/bwWebsite/}, accessed 3 September 2008.} In 1986 the marshes were also included in the Ramsar List of Wetlands of International Importance and became, in
principle, subject to the management regulations of the Ramsar Convention.\textsuperscript{118} However, the wetlands continued to decline and additional concerns emerged, such as the use of toxic chemicals by cotton growers near the marshes.\textsuperscript{119} Conflicts over the marshes were to come to a head in the 1990s, as irrigation encroached further and the research of ecologists revealed increasing environmental degradation. Environmental activists from around the nation became involved in the dispute.\textsuperscript{120}

The Namoi and Macquarie rivers were particular cases, but dams and irrigation created similar, although place-specific, issues throughout the Murray and Darling river systems, as well as elsewhere in Australia.\textsuperscript{121} The reproduction and migration of native fish, such as the iconic Murray Cod, was affected. Dams and weirs created barriers for fish and water holes used for breeding silted up from changed floods and river flows. Rivers, such as the Balonne in Queensland, contained more suspended silt as irrigation pumps, dams, and weirs increased the turbidity of the water. Recreational fishers monitored such changes in rivers and the decline in native fish numbers (and the consequent spread of introduced European Carp through the rivers).\textsuperscript{122}

Government engineering projects to increase irrigation water supplies and hydro-electricity along the Murray and its headwaters were also completed in this period, bringing controversial changes to those who lived along the rivers and watercourses that became diverted into the Murray system. For example, dams built for the Snowy Mountains Scheme turned more of the waters of the eastward-flowing Snowy and Mitta Mitta rivers westward, into the Murray system. While established dairy farmers, crop


\textsuperscript{119} See, Masman and Johnstone, Reedbed Country, pp.206-219.

\textsuperscript{120} McHugh, Cottoning On, pp.75-90; Eric Rolls, 'A Place for Bird and Song', The Sun-Herald, 21 November, 1993, p.40; and Eric Rolls, 'Marshes Endure Misplaced Stress', The Sun-Herald, 28 November, 1993, p.43.


\textsuperscript{122} Lucas, 'Shifting Currents: a History of Rivers, Control and Change', especially pp.116-123; and, Sinclair, The Murray, pp.120-172.
growers, and graziers along the rivers had been assured by the Snowy Mountains Hydro-Electric Authority (SMA) that they would benefit from the flood mitigation capacities of the dams, so much water was stored that not only were beneficial floods reduced but river flow was limited to a fraction of what it had been. The SMA rejected the protests of residents over the effects of the dams in favour of irrigators’ claims.\(^{123}\)

The effects of changed rivers and flood flows along the Murray, such as the death of red gums from prolonged flooding or extended drying, as well as increased soil salinity, had been recognised early in the process of river regulation for irrigation.\(^{124}\) However, these problems increased and gained wider public recognition in the 1970s and 1980s as irrigation was pursued more intensively.\(^{125}\)

Settler land use practices contributed to increased soil salinisation throughout the Murray and Darling river systems in multiple ways. Irrigation raised water tables in some areas, such as the lower Murray, intensifying salt concentrations in the already salty soil. Water diversions also meant dryland areas that comprised 98 percent of the Basin, including many floodplains, were not regularly flushed of accumulated salt. Land clearing also affected salt levels, allowing the water table to rise and the soil mineralise through capillary action.\(^{126}\)

In some areas ideas of irrigation and dams as projects of national development and technological progress endured. Such notions prevented residents of flood country voicing their opposition to irrigation schemes, even if they were disadvantaged by reduced river flow. For example, 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’.\(^{127}\) The power of more than a century of river development and land settlement rhetoric endured.

While social, political, economic, and environmental problems that stemmed from dams, irrigation, and narrow government development policies and management


\(^{124}\) Powell, Watering the Garden State, pp.255-258.

\(^{125}\) Powell, Watering the Garden State, pp.258-262.


focus mounted in regional communities throughout the Murray and Darling river systems, a national environmental movement was gaining momentum. Environmental (and humanitarian) activists and organisations, often based in urban centres, lobbied against projects by governments and private companies that would destroy ‘wilderness’ areas. The activism of the 1970s and 1980s was generally (although not exclusively) focused on specific causes that related to places frequented by urban tourists, such as the Great Barrier Reef in northern Queensland, or was linked to particular and well-publicised struggles to limit or prevent development, such as the Little Desert in western Victoria. Environmental activists did not often connect with the problems being experienced in the Murray and Darling river systems until the 1990s. However, it is important to briefly explore the issues raised by environmental campaigners in the 1970s and 1980s, and the types of concerns they brought to government and popular attention, as they were to impact on changing popular conceptions of dams and other projects of national and private enterprise development. They also forced changes in government policies and legislation, particularly around land and marine conservation.

Urban and rural environmentalists and human rights campaigners were also to constitute another sector of Australia’s population that challenged government’s traditional environmental/natural resource management frameworks.

* * *

Environmental Movement: Going National

A number of factors converged that lent a particular urgency and ‘national’ flavour to the 1960s and 1970s environmental and human rights movements. The publication of Rachel Carson’s Silent Spring in America in 1962 stimulated the formation of campaign and lobby groups against certain chemicals and pollutants, such as DDT, in Australia. By the late 1960s, however, wilderness causes came to the fore in Australia, in part invigorated by the publication of A.J. Marshall’s The Great Extermination (1966), on the

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destruction of Australian fauna and habitats. In 1965 the Australian Conservation Foundation was established to bring together environmental campaigners from around the country. It was the first national organisation of its kind anywhere in the world. The unpopular Vietnam War politicised student bodies in America and Australia in the 1970s, who sought national political change. In addition, human rights campaigns for oppressed populations gained momentum, particularly in America. The image of earth from the moon, widely published and circulated in the late 1960s and 1970s, also brought a realisation to many that the planet’s resources were finite.\textsuperscript{130}

The 1960s and 1970s environmental activists faced new challenges. In the past, those with concerns about the threat of developments to particular areas had been able to approach politicians and negotiate, in what Dew Hutton, Libby Connors, and others described as, a ‘gentlemanly’ manner – one of caution, trust, and honourable negotiation.\textsuperscript{131} The new political clout of private companies, as government became more reliant on private industry after expensive post-war projects, created a new kind of ‘dirty politics’. For example, the 1960s campaigns to prevent exploratory oil drilling on the Great Barrier Reef and to stop sand mining on Fraser Island, were thwarted by politicians’ broken promises. Environmental activists formulated new tactics, including, significantly, highly successful public awareness campaigns using posters, bumper stickers, public seminars, and so on. Further, trade unionists who led the urban ‘green ban’ invigorated the environmental movement to challenge ‘boys club’ politics and decision-making.\textsuperscript{132}

A rift emerged in many campaigns in the 1960s, between environmental activists and scientists. Although scientists had been important advocates for environmental protection before World War II, industry and government demands for science expertise meant that many scientists left environmental groups. The increased radicalisation of the environmental movement in the 1970s further drove more conservative scientists from the new brand of environmentalism. Val and Richard Routley’s critique of the forestry industry in \textit{Fight for the Forests}, published in 1973, alienated many foresters and forest


scientists. On the other hand, government scientists sometimes helped campaigns, such as the 1969 campaign to protect the Little Desert from being opened up for land settlement and dry-farming. In the 1970s a number of scientists also became involved in environmental organisations and campaigns, providing important data to support causes, for example, forest ecologist Len Webb in the Wildlife Preservation Society of Queensland.\footnote{Hutton and Connors, A History of the Australian Environment Movement, pp.97-100; and, Robin, Defending the Little Desert, pp.138-154. Val Routley later changed her name to Val Plumwood.}

Indeed, the work of ecologists was increasingly used by environmental movement campaigners to challenge development projects and ideologies in this period. Although ecology had a long history in science, with its roots in the nineteenth century, it only emerged as a professional discipline in the post-war period. Ecology takes an ecosystem as a starting point and seeks to study and account for the relationships between various organisms and also between organisms and their physical environments. By studying the ways in which organisms and environments affected each other, ecology gave environmentalists a tool that both lent itself to their cause and was rooted in ‘hard science’.\footnote{Sinclair, The Murray, pp.175-176; Bruce Winterhalder, ‘Concepts in Historical Ecology: The View from Evolutionary Ecology’, in Carole L. Crumly (ed.), Historical Ecology: Cultural Knowledge and Changing Landscapes (Santa Fe: School of American Research Press, 1993), pp.17-41, pp.18-20; and, F.B. Golley, A History of the Ecosystem Concept in Ecology: More than the Sum of the Parts (New Haven: Yale University Press, 1993), p.2.}

Two campaigns were to significantly alter national conceptions of dams (and greatly bolster the environmental movement generally) in this period, both in Tasmania. These campaigns were the flooding of Lake Pedder and the damming of the Franklin River for hydro-electric schemes. The campaign to save Lake Pedder began in the late 1960s as a local movement by bush walkers and other visitors to the lake. The unresponsiveness of the state government led campaigners to take the cause state-, and then, nation-wide. Despite the substantial support generated by the campaign, in Tasmania and around Australia, the flooding of the lake went ahead, beginning in 1973. Although the campaign failed in preventing the flooding of the lake it created significant changes, including a more environmentally attuned national population. The campaign also achieved national political recognition and debate as the controversy of flooding
Lake Pedder became an election issue at the 1972 national elections, and led to the creation of the United Tasmania Group (later Greens) political party.135

The Franklin River campaign in the late 1970s and early 1980s created even more political friction. The campaign again went national and generated so much support that it swung the 1983 federal election to the Labor Party. The Labor coalition had aligned with the campaigners to stop the Franklin River dam when the election was called, and the river had become a major election issue. Part of the reason campaigners took the cause to federal politicians was the unwillingness of the state (also Labor) government to engage in a 'no dam' option when the issue came to a state referendum. The government instead gave voters the choice of two alternative dam sites. The campaigners had sought federal intervention and national support to stop the dam, a tactic other campaigners had successfully employed for other causes. The Federal government also broke new ground by intervening in state development works, preventing the dam from being built by invoking its responsibility as a signatory to international World Heritage agreements.136

Environmental campaigners for Lake Pedder and the Franklin River recognised, and experienced, some similar problems in government environmental management and development to those experienced by residents within the Murray and Darling river systems – most clearly, some of the problems of the narrow government focus on land settlement and development works. Libby Robin has argued that participation in environmental campaigns was ‘about introducing a moral sense of ‘limits to development’”.137 While the Lake Pedder and Franklin River cases revolved around government works, other environmental campaigns in this period lobbied against government permissions for private companies to develop or mine areas, such as the Great Barrier Reef and Fraser Island.138 Both environmental campaigners and those in flood country reacted to the strong alliance between certain private enterprises and governments that overlooked other sectors of the population, their reliance on environments and environmental destruction.


137 Robin, Defending the Little Desert, p.41.

There were, of course, obvious differences between environmental activists and residents of flood country. Environmentalists concentrated their campaigns on saving places from people (specifically, government and industry projects of land settlement and exploitation) — they wanted to prevent development and the march of land settlement from destroying environmentally unique or beautiful places, ‘wildernesses’. The environmental movement in this period began to link with Aboriginal rights movements, which increasingly problematised notions of ‘wilderness’ for settler environmentalists. Residents of Murray and Darling flood country lived in places that had been deeply changed by settler land use for a century and a half. Further, the region had long been a ‘working’ landscape in Australian settler culture. In the 1990s, with the rise of the ecological sciences and changing understandings of environments, urban environmentalists were to become more involved in disputes over the effects of dams and irrigation in the Murray and Darling river systems.

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The Beginnings of Reform

By the 1980s Australian state governments’ water management bureaucracies were disconnected from changing community concerns and needs. The authority to manage water in Australia had been vested in governments since settlement, being governed as a public utility. ‘Top heavy’ management structures, which had developed expertise in the planning and construction of large-scale engineering projects, were in many ways unable to cope with the various complexities, local specificities (as on the Namoi) and concerns that had emerged, in both inland river regions and urban environmental movements. Reflecting in 2008, historian Daniel Connell described the water management institutions of this period as, ‘large, hierarchical, technocratic and culturally monolithic but performed efficiently as measured by the criteria of their time’. However, ‘their time’ was perhaps the 1930s and 1940s. By the 1980s they were disconnected from changing community concerns and were unable to cope with the complex social and environmental problems they had helped to create.

139 Hutton and Connors, A History of the Australian Environment Movement, p.145-146; Robin, Defending the Little Desert, pp.140-143; and, Doyle, Green Power, pp.117-118.
Powell noted that some engineers in the 1940s had foreseen the potential pitfalls of narrow government water administrations geared towards development works, that: ‘The tunnel vision of narrowed specialisation could lead to a cul-de-sac of social irrelevance’.\textsuperscript{140} In the 1980s government water bureaucracies had become outdated. In New South Wales, as Lloyd wrote, water administrations had changed in structure and name but rested on legislation that was ‘virtually 75 years old’: the 1912 Water Act.\textsuperscript{141} New problems and challenges had emerged, including greater demands for water supply from an increasing population, and the just as pressing issues of water quality and soil salinity in many regions of the Murray and Darling river systems. Further, there were international changes in attitudes to water and the environment that filtered into Australia as new political issues arose, especially over future competition for water within nations and internationally, which were already problems in the USA and Europe.

In 1987, a UN commission headed by Norwegian Prime Minister Gro Harlem Brundtland published a report, \textit{Our Common Future}. The report developed concerns, raised in UN conferences since 1977, that ‘water security and accessibility increasingly threaten four fundamental aspects of human security – food production, human health, the health of the aquatic environment and social, economic and political stability’.\textsuperscript{142} \textit{Our Common Future} (or ‘The Brundtland Report’) argued that unsustainable development had impacted international and national security and would continue to do so.\textsuperscript{143} The report put forward an argument for sustainability on environmental, social, economic, and political grounds, each contributing to total human welfare: the ‘needs of the present’ must be met, the report stated, ‘without compromising the ability of future generations to meet their own needs’.\textsuperscript{144}

The New South Wales government had restructured its water bureaucracy in the 1970s, bringing disparate departments under a single water authority, the WRC. However, the WRC was haunted by old philosophies and programs. Lloyd argued that in the 1980s water management remained unconnected to changing circumstances: ‘the [water management] industry was perceived as patronising and centralised, offering little participation to significant client groups, remote from many of its users and preoccupied

\begin{itemize}
  \item Powell, \textit{Watering the Garden State}, p.245.
  \item Lloyd, \textit{Either Drought or Plents}, p.291.
  \item See, Connell, \textit{Water Politics in the Murray-Darling Basin}, p.2.
  \item Connell, \textit{Water Politics in the Murray-Darling Basin}, p.2.
  \item Quoted in, Connell, \textit{Water Politics in the Murray-Darling Basin}, p.2.
\end{itemize}
with concerns of central administrations in Sydney'.\textsuperscript{145} In the mid 1980s the WRC was revamped by a Water Management Audit, which was briefed to reposition the Commission and formulate new ‘strategic directions’ that addressed contemporary issues.\textsuperscript{146} Out of the Audit the WRC was reformulated as the Department of Water Resources, with policies that emphasised commercialisation of water-related industries and indeed, of water itself as a tradeable commodity. However, as Lloyd argued, its new underlying creed also changed from development to environmental management.\textsuperscript{147} The state also planned for the establishment of catchment management bodies which could facilitate community consultation in order to formulate management policies for particular river catchments, essential for addressing the pressing issues of salinity, water quality, and water security, as well as broader management challenges such as negotiating the needs and concerns of various ‘stakeholders’. Water bureaucracies in the other eastern states were similarly restructured in the 1980s and early 1990s. The restructures reflected national shifts in thought, understandings, and sense of the purpose of water management.

The attempts of state water departments to address these changes were self-conscious. The reflexivity provoked by a changing sense of purpose and bureaucratic structure can be seen, for example, in the water management histories they commissioned in this period. These include Lloyd’s history of New South Wales water management, \textit{Either Drought or Plenty}, and Powell’s Victorian history, \textit{Watering the Garden State}, which are referred to extensively in this thesis. Both books, whilst commissioned histories, are critical of water management and the international networks and ideologies, as well as local environments that shaped them. Both books were heavily influenced by ideas in the social sciences and physical geography at the time, and focused on land settlement.

Although state water bureaucracies restructured in an attempt to address more complex issues, such fundamental changes were slow to be implemented and to take root in practice. Connell has argued that when Australian water management bureaucracies instituted further reforms in the mid 1990s they did so because of continued centralised management and narrow focuses that limited their ability to address community concerns and environmental degradation. He argued that ‘[f]or a variety of reasons’ water managers ‘were unable to cope with the expansion of their brief from storing and distributing water

\textsuperscript{145} Lloyd, \textit{Either Drought or Plenty}, p.293.
\textsuperscript{146} Lloyd, \textit{Either Drought or Plenty}, p.293.
\textsuperscript{147} Lloyd, \textit{Either Drought or Plenty}, p.297.
to also include protecting its quality'. Chief among the reasons for institutions' inadequacy to deal with water quality (and adopt ecological conservation), Connell argued, was that it required intensive consultation with communities and research scientists outside of government employees. Governments needed to look outside old institutional models to take more comprehensive account of the growing environmental concerns of communities and political activists, Indigenous knowledge and rights to water, and to expand the breadth of water management. Integrated Catchment Management (ICM) was to be adopted by each Australian state in the 1990s and 2000s, and in 2001 by the Murray-Darling Basin Commission (formed in 1993, replaced by the Murray-Darling Basin Authority in 2008). ICM aimed to institute methods of community consultation and co-management of watersheds, especially to address water quality and soil salinity. By 1990, however, Australian state water management bureaucracies, and other administrative branches, remained largely centralised while plans for more decentralised, consultative models of management were being developed. In this period of transition, state governments were caught between lingering centralisation, 'top heavy' management, established irrigation practices and water extractions for industry, and ways of incorporating local, and other 'extra governmental', knowledge, needs, and values, into bureaucratic decision-making.

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From the aeroplane the earth looked vast, red, flat, and dry. I was flying west, from Brisbane to Cunnamulla, located on the banks of the Warrego River, to the final place of my flood research. The plane landed in St George to let passengers off. It was the last stop before Cunnamulla and the plane was nearly empty. We took off again. From when we left St George I sought grey-green tree lines from the air and traced them with my eyes, looking for brown stretches of water. I searched for water not only because I was going to Cunnamulla to research floods, but also because some instinct kicked in. I was trying to locate myself through the most dominant landmarks I could find — rivers and water. They were dominant because they were so scarce. Craters of dry dams testified to the elusiveness of surface water in these parts. The red dryness of the land boosted another reflex that went deeper, prompting me to scan the land for water. The tree lines, rivers, and creeks were far apart, and water is the stuff of life. It was my second visit to Cunnamulla and I felt overwhelmed. The first time I travelled there, the previous year, I had driven north-west from Canberra. The changes in the landscape had been gradual; leaving the mountains behind, crossing the inky Darling River floodplains, and then coming upon the flat, open plains that border the Warrego River. I was returning to follow up research on a flood on the Warrego in 1990. These were the river’s floodplains, stretching off into the dusty horizon.

The Warrego’s headwaters are in the Carnarvon Ranges in Queensland, an outcrop of the most north-westerly point of the Great Dividing Range. From there, the river winds south, joining with the Darling River in New South Wales. The Warrego is located between four rain-led ecologies: the monsoon to the north; the plush Darling
Downs, petering into aridity, to the east; semi-arid western New South Wales to the south; and desert to the west. It is fringe country. In managerial terms, it is marginal farmland. The river and land have even more dramatic booms and busts than the Darling River. The Warrego catchment comprises seven percent of the area of the Murray-Darling Basin, but on average contributes only one percent of the Basin’s total annual flow. The river and tributaries have a wide range of hydrologies, from the headwaters to the junction with the Darling. The headwaters’ faster flows move over and through shale rock formations, feeding subterranean aquifers. The rivers and tributaries also have highly variable flows and experience periods of intense drying, freshes, and flooding. Along the mid and lower reaches the land has only a slight gradient and the watercourses are shallow. Floods can be kilometres of submerged land and can last for months. When enough rain falls the water spreads across the braided channels, in a shallow and wide expanse over flat red earth. The floods do not bring the inky sediment seen on Darling River floodplains. This is a country dominated by sand hills and red dusty soils.

To the Warrego’s west lies the Paroo River, shadowing the course of the Warrego. The Paroo is so shallow and intermittent that cartographers do not join this river to the Darling on maps: it is merely a floating line across the Queensland and New South Wales border. The Paroo only joins the Darling when in flood, when it also often joins the Warrego across the floodplains. Its floodwater drains south slowly and transforms the country: birds, frogs and fish breed, plants sprout and seeds and animals perish and flourish; and people seek higher elevations.

In April 1990, an Army helicopter flew over the soaking Warrego floodplains. The flood was the largest since records began to be kept by settlers in the area in 1910. In the helicopter were two people, watching the water. They were both there to protect Cunnamulla; but they had been in disagreement. Allan Tannock had asked Police Superintendent Harry Edwards to join him in the flight from Cunnamulla. Tannock hoped to convince the Superintendent that Cunnamulla would not flood. In Tannock’s mind there was no doubt the town was safe. Before the flight the Superintendent had thought that the town would be severely flooded, that the levees would not hold or that the water would rise beyond their height. The Superintendent was so sure that he had ordered the evacuation of the town and people were gathering at the airport to be flown out by more Army aircraft.

That day the flood would peak in Cunnamulla. This was Tannock’s last chance to prevent a full evacuation. Tannock wanted the Superintendent to see the river from the
air, so that he could see the channels and how the water was flowing; to see that the western floodplains were taking water from the Warrego, reducing the height of the flood peak in Cunnamulla. Tannock needed to convince the Superintendent because it was the Superintendent who would make the final decision about Cunnamulla’s evacuation.¹

The Superintendent was an agent of the state, sent from Brisbane to coordinate the effort to prevent the town from flooding. Tannock’s disagreement with him over the potential of the flood and the appropriate course of action to save Cunnamulla, stemmed from Tannock’s experience with the river, its changeability, and his view of the ‘unique’ way this flood was behaving. Tannock had lived with the Warrego for 60 years and issued flood warnings for the river for 40 years.

The difference in their understandings (of the way the flood was moving down the Warrego and the level of threat to the people of Cunnamulla) hints at the ways each was acting within a different knowledge system. Tannock and the Superintendent came from different backgrounds: one came from a government department located in distant Brisbane and one from the community and the place now threatened by flood. The Superintendent was acting within a government knowledge system that was codified in the State Counter-Disaster Organisation Act 1975. This Act had formalised government responses to ‘natural disasters’ in Queensland for the first time, codifying government aid through legislation and a bureaucratic body, the Counter Disaster Organisation. The Act centralised aid and financial relief to the state government and gave the government power to take charge in a natural disaster event. It also established a system of response, through its clauses, that was dominated by methods of risk assessment (to human life and property) and an ideology of humanitarian aid. In this framework, evacuation of threatened communities was supported, indeed privileged – if there was any risk to the people of Cunnamulla (in the context of the Act), they should be evacuated. The Act represented a government knowledge system that promoted ‘knowing’ floods as (arguably) abstract events, where humanitarian approaches were valued above place-informed understandings.²

² State Counter-Disaster Organisation Act 1975. The State Counter-Disaster Organisation Act 1975 was amended in 1978 by the State Counter-Disaster Organisation Act 1978. The 1978 amendment mostly changed some terminology and is not relevant in the following discussion. State Counter-Disaster Organisation Act 1975 was also amended in 1995 by the Emergency Services Legislation Amendment Act 1995. Importantly for this chapter, the 1995 Act amended the spelling of ‘organization’ to ‘organisation’ [s45]. In citing the 1975 Act in the text of this thesis the spelling ‘organisation’ is used.
In contrast, Tannock's knowledge was one of community-in-place. In the 1950s Tannock had established a free, independent flood warning service for the Warrego, when such a service had not previously existed. Summaries of rainfall and his predictions were broadcast over Charleville radio station 4VL, and later through 2UE in Bourke. Tannock's knowledge of the river was through lived experience and through networks with others who lived in upstream towns and properties; what he termed 'local knowledge'. His understanding of the river and floods was formed over a lifetime of living with the river and talking with others who lived along its banks. Tannock's knowledge and flood warning service was valued and respected along the river.

The strength of Tannock's argument, that Cunnamulla did not need to be evacuated, must be seen within broader social and economic circumstances, along with its environmental context. In 1990 rural Queensland was in economic decline. The southwest of the state (including Charleville and Cunnamulla) had been dubbed 'the heartbreak corner'. An evacuation now could mean that many who lived in the town would not return: the negative economic impact on businesses, which would remain closed during the period of evacuation, could potentially be too great. In this context, such disruption to the human ecology could radically change the town. Tannock and the Superintendent had different ideas about the threat the flood posed to the town and significance of an evacuation: one with concerns about the community-in-place, the other with concerns about how to manage the flood risk.

This chapter explores the 1990 flood in Cunnamulla in the context of rural decline in south-western Queensland and highly bureaucratised state involvement in 'flood response'. It draws out the competing knowledge systems of Tannock and Edwards and discusses other knowledge systems, such as those embedded in scientific approaches to the floods. The floods in the Warrego threw into relief interplay of power and knowledge under particular legal and environmental contexts that enveloped the two men. These wider contexts took a particular form in Cunnamulla, directly influenced and heightened by the flood itself, which behaved in unexpected ways, and involved unique individuals such as Tannock whose local knowledge offered a different kind of model.

The Cunnamulla story will be contrasted with the evacuation of Charleville, a town located upstream on the Warrego. While Tannock and the Superintendent flew over the floodwater, Charleville was experiencing severe flooding and a mass evacuation

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of residents. The flood in Charleville situates my discussion of Cunnamulla in two ways. The severe flooding of Charleville created expectations that downstream Cunnamulla would experience similar inundation, that it would become 'another Charleville'. The government’s reaction to the flooding of Charleville and the evacuation of the town also highlight some of the tensions between the government’s risk management approach and that of communities-in-place. Which knowledge is considered valid within centralised networks of emergency planning? How can local knowledge such as Tannock’s influence the chain of command?

* * *

Allan ‘A.D.’ Tannock and The Warrego Watershed

I first met Allan Tannock in September 2005. I arrived on his doorstep in Cunnamulla after a number of conversations with people about the 1990 flood on the Warrego; each conversation confirming that he was someone I needed to meet. According to those I spoke with, Tannock knew the most about floods in the area and they suggested that I try to contact him. The owners of the cattle grazing station (‘Coonberry’) where I was staying, were the first to suggest that I try to talk with ‘A.D.’ (as he is known in Cunnamulla) Tannock about his predictions of floods, especially the 1990 flood. They also told me that he had written a book on the history of floods on the Warrego. Unsure of how to find Tannock, I decided find his book first.

I looked for the book at Cunnamulla’s Visitor Information Centre. After searching the shelves and not finding it, I asked at the desk. They had sold out. I spoke to the person at the desk about my research and he too suggested I try to speak with Tannock. He gave me directions to where he lived, assuring me it would be fine to drop in. If Tannock was not there, he said he would be at the newsagency. Embarrassed, I thought of (but did not voice) an obstacle. I would not know what Tannock looked like if it came to finding him in the newsagency since I had not met him before. I felt that Tannock was so well known that I should know who he was. I thanked the person at the desk and left, hoping that Tannock would be at home. He was.

We made a time to meet later that day. When I arrived back at his house for our meeting he graciously had a copy of his book, The Warrego Watershed, ready to give me. I
spoke with Tannock twice; at that initial meeting and again when I returned to Cunnamulla the following year. This section draws on those conversations in places, but more substantially on his book as well as newspaper, government, and scientific reports.

The Warrego Watershed was the culmination of Tannock's flood recording and flood warning experience. He published this book soon after the 1990 flood to record what he knew of floods in the Warrego area, having retired from flood warning that year. In The Warrego Watershed Tannock describes eight floods (including the 1990 flood) that he witnessed between 1949 and 1990. He selected these floods for their significance in demonstrating changes in settlement in the watershed (and therefore in the effect of the floods on towns and rural properties) and also to show the differences in flood behaviour, as each occurred under distinct environmental conditions. Besides these, there were many other floods on the Warrego during that period.

Throughout The Warrego Watershed there are glimpses of how Tannock gained his knowledge of the Warrego. First, he lives there. Tannock has lived with the Warrego for more than 60 years. Secondly, his professions have demanded attention to river flows. In his youth he was a jackaroo (or drover), moving stock between Charleville and Cunnamulla. The flows of the rivers and creeks are pivotal in droving; determining watering places for stock and crossing places on the watercourses. Tannock draws on his early work experiences in the book, noting that extensive flood mitigation had been suggested for Charleville in 1933-34 after a large flood: 'I was Jackarooing on Oakwood Station in 1933 at which time Charleville experienced a Major Flood similar to but not as high as the 1990 flood'. The mitigation works, which included diversion channels for a flood overflow and levee banks, did not eventuate. Tannock postulated that this was because of the financial costs of the works and the imminence of World War II.4

Later Tannock established a business, A.D. Tannock and Co. Stock and Station Agents. In this work also, knowledge of river flows and rainfall was of substantial benefit, as river flows affect droving routes, the health of livestock, and stock numbers. It was through this business that Tannock established a free flood warning service along the Warrego that provided summaries of rainfall, and forecast (and tracked the progress of) floods from Charleville through to Bourke in New South Wales over radio stations 4VL

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4 Original capital letters. Tannock, The Warrego Watershed, p.27; and, Allan Tannock, pers. comm., 7 September, 2005.
in Charleville and 2UE in Bourke.\textsuperscript{5} When I asked Tannock how he became interested in flood warning, he replied that a formal flood warning system on the Warrego had simply not existed before this (1950s). He saw himself as filling a need for Cunnamulla and surrounding stations.\textsuperscript{6}

Tannock’s flood warning service was made possible through personal networks along the river. Tannock especially acknowledges the river level readings and communications of Joan Leeds, to whom he dedicated his book. Leeds lived in upstream Murweh, near Wyandra, and communicated river heights to Tannock from 1954 to 1979.\textsuperscript{7} Tannock and Leeds together studied the relationship between flood heights at Murweh and Cunnamulla. Tannock used Leeds’ upstream river readings to judge how high a flood would be in Cunnamulla, including the speed of the flood and how much water was flowing onto the floodplains from the river channel.

Leeds’ personal contacts with people upstream from Murweh enabled her to evaluate the flood flows within a wider environmental context. Tannock paid tribute to these personal networks in his book, writing: ‘Joan not only dedicated herself to keeping me posted with daily Flood Reports from Murweh, but she also had personal contacts on The Upper Warrego and its Tributaries, The Nive, The Ward and Langlo Rivers and Augathella Creek’. Through this network, ‘she could estimate with a great deal of accuracy... the flood level expected at Murweh in each individual flood. This in turn enabled me to make early and accurate forecasts of flood levels at Cunnamulla’.\textsuperscript{8} After Leeds left Muweh in 1979, Tannock received river heights from the area from ‘Mrs. Hurse’ between 1984 and 1990. However, the personal networks Leeds had established dissolved. Tannock attempted to maintain the associations in the Upper Warrego and its tributaries but, he wrote, ‘I found it impossible to achieve anything similar over the years after John [Leeds’ husband] and Joan Leeds left Murweh... I had to give it “best” [give it up] as, apart from Mrs. Warner at Mt. Morris on The Langlo River, nobody appeared to be taking Flood Readings or appeared to be interested in keeping them’. Tannock ‘could

\textsuperscript{6} Tannock, pers. comm., 7 September, 2005.
\textsuperscript{7} Tannock, The Warrego Watershed, p.9.
\textsuperscript{8} Original capital letters. Tannock, The Warrego Watershed, p.9.
Map 7.1
The Warrego watershed, 1990. This map, drawn by Allan Tannock, shows the location of Murweh and other localities important to the flood warning network. [From: Allan Tannock, The Warrego Watershed: Forty Years of Flood Records and Research (Toowoomba: Harrison Printing Co., 1990), p.48.]
not obtain Flood Readings from Charleville during the crucial period’ in 1990, and had to wait until he received the Murweh readings before making a prediction for Cunnamulla.9 This reduced the amount of time between his warning and the flood’s peak.

Networks along the river and tributaries are critical in forecasting for each flood. Each flood is different and can behave in unexpected ways. Personal networks were crucial to Tannock in judging the unique behaviour of each flood. It was a matter of ‘reading’ each flood, with the aid of Leeds’ and others’ observations and knowledge. In The Warrego Watershed Tannock describes floods he has experienced and the differences between them. Tannock notes that, ‘no “Rule of Thumb” method can be employed by which all Floods can be read the same. The circumstances preceding each Flood must be studied in great detail’.10

From his experiences with floods on the Warrego, Tannock developed a ‘formula’ or guide to judge the heights of floods in Cunnamulla in relation to flood heights and flows in Murweh. Tannock estimated that it takes between 60 and 90 hours for a flood peak in Murweh to reach Cunnamulla. According to his calculations, the eventual height of the peak in Cunnamulla varies according to an 8 metre threshold at Murweh: for floods under 8 metres at Murweh, ‘Cunnamulla reads higher by 1.46 metres’ and over 8 metres Cunnamulla’s peak will reduce by ‘0.3 metres for every metre the reading at Murweh is higher than 8 metres’.11 Tannock adjusted these calculations in response to the particular contexts and circumstances of each flood, such as the speed of the floodwater, the amount that flowed into various break outs, and changes in the landscape: fast and high floods meant more water flowed into break outs, but particular speeds and heights determined how much water flowed into which break outs. Tannock published his formula in The Warrego Watershed as a guide for others, so that this flood work (including recording the behaviour of floods, their heights, speeds, other influences on their flow, and so on) could be continued.

Tannock worked closely with the Bureau of Meteorology (BoM) during the years that he operated his flood warning service, sharing knowledge in an informal way. However, he remained outside the institutional hierarchy throughout his flood warning career. Tannock particularly shared information with two BoM staff, Geoff Heatherwick

and Brian Tippler. Heatherwick wrote a foreword to *The Warrego Watershed*, commenting that '[o]ver the years, staff of the Hydrology Section [of the BoM (in which Heatherwick and Tippler worked)] have compared notes with Allan, both during flood periods and post event, when we have come to appreciate the depth of local knowledge and understanding that he had about the behaviour of the Warrego River'. Heatherwick and Tannock's relationship stretches back to 1972. Then on a field inspection of river level reporting stations, Heatherwick heard of Tannock's radio broadcasts and flood predictions from BoM river gauge readers and realised the value of Tannock's flood work. 'It became obvious', he wrote, 'that the flood reporting service operated by A.D. Tannock and Co. Stock and Station agents [sic], was a highly regarded service which had a large listening audience'. The BoM also forwarded river height and rainfall information to 4VL (the same radio station that broadcast Tannock's reports). The benefit of Tannock's reports were, in Heatherwick's opinion, that they 'provided a consolidation of information and details of rainfalls in the area', as opposed to the BoM's frequent numerical bulletins.¹² Tannock's contributions to Cunnamulla were recognised when he received the Citizen of the Year award in 1983.¹³

For Tannock, the 1990 flood was 'unique' among all the floods he experienced; he wrote that it 'was the most contentious and unpredictable'.¹⁴

* * *

1990: The Floods Begin

A monsoonal low moved inland in early March 1990, bringing heavy rainfalls across the Warrego. The empty, shallow channels filled quickly and the river and tributaries flooded, isolating stock on pastoral stations between Charleville and Cunnamulla.¹⁵ These initial floods were followed closely by a second wave of flooding. In early April a low pressure system again moved across south-west Queensland, converging with another trough to cause heavy rainfalls and thunderstorms across the Warrego.¹⁶ Three concentrated rainfall events from 2 to 20 April further swelled the already full river. The

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¹⁶ 'April 1990 Floods in Inland Queensland' (Melbourne: Bureau of Meteorology, June 1990), p.11.
third rainfall event was the heaviest downpour. It centred on the Carnarvon Ranges. The surge of water flowed quickly to Charleville, located at the foot of the Ranges, and into a Warrego flood overflow, Bradleys Gully, which ran through the town. The town lies at a convergence of major Warrego tributaries, including the Nive, Ward and Langlo Rivers, which were also in flood and funnelled water towards the town. Following the heavy rain, the water rose almost 3 metres in 3 days in Charleville (from 5.5 metres on 18 April to a peak of between 8.2 and 8.54 metres on 21 April). The town was severely flooded. Many who lived there found themselves homeless. All commercial buildings flooded, 80 percent of residences were inundated, and many other homes were damaged and uninhabitable. The Sunday Sun reported that residents were ‘in shock... as they take in the full extent of the worst flood in the town’s history’. Many did this from helicopters and Army aircraft as they were rescued from rooftops by Army personnel and State Emergency Service (SES) volunteers.

The entire population of the town was evacuated to Charleville airport or to Brisbane. People searched for family members in the crowds of evacuees. A woman sought her granddaughter and three-month-old great-grandchild amongst hundreds of people now housed in an aircraft hanger on the outskirts of Charleville. She last saw them waiting for rescue on their rooftop. ‘I keep hoping the lot of them will turn up here’.

Other towns suffered similar (although not as total) damage. The towns of Alpha, Blackall, and Jericho on the north-western side of the Range, and Augathella in the Warrego catchment were inundated that month. At the time, the total cost of flood damage both to built structures and from the loss of livestock in the Warrego catchment was thought to exceed $100 million and possibly reached $200 million. Of this, an estimated $30 million accounted for damage to rural property outside towns. The floods spread from Queensland into New South Wales, reaching as far south as Nyngan, located on the Bogan River. The Warrego floods carried more water and reached greater heights than the 1956 floods, which had previously been the highest since records began to be

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18 Sunday Sun, April 22, 1990, p.3.
19 Sunday Sun, April 22, 1990, p.3.
20 Queensland Times, 27 April, 1990, p.1; and, Sun, 27 April, 1990, p.2.
Figure 7.1 (right)
Extent of the 1990 floods in Queensland and New South Wales.
[From: Sun, 23 April, 1990, p.2.]

Map 7.2 (left)
The Warrego and adjoining catchments to the north-west. The towns of Alpha, Blackall, and Jericho, situated in these adjoining catchments, were flooded in April 1990.
[From: Scott Furby Pty Ltd, 'Western Queensland Towns Flood Study, Volume 1 - Report', Water Resources Commission, January 1991, Figure 1.2.]
kept in the area in 1910. Emergency Management Australia later estimated the total damage from the 1990 floods in both states to be $417 million (1997 values).\(^{21}\)

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‘Another Charleville’: Cunnamulla Prepares

Cunnamulla is the last major Queensland town on the Warrego before the river flows into New South Wales. Residents of the town knew of the destruction the floods had caused in Charleville and the upper Warrego before the water reached Cunnamulla. This meant that they, and the shire council, had time to prepare; but also that there was intense anticipation and anxiety surrounding the potential severity of the floods. Residents heard of the devastation in Charleville through the town’s newspaper, the Western Sun. The Western Sun reported the speed with which the water rose in Charleville, the record height, the displacement of the population, and the extensive damage to buildings and other property. Now the water was moving downriver, towards Cunnamulla.

Cunnamulla was already isolated by floodwater when Charleville and the upper Warrego flooded.\(^ {22}\) There was a possibility that the water flowing towards the town could combine with local flooding to cause levels of inundation and destruction similar to those experienced in Charleville. In the view of SES senior operations officer John O’Callaghan, Cunnamulla’s fate looked grim. ‘We are expecting real problems... it could be another Charleville’.\(^ {23}\) There were two floods coming down the river; initial floods from March and the heavy April rains that had razed Charleville. It was feared that the faster April flood would catch the March water and combine to cause one very large flood surge.

Cunnamulla was widely predicted to have four days to prepare for the arrival of the water. Army personnel, SES workers, and a number of Black Hawk, Iroquois, and Kiowa helicopters from the Army and Royal Australian Air Force bases in Townsville and Oakey were stationed at the town from 21 April to aid the Paroo Shire Council’s preparations for the flood’s peak. While these officials put in motion procedures for


\(^{22}\) Western Sun, 4 April, 1990, p.1; Western Sun, 18 April, 1990, p.1; Queensland Times, 24 April, 1990, p.1

\(^{23}\) Sun, 23 April, 1990, p.2.
protecting the town and organised supplies to be flown in, residents began to fill sandbags
to reinforce levees and create new protective walls around their properties.24

Relying on residents' and local Councillors' advice, between 16 and 22 April the
Paroo Shire Council directed the erection of Army tents, pit toilets, water tanks, and a
helicopter landing pad on sand hills which lay south-east of the town.25 The sand hills,
residents claimed, were above the reach of any flood. A car park was also organised near
the caravan park so that vehicles would be above flood level. In addition, the Council
organised for the levee banks, initially built in the summer of 1971-72 at a height of
about 9.5 metres, to be raised by a metre and a half which, it was believed, would be
adequate to protect the town.26

Map 7.3
Cunnamulla town map, 1990, showing the 1971-72 levee bank.
[From: Scott Furfy Pty Ltd, 'Western Queensland Towns Flood Study, Volume 1 - Report',
Water Resources Commission, January 1991, Figure 7.1]

On 22 April Councillor Darby Land called a town meeting. Residents were
advised of the evacuation plan: to move to the sand hills and to move their cars to the car
park in case water rose above the levees or they were breached. If the levee broke, a siren

24 Western Sun, 27 April, 1990, p.1 and p.7.
25 Sun, 23 April, 1990, p.2.
would sound and, in this event, households identified as low-lying were advised to raise furniture and other belongings above a two-foot inundation level.\textsuperscript{27}

That afternoon, Allan Tannock was in contact with officials in Charleville and Murweh, receiving information on river heights upstream (Murweh 11.2 metres) and progress of the flood. He realised that the lowering in gradient of the land, reaching one foot to a mile 40 miles from Cunnamulla, was slowing the leading flood. Using the formula he had devised over 40 years of predicting floods, Tannock calculated a flood peak of 10.4 to 10.6 metres for Cunnamulla. This calculation allowed for water flowing into 'by-washes' (or floodplains) and for the effect of the river and floodplains already being in flood. The buildup of water was pushing large volumes onto the floodplains, reducing the overall height of the flood. Tannock's prediction meant that Cunnamulla might escape the destruction Charleville had experienced.\textsuperscript{28}

\begin{figure}
\centering
\includegraphics[width=\textwidth]{cunnamulla_flood.jpg}
\caption{Cunnamulla prepares for record flooding, 1990.}
\end{figure}

\textsuperscript{27} Tannock, \textit{The Warrego Watershed}, pp.39-41.
\textsuperscript{28} Tannock, \textit{The Warrego Watershed}, pp.39-41.
Predicting Floods in a Changing Landscape

The morning after he received the river heights from Murweh and Charleville Tannock flew over the river as far as Wyandra, in an Army helicopter, to observe the flood. This flight made him again re-evaluate the eventual peak in Cunnamulla. After the flight he reduced his predicted peak to 10.2 metres. The flight confirmed for him that the second flood was moving faster than the first, gaining on its lead. The saturation of the ground, combined with the amount of water carried in the second flood, meant that the second flood did not soak into the earth and moved quickly across the now very wide body of water over the floodplains. The first flood was moving more slowly than he had thought initially, and the second flood much faster; they were becoming one large flood as feared, but farther upstream from Cunnamulla than anticipated. The huge amount of water sought open floodplains and was spreading east from the river just below Wyandra, between Claverton and Cunnamulla, reducing the amount of water carried in the Warrego.29

A railway embankment was also altering the course of the flood. Built between Claverton and Cunnamulla in 1898, it paralleled the river and severed a floodplain. While it had survived the 1910 flood, it washed away in 1990. Thirty-eight miles of embankment were 'excavated' by the water, leaving the steel railway lines suspended. If this stretch of embankment had not 'washed away and let the water go', in Tannock's words, 'then a large percentage of the water would have eventually converged back on Cunnamulla', testing the strength of the levees on the north-eastern side of the town.30

Tannock also noticed that other elements of the river and floodwater were combining to shape the flood's course, which would reduce the surge of water heading towards Cunnamulla. The speed of the water and the gradient of the land, combined with long, gradual shifts in the streams' flows and beds, was causing more water than he expected to flow onto floodplains. Large volumes of water were being pushed onto the western floodplains and creeks as the floods neared Cunnamulla.

Cunnamulla, built on the eastern riverbank, was, in Tannock's opinion, going to be safe. The water was being taken away from the Warrego, along creeks and onto

floodplains west of the town. Tannock later speculated that had the 'by-washes' not taken so much water, the floods heading towards Cunnamulla would have been a metre higher. He later wrote that this flood was 'unique': 'The volume of water taken out by The Bye-wash [sic] Watercourses was far greater than anything known by the older Locals who can go back at least 70 years'. Further, the western creeks were taking more water than floods he had previously forecast. For Tannock, 'If all the Major Floods I have experienced on The Warrego this was the most contentious and unpredictable'.

With adjusted calculations Tannock predicted the flood would peak on 25 April and rise one metre in the preceding twenty-four hours. His predicted flood peak of 10.2 metres broke Cunnamulla's previous flood record of 9.8 metres. However, the oncoming flood did not represent the full volume of water from Charleville and Tannock believed that it presented very little danger to the residents of Cunnamulla. If the levees were raised by one metre, the town would not flood. Ironically, the double flood (which caused anxiety in Cunnamulla and for the SES and was reported in the Queensland media) would help to reduce the height of the peak in Cunnamulla by pushing large amounts of water from the Warrego onto floodplains.

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'Flood of the Century'

The 1990 flood was forecast (by Tannock and others) to reach heights greater than past flood peaks in Cunnamulla. Even with large amounts of water spilling on to the floodplains, this flood was being labelled as the 'worst on record this century'. Indeed, there were only records, that were scientifically acceptable, for the twentieth century on the Warrego. Because of the damage sustained in Charleville, due to unprecedented flood heights upstream, residents in Cunnamulla were anxious and expected the worst. A Cunnamulla resident, Police Constable Maloney, gave a sense of the feeling of inevitability that Cunnamulla's 1,700 residents faced an unstoppable surge of water that would test the levees and possibly destroy the town: 'The big water is 12km north of

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34 Sun, 23 April, 1990, p.2.
Wyandra at the moment and the head water should hit us today. Nothing can stop it'. 35
On 23 April the Sun reported that ‘A wall of water raced towards Cunnamulla today in a
massive flood surge police fear will devastate the outback sheep town’. 36

There are records that show Cunnamulla had experienced large floods since
settlement. The town was established in 1868 as a pastoral centre on the Warrego River,
during the height of a cattle boom. The town was sited at the junction of east-west and
north-south stock routes, at a drovers’ resting area, on the east bank of the Warrego.
Small floods were a key source of water for pastoralists and the town, but large floods
presented danger.

A flood in 1890 inundated parts of the town and flooded pastoral stations, with
the manager of Thurulgoonia estimating losses of 10,000 sheep. 37 More floods followed.
Floods in 1956 reached 10.13 metres in the town and stayed at this level for three days.
After further floods in 1963 and in the summer of 1971-72 levees were built in key areas
of the town to the height of the 1956 flood. In May 1983 the river peaked at 10.09
metres, below the levee heights; however, gaps between the levees and the damming effect
of a recently constructed road pushed water into the eastern part of the town. 38

Besieged by record floods and damage bills in 1990, for many in Cunnamulla it
seemed inevitable that the town would experience unprecedented flood damage. A senior
engineer at the Brisbane Weather Bureau said simply that, ‘[t]he heartbreak is set to
continue’. 39 As residents waited and prepared for the water to reach their town, other
towns and pastoral stations that were already inundated faced the aftermath.

Aid on the Warrego: The State Government Response

Cunnamulla was surrounded by devastation, political turmoil, and insurance chaos.
Upstream, Charleville was a particular focus for state bureaucrats, insurance companies,
and relief workers. The town had experienced ‘record flooding’ which broke the previous

36 Sun, 23 April, 1990, p.2.
37 T.W. Blake, Cunnamulla 1879-1979: A Centenary of Local Government (Cunnamulla: Paroo Shire Council,
1979), p.27.
38 Blake, Cunnamulla 1879-1979; and, Tannock, The Warrego Watershed, pp.16-18.
record (set in 1956, of 6.96 metres) by 1.6 metres. The torrent of water swirled through the streets of the town, eroding bitumen roads and undermining pavement foundations. Cars were waterlogged and swept along by the current. All business and commercial buildings flooded and 1,180 out of 1,470 homes were inundated.\textsuperscript{30} The flood overwhelmed residents, who had little time or warning to prepare. The aftermath of the flood in Charleville is important in understanding Cunnamulla's regional context. The flood in Charleville, including the mass evacuation of residents and the financial difficulties they faced, highlights (and added to) the fragility of settlement in south-west Queensland. Businesses in Charleville were often uninsured and many now faced closure. Further, government responses to the flood in Charleville draw attention to the state's approach to the flood as one of humanitarian aid and risk assessment, as opposed to communities-in-place. The effects of the flood in Charleville, and the government response, coloured the anticipation of large floods in Cunnamulla.

The SES coordinated the evacuation of Charleville's population of 3,500 on 21 April 1990, as the river peaked.\textsuperscript{41} Residents were flown by Army helicopters to temporary accommodation at the airport. There, tents and other amenities had been organised as a precautionary measure since the minor floods in mid April.\textsuperscript{42} Conflict arose between state workers who organised the evacuation, including SES officials and police from Brisbane, and local residents and councils. The Mayor of Roma, a town that lies 280 kilometres east of Charleville, criticised the evacuation as 'text-book army style': efficient but without concern for the comfort, or sensitivity to the distress, of residents.\textsuperscript{43} Newspapers reported that conditions in the Charleville evacuation camp were undesirable: makeshift tents with bedding laid directly on floors. There had also been an outbreak of gastroenteritis.\textsuperscript{44} Evacuees would have to camp there for up to two weeks. Indeed the Mayor of Roma, Bob Coomber, was reported to have described the camps as 'primitive'.\textsuperscript{45}

Coomber argued that those in the camp could have (and should have) been evacuated to Roma where many had family and friends and the town had been willing to house the victims. Roma residents had urged police to allow at least a portion of the victims to travel to Roma, which had not been cut-off from Charleville by the floods and

\textsuperscript{30} 'April 1990 Floods in Inland Queensland', p.12.
\textsuperscript{41} Scott & Furphy Pty Ltd, 'Western Queensland Towns Flood Study, Volume I'.
\textsuperscript{42} 'April 1990 Floods in Inland Queensland', p.21; and, Sunday Sun, 22 April, 1990, p.1 and p.3.
\textsuperscript{43} Sun, 24 April, 1990, p.2.
\textsuperscript{44} Sun, 23 April, 1990, p.2; The Courier Mail, 23 April, 1990, p.1; and, The Courier Mail, 24 April, 1990, p.1.
\textsuperscript{45} Sun, 24 April, 1990, p.2.
was only two-and-a-half hours drive away. 'It would have been easy to transport the people over that distance', Coomber argued, 'but it seemed more of a military-style operation had taken over'. Evacuees were instead, 'herded into the camp and not allowed to escape'. The police and SES defended their decision to evacuate the population to the camps as 'logical and correct'. Coomber's outrage at the lack of sensitivity towards the evacuees draws attention to the conflicting desires for a successful response to the flood. Coomber argued for an approach that included government consideration of the regional and personal circumstances of Charleville residents. Instead, in Coomber's portrayal, state agents organised temporary accommodation along standardised lines that may have been bureaucratically 'logical and correct', but lacked the perspective of the community-in-place.

Within a week of evacuation the townspeople returned to Charleville to survey the damage. Most found their homes uninhabitable; 2,800 out of the population of 3,500 (over two-thirds of the townspeople) were displaced, their homes overcome by floodwater. Many returned to find their homes had been looted. The Courier Mail reported that a Charleville resident, 'had seen business people yesterday look at their businesses then drive out of town'. The interviewee observed that, ‘This town could fold forever unless these people get some incentive, big incentives within 24 hours’. The financial cost of the flood damage in Charleville was estimated in June of that year by the BoM to be $45 million (1990 values). A report by the BoM in June 1990 examined why residents of Charleville had received so little warning of such a ferocious flood. Was it the Bureau's fault? The Bureau offered three reasons: some recording stations had been established too recently to give useful historical data; at other stations observers had been evacuated; and there was no warning network on Bradleys Gully to predict the 'flash flood' that had suddenly and immensely increased the flood in the town. Another factor may have contributed to the unexpectedness of the flood: this was not a La Niña year. Australia was supposed to be in drought.

46 Sun, 24 April, 1990, p.2.
47 Sun, 24 April, 1990, p.2.
49 Western Sun, 2 May, 1990, p.1 and p.3.
Likewise, those outside town centres received little warning. There, the floodwater moved quickly across — and lingered on — already flooded pastoral stations. According to the BoM’s June 1990 report ‘initial rural damage estimates’, gained from the Queensland Department of Primary Industries, were extensive: 30,000 sheep and 11,000 cattle had died; 9,200 kilometres of fencing needed replacing; and, buildings and equipment were damaged. ‘Total rural hardship’ reached $30 million. In New South Wales, sheep remained isolated for more than a month. Emergency fodder drops kept up to 115,000 sheep alive. Such successes were overshadowed by heavy losses. Reports of sheep drowning and starving filled the pages of Queensland Country Life. The newspaper estimated, from early reports by pastoralists, that more than 100,000 sheep died throughout western Queensland due to the floods (well beyond the 30,000 recorded by the Department of Primary Industries). Further, the Country Life journalists suspected that once the total effects had been felt, the number could rise to 250,000. Such losses ‘would rival the January 1974 floods as the State’s worst on record’. Shearing in the flooded regions was cancelled and, with up to 13 months wool on their backs, sheep bogged in the mud, increasing both stock losses and losses from unshorn wool clips. In addition, a

55 Queensland Country Life, 26 April, 1990, p.3.
fly epidemic was expected after the floods receded, and lambing was due to begin in a few months, contributing to pastoralists' concerns. 56

Many in Charleville, Alpha, Augathella, Jericho, Blackall, and outlying stations were uninsured. The risk of inundation in the region was high and flood insurance was either unavailable or very expensive for those in towns and stations along the Warrego. 57

Less than 10 percent of damaged or lost property was insured against floods. Further, flood insurance was not included in most insurance policies but was an elective. The Queensland regional manager for the Insurance Council of Australia suggested that as it had been a long time since the last flood 'it may well be that a number of business people perceived it as a low-risk elective and decided not to take it'. 'They believed it could not happen to them'. 58 A United Graziers Association (UGA) spokesperson took another view, noting with some irony that the cost of insurance was so high that it possibly equalled the cost of the flood damage; so, 'if you can afford the insurance you probably don't need it'. 59 The consequence for business owners who had little or no insurance or remaining capital was financial crisis. A Charleville police officer reflected that: 'Ninety-nine percent of the businesses in the main street have been flooded out - they have lost everything and will never get it back'. 60 The cost of recovery for businesses was estimated in the millions of dollars.

After visiting the flooded region, then Queensland Premier Wayne Goss acknowledged the effect business closures may have on communities, as many proprietors could potentially leave the district. The Sunshine Coast Daily reported the Premier as saying, 'entire townships may be wiped off the map and never resettled after the western Queensland floods'. 61 Another newspaper conveyed the threat made by Charleville business owners to leave the area if the government did not intervene: 'The town's [Charleville's] business people said yesterday they would leave town forever unless the Federal and State Governments promised a multimillion-dollar relief program today'. 62 Brisbane's Sunday Mail criticised the Federal government's delay in issuing financial relief

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56 Queensland Country Life, 26 April, 1990, p.3 and p.7; and, Sunday Sun, 29 April, 1990, p.2. See also, Western Sun, 9 May 1990, p.4.
58 Sun, 24 April, 1990, p.2; Sun, 25 April, 1990, p.3; and, The Courier Mail, 24 April, 1990, p.1
60 Sun, 24 April, 1990, p.2
to businesses and homeowners. The newspaper suggested it was Deputy (and Acting) Prime Minister Paul Keating’s preoccupation with coastal urban centres that laced the political and financial abandonment of western-Queensland at a critical time. The newspaper wrote that Federal government bureaucrats, ‘either do not know or do not care that the inland has been in decline since the ’50s. They seem not to recognise that the family properties have all but gone, the victims of alternate flood and drought and taxing Governments. It’s not clear to them that towns beyond the Great Divide have been clinging on for 30 years. Charleville is what it is — was, rather, — because it is a classic example of forced survival’. In a period of rural decline, Charleville faced extinction. Charleville’s situation echoed in ‘other small and economically fragile towns’.

The state government implemented its Natural Disaster Relief Arrangements in south-western Queensland (supplemented by the Federal government) in late April 1990. The response was designed to provide financial and physical aid (through the SES) following ‘natural disasters’. The scheme, which was developed in the 1970s, was still ‘green’ in 1990, untested in Queensland by an environmental event of this magnitude. Once implemented, it quickly became clear that people were not receiving enough aid under the program. Premier Wayne Goss and Deputy Premier and Minister for Police and Emergency Services Terry Mackenroth revised the scheme, stating to newspapers that it was ‘inadequate for the scale of the flood in Western Queensland’.

Initially the scheme made up to $3,000 available for each household for damage to household items. A further $8,000 per household was available for ‘emergency repairs’. These relief measures were regulated by a means test, and many were ineligible to receive the full amount. The test was adjusted in early May, being relaxed to a higher per annum income before relief was reduced. A new scheme was also implemented for those who did not qualify under the means test, of a concessional loan of up to $8,000. The conditions put on financial relief were proving to be unrealistic. The flood had destroyed homes and many were unable to work because they were either repairing their properties

63 Sunday Sun, quoted in, Western Sun, 2 May, 1990, p.16.
65 Sunday Sun, 29 June, 1990, p.11; and, Queensland Times, 24 April, 1990, p.3.
67 Western Sun, 2 May, 1990, p.1.
68 Western Sun, 2 May, 1990, p.1.
or their place of employment had been flooded. Adjustments to the scheme continued and in May the means test was removed entirely.\textsuperscript{69}

Teething problems continued. Farmers had been left out of the relief arrangements. The UGA lobbied the state government for the inclusion of grazing homesteads and primary producers in financial relief. The UGA submitted a plan for aid to the state government, which included grants of $80,000 as well as loans for restocking and increased loan amounts to cover the costs of freighting fodder, fencing, and stock. Graziers had suffered heavy stock losses and property damage, losing capital already reduced by a previous drought. The UGA’s aid plan was packaged by UGA President, Bill Bonthrone, as a long-term recovery strategy for primary producers in western Queensland. He proposed $300,000 be made available to farmers over a 15 year period.\textsuperscript{70} Primary producers were hurriedly incorporated into the state government aid arrangements.

* * *

State Officials and Flood Expectations in Cunnamulla

Because of the devastation at Charleville, Police Superintendent Harry Edwards and a number of officers from Brisbane were flown to Cunnamulla on 24 April 1990, to take over the flood response from the Paroo Shire Council and district police. The Superintendent was a late entrant to the floods in Cunnamulla, arriving from Brisbane the day before the peak. His role was to take command of the state-led (and federally supported) flood response in Cunnamulla. The Superintendent had been involved in one other flood response, for a flood at Gatton, just 90 kilometres from Brisbane in 1974. In the Gatton flood he was involved in the operation to move people to safety, part of a broader police effort during the flood. The Cunnamulla flood was the first flood for which he managed the police response and it was 700 kilometres from Brisbane. It was also his last as the Superintendent was due to retire in six months. In a recent conversation with Superintendent Edwards he told me that at the time of the 1990 flood he had finished working on an internal police inquiry and was ‘in between’ assignments.

\textsuperscript{69} Western Sun, 9 May, 1990, p.4 and p. 5.
\textsuperscript{70} Queensland Country Life, 3 May, 1990, p.3.
He was available to take up the position of leading the Cunnamulla flood response, to which he was assigned.\textsuperscript{71}

The Superintendent first met Tannock the day he arrived in Cunnamulla.\textsuperscript{72} At this time Tannock remained uncertain about the peak flood height but was sure the town would not flood and conveyed the information to the Superintendent. Tannock hypothesised that although Cunnamulla was isolated by floodwater, the town would not need to be evacuated. The Superintendent, however, was concerned about the flood risk for Cunnamulla and in some ways needed to prepare for the worst possible scenario: a repeat of the flooding in Charleville. The amount of water, for him, indicated that Cunnamulla could be in serious danger.\textsuperscript{73} The Superintendent consulted with Tannock throughout the lead-up to the flood peak about the way the flood was moving, its threat to Cunnamulla and how high the flood would peak around the town.\textsuperscript{74} However, the final decisions were his prerogative and responsibility.

The view that Cunnamulla could be severely flooded was shared by many others. Some SES workers thought that the floodwater would overflow the levee and that the flood would peak a metre higher than they had initially expected. Others were concerned that the levee would break under a 'wall of water'.\textsuperscript{75} The Paroo Shire Council expected the levee would not hold the water and was unsure how to act. One member of the shire council, Suzette Beresford, said: 'It's a big surge of water... we're facing something that nobody has knowledge of.'\textsuperscript{76} Cunnamulla Police Sergeant Jim Egan thought that in such a situation residents were the best judges of the flood: 'The locals are the best people to know where it will come from.'\textsuperscript{77} The town waited: according to one resident it was 'like sitting on a time bomb'.\textsuperscript{78}

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Centralisation of Flood Aid: The Superintendent as State Agent

Under Queensland state legislation the Superintendent was responsible for the coordination of equipment, personnel, and volunteers from the Australian Army and SES, now congregating in Cunnamulla. Empowered by the State Counter-Disaster Organisation Act 1975 he could also order and enforce an evacuation of the town.79

The 1990 flood occurred at a time when state involvement in community preparations and responses to floods had been formally centralised by policy and legislation. In the 1970s all states and territories passed Acts similar to the State Counter-Disaster Organisation Act 1975, prompted by a series of environmental events, including Cyclone Tracy and costly floods in Brisbane in 1974. The chaos of aid and mass evacuations that followed these events relied on charity and last minute government aid, and proved incentive for states and territories to seek order in emergencies. In many of the resulting state Acts, governments reserved the right to procure equipment that was privately owned.80 Through the Acts, responses to floods were in many ways standardised. They established channels of action, and financial aid to individuals and local governments, that corresponded to the level of crisis a community faced.81

In Queensland, the State Counter-Disaster Organisation Act 1975 aimed to coordinate responses to 'natural disasters' through the state government. The legislation centralised responses, including physical aid and financial relief under the umbrella body of the State Counter-Disaster Organisation (SCDO). Within the SCDO, the SES was positioned as the primary response group on a local level, comprised of local volunteers. The SES was originally created in 1955 as State Emergency Services, a state funded ‘grassroots volunteer organization’ with dual functions: to aid communities in preparing for floods and coordinate reparation work and, during the Cold War, to mobilise civil

79 'About Us', State Disaster Management Group. State Government of Queensland. http://www.disaster.qld.gov.au/about/, accessed 17 April 2008; and, State Counter-Disaster Organisation Act 1975, s22(1) and s25(2)(a)(ii). The State Counter-Disaster Organisation Act 1975 was reviewed in 2002-03. The review resulted in a new Act, which replaced the 1975 legislation – the Disaster Management Act 2003. This Act remains the current legislation in Queensland. The new Act retained many of the previous Act's measures and in addition expanded state response to disasters to be more holistic. It now includes, for example, mitigation and prevention.

80 For Queensland see: State Counter-Disaster Organization Act 1975, s25(2)(a)(i).

defence. Under the new Act the SES became a government-operated branch and, also, the predominant labour and coordination organisation in natural disaster response. However, the power of the SES to respond to, and aid preparations for, floods remained limited. The police force was included under the SCDO as a second tier of response, to be summoned as a coordinating, as well as a law enforcement body, if the ‘natural disaster’ proved severe. Such ‘top heavy’ decision-making in ‘natural disasters’ and their aftermath was codified in law but was deeply resented by local residents. Since Cyclone Tracy, locals had urged place-sensitive responses to disaster management.

The government legislation created an overarching context for both Tannock and the Superintendent. The Act privileged state agents as decision-makers in ‘natural disaster’ areas by centralising responses to the environmental events to a state level. The Act also privileged the environmental knowledge of government agents by giving them positional power over those in the effected and threatened areas. It allowed government workers to make decisions as to the communities’ best interests in situations declared as emergencies. In this way the Act set parameters on which knowledge was considered valid in such a situation, clearly privileging that of the government. In addition, standardised responses and the summoning of remote officials, who potentially had little knowledge of the areas, created a high potential for government agents to respond to and understand environmental events in abstracted forms.

Further, the power of state agents to enforce an evacuation (which the Act enabled) reflected an ideology of humanitarian aid that privileged the removal of people from threatened areas and valued human life separately from people’s connections with place. The benefit of such an approach is human survival. The drawback is that it

82 Chas Keys, ‘Towards Better Practice: the evolution of flood management in New South Wales’, unpublished conference paper presented at the Australian Disaster Conference, Canberra, 1999, pp.111-116, p.113. The Deputy Director General of the New South Wales State Emergency Service, Chas Keys, argued in a 1999 paper to the Australian Disaster Conference in Canberra, that under similar circumstances in New South Wales the enabling Act failed to give the SES sufficient power to effectively manage floods. The SES remained focused on emergency response during flood events rather than long-term preparations in communities that repeatedly experienced floods. Further, Keys argued that, '[t]he Act gave the SES few clear responsibilities and no power to co-ordinate the activities of other agencies in relation to flood management' (p.3). Flood warning, floodplain development planning, community awareness, and SES emergency response remained isolated management processes. In 1989 a review of the SES resulted in the restructuring of the organisation through a new state Act (State Emergency Services Act 1989). The SES was made responsible for flood management and coordinating other agencies to protect flood threatened communities in New South Wales, both in emergencies and long-term preparedness.
undermines a consideration of communities-in-place. Humanitarian evacuations, as in the case of Cunnamulla and other places in south-west Queensland, can have personal and psychological effects that result in severing connections between people and place and jeopardise future economic survival of communities. Further, the approaches the Act codified meant important environmental and social knowledges held by those who live in the areas were potentially sidelined.

* * *

Tannock and the Superintendent: The Last Flight

On Tuesday 24 April 1990 the Superintendent decided to bypass the community organised evacuation plan, which was to move to the sand hills. This was because, in his view, the facilities were inadequate.\(^{85}\) He put in motion alternative measures and recommended that the evacuation of the townspeople to the Charleville camp and to Brisbane should begin. This plan had been developed as an avenue to cope with extreme flooding in the town that could not be handled locally. It required greater state government involvement and coordination. That day, 90 people including the elderly and sick, pregnant and nursing women and young families were flown to Brisbane.\(^{86}\) It would be the largest air evacuation since Cyclone Tracy in 1974. As many as 1,100 residents were to be flown to Brisbane and 600 to the evacuee 'tent city' in aircraft hangars near Charleville. Some residents did not want to leave if the planned evacuation eventuated and the sand hill camp was stocked with provisions for them.\(^{87}\)

SES deputy director Bob Barchard told newspapers that the decision to evacuate had been made after 'shire officials and engineers forecast floodwaters would exceed the levees by a metre'. It was a close call to make. However, Barchard supported the decision, saying: 'Once the water goes over the levee banks it is too late to make a decision'. The risks to human life were too great. The evacuation would mean displacing the entire population of Cunnamulla. 'I shudder at the thought of displacing them from their homes', Barchard said.\(^{88}\) As well as the emotional fissures and dispersals of family

members created by an evacuation, Cunnamulla's small economy would suffer, and possibly not recover.

![Airlift for 1700](image)

Figure 7.4 (above)
Newspaper headline as Cunnamulla prepared to evacuate.

Figure 7.5 (below)
'The evacuation commences...'
[From: *Western Sun*, 27 April, 1990, p.7.]

The Superintendent consulted with Tannock and formulated a plan that would provide a small window of opportunity to either evacuate the town or to allow residents to stay. Just before a full evacuation they would take a second flight together over the Warrego floodplains and make a final decision as to whether to continue the evacuation.\(^8^9\) It was to be a critical moment of judgement for both men.

At 6am on Wednesday 25 April the Superintendent ordered the sirens to be sounded for residents to gather on the sports oval for evacuation by helicopter to the town airport and from there to Charleville or Brisbane. Residents gathered at the airport, but the final leg was put on hold. Tannock and the Superintendent flew over the floodwaters. In the helicopter Tannock pointed to the rivers and creeks near Cunnamulla and asked the Superintendent, 'which do you think the main channel is?' The

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\(^8^9\) Edwards, pers. comm., 19 December 2008.
Superintendent said ‘that one’, and Tannock responded, ‘that’s the creek’. Near Cunnamulla the creeks were taking a large amount of the water west and had appeared from the air as the main channel. The Warrego and creeks were funnelling water away from Cunnamulla.

After the flight, having seen the river and tributaries from the air, the Superintendent called the evacuation off, radioing in the decision from the helicopter. The flood peaked that day at 3p.m. at 10.15 metres, five centimetres lower than Tannock’s prediction. The evening that the flood peaked, a portion of a levee gave way, flooding the showgrounds and Oxford Hotel in the southern part of the town in ankle-deep water. Floodwater threatened to seep through other soil and sand bag levees in the following days, but they held. Outlying properties sustained damage and substantial stock losses. However, Cunnamulla’s township escaped significant inundation.

After the flood had peaked and Cunnamulla was declared ‘safe’, journalists from the Western Sun expressed the town’s gratitude for Tannock’s involvement in preventing an evacuation:

‘A.D.’ (Tannock) as he is known to us all has spent a lifetime playing with the figures of floods in the south-west and had in the past been able to predict the flood heights to the mm. This information has proved invaluable.

It must be remembered that a full scale evacuation of the town where the population ended up in Charleville, with problems of their own or in Brisbane unable to return for some days would have been just as devastating to Cunnamulla’s economy as a raging torrent through the town. It would have been a disaster in its [sic] own form from which many business houses would not have recovered.

To this end thanks to those on properties above the town who had to swim to get flood levels for us.

The helicopter flight saved Cunnamulla. No reports of the flood were made by or required of Harry Edwards. Instead, there were joint debriefings in Roma and Brisbane for all those involved in flood response, including residents in the flooded and flood-threatened areas.
Figure 7.5
Floodwater April 1990 – Wyandra-Cunnamulla reach
Aerial landstat image.
'The Rivers Are Moving West': The Warrego's Shifting Course

Tannock has explained that these western creeks were generally taking more water from the Warrego. 'The rivers are moving west', Tannock told me. The water is no longer flowing down the Warrego as it used to: one of its western tributaries, Cuttaburra Creek, is becoming the main channel. In 1990 this channel was where a large portion of the floodwater flowed below Cunnamulla. This channel shift may also explain why floodwater flowed west across floodplains as it neared Cunnamulla. Tannock writes that this process is in response to the westward drop in the gradient of the floodplains: 'What is happening to The Warrego and the Cuttaburra [the largest western creek] is normal procedure... [for] our western rivers. One only has to fly over them to see the pattern outlined. Because of the reduction in height above sea-level the further one goes west toward the inland then our streams have a tendency to keep breaking west'. 94

Tannock’s notion that rivers are moving west was influenced by information communicated to him by an Aboriginal friend. Tannock explains that, 'according to an old Aboriginal Friend of mine (long since deceased) The Widgeegoara Creek [now an eastern tributary of the Warrego] was at one time the main stream of The Warrego in the southern portion of The Basin... I feel that he could have been right. According to him The Aboriginal word “Widgeegoara” means “Where’s The Water Gone”'. 95 It had, the story follows, gone to the Warrego. Widgeegoara, once the main channel, is now a creek, feeding its former tributary, the Warrego River, which lies to its west. Other creeks above Cunnamulla are also 'breaking west', creating serpentine new channels. The changes in water flow have been going on for hundreds, perhaps thousands, of years, Tannock hypothesises. He implies that there are larger geological timescales that we need to take into account in our environmental and flood knowledge, which, in turn, needs to be continually adjusted. It is easier for those living on the floodplains to see this, as they experience it. For those in the state government it is a little harder.

Tannock’s recognition of the changing course of the rivers brings acknowledgement of the rivers’ agency in the world. People like Tannock are experiencing and understanding that the environment is constantly changing and that

this needs to be recognised if its dynamic is going to be understood. Because the rivers move, and floodplains change, no two floods are the same. Where the water flows and how it flows, is different every time. Each flood is unique in this sense. Tannock perceived the 1990 flood as a particular dynamic of water, river channel, land, and weather. He also saw humans within this dynamic, as constructions on the floodplain influenced the course of the flood. The railway embankment, albeit in its absence, played a part in the flood; and the levee bank moved the water away from Cunnamulla. Further afield than Cunnamulla there is growing concern by hydrologists that levee banks speed the flow of floodwater by confining it to river channels and pushing it back across the land in a way it would not otherwise flow. Increased flood speed causes erosion and vegetation loss.

Human actions are changing floods and, in consequence, ecological processes; each change creates a new influence on floods. The state government’s commissioned report on the 1990 flood noted that residents in Charleville and Blackall had observed that the amount of vegetation growing in the riverbed had increased since stock grazing ceased on the riverbanks in the 1960s. Plants in the bed of the river sprouted when the river was dry and, with no grazing animals to eat it, flourished. Cattle and sheep have displaced native animals that may have grazed on the vegetation and land clearing along the riverbanks has reduced this vegetation’s competition for growth. In both areas soil had accumulated around the riverbed vegetation, making the river shallower. ‘Both the above factors’ (riverbed vegetation and soil accumulation), the report stated, ‘would raise water levels for a given flood flow’.96 With recognition of the interplay between various actors in floods (human and non-human) the divisions between rivers, humans, rain, animals, aquifers, vegetation, and soil, disappear. Each is an actor, but their combined dynamic creates the particular ecological conditions of each flood.

Tannock’s predictions of the flood were based on his experience of the river as he observed these changing relationships over many years. The knowledge gained from living with the river in its different forms and studying its changes is what he terms ‘local knowledge’.97

Local Knowledge and State Bureaucracy

In *The Warrego Watershed*, published shortly after the 1990 floods, Tannock empathises with the Superintendent from Brisbane on the grounds that whilst he did not know the river, he was nevertheless faced with the task of making decisions about responding to the flood:

> I for one had a happy association with Superintendent [sic] Edwards by the time we had completed The Flood Operations, but I could see at this time, that he was working under a great handicap: (a) The Warrego Watershed was strange to him. He was aware of what happened to Charleville and there was no reason for him to believe that the same could not happen to Cunnamulla. (b) He could not, at that stage, accept the fact that The Cunnamulla Evacuation Camp on the Sandhill was completely safe from Flood Inundation... His was an unenviable situation in that either way he could be liable to censorship, if he failed to evacuate and we had a repetition of Charleville or Nyngan or on the other hand if he evacuated and it was subsequently proved not to be necessary.  

Tannock’s relationship with the Brisbane Superintendent, while in the end a ‘happy’ one, needed to work across differing environmental knowledges and expectations of the Warrego during the flood and planned evacuation. The Superintendent did not know the river the way Tannock did, and yet was responsible for the town’s safety. The structures of power and knowledge played out in this flood draw attention to tensions between centralised state government and the knowledges of those who live with the river, far from the centres of political and managerial power. Personalities, and the moment of crisis, perhaps closed this gap between two understandings of the flood’s potential and response to it. Indeed, the Superintendent visited Tannock in Cunnamulla after he retired, when Tannock gave him a copy of *The Warrego Watershed*. However, until the evacuation was called off there existed different and conflicting visions of the river’s floods. The Superintendent had the power to act on his while Tannock, and the Paroo Shire Councillors, did not.

Settler responses to the flood were governed by an order of bureaucratic rank and power that did not take account of those who had experiential knowledge from living

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with the rivers. The differences between Tannock and the Superintendent over knowledge and expectations of the river were played out within larger frameworks of power and codified responses, where power lay with the agents of a centralised state bureaucracy. Through these governing channels, the Superintendent's knowledge was valued above Tannock's. Tannock's local knowledge had little status or power in critical decision-making, but ultimately relied on the willingness of the Superintendent to engage with other ways of understanding the river's flows.

Tannock envisions an important role for local knowledge in state-led preparations for floods, mitigation planning, and flood warning systems in the future. In his book he included suggestions for additional levee banks in Cunnamulla, and plans for them in Charleville and Augathella. He rationalised each levee bank in terms of past floods and water flows, acknowledging that current flood peak 'records were made to be broken' and factoring the possibility of larger floods in to his designs. Implicit in his suggestions is an argument for more equitable collaboration between those living with the river and governments, for a sharing of knowledges. In the introduction to his book, he explained the value of recording local knowledge of rivers:

> In concentrating on the problems of the Warrego Watershed, I am hopeful that other persons with an intimate knowledge of other Watersheds which were similarly affected by the April 1990 floods, will be prompted to write something similar as the problems in the Warrego Watershed, are, I feel common to so many of our other Watersheds... I feel that if these problems can be documented now, then our Local, State and Federal Governments can be made aware of the problems and the necessity for planned flood mitigation in the future to avoid the tragic losses, the resultant loss of production and the colossal Post Flood Expenditure necessary to repair the damage.¹⁰⁰

Sharing his knowledge of the river and floods through his book created a record of Tannock's observations and made it accessible to different levels of government, as well as to others living with the Warrego. If others did the same, Tannock suggested, important avenues of communication with governments could be opened. Residents have important knowledge to offer in planning for subsequent floods and to pass on to future generations.

Indeed, others with local knowledge of floods have done something similar. In the Burdekin shire, on the north Queensland coast, Doug Haig had developed a system of flood warning for the region that proved accurate and successful. Like Tannock, Haig’s warning system was reliant on informal networks. He was a shire engineer and received telephone calls from people with river heights throughout the Burdekin River watershed. Over a number of years he developed a formula for predicting flood peaks. Haig, together with Burdekin Shire Council employees, developed a computer program based on his knowledge and formula, for predicting flood heights. The program could then issue warnings automatically to the Australian Broadcasting Commission (ABC) radio to broadcast flood warnings to the community — a continuing legacy well after Haig’s death.101

Cunnamulla did not flood, but the threat that the flood posed to the town, combined with rural losses, damage to other towns, changes to the floodplains, his retirement, and the almost-evacuation, prompted Tannock to write down his 40 years of observations and pass on what he had learnt. His book is a testimony to rivers’ continuing changeability, the variability of drought and flood, and the differences between each flood, as influenced not just by rainfall but also by their changing biophysical contexts. This is information Tannock believes current and future generations, both inside and outside government, need to know. He wrote the book as a gesture to the future.

Local Knowledge in the Context of Climate Change

There is a sense of urgency to Tannock's suggestion that those living on floodplains need to be proactive in their communication with governments and in forming partnerships with government agents. Further, both governments and those living on the floodplains, he argues, need to take a new approach to floods, giving flood warnings higher priority. Tannock expressed a sense of urgency for immediate action and communication because of the potential impact of 'the greenhouse effect' or climate change:

I sincerely hope that the tragic losses incurred in the April 1990 Flood in Charleville and elsewhere, will be instrumental in seeing the establishment of a comprehensive and efficient "Flood Warning Service" throughout the whole Watershed with the distinct possibility of more frequent major floods in the future as a result of the possible "Greenhouse Effect", this now becomes a matter of paramount importance.¹

For him the 1990 flood was a call to action for floodplain communities, state, and nation, in preparing for more severe, and possibly more frequent, floods.

Tannock's role in preventing the evacuation of Cunnamulla and his knowledge of the Warrego watershed makes a strong case for incorporating local and experiential knowledge in flood warnings during flood events, and for ongoing communication and equitable collaboration between community members, governments, and councils, in

future planning. The development of channels within government bureaucracy for types of knowledge that are personal (in the sense that they are acquired through living with the river) and 'informal' (in the sense that they are accumulated outside either government or acceptable scientific or academic frameworks) needs to occur for Tannock’s vision to be realised and for the full benefit of local knowledge to be felt.²

Libby Robin has recently argued that science in Australia dominates national and regional comprehensions of environments, and has increasingly done so since Federation. Government science shapes environmental understandings that underpin and permeate policy and town and industry planning on local, state, and national levels. Science ‘speaks for nature’ while also being the primary frame through which ‘natural resources’ are understood and managed. Robin explores the political and cultural contexts of science, particularly government science, in ways that highlight how it has informed, and continues to inform, ‘a national vision’. She discusses, for example, a series of government backed settlements on the Daly River in the Northern Territory established from the early twentieth century. She does this within the context of government scientists’ (and scientists outside governments) debates over settlement of tropical northern Australia. Many of the Daly River settlements (including government experimental farms) were short-lived, as government planning did not take account of place-specific environmental conditions, including the extreme potential for many of the sites to flood.³ Drawing on such examples, Robin argues that room needs to be made in political and cultural spaces for ‘alternative voices that might also speak for nature’.⁴ Further, Robin suggests that government planning and management processes might be improved through the incorporation of other environmental knowledges, such as those of Indigenous peoples, farmers, and town dwellers.

This is something for which James C. Scott has also argued. Scott argued that government (and institutions and enterprises) can add to, and improve, their knowledge base by incorporating local knowledge: ‘An institution, social form, or enterprise that takes much of its shape from the evolving métis [local or practical knowledge] of the

³ Libby Robin, How a Continent Created a Nation (Sydney: University of New South Wales Press, 2007), pp.123-149.
⁴ Libby Robin, How a Continent Created a Nation, p.10.
people engaged in it will thereby enhance their range of experience and skills’. Scott suggested that a question we should ask of ‘any planned, built, or legislated form of social life’ is: ‘to what degree does it promise to enhance the skills, knowledge, and responsibility of those who are part of it?’. This, Scott argued, should be its test.

Through her study of the relationship between science and government in Australia, Robin draws attention to a pervasive issue within Australian government bureaucracy: a need for the inclusion of place-informed (including experiential – which does not mean uninformed) understandings in decision-making processes. However, in such a global happening as climate change, what are the limits of local knowledge? This chapter seeks to explore the value of local knowledge in the face of environmental uncertainty, induced by climate change and other alterations to the environment from past and current settler land use practices. Scientists are uncertain about the effects of climate change. I will argue that in this environment of uncertainty and potentially radical change, there is an additional, and even greater need for alternative voices in debates about, as well as decisions towards, how Australians and their governments will approach altering ecosystems.

Climate Change

Recent studies, such as bureaucrat Greg McKeon’s 2006 submission to Australia’s ‘State of the Environment Committee’ (‘Living in a Variable Climate’), the 2008 ‘Garnaut Climate Change Review’, and recent assessments by the Intergovernmental Panel on Climate Change, conclude that the effects of climate change on floods in the Murray-Darling Basin and other semiarid countries around the world cannot currently be predicted. One reason that the effects of climate change on flooding in the Basin is uncertain is that the intensity of the effects of global warming (and changes to rainfall, temperature, and water evaporation rates) depends on the degree to which governments

6 Scott, Seeing Like a State, p.355.
and national administrative regimes around the world (especially in developed and developing nation-states) reduce the production of greenhouse gasses. Another is that instrumental records of rainfall and river heights in the Murray-Darling Basin do not extend far enough back, or are too suspect (i.e. cannot be accurately standardised into current measuring systems) to provide reliable bases for future projections. However, strong evidence is emerging that climate change will affect the Darling and Murray river systems differently.

The Darling River system is affected by northern monsoonal rains, whereas the flow in the Murray is largely dependent on winter rainfall and Spring snowmelt. In a 2008 study, Barrie Pittock et al draw attention to how these different hydrologies may be affected by climate change: summer monsoons will probably intensify, with higher rainfalls, and more frequent severe floods are likely in northern parts of the Basin. Floods could also be faster and more erosive if there is widespread vegetation deterioration. Along the Murray, a decrease in rainfall and snowmelt could mean possibly fewer floods and generally less river flow. Pittock et al warn, however, that 'any accurate quantitative estimate of changes in flood frequency in the MDB [Murray-Darling Basin] due to enhanced greenhouse effect is at this stage premature'. While the exact effects of climate change are unknown, the rivers and floodplains are likely to change dramatically and quickly, while floods are likely to become more unpredictable. Tannock's call for the establishment of warning systems and response mechanisms able to cope with increased floods in the Darling river system remains valid.

Past Settler Land Use

Along with the uncertainties of climate change, the rivers and floodplains are experiencing more localised changes to ecological processes from past settler land use. In 2005-06, the Basin contained 65 percent of Australia's irrigated agriculture and (with extractions totalling 65 percent of all diversions) it is largely water extraction for this industry (but also for rural and urban water supply and pastoral irrigation) that has

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9 Pittock, et al., 'Climatic Background to Past and Future Floods in Australia', p.35.
caused an overall dramatic decrease in flow.\textsuperscript{10} In 2000, a Murray-Darling Basin report revealed that water flow out of the Murray mouth had reduced to 28 percent of its previous flow.\textsuperscript{11} It is largely irrigation agriculturalists, graziers, and towns dependent upon the industries, as well as floodplain ecologies, that are feeling the effects of reduced water flow. Irrigators’ extraction licences were suspended in 2007 throughout the Basin after a decade of drought. While Victoria and South Australia have since eased these restrictions, the future of the irrigation industry remains uncertain. Extraction has been continual and unlimited, stemmed only by drought.

In 1994 the Murray-Darling Basin Commission (MDBC) implemented a cap on irrigation extractions for each state. States agreed to be ‘capped’ at their 1993 rates of extraction. However ‘the Cap’, is not enforceable under rights of state sovereignty held in the Constitution, and states (particularly New South Wales) frequently extract more than their assigned amount.\textsuperscript{12} One significant result of extractions has been that smaller, as well as larger floods, have not flowed across floodplains and wetlands. Extractions have caused serious deterioration in riverine environments, changing vegetation, and affecting the survival of fauna such as frogs that rely on periodic river ‘flushings’ for breeding.\textsuperscript{13} Further, flood and drought mitigation by large dams, that aim to contain rivers within their banks and make their flows consistent, has seen the death of many stretches of red gum forests on the Murray River. Settler land use practices have also contributed to increased soil salinisation in the Murray and Darling river systems. Salt concentrations have reached levels of toxicity in areas of the Basin, that have rendered the land unfit for farming and poisoned vegetation.\textsuperscript{14}

In his recent book, \textit{Water Politics in the Murray-Darling Basin}, Daniel Connell draws attention to the fact the Australians have not yet seen the full environmental effects of extraction: ‘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

\textsuperscript{13} Kingsford, ‘Review: Ecological impacts of dams, water diversions and river management on floodplain wetland’, p.110 and p.111.
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, dramatically different land use practices by humans since European settlement, and current extraction. Flood flow and size will alter as these changes manifest in future landscapes.

There has been growing recognition by governments since the 1970s, internationally and within Australia, that the pattern of past water use will be the source of future social, political, and environmental instability. United Nations conferences in the 1970s and 1980s, along with the Brundtland Report published in 1987, argued for national governments to manage fresh water for environmental, social, political, and economic sustainability (see chapter six). A 1992 United Nations (UN) conference in on Environment and Development outlined management systems based on catchment areas as the best way to develop policy, solve environmental justice issues, and address the aims of sustainability. The catchment management model relied on community involvement, in essence arguing that rather than ‘top down’ management, ‘bottom and top’ negotiation was essential to approaching water conflicts. The 1992 UN conference made clear that it is essential to include stakeholders in decision-making processes and to ensure that both government and those ‘on the ground’ were vested with responsibility for the outcomes.

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Water Bureaucracies

In response to the 1992 UN conference, and growing public and industry concern over environmental degradation, Connell argues that Australia ‘embarked on a program of institutional reform’. There were two significant changes to national and state institutional structures. First, the River Murray Commission was replaced by a tripartite structure: the Murray-Darling Ministerial Council, the Community Advisory Committee, and the MBDC. Queensland joined New South Wales, Victoria, South Australia, and the Federal government as part of the restructure. Secondly, integrated catchment management was adopted by each state in the early to mid 1990s, and by the MDBC in 2001. The catchment approach ‘integrates water quality and quantity issues, land, water

16 Connell, Water Politics in the Murray-Darling Basin, p.16.
and air interactions and upstream and downstream affects, is systems oriented, requires research-based policy and emphasises stakeholder involvement and partnerships'. It was a more 'holistic' approach to water management.\textsuperscript{17}

Integrated Catchment Management (ICM), Catchment Management Authorities, and community consultation were established by the states in the late 1980s to mid 1990s to engage communities and to gain feedback on water quality, distribution, and ecosystem health decisions and issues, and to involve community members in locally run projects jointly established with government. An example of the effectiveness of Catchment Management Authorities is the achievement of the Basin Salinity Management Strategy (implemented in 2001) in reducing salinity through changed methods of community governance and farming practices.\textsuperscript{18}

A key part of ICM has been restoring floodplains and wetlands. Floodplain restoration has further been spurred on by the National Water Initiative (NWI), which was approved in 2004 by the Commonwealth and state governments. The NWI is an added attempt at institutional restructuring that aims to stimulate economic growth while protecting ecologies.\textsuperscript{19} The primary function of the two management bodies is to negotiate and balance the need for water between the irrigators and the environment.

Another area of government management that was addressed in the 1990s was the inclusion of processes for community consultation in flood response and preparation. Following the 1990 floods the Queensland government, with federal assistance, took steps to construct levee banks to protect Charleville from further large floods and to carry out land and flood surveys. Importantly, decision-making about the location and height of the levees included extensive consultation with members of the community.\textsuperscript{20} In the debriefing sessions held in Brisbane and Roma after the 1990 flood, the need for longer-term preparation for floods, beyond the event, was identified, such as levee building in some areas and a greater understanding of flood risks. Further, greater community consultation in longer-term preparation was identified. Due to a lack of community consensus about the height and location of levees in Charleville, the levees were not built.

\textsuperscript{17} Connell, Water Politics in the Murray-Darling Basin, p.17.
\textsuperscript{19} Connell, Water Management in the Murray-Darling Basin, pp.26-34. See, Connell, Water Management in the Murray-Darling Basin for more on the structure of ICM and NWI.
in the following years. After further floods through the Warrego river system in 1997, when residents of Charleville were again evacuated and damages of $1000 million were incurred, new levee plans were developed by the local, state, and Federal governments in consultation with the community. In September 2000, the local government agreed to construct levees that could protect the town from a flood such as occurred in 1997 (which was not as high as the 1990 flood). The 1997 flood, along with another that occurred in 1998, prompted (along with other events and administrative issues) a review of the governing legislation, that included an expansion of the role of the SES and greater community consultation.  

The State Counter-Disaster Organisation 1975 legislation was reviewed in 2002-03. The review resulted in a new Act which replaced the 1975 legislation — the Disaster Management Act 2003. This Act remains the current legislation in Queensland. The new Act retained many of the previous Act's measures and in addition expanded the role of the State Emergency Service (SES) and included implicit mechanisms for community consultation. In particular it expanded the role of the SES to include longer-term preparation for floods, for example flood mitigation and prevention. Under the previous Act the different levels of government involved were required to establish action plans that could be implemented during a flood event, and at different stages the plans of corresponding levels of government could be implemented and supersede other, more local, plans. The new Act established a legal mechanism for community involvement and consultation in the process of longer-term local planning through the SES, which is mostly formed from local volunteers, local government, and district disaster centres. Through the SES there are now avenues for local knowledge to play an important role within government flood preparation and response at a local and regional level. Indeed, at many levels of government the importance of community involvement in flood preparation is recognised. Emergency Management Australia, a federal body, today encourages school children to 'know your local flood history', to empower them to make informed individual decisions during future flood events. Such encouragement and flood knowledge could also allow them to become significantly involved in future community

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and wider flood preparations. Whether these consultative and educational processes are effective will take time to ascertain as they are tested in years to come. The Disaster Management Act 2003, like the Act that preceded it, still allows state government officials to take charge in flood events, including enforcing evacuations.

While a number of government agencies have been adjusted, or created, to facilitate community consultation and participation in decision-making processes related to rivers, floodplains, and flood events, these agencies remain disparate and represent different government and settler interests that often conflict. Recently, ecologist Richard Kingsford argued that there was a bureaucratic gulf in river and floodplain management that limited holistic management of riverine areas. He argued, "[i]n practice, river managers focus on the hydrology of the river channel, while conservation managers concentrate on the ecology of floodplain wetlands." River managers, Kingsford continued, concentrate on ‘delivering water for human purposes’. Ecologists on the other hand attempt to study and manage floodplains for ecological conservation. Kingsford argued that the management of rivers and that of floodplains are too independent of each other and require greater synergy as they are related to one another, especially through flood flows. Kingsford’s observations and arguments remain relevant to current management practices, as river and floodplain management continue to remain largely independent of each other. To these disparate management areas we can add another: flood mitigation, preparedness, and response. Management of rivers for irrigation and other ‘human purposes’, floodplain ecologies, and flood events are largely independent of one another, although each is relevant to the others as their ‘on the ground’ effects interact. Further, they are often in conflict, for example, when water supply for irrigators interrupts flood flows to floodplains and wetlands.

In addition, some residents of flood country and government managers have conflicting interests. A good example is on the Macquarie River, where competition for floodwater between irrigators and the ‘environmental flows’ allocated by the MDBC (as of late 2008, the Murray-Darling Basin Authority) for the Macquarie Marshes still remains unresolved. In February 2008, the results of a year long study of Macquarie River floodplains by researchers at the University of New South Wales (UNSW), including

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24 Disaster Management Act 2003, s77(1)(c).

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Kingsford, were released. Satellite images and aerial photographs showed that farmers had built earth works to funnel floodwater on to their drought ridden, and irrigation-licence-suspended, properties for (mainly cotton) irrigation and farming, diverting water from the ecologically important wetlands. Parts of the Macquarie River floodplains are protected Nature Reserves, covering high density water bird breeding sites, while 88 percent of the marshes are under private ownership, and subject to strict regulation, as they also include breeding sites for birds and other species. 26 The UNSW report claimed that 2,000 kilometres of levees have been built across the floodplains. Some levee banks may have been authorised. However, the report claimed that 400 kilometres of levees (which were up to 20 kilometres long and five metres high) and storage dam embankments were illegal. 27 These embankments subverted government agreements over wetland restoration and irrigation licence suspension by going ‘under the radar’, at the same time circumventing MDBC Cap monitoring and audits. In addition, these embankments have been shown to interact with flood flows, increasing their depth and velocity (see chapter six). The media labelled the irrigators’ diversions ‘water theft’ and ‘floodplain harvesting’. 28 The use of such terminology in public forums reflects substantial institutional problems as well as the acceleration of ecological, social, economic, and political crises. Further, after substantial debate by scientists and in the media as to whether the prolonged drought beginning in 2000 (that had seen the government suspend many irrigation licences) was part of the El Niño/La Niña cycle or intensified by climate change, in late 2007 the Bureau of Meteorology declared the severity of the drought to be influenced by climate change.

Connell argues that there is ‘[g]rowing acceptance of the imperative to adapt continually to changing circumstances’ as ‘part of a worldwide reassessment of the extent to which humans can control and direct complex socio-ecological systems’, and the UN conferences, ICM, and the NWI reflect this view. 29 Management frameworks may reflect such trends, but ‘on the ground’ there is clearly disjuncture between bureaucratic aims,

29 Connell, Water Management in the Murray-Darling Basin, p.3.
disparate administrative processes, and the needs and expectations of those who live with the rivers, over important issues. Perhaps one reason for the gap, noted by social geographer Sharon Pepperdine in relation to community values in Woady Yaloak catchment in Victoria, is that riverine and floodplain management structures focus largely on biophysical issues and do not account for complex social and industrial relationships and issues.\(^\text{30}\) In the face of climate change and effects of past and current settler land use practices, these issues have become pressing.

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Local Knowledge and Environmental Change

Worldwide networks of researchers and investigators of global phenomena are attempting to fathom the interconnectedness of atmospheric, geological, vegetative, animal, and hydrological processes and the repercussions of temperature changes across the earth. In Australia, there is the additional factor of future effects of past and current settler land use practices. Australians are living in a time of increasing environmental uncertainty. The potential effects of these changes (and those that are already being experienced) on human and non-human species, and their habitats, seem to suggest an even stronger need for effective avenues to be established through which people, living in places like Cunnamulla and the Macquarie Marshes, can communicate and work with governments to adapt and become more involved in planning for those changes. Recent government initiatives, such as 'WISE: Water Information Systems for the Environment' established by New South Wales National Parks and Wildlife Service, have attempted to bring together government, scientists, and custodians of local knowledge with the aim of 'pooling' these different types of knowledge to improve river management. Such organisations may go some way forwards to better river and flood management by providing an avenue through which local knowledge can be valued within more standard sources of knowledge (science) and incorporated into decision-making processes.\(^\text{31}\)

However, Tannock's knowledge was accumulated over a lifetime, during which he experienced and observed substantial, but slow, changes in the river and landscape.


Climate change could cause relatively rapid and dramatic instability, potentially thwarting such an accumulation of knowledge in a human lifetime on an experiential scale. Rapidly changing habitats could prevent or limit both the accumulation of useful knowledge and the relative stability needed to formulate a benchmark through which change and particular biophysical conditions can be comprehended. The biophysical conditions of each flood could alter so quickly and drastically that experiential knowledge of one does not translate to the next, nor the ones before. Each flood, while already unique, could become more so as ecosystems respond to global changes.

Yet there is also the potential for local knowledge, particularly where it is knowledge of uncertain and unpredictable events, to play a pivotal role in flood planning and human adaptation to climate change induced alterations in riverine habitats where variability is increasing. Close knowledge of rivers can give important perspectives on how flows alter, and may alter in the future, as well as how communities might accommodate those changes. Despite possible future limitations to accumulating experiential knowledge of the rivers and understandings of changes in flow, and the current atmosphere of distrust between government and irrigators, uncertainties about the effects of climate change mean that holders (or custodians) of local knowledge could work in synergy with government. As uncertainties are great, it is critical now, more than ever, that different forms of knowledge be given voice in decision-making and adaptive processes. It is a question of the best ways in which local knowledge, such as Tannock's, can be included within government planning frameworks so that it is valued and given credence in the face of uncertainty. This has perhaps become a more pressing issue recently, as floods in coastal Queensland, New South Wales, and the inland signal the beginning of a series of La Niña years.
Conclusion

When I went to Mildura in 2006 for research, it was the 50th anniversary of the 1956 floods. The town was alive with commemorative exhibitions, seminars, and activities. I had missed, but was told about, the rally of hundreds of Ferguson tractors (or 'Fergies') in Wentworth earlier that year. These tractors had been assigned to soldier settlers throughout the Sunraysia farming district and in 1956 their sturdiness and useful design attributes — including a detachable front end loader — made them a feature of volunteer efforts to construct levee banks. In 1959 a monument of a Fergie was erected in Wentworth as part of the town's centenary celebrations. At the unveiling, the Town Clerk proclaimed, 'by God and by Fergie we beat the flood'. Fergie tractors quickly became symbols of settler efforts to combat the 1956 floods. The memorialisation of the 1956 floods through these tractors, today remind us of the importance of the heroes and heroics that emerge during floods (and other environmental 'battles') and in the stories that are told about them. Stories of ‘combat’ and ‘control’, rather than of flow and adaptation, dominate Australia’s publicly-told flood and river histories. The tractors, however, also reflect the specific context in which the 1956 floods occurred; namely, post-war irrigation expansion and dam building along the Murray and its tributaries. Like the settlers along the Murray and Darling rivers in 1956, our relationships with floods today are mediated and transformed by technologies and diverse ways of knowing and interacting with rivers.

2 Quoted in, Chapman, By God and By Fergie... We Beat the Flood, p.1.
Figure 9.1 (left)
This book, by Carmel Chapman, takes its title from the statement by the Wentworth Town Clerk and is a history of the 1956 floods as experienced by residents of Wentworth. First published in 2001, a new edition of the book was released for the 50th anniversary of the 1956 floods in 2006. On its cover is a Fergie tractor. These tractors were standard issue to soldier settlers and were used to build levees during the 1956 floods.
[Carmel Chapman, *By God and By Fergie... We Beat the Flood*, second edition (Wentworth: Wentworth Shire Council, 2006).]

Figure 9.2 (right)
Riverside flood marker at Lock 11, Mildura.
The 1956 flood mark is second from the top. The top mark is the height reached by the 1870 flood.
[Ted Lawton, 9 January 2001, used with permission.]
In 2006 exhibitions in Mildura and elsewhere included photographs by Ted Lawton, Frank Zaetta, and others, videos of residents recounting their memories of events and historic footage of the floods, and maps. One of these maps was a poster of the Murray-Darling Basin produced by the Murray-Darling Basin Commission. Along with a current map of the Basin, the poster had information about, and photographs of, the floods that had flowed through the river system fifty years earlier. While on this research trip I also drove to Renmark, in South Australia, to see a travelling exhibition of flood photographs that was making its way through towns in the Sunraysia region. The exhibition was located on the banks of the Murray, and visitors could gaze out over the river in contemplation of past and possible future floods. A nearby pub, like so many others throughout the Murray and Darling river systems, had photographs of floods hanging on the walls.

The commemorations of the 1956 floods in Mildura and Sunraysia, along with pub photographs and riverside markers, demonstrate the importance of floods in local, as well as national, histories. They also point to the way floods have shaped and been shaped by settler lives, technology, and livelihoods as well as government policy. Floods punctuate individual and collective histories and are entangled not only in environments but in their cultural, social, economic, and political contexts.

This thesis has explored changing ways of knowing and understanding floods in the Murray and Darling river systems over one hundred and fifty years; from the early settlers in Gundagai, who 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 people in Cunnamulla, who relied on the local knowledge of a resident and resisted an evacuation in 1990. This history comes right up to the present, into an engagement with issues of contemporary importance, such as climate change and environmental degradation from past and continuing settler land use practices.

Through the case studies and linking chapters this thesis has analysed the tensions and cooperations between residents of flood country and centralised governments. This issue has been unmistakable as one of the major distinguishing features of each of the floods discussed. In particular, I have highlighted the ways in which these tensions have been shaped by the dominance of centralised governments in both short-term decision-making processes during flood events, and in the long-term planning of settlements, flood mitigation, and environmental management. In the context of relief arrangements, for
example, we have seen an increasing centralisation to state (and Federal) governments. Centralised responses to 'natural disasters' were especially evident during the 1956 and 1990 floods and were discussed in the last four chapters. We can, however, see the beginnings of direct government involvement in flood mitigation in the discussions for a permanent levee to protect Bourke in 1890 (chapter three). This flood highlights an important point of transition to greater government responsibility in managing natural disasters. Government finances were necessary for long-term flood planning, particularly for built works, but also for emergency aid. This kind of government involvement, however, also created the opportunity for centralised governments to have greater power over local responses to flood events.

Centralised water management and responses to floods have provided important and necessary bureaucratic frameworks. Two of the most obvious, and important, aspects of these are coordination (of disparate claims on river flow and floodwater) and the mobilisation of resources (for example, during flood events). The way these frameworks have functioned during particular floods, and their ability to address local issues and circumstances, however, have been the source of many tensions.

Many of these tensions have centred on different ways of knowing and understanding rivers and floods. I have discussed some of these ways within the context of broad categories like local knowledge, scientific knowledge, and government and managerial knowledge. These knowledges have been valued very differently within centralised bureaucracies and in local areas; we have seen, for example, that local knowledges and considerations of communities-in-place have often been sidelined. Alongside points of tension, there have also been points of cooperation between custodians of different kinds of understandings, both within regional areas and between residents of flood country and centralised governments. Competing understanding of floods connect with different values and livelihoods; for example, floods are important to graziers as rejuvenating to pastures, but they are viewed as destructive by cotton irrigators and township residents.

Different values and understandings of floods have been influenced by broad changes in approaches to environments. In the late nineteenth century, supporters of river engineering challenged the dominance of meteorology and flood forecasts as an acceptable way of preparing for floods. Settlers and governments increasingly looked to engineering as a way to mitigate the effects of floods and droughts (chapter three). Following Federation, state and federal bureaucratic frameworks fostered river
The construction of dams in these periods constituted a major turning point in the way that water was managed and natural disasters were mitigated. Together dams and irrigation 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, Burrendong, and Keepit dams, were made possible through highly centralised state government water management and federal bureaucracies, especially the River Murray Commission (RMC) (chapters five and six).

During and after the 1956 floods, engineering was perceived by settlers to have failed to adequately mitigate and manage these events. By the 1960s river engineering, especially the building of dams, was seen by various groups to have failed in other ways. The privileged position of irrigation and national development through dams was challenged by economists, non-irrigators, and environmentalists. The ecological sciences, a relatively new disciplinary area, became aligned with environmental opposition to projects of land and river development (chapter six). The study of ecologies has become a way to assess the environmental impacts of dams and irrigation, and a tool in the conservation of biological diversity. The RMC was replaced by the Murray-Darling Basin Initiative in 1992. The Initiative established a tripartite administrative structure, one branch of which was the Murray-Darling Basin Commission (MDBC). With its establishment, the Initiative defined the Murray-Darling Basin as a managerial unit, in part to engage with the environmental degradation of floodplains throughout the region. Dams, the expansion of irrigation, and the resultant changes to flood flows have been major causes of this environmental degradation, including soil salinity and the decline of wetlands like the Macquarie Marshes.

In 2007 the 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 MDBC was superseded by the Murray-Darling Basin Authority, in accordance with the Water Act 2008. This most recent restructure is part of a history of government attempts to address changing national 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. It is planned that the water entitlements of these licences will contribute to environmental flow allocations, for example to wetlands; that is, when there is water in the rivers to meet these entitlements. Whether this new management and injection of money will be able to address the many issues and conflicts within the Basin remains to be seen.

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 settler relationships with rivers and floods. The histories of industries, technologies, and relationships with environments need to be considered in current approaches to managing and living in the region. The Fergie tractor rally and other commemorations of the 1956 floods remind us that the flood country of today has been shaped by those past relationships with rivers; and by the fraught, duplicitous role of flood as natural disasters and as part of wider environments and water management. Physical traces and cultural legacies of past understandings and practices are another reason why histories are so important in addressing contemporary issues. Floods in the Murray and Darling river systems continue to shape lives and livelihoods, ideas of the nation and national politics. It is out of this complex history that we will ultimately need to create liveable water futures.
Bibliography

Archival Collections and Manuscripts
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