Contents

List of Figures ix
Foreword xi
Preface xiii
Acknowledgments xv
Abbreviations xvii
Notes on the Contributors xix

Introduction
Climate, Science, and Colonization: Histories from Australia and New Zealand
James Beattie, Emily O’Gorman, and Matthew Henry 1

Part I  Frames, Events, and Responses

Chapter 1
Australasia: An Overview of Modern Climate and Paleoclimate during the Last Glacial Maximum
Andrew M. Lorrey and Helen C. Bostock 19

Chapter 2
“The usual weather in New South Wales is uncommonly bright and clear . . . equal to the finest summer day in England”: Flood and Drought in New South Wales, 1788–1815
Claire Fenby, Don Garden, and Joëlle Gergis 43

Chapter 3
Extreme Weather and ENSO: Their Social and Cultural Ramifications in New Zealand and Australia in the 1890s
Don Garden 61

Chapter 4
Pioneer Settlers Recognizing and Responding to the Climatic Challenges of Southern New Zealand
Peter Holland and Jim Williams 81
CONTENTS

Part II Debating Human Effects

Chapter 5
“For the sake of a little grass”: A Comparative History of Settler Science and Environmental Limits in South Australia and the Great Plains  
Kirsty Douglas  

Chapter 6
Debating the Climatological Role of Forests in Australia, 1827–1949: A Survey of the Popular Press  
Stephen Legg  

Chapter 7
Science, Religion and Drought: Rainmaking Experiments and Prayers in North Otago, 1889–1911  
James Beattie  

Part III Climate Understandings

Chapter 8
Farming on the Fringe: Agriculture and Climate Variability in the Western Australian Wheat Belt, 1890s to 1980s  
Ruth A. Morgan  

Chapter 9
“Soothsaying” or “Science?”: H. C. Russell, Meteorology, and Environmental Knowledge of Rivers in Colonial Australia  
Emily O’Gorman  

Chapter 10
Imported Understandings: Calendars, Weather, and Climate in Tropical Australia, 1870s–1940s  
Chris O’Brien  

Chapter 11
Destabilizing Narratives of the “Triumph of the White Man over the Tropics”: Scientific Knowledge and the Management of Race in Queensland, 1900–1940  
Meg Parsons  

Chapter 12
Matthew Henry  

Epilogue: Future Research Directions  
Emily O’Gorman, James Beattie, and Matthew Henry  

Index
Introduction

Climate, Science, and Colonization: Histories from Australia and New Zealand

James Beattie, Emily O’Gorman, and Matthew Henry

Introduction

Climate, Science, and Colonization: Histories from Australia and New Zealand provides new historical perspectives on local responses to climate and its physical impact on the British colonization of that region. Grounded in the fields of climate history and environmental history, Climate, Science, and Colonization acknowledges definitions of “weather” and “climate” both as physical phenomena and as constructed cultural meanings.

Although this book principally focuses on the colonial period (from 1788 for Australia and 1840 for New Zealand), it situates colonization in relation to often very long-established climatic processes. Likewise, while the main focus of the book ends in 1940, chapter 8 and the “Epilogue: Future Research Directions” bring the discussion up to the early 2000s. Three reasons underpin our focus on climate from 1788 to 1940.

First, this period was foundational in establishing expectations and norms of the region’s weather and climate, norms that, we argue, laid the basis for European settlement patterns and agricultural land use. These expectations may also have played a role in shaping the identity and political groupings of the economies and settlements of Australia and New Zealand. Indeed, as Eric Pawson, Tom Brooking, and their research team have argued, the “grasslands revolution,” which saw the rapid remaking of so much of New Zealand’s lowland beginning in the nineteenth century, laid the foundation for its present primary export economy and many of its current environmental problems. That agricultural transformation, like others across Australia and New Zealand, arose partly from settlers’ expectations that Antipodean climates would behave in similar ways to those of Britain and support similar kinds of agricultural pursuits. The book’s chapters draw attention to how
many people have been struggling ever since to come to terms with Australia and New Zealand’s fundamentally different climates and to match environmental usage with environmental expectations.

Second, we have also chosen this period because much of Australian and New Zealand climate science, as well as our present understandings of climate, derives from institutional and scientific developments dating from the colonial period. Most of us unknowingly rely on daily meteorological forecasts and other information founded partly on climate understandings calculated from historical data. High and low mean temperatures, maximum and minimum river flows, monthly air temperature, the number of storms per decade—all of this, and a host of other information, rely in part on data that began to be collected during the main period this book focuses on.

Third, this collection highlights that many of today’s concerns, so often regarded as uniquely modern—such as debates over human-caused climate change or discussions of farming practices appropriate to particular environments—actually have a much older history. Oscillation between optimism in human ability through science to meet the climatic challenges of the present and the future, and anxiety about the effects of development on our ability to do so, are common in debates within both professional and popular spheres in the colonial times as well as our own. We hope that by reading this book, policymakers and citizens would gain insights into which past environmental actions worked and which didn’t, as well as what they reveal about the wider hopes and values that underpinned them. We are hopeful that these insights may help inform future planning in an unstable climate.

Perspectives

In exploring how European settlers struggled to comprehend and adapt to complex, poorly understood, and highly variable climates, the contributors to *Climate, Science, and Colonization* have drawn from disciplinary expertise in the climate sciences, social sciences, and humanities to consider three core questions. First, to what extent has climate, and climate variability, shaped the colonization of Australia and New Zealand? This question addresses not only the establishment of agricultural economies, but also other dimensions of colonial politics, society, and economies. Second, to what degree has the circulation of knowledge, within and beyond provincial, state, and national boundaries, encouraged contested understandings of weather and climate? This question leads us to look at different processes of understanding weather and climates, from those proffered by Maori and Australia’s Indigenous peoples to settlers whose expectations were framed by European experiences and emerging scientific and lay environmental knowledge. Third, what has been the relationship between local experiences of weather and climate, and international interpretations of these phenomena? Framed by a concern with the local, this question disrupts taken-for-granted frames of reference for understanding climate, notably the use of the nation-state as the primary unit in historical analysis. It also forces us to think critically about the meanings
attached to local climates and how these were received and understood differently in different places and at different times.

**Approaches**

Animated by these questions, this book is, to adapt William Cronon’s memorable phrase, a collection of “stories about stories about” climate. For Cronon, environmental historians use the technique of narrative to place complex events and processes into sequences that lend human and nonhuman activities order and meaning. By turning environments into stories, by making nature a narrative, Cronon asserts that historians actively select and edit what they judge to be of relevance. And, in doing so, the narratives they construct about particular environments, processes, or experiences succeed only to the extent that they can hide “the discontinuities, ellipses and contradictory experiences that would undermine the intended meaning of its story.” Inevitably, then, the stories we tell about environments—including the stories British settlers have told about Australian and New Zealand climates and weather—are stories that shape understandings and actions: stories that have power, in particular, to naturalize or denaturalize certain environmental categories and processes, and ideas and events.

This is evident in the relative lack of scholarly attention paid to the connection between cultures and climates in settler societies. With some notable exceptions—such as *A Change in the Weather: Climate and Culture in Australia* (2004), coedited by Tim Sherratt, Tom Griffiths, and Libby Robin, and Don Garden’s *Droughts, Floods & Cyclones: El Niños That Shaped Our Colonial Past* (2009)—one of the dominant stories about the stories of Australian and New Zealand climate histories is the existence of two often separate fields of scholarly inquiry. The first one is undertaken by historians of climate and is generally focused on the institutional histories of climate disciplines. The second one is written by physical scientists interested in histories of atmospheric processes. Where the first field deals with the human scale, measured over a period of decades or a century, the second examines a vast sweep of time, measured in thousands or hundreds of thousands of years, even millions. The differences do not stop there. Although climate scientists have produced several studies of the effects of atmospheric processes on Australia and New Zealand, very few have examined in detail, as this book does, the intersection of climate and histories of culture and colonization. By the same token, social scientists and humanities scholars have often ignored the physical dimensions of atmospheric processes, or explored them only in terms of their impact on agriculture and settlement in colonization. Building on the work of these scholars, *Climate, Science, and Colonization* attempts to examine responses to climate expressed at a local level.

It considers the many and complex ways through which the cultural and physical dynamics of climates have been experienced, understood, and narrated. Only by combining these understandings, we argue, can scholars begin to comprehend the processes of connectivity and complexity, causality
and comprehension so central to the processes of climate and colonization. Our aim is supported by climate historian Mike Hulme, who contends that “the idea of climate can only be understood when its physical dimensions are allowed to be interpreted by their cultural meaning.” An attempt at teasing out the interplay of the physical and cultural dimensions of climate in colonization also addresses what we have called the “Cronon conundrum.” This is the challenge for environmental historians to try to incorporate both human and nonhuman elements into their narratives, despite that “what we care about in nature is its meaning for human beings.” This book’s attempt to bring an “active nature” back into the historical narrative also aligns it strongly with the field of environmental history, which recognizes that humans shape ecological processes just as these processes shape humans.

Despite the strength of environmental history in Australia and New Zealand, most studies of these countries take climate as a given, as something providing the material basis for settler environmental transformation. This volume addresses this significant lacuna, by examining climate’s material and cultural significance in colonization. As well, it presents one of the few works of environmental history to consider Australia and New Zealand together. Furthermore, it contributes to scholarship on both climate and colonization and the history of science in Australia and New Zealand by building on the only other work to examine climate and colonization across these regions, Don Garden’s *Droughts, Floods & Cyclones*.

Another of its contributions to climate history comes in its challenge of the kinds of narratives sometimes woven around the institutional development of climate science. Evident particularly among New Zealand’s institutional histories, is the presentation by interested amateur historians of the development of their professions as stories of scientific progress and disciplinary expansion sweeping aside ignorance and inexperience. The chapters in this volume challenge such neatly framed narratives of progress by shifting attention toward the different areas in which science was contested. In doing this, they reinforce the findings of Simon Naylor in Britain, who argues that local and national ambitions, the proliferation of standards, and the sheer difficulty of dealing with masses of data meant that the germ of British national standardization remained stubbornly subject to local variation. “[T]he vagaries of local geography, social norms and politics” in Britain, Naylor notes, thwarted the steady and frictionless expansion of British meteorology across national space.

**Locality, Knowledge Exchange, and Comparison**

This book does not claim to present a comprehensive overview of every facet of science, climate, and colonization over the region (the epilogue outlines how future research can build on the work in this volume). It presents a series of local case studies operating sometimes at, within and beyond the national level, in recognition of Tom Griffiths’s argument that environmental histories are sometimes best couched at analytical scales that can “fragment or enlarge...
the national perspective,” thereby helping “…to scrutinize and reflect upon the intersections of nature and nation.”

This approach has several advantages. It enables analysis of the impacts of the same climatic events in different places among a settler population that, as we subsequently show, had much in common: in their promotion of the ideals of agriculture and closer settlement; in their shared British heritage and attitudes toward climates; and in their movement among the colonies of Australia and New Zealand. The book focuses on the local, rather than the global, but, where appropriate, it comprehends the local as it was fashioned through its connections to other places. To this extent, several of the chapters bear out David Lambert and Alan Lester’s argument of the importance of colonial experiences in one place shaping individuals’ attitudes and experiences elsewhere in the British Empire.

The volume also emphasizes the ongoing significance of British understandings of climate in shaping settler understandings of Australian and New Zealand climates while pointing to the importance of American ideas too. This perspective is neatly illustrated in chapter 6: in this chapter, Stephen Legg demonstrates the complex route by which climate-forest ideas reached eastern Australia and were then introduced at a local level. International debate on the theory came from Europe, America, and Asia, appearing in a variety of newspapers and parliamentary papers. Such developments, Legg shows, were tied up with the revolution in nineteenth-century communications, especially printing, steamers, and telegraphy. International connections, Legg highlights, reinforced the importance of local and regional newspapers, which reported very recent scientific debate on climate-forest influences and commented upon their local relevance. Furthermore, he notes, colonies exchanged forestry policy and information, as when, for example, the Australian colony of Victoria (later a state, following federation in 1901) obtained detailed information on forestry in India via New Zealand. In chapter 7, too, James Beattie shows how rainmaking in the US Great Plains inspired North Otago residents to undertake similar experiments. Information flowed in other directions as well; a New Zealand government meteorologist published his findings on North Otago rainmaking in a US meteorology journal.

A further advantage of using local case studies is the potential it offers for scholars to engage in comparative research. A stimulating example of this is provided by Kirsty Douglas in chapter 5, in which she compares colonization of the agriculturally marginal lands of the North American Great Plains with the expansion of settlement into South Australia’s marginal lands. Both, she shows, were motivated by arguments that “rain follows the plow” and by the ideals of closer settlement; both were inspired by political boosters and supported by state legislation; and both foundered in the 1880s in the face of a prolonged period of low rainfall. How can examining similar environments and processes, she asks, shed light on comparative environmental history and the narratives we tell about nature? Her analysis offers examples of the importance of considering social and economic factors alongside environmental ones in teasing out processes of colonization and climate.
Themes

Four key themes inform *Climate, Science, and Colonization: Histories from Australia and New Zealand*: first, settler climate expectations and climate realities; second, the relationship between climatic systems, locality, and colonization; third, settler responses to variable climatic systems; and fourth, how settlers gathered climate knowledge, engaged in climate prediction, and contested climates. We outline each in the section below.

**Theme 1: Settler Climate Expectations**

Britain’s climate fundamentally shaped settler expectations of the kinds of agricultural pursuits they could establish in Australia and New Zealand. The volume’s chapters argue that most settlers’ cultural conditioning to Britain’s temperate climes, with its hallmarks of consistency of rainfall and defined seasonality, fostered unrealistic expectations of the capacity of Australian and New Zealand climates and soils to sustain European-style agricultural pursuits and close settlement patterns. This cultural conditioning is evident, for example, in chapter 8. Here, Ruth Morgan demonstrates how the mismatches between settler environmental expectations and environmental constraints set the pattern for the emergence of later problems in southeastern Western Australia. In the area Morgan examines, expectations that the climate should behave in a particular way and support a particular kind of land-use—in this case, closer land settlement for wheat growing—heightened the vulnerability of environmental, economic, and social systems to climatic instability.

Morgan’s Western Australian example demonstrates that, like Maori in New Zealand or Indigenous peoples in Australia, British migrants in Australia and New Zealand relied greatly on climatic attributes—in the form of regular rainfall and sunshine—for the foundation of their new societies. Agriculture underpinned not just much of the region’s economic prosperity but also settlers’ aspirations and political drives. In the Australian and New Zealand colonies, political groupings and later parties emerged that clustered around the interests of settlers seeking pastoral development or closer land settlement. The yeoman ideal of independent small-farming figured strongly in the imagination and identity of settlers across Australia and New Zealand.17 As several chapters show, visions of transplanting British agricultural worlds and yeoman farming into the Antipodes helped to push agricultural development into some areas that were often climatically unsuitable or extremely variable, such as in South Australia (chapter 5), Western Australia (chapter 8), and southern New Zealand (chapters 4 and 7).

Australian and New Zealand colonial parliaments promoted agricultural development through surveying, land legislation, and land sales, including, in some cases, favorable land grants to settlers.18 Meanwhile, colonial promotional literature played up the temperate and well-watered nature of colonial climates. In a world where environment was thought to impact directly and
irrevocably on health, the “healthiness” of particular areas in Australia and New Zealand also received regular mention and motivated many thousands to migrate.\(^{19}\) In the early years of colonization, pastoral farming flourished while the ideals of closer land settlement held sway in the latter nineteenth and early twentieth century.\(^{20}\) A vision of closer settlement was shaped strongly by the European experience, and by European notions of civilization, which regarded settled agriculture as the highest and noblest form of land use.\(^{21}\) It was also driven by mass immigration, and the corresponding land hunger it created.

Australia received large numbers of convicts until 1856, in addition to free settlers. In January 1788, the Penal Colony at Botany Bay numbered 1,035 persons, rising to some 5,100 by September–November 1800.\(^{22}\) In 1828, the population of non-Aboriginal Australia was 54,726, with the majority of Europeans living in New South Wales (35,960). In 1851, Australia’s population stood at 437,665 (New South Wales: 178,668; Victoria: 77,345; Queensland: 8,575; South Australia: 63,700; Tasmania: 70,130).\(^{23}\) New Zealand attracted free settlers. The New Zealand Company, a private immigration concern, sent nearly 10,000 settlers from Britain. Government-assisted migration brought an influx of settlers into Australia and New Zealand over the next decades. From 1861 to 1900, net migration to New South Wales was 331,000 migrants; Victoria 28,000; South Australia 18,000; Western Australia, 134,000; Queensland, 256,000; and New Zealand, 223,000. This population was highly mobile. Despite Victoria only receiving 28,000 migrants, its population grew from 350,860 in 1861 to 1.35 million by 1901, illustrating the importance of natural increase and internal movement within Australia. Census figures show that, along with several thousands of other groups, by 1901, 3.8 million settlers of European descent lived in Australia while New Zealand’s population stood at some 800,000 Europeans and 46,000 Maori.\(^{24}\) Into the twentieth century, the population of both countries increased: by 1916, New Zealand had nearly 1.5 million people (95 percent of European origin) while Australia had three times that number by 1911, and over 6.62 million by 1933. New Zealand’s population flattened out by the 1936 census to 1.57 million, only to rise again after the Second World War.\(^{25}\)

Farming, and the ideals of closer settlement, promised to meet the demands of settlers hungry for land to develop. Closer settlement and its attendant ecological changes, such as deforestation, overgrazing, and the introduction of a host of pest and weed species later, however, heightened the vulnerability of the settlers to certain climatic events.\(^{26}\)

**Theme 2: Climatic Systems, Colonization, and Locality**

*Climate, Science, and Colonization* focuses on the importance of locality in framing settler responses and perceptions of climatic differences. This is recognition that while weather and climate might be interconnected global processes, they are, as Andrew Lorrey and Helen Bostock show in chapter 1, subject to great local variations that have had significant implications for the
possibility of colonization and its patterns. As they argue, a complex mosaic of climatic conditions and variability across the region has had corresponding impacts on patterns of vegetation and animal distribution, from climatic pulses of global warming and cooling over the last 2.5 million years, to oceanic and atmospheric influences, such as the El Niño Southern Oscillation (ENSO).

Long before Europeans arrived in the region from the late eighteenth century, other humans had benefited from such periods of climatic change to colonize Australia. For example, cooling periods created land bridges, such as those connecting Australia with parts of South East Asia, that made possible the migration of people first into the Australian continent somewhere between 40,000 and 80,000 years ago, and then into Tasmania around 40,000 years ago. Other climatic patterns enabled the emergence of different colonization routes. Lorrey and Bostock demonstrate that the prevailing weather system—based on westerly winds—regularly carried troughs and anticyclones from west to east around the Southern Hemisphere mid-latitudes. This climate system permitted the transoceanic migration of Polynesian peoples across the Pacific. By sailing into the westerly winds, they could then use them to return home. Eventually, they reached New Zealand, known to Maori as Aotearoa, around the year 1300 AD. These same atmospheric processes eventually facilitated the British colonization of Australia and New Zealand.

European settlers also utilized the westerly wind systems in undertaking a perilous and long sea journey to reach the Antipodes. Once ashore, settlers experienced climate and weather phenomena fundamentally at a local level, even if, as several other chapters note, colonists were also attempting to collect local data to build national or state understandings of climate. The book's focus on locality enables chapters to critically examine the nation-state as a privileged means of conceptualizing and experiencing climate, in the light of the observation by historian of science David Livingstone that: “Local conditions pose local problems needing local solutions.”

The book’s contributors argue that local geographies of place and culture, as well as local geographies of climate, complicated global, national, and even regional scientific conceptualisations of climate. Frequently, as several chapters in this volume show, developing national networks of weather collection and forecasting in Australia and New Zealand served to highlight the existence and importance of local climatic variations. This is evident in chapter 3, where Don Garden demonstrates the complexity of local climates experienced by settlers through an examination of a series of extreme weather events that swept across Australia and New Zealand in the 1890s. While two of the events he examines—floods in southern Queensland in 1893 and southern New Zealand’s “Great Snow” of 1895—could be directly linked to ENSO’s influence, the other two could not: southeastern Australia’s heat wave of 1896 and the Easter Floods in New Zealand’s North Island in 1897. Like Morgan, Garden demonstrates that settler environmental actions, in part, made them more vulnerable to the
effects of changes in weather: “Deforestation and land clearing,” he notes, “reduced vegetation, while grazing animals, notably sheep, denuded ground cover and the resilience of remaining plants to drought.”

Local variations shaped colonization elsewhere in the region. In chapter 4, Peter Holland and Jim Williams demonstrate that longer European residence in southern New Zealand, combined with greater climatic variability from the 1870s, helped to modify overgeneralized national framings of New Zealand’s climate based on latitudinal comparisons with overseas venues. The return of low rainfall to South Australia, as Douglas shows in chapter 5, eventually ended settlement in the region while, as Beattie demonstrates in chapter 7, drought in North Otago heightened the government’s meteorological awareness of the importance New Zealand’s regional climatic variations.

The focus on locality in defining experiences of weather and climates also acknowledges that experiences of the same phenomenon in the same place might differ from one person to another—and provoke a variety of different responses. As Chris O’Brien shows in chapter 10, where settlers in tropical northern Australia discerned two seasons, defined by the presence or absence of rainfall, local Aboriginal people defined several, based on the flowering of certain plants.

Definitions of drought in Australia and New Zealand differed by locality; water scarcity depended as much on the kinds of land-use practice as it did on the prior experience of settlers. Whereas a farmer might measure drought primarily by a reduction in crop or pasture growth, a meteorologist would measure this same phenomenon by lack of rainfall. On the other hand, drought may only feature in the consciousness of townsfolk when water supplies threaten to dry up, or if garden plants can no longer be watered. And, a drought’s impact may vary from one neighboring farm to the next. As the climatologist Jim Salinger acknowledges, “the severity of a drought is controlled not just by the duration of the period without precipitation (meteorological drought), but by the effect of weather on plant growth, water supplies, and human activity.”

Until their arrival in New South Wales, British settlers had regarded drought as a period of low rainfall lasting over a month (chapter 2). The effects of its opposite—flooding—were also worsened as colonists created uncertain, and at times dangerous, living conditions by settling on or near floodplains (chapters 2, 4, and 9).

Location thus mattered in shaping the experience and effects of different climates.

**Theme 3: Responding to Climatic Uncertainty**

This book’s focus on locality demonstrates that human resilience to long-term climate shifts, and short and severe weather events such as drought or flooding, depended on many variables, from an individual’s capital and experience, to prevalent government policy and the location in which they settled. A region’s underlying geology and soils also played a part, as have the kinds of environmental practices settlers engaged in. In chapter 2, Claire Fenby, Joëlle Gergis, and Don Garden demonstrate that, in Australia’s first
twenty-seven years of colonization, ex-convicts farming near the Hawkesbury River, New South Wales, struggled to make a living as a result of a series of droughts and floods. Based on expectations of a much more stable and wetter climate, the ideals of closer settlement—expressed in the relatively small-size of farms granted to these settlers—heightened their owner’s vulnerability to such events. Instead of recognizing this, colonial officials blamed the failure of many farms on the poor moral fiber and laziness of the ex-convict farmers. Elsewhere in New South Wales, climate events such as drought further undermined the resilience of already marginalized Indigenous peoples, as competition for prized water resources became a factor driving conflicts between local Aboriginal peoples and pastoralists (chapter 9). Even parts of New Zealand—a landmass commonly depicted as well-watered in comparison to Australia—suffered from drought, its greatest impacts felt by the most vulnerable in society (chapter 7).

Even when settlers recognized climatic differences between their new home in Australia or New Zealand and their old home in Britain, chapters highlight how they demonstrated remarkable persistence in the belief that drought and climatic variability represented abnormal, rather than normal weather. While colonists made efforts to mitigate the effects of climate, in most cases they did not waver in their vision of transplanting European-style agriculture into Australia and New Zealand. As Douglas outlines in chapter 5, despite facing major setbacks with drought in the 1860s, settlers resumed the expansion of South Australia’s frontier of settlement in the 1880s after a period of high rainfall in the region, only for their hopes to be finally dashed in the next decade of that century.

Indeed, as Douglas shows, settlers initially expressed great confidence in their ability to change local and sometimes regional climates in Australia and New Zealand. Many South Australian settlers and promoters believed that cultivation was changing the region’s climate for the better. The so-called rain follows the plow argument matched in popularity the notion that trees changed climates. Some settlers, scientists, and politicians believed that tree-planting would increase a region’s rainfall, and could even turn marginal lands into flourishing agricultural settlements. This, as Legg demonstrates in chapter 6, is what some of the more optimistic settlers and politicians fervently promoted in parts of eastern Australia. Like tree planting or plowing, rainmaking experiments offered the possibility of artificially bringing rainfall, as had apparently occurred in parts of the United States, Australia, and New Zealand (chapter 7). In this period, too, state departments of agriculture, along with other state-directed scientific agencies, sought to bring marginal lands into production through various measures, including the development of plants more resilient to climatic extremes.  

From the late nineteenth century, Australian and New Zealand settlers increasingly resorted to irrigation and dams as technocratic responses to climatic variability. As Garden notes in chapter 3, Australia’s turn-of-the-century Federation or Long Drought (1895–1902) provided an impetus for state irrigation, as well as for the tapping of artesian water supplies, the former
also resorted to in the drier parts of New Zealand (chapter 7).\textsuperscript{35} The application of natural and later artificial fertilizers, as well as the introduction of higher-yielding varieties and other land management techniques, also helped to improve harvests.\textsuperscript{36} Yet, as Morgan shows in chapter 8, the reliance on state and private water supplies required ever greater investment in infrastructure and sometimes actually diminished over the long term both farm yields and farmers’ resilience to very dry conditions, as witnessed across southeastern Western Australia from the 1960s. With its budgets tightening, the Western Australian government also started to pull out of expensive investments in irrigation.

\textbf{Theme 4: Climate Knowledge, Prediction, and Conflict}

Knowledge of climates and understandings of climatic processes were important in colonization. An ability to understand weather patterns and even predict future weather would greatly advantage settlers. It would mean they would be able to know what to plant and when and be able to store water at the right times of year and move stock in anticipation of drought conditions. In the early stages of European colonization, some, albeit limited, environmental learning took place as settlers drew from the climatic knowledge of Indigenous peoples. For example, in chapter 4, Holland and Williams demonstrate how, in the early years of settlement, settlers in southern New Zealand sometimes turned to local Maori for advice about when rivers flooded so as to know when to move stock to higher ground.

Over time, however, in helping develop local and national climate understandings, meteorology promised to fulfill a crucial role as a “science of empire,” to borrow Libby Robin’s description of the ecological sciences.\textsuperscript{37} Its importance in Australia is indicated by Emily O’Gorman, who notes in chapter 9, that: “By the mid-1860s, all colonial governments in Australia had departments that studied meteorology, a subject ‘which also usually encompassed astronomy, post and telegraph duties.’”\textsuperscript{38} In New Zealand, systematic weather forecasting began under Charles Knight in 1861 while the Marine Department oversaw forecasting for shipping. Thereafter, although a nationwide set of observers dated from the late 1850s, meteorology in New Zealand moved between several different agencies, and was widely considered inferior to other sciences of settlement. The problems brought about by this constant state of flux were lessened after a unified Meteorological Department was established in 1881, although even then, it faced successive funding crises.\textsuperscript{39}

Despite aspiring to understand and predict climates, the status of meteorology as a science in New Zealand (chapter 7) and Australia (chapter 8) was often ambiguous due to its relatively recent emergence, compounded by the difficulties of trying to predict weather in such complex, little understood, and unstable climate systems. While the problems associated with meteorology in Australia and New Zealand also dogged progress toward its acceptance as a science in Europe and America,\textsuperscript{40} the challenges facing meteorologists in the Antipodes were compounded because of the absence
of reliable long-run weather data from which they could draw predictions. Meteorologists sometimes sought local knowledge to fill data gaps. In chapter 9, O’Gorman shows how the meteorologist H. C. Russell used settler descriptions of weather events as the basis for his predictive model. This, however, undermined the very legitimacy of the discipline Russell was trying to establish, because to his peers his evidence and his reporters lacked scientific credibility. O’Gorman’s chapter demonstrates that a focus on locality can both build upon and expand Australia’s already impressive literature on the disciplinary development of meteorology and climatology by looking at and beyond national and state institutional framings of scientific organizations and government departments.  

Competing understandings of climatic processes and climatic science characterized this period. In chapters 5 and 6 respectively, Douglas and Legg chart heated colonial debates over human climatic intervention. Douglas notes that the stakes were high, for areas whose climates could not be improved faced economic ruin. And, in chapter 7, Beattie analyses competing understandings of science among residents and meteorologists in southern New Zealand.

One reason for the existence of such a plurality of views was because settlers and meteorologists were attempting to find order and predictability in essentially disorderly and unpredictable systems. As O’Brien demonstrates in chapter 10, such attempts have their origins deep in Western civilization. Greco-Roman traditions, O’Brien shows, shaped Western notions of calendar time, while subsequent scientific developments during and after the Enlightenment reinforced the notion of nature running to time, of nature operating in an orderly fashion. This is why, O’Brien argues, settlers in “The Top End”—tropical northern Australia—sought to impose order on a very different climate to the one they were accustomed to in Britain. Instead of Britain’s four seasons, settlers in The Top End recognized two: The Wet and The Dry. While appearing to represent a successful European adaptation to tropical Australia’s climate, O’Brien demonstrates that these distinctions were as arbitrary as the ones in Europe dividing its seasons into four: As he notes, “cultural constructions overrode the reality of weather events and climate.”

*Climate, Science, and Colonization* also illustrates the manner in which climate and its interpretations could be mobilized for political ends. Beattie suggests that New Zealand meteorologists attempted to gain legitimacy and financial support for their discipline by criticizing the unscientific nature of rainmaking experiments. Matthew Henry (chapter 12) demonstrates how geopolitical rivalry in the South Pacific prior to the Second World War simultaneously shaped the development of oceanic aviation routes and meteorological forecasting. The establishment of commercial transoceanic aviation routes promised the governments of both Australia and New Zealand improved connections with Britain and the United States, and would gradually shift the political and cultural relationships of both countries. Yet, he demonstrates, the establishment of these routes created new questions of sovereignty as well as challenging existing geopolitical relationships. Politics and
race are evident, too, in chapter 11. In it, Meg Parsons charts the political and racial reasons influencing the changing accounts of climate and health in twentieth-century Queensland. She shows how national policies promoting “White Australia” impacted on the promotion of the healthiness and suitability of tropical Queensland to white settlement. In contrast, she explains that the absence of recourse to climatic explanations for the appalling health of Australia’s Indigenous peoples would have significantly undermined the campaign to settle this region with whites. Despite putting the high Indigenous death rates down to the process of “civilizational contact,” Parsons highlights the contradictions in the White Australia policy in Queensland through the region’s continuing reliance on nonwhite labor and through lingering doubts about the region’s suitability for white settlement.

Structure

*Climate, Science, and Colonization* is divided into three sections. “Part I: Frames, Events and Responses” sets the scene for subsequent chapters in the book by considering the wider climatic processes within which colonization took place (chapter 1). Subsequent chapters provide case studies of the importance of regional variations in shaping settler responses to particular climatic events. These include a study of the impact of weather events in New South Wales (chapter 2), an overview of ENSO events and responses in regions of Australia and New Zealand (chapter 3), and a chapter exploring the climatic perception and limits to agriculture in southern New Zealand (chapter 4).

“Part II: Debating Human Effects” examines the intertwined debates on the role of settlement and climate change. Contributors compare the impact of ideas of rain follows the plow in South Australia and the American Great Plains (chapter 5), overview the forests–climate debate in eastern Australia (chapter 6), and examine contrasting reactions to rainmaking experiments and prayers in New Zealand (chapter 7).

“Part III: Climate Understandings” considers the understandings and impacts of climatic variability in southeastern Western Australia (chapter 8), the struggle for meteorologists to understand the complexity of eastern Australian climates (chapter 9), and how imported understandings of weather shaped settler perceptions of tropical Australia (chapter 10). The final two chapters consider the deliberate erasure of climate in twentieth-century accounts of Aboriginal health in tropical Australia (chapter 11), and imperial meteorological geopolitics in the Pacific (chapter 12), while an epilogue suggests future areas of research.

Notes


3. This term denotes Aboriginal peoples and Torres Strait Islanders.


12. The others are: Don Garden, Australia, New Zealand, and the Pacific: An Environmental History (Santa Barbara: ABC-CLIO, 2005); Beattie, Empire and Environmental Anxiety.


Index

Abbe, Clement, 146, 148
aboriginal Australians.
   See indigenous peoples
accidents, 73
acclimatization, 113n. 1, 123–5
Adelaide, 67, 130, 206
   Botanic Garden, 108
Adelaide plains, 115–16n. 36
Adviser (Adelaide newspaper), 130
advertising, 71
aerodromes, 240, 244
afforestation, 119, 121, 123–5,
   127–32, 135n. 47
   see also forests; reforestation
Africa, xii, 126, 166, 182, 217, 223
African-Americans, 219
agrarian ideal, 103, 162
agricultural
   change, 149–50
   development, 160–1, 167, 169, 172
   diversification, 108
   effect on climate, 101–3, 105–7, 110,
      112, 115–16n. 36, 125
   efficiency, 171
   expansion, 103, 112, 164, 169
      frontiers, 100–2, 107, 110, 111
      see also Goyder’s line
   implements, 101
   improvement, 128
   monoculture, 108
   policy, 167
   practices, 150, 164
      British, 139, 151
      standardization of, 102
   production, 46, 51, 52, 177
   selectors, 127
   settlement, 161–2, 171
   yields, 143, 151
   see also pastoralism
Agricultural Notes (periodical), 128
agriculture, 3, 5–7, 10, 11, 44, 46,
   48–50, 61, 69, 100–12, 124,
   129, 131–2, 143, 159, 161–3,
   165–8, 171, 198, 218–19
   government departments, 10, 130,
      141, 163–8
agronomy, 141, 164
air bases, 244
air conditioning, 253
air forces, 240, 242, 244–5
   Royal Air Force, 240
   Royal Australian Air Force, 245
   Royal New Zealand Air Force, 245
   US Army Air Force, 245
air transport: South Pacific Air
   Transport Council, 245–6
aircraft, 238, 240
   flying boats, 233–4
aircrew, 240
airlines, 233–5, 238–40, 244
airspace, 233, 235, 236, 238–42, 246
   reciprocity of rights, 239
Aitkin, Don (historian), 162
Albert, Prince of Wales (later King
   Edward VII), 141
Albury, Randall (historian), 226
Albury (river steamer), 184
Alexandra (Otago), 91
Algeria, 85
Alice Springs, 28
almanacs, 195, 199–200, 202–7
Amazon basin, 198
America, north, 54, 104, 129, 150, 203
   see also Canada; United States
Aotearoa. See New Zealand
Apia (Western Samoa), 242, 245
aquifers, artesian, 183
Arafura Sea, 20, 198
Arbor Day, 125
Argus (newspaper), 121, 123–4, 130
aridity, 111, 127, 129, 150, 167
army, 144–5
Permanent Artillery (NZ), 149
see also defence
Arnold, David (historian), 216
art
galleries: National Gallery of Victoria, 74
nationalist, 72
artillery, 76, 132, 144, 145, 149
artists, 74
Ashburton Guardian (newspaper), 138
Ashcroft, William, 215
Asia
central, 130
minor, 126
southeast, 8
assimilation, racial, 223, 225
astronomers, 126, 177–8, 181, 201
government, 181, 185
astronomical
events, influence on climate of, 126, 133
observations, 82–3, 178, 199, 201
astronomy, 180, 182, 199, 200, 205
astrophysicists, 131
Atkins, Judge Richard, 47, 54
atmospheric
circulation, 19–20, 23, 24 (Figure 1.2), 25–7, 29, 33, 35 (Figure 1.4), 36

Hadley, 23, 25, 26, 34, 36
Southern Hemisphere Westerly, 25
Walker, 25, 26, 34, 35
dynamics, 195
effects as predictors of weather, 83
observations, 75, 84, 86, 87, 140, 204
oscillations
Interdecadal Pacific, 27
Madden–Julian, 27
Southern Oscillation Index (SOI), 61, 64, 94
see also El Niño–Southern Oscillation (ENSO)
processes, 141
studies, 3
see also meteorology
Auckland, 233, 234 (Figure 12.1), 237, 238, 242
region, 34
Waitemata Harbour, 233
Aughey, Samuel, 105, 106, 116n. 46
Australasia. See Australia; New Zealand
Australasian (newspaper), 119, 121, 142
“Australasian” (the term), 234
Australasian Integration of Ice Core, Marine, and Terrestrial archives project (AUS–INTIMATE), 31
Australia, xi, xiii, xiv, 1–13, 26–9, 30 (Figure 1.3), 31–2, 34, 43, 46, 50, 54–5, 61, 63 (Figure 3.2), 65, 69, 73–7, 94, 99–100, 102, 104, 107–9, 119, 120 (Figure 6.1), 121–3, 126–7, 130–3, 138–9, 142–3, 149, 151, 177, 181, 185, 187–8, 195, 202, 209, 215, 233–5, 237–8, 240, 242–6, 251–3
central, 28, 128, 178
eastern, 20, 22, 177, 179, 188
northeastern, 217
northern, 9, 12, 25, 195, 208, 216
northwest, 20, 33
southeast, 46 (Figure 2.1), 61, 67, 178 (Figure 9.1)
see also under individual states
immigrants
Asians, 218–20
British, 219
Ceylonese, 218
Chinese, 215, 218–19, 223
Indians, 219
Japanese, 218
Malay, 218–19
Melanesians, 219
Pacific islanders, 214–15, 218–19, 223
Australian Forestry (journal), 133n. 2
Austria, 129
aviation, 235, 240, 246
civil, 239, 242, 244
international, 239
Paris Convention Relating to the Regulation of Aerial Navigation (1919), 239, 240–1, 246
safety, 240
transoceanic, 12, 233–5, 237–8, 243
trans-Atlantic, 245
trans-Pacific, 242, 245, 246
trans-Tasman, 241
Aviemore Station (Otago), 93
Babylon, 200
bacteriology, 141, 215, 219
Ballarat Star (newspaper), 121, 124, 125
balloons, explosive, 138, 139
banana plantations, 66
Banks, Sir Joseph, 81
Baptists, 147
Barambah reserve (Qld; later Cherbourg), 215, 224
barbed wire, 101
Barker, Lady Mary, 83
Barkley–Jack, Jan (historian), 48
barley, 105
Barmabah Aboriginal Settlement (Qld), 230–1n. 74
Barwon River (Vic), 75
Bashford, Alison, 215
Bass Strait, 32
Bates, Daniel Cross, 139, 144–50, 240
battles, as a cause of rainfall, 144
beans, 205, 206
Beattie, James (historian), 5, 9, 12, 85, 160, 252
Beattie, James Herries, 91
Becquerel, M. A. C., 123
BEL cycle (Bruckner, Egeson, Lockyer), 188
Belich, James (historian), 147, 237
Bendigo (Otago), 91
Bengal, 53
Benn, Mr. (fl. 1809), 49
Best, Elsdon, 82
Bestry, William, 165
Bible, 199
biblical interpretation, 142, 144, 148
Big Hill (Papakaio, Otago), 145
Bildad (Old Testament figure), 142
binaries, 112
biological difference, understandings of, 226
birds, 69, 111, 198, 199
game, 82
migratory, 82
as predictors of weather, 83
Black, Edward, 165
Blaxland, Gregory, 54
Bleakley, J. W., 222–6
Blue Mountains (NSW), 44, 53
Bluff, 240
Blyth, Arthur, 101
Boeing “Clipper” flying boats, 233, 234 (Figure 12.1)
Bocotia (Greece), 199
Bogue, David, Book of the Months and the Circle of Seasons (1844), 203
Bonyhady, Tim (historian), 188
boosterism, 103, 112
developmental, 130
technological, 131
Boothby, Josiah, Adelaide Almanac and Directory for South Australia (1880), 205
borders, state, 105
Bostock, Helen, 7–8, 251
botanic gardens, 74, 113n. 1
Adelaide Botanic Garden, 108
Melbourne Botanic Gardens, 124
Royal Botanic Gardens, Kew, 124
botanists, 124, 169, 216
Botany Bay (NSW), 7
Bourke (NSW), 67, 68, 183, 184, 187
Boussingault, Jean Baptiste, Rural Economy (1865), 123
Brahe, Tycho, 201
Breinl, Anton, 221
Brett, Judith, 171
bridges, 69, 70, 91
Briggs, F. S., 240
Brisbane (Qld), 66, 68, 70, 224
Brisbane Courier (newspaper), 121
Brisbane River, 66
Britain, 1, 4, 5, 6, 10, 12, 73, 81, 86, 87, 119, 122–3, 127, 141, 188, 204, 205, 218, 233, 242, 244, 245
northern, 85
see also England; Scotland; United Kingdom
British empire. See empire
brooking, Tom (historian), 1
Broome, Lady Mary, 83
Brown, John Ednie, 108, 128
Brown, Rev. John Croumbie, 126–7
Forests and Moisture or Effects of Forests on Humidity of Climate (1877), 127
Bruckner, Eduard, 188
Buffon, Georges Louis Leclerc, comte de, 104, 105, 109
“Des époques de la nature” (1778), 104
buildings, 71
multi-storey, 253
The Bulletin (periodical), 185–6 (Figure 9.2), 187
Bundaberg (Qld), 218
Burgess, J. W., 233
Burrugumirri (season), 198
Burvill, George H., 164
bushmen, 73
butter, 143
cabbage trees (ī, Cordyline australis), 82
cabbages, 205, 206
Caesar, C. Julius, 200
Cairns (Qld), 218
calendar, 195–6, 202–9
ancient, 200–1
concept of, 12, 82, 203
reform, 200
California, 128, 238
Callabonna Station (near Flinders Ranges), 111 (Figure 5.2)
Campbell, Walter Scott, 108
Campbell Plateau, 32
Canada, xii, 101, 104, 237–8, 245
Canterbury (NZ), 66–7, 81–3, 86–7, 103, 143, 149
Canterbury Bight, 84
Cape York peninsula, 217
Capp, Bernard, English Almanacs, 1500–1800 (1977), 203
Cardwell (Qld), 218
Caribbean, 127
carrots, 205
cartographers, 179
Castlereagh (NSW), 49
Catchpole, Margaret, 54
Catholicism, 143, 147, 149
Catlins (Otago and Southland), 91
cattle, 86, 91, 137
cauliflowers, 205, 206
celery, 205
census, 228n. 24
Centaurus (flying boat), 233, 234 (Figure 12.1)
cereal crops, 105, 106
Ceylon, 124
charities, 70, 91
Chatham Rise, 22, 32
Cherbourg reserve (Qld; formerly Barambah), 215
children, 71–2
China, 129
ancient, 200
cholera, 141–2
Christchurch (NZ), 81, 85–6
Sockburn aerodrome, 240
Heathcote Valley, 86
Christianity, 75, 151
Chudleigh, E. R., 85
churches, 70, 144
Church of Christ, 147
Church of England, 141–2
established, 143
see also Catholicism; evangelicals; Protestantism
cicadas, 199
Cilento, Raphael, 213, 221, 224–5
circulation. See atmospheric; oceanic civilization, 7, 104, 215, 219
“Civis” (newspaper columnist), 140
Clarke, Rev. W. B., 126, 191n. 25
“The Effects of Forest Vegetation on Climate” (1876), 126
Cleland, Sir John Burton, 224
clergymen, 148
climate, xi, 1–8, 10–11, 13, 23, 26–9, 32, 36, 43–4, 46, 48–52, 61, 72, 77, 84, 99–100, 102, 104, 110, 130, 137, 202, 204–5, 208, 215, 226, 251–2
adaptability, human, to, 219
amelioration, 104–5, 108
anxieties, 160, 219
assumptions regarding, 195–6, 207
change, xiii, 8–10, 19, 31, 33, 35–6, 54, 73, 109, 123–5, 128, 130, 132, 166–9, 171, 216, 236
anthropogenic, 12, 104, 122, 131, 159, 166, 253
Committee on Climatic Change (Australia), 166–7
data, 8, 168–9, 178, 187–8
domestic, 252–3
etiologies, 215
expectations of, 6, 9, 43, 100, 102, 163
goengineering, 104, 109
harshness of, in national self-image, 73–4
influence of heavenly bodies on, 76, 108, 127
knowledge, 11, 93, 99, 165, 209, 251
maritime, 19, 29, 85, 252
memes, 99
for “rain follows plow” theory (see agriculture, effect on climate; for “trees bring rain” theory, see trees, effect on climate; forests, climatological role of)
memory, 52, 75, 83, 106, 207
microclimates, 253
oscillation, 27
phenomena, 8, 26–8, 67, 142, 200–2
physiological responses to, 217, 221, 224, 252
records, 75, 87, 112, 130, 196, 207–8
science, 2, 76, 163, 166, 180, 216
temperate, 94, 216
terrestrial, 19, 23
terrestrial paleoclimate, 31, 35 (Figure 1.4), 36
tropical, 9, 12–13, 213, 216–18, 220–1
climatology, 12, 130, 164, 181, 226
Clive (Hawkes Bay), 68–70
clocks, 201–2
clouds, 148, 204
cloud-seeding, 76
observations, 7, 208
patterns as predictors of weather, 83
clover, 86
Club of Rome, The Limits to Growth (1972), 166
Clutha River, 88, 91
Clyde (Otago), 91
Coad, N. E., 237
Coates, Peter (historian), 199
Cobbe, J. G., 238
Cold War, 236
Collingwood, R. G., 202
Collins, Colonel David, 46, 52
colonialism, xiii, 112, 209, 215, 216, 219
colonists, 71, 74, 195
self-perception, 72
in tropical regions, 217
systematic, 102–3
commissions of enquiry
Australian Climate Commission, xiii, 159
International Commission for Aeronautical Meteorology, 245
Royal Commission on Forests, Victoria (1898–1901), 130
State Rivers and Water Supply Commission, Victoria, 77
communications. See telecommunications
conferences
Defence Conference (Wellington, 1939), 245
International Meteorological Conference (1919), 240
Regional Conference for the South West Pacific (1937), 244
scientific, 129
conflict, 236
conservation, 124, 171
forest, 121, 127, 128
constellations, 82
  Pleiades (Matariki), 83, 199
  Scorpius, 83
continental climates, 84
convergence zones
  Intertropical, 23, 24 (Figure 1.2), 25, 27, 28, 34, 36
  South Pacific, 23, 24 (Figure 1.2), 27
convicts, 7, 46, 48, 102
  former, 10, 48, 49, 54
Cook, James, 81
Cook Islands, 237
Cook Strait (NZ), 32
Cookson, I. T., 86
Cooper, John Cobb (junior), 238
Copernicus, Nicolaus, 201
Coral Sea, 20, 31
corn, 106
cosmic influences on climate, 108
cost of living, 71
Coughlan, Michael, 167
“countrymindedness,” 162, 171
courts, law, 128
cranes (birds), 199
cress, 205, 206
Cretan, 198
crocodiles, 198
Cronon, William, 3, 195
  “Cronon conundrum,” 4
crop
  failure, 48, 51, 66–7, 72, 106, 166, 181
  planting, 82, 205, 206
  yields, 101, 103, 108
  crops, 11, 46–51, 82, 85–6, 104–6, 137, 143, 159
  cereal, 6, 46, 48, 51, 53, 102–3, 105–8, 110–11, 137, 143, 151, 159, 161
  introduced, 105–8, 143, 150, 161, 205–6, 218
  new varieties, 102
CSIRO. See government departments
cultivation, 101, 104–7, 110, 198
  see also agriculture
Cultowa Station, 184
culture, 219
  colonial, 3, 8, 61, 70–4, 223
  cultural constructions, 195–6
  indigenous, 214, 218, 219, 222–3
currents. See oceans, currents
  Cushing, Nancy, 252
cyclones, 23, 27–8, 64, 66, 68, 113
  Cyclone Oswald, xiii
Dalgety’s Hill (Otago), 145
Dalwallinu (WA), 165
dams, 10, 77, 189
  farm, 165–6, 170
Darling Ranges (WA), 161, 171
Darling River, 177, 183–5
  system, 68, 177, 178 (Figure 9.1), 179, 187, 193n. 63
Darwin (NT), 195, 198, 204, 206–8
davey, M. E., 147
Davies, Paul, 202
Davison, Graeme (historian), 171
deaths
  animal, 67, 69, 71–2, 74, 179
  human, 47, 52–3, 66–7, 69–73, 180, 223–4
debates, parliamentary, 121
debt, farm, 171
defence, 235–6, 238, 242–5
  see also air forces; army; naval forces
  see also forests; trees
Denoon, Donald, Philippa Mein Smith, and Marivic Wyndham, A History of Australia, New Zealand and the Pacific (2000), 234
departments. See government departments
desertification, 111, 123, 127, 130
deserts, 105–6, 108, 112
dew, 104, 108
Dharratharramirri (season), 198
Dharug people (Hawkesbury River region), 44, 46
diaries
  explorers’, 184
  farm, 87, 89–90 (Figure 4.1), 91–2
  settlers’, 87
  weather, 91
  see also logs, ships’
diarrhoea, 72
INDEX 261

diet, 72, 220, 223, 225
diplomacy, 239
dirt, 252
disasters. See natural disasters
diseases, 68, 71–2, 214, 217, 219, 223–6, 252
  agricultural, 102
  endemic, 221
  indigenous people, 222, 225
  introduced European, 223
  livestock, 141
  tropical, 215, 220–1
  viral, 224
  see also illness; medicine
distance, travelling, 101
divine intervention, 75
doctors, 219
Doel, Ronald, 236
dona (season), 198
Douglas, Kirsty, 5, 9, 10, 12, 251
  drainage, 71, 77
    roaded catchments, 165, 170
drink
  alcoholic, 71, 222
  manufacturers, 71
  non-alcoholic, 71
  mitigation of, 113
  relief, 53, 70, 166, 170
  Drownings, 47, 64, 69, 70, 73
  drug use, 222
  Drury, Captain Byron, 84
drying trend. See dessication
  Dunedin (Otago), 85, 86
  Duntrroon (Otago), 143, 149
dust, 71
  Dyer, W. R., 245

  Ebemayer, E. W. F., 128, 129
  Ecclesiastes, 199
  ecological
    change, 7, 106
    degradation, 172
  ecology, 112, 199
  economic
    constraints, 170
    depression, 69
    development, 160, 161
    effects of drought, 72
    failure, 101
    growth, 181
    hardship, 171
    implications of natural disasters, 69
    policies, neoliberal, 165
  economics, 100
  economy, 6, 61, 69, 70, 72, 74, 94, 103, 112, 160–2, 171
  Korean War boom, 161
  ecosystems, 100
  education, 82, 225
  Edwards, Paul, 236
  Edwin, Captain, 141
eels (tuna, Anguilla spp.), 82
egalitarianism, 73
Egeson, Charles, 179, 185, 186
  (Figure 9.2), 187, 188
  Egeson’s Weather System of Sun-Spot Causality. Being Original Researches in Solar and Terrestrial Meteorology (1889), 185
Egypt, ancient, 191n. 25, 200
El Niño, 26–8, 61, 64, 65, 70, 138
El Niño–Southern Oscillation (ENSO), 8, 25–9, 61, 64, 65, 77, 138, 182
  electrical forces, atmospheric, 127, 130
  Elkington, J. S. C., 220
  Ellery, Robert, 109, 127
    “Climatic Influence of Forests” (lecture, 1879), 127
  Embeling, Thomas, 123–4
  emigration. See migration
  empire, British, xii, 5, 235, 237–8, 244, 252
  employment. See labor;
    unemployment
  Endeavour (ship), 81
endive, 205
INDEX

engineering, 76, 189
anti-flood, 188–9
chemical, 185
river management, 179

England, 86, 88, 141, 143, 149, 151, 182, 202, 203, 205
climates compared to New Zealand, 84–5

ENSO. See El Niño–Southern Oscillation

environment, 1, 2, 6, 7, 72, 99, 100, 102, 103, 112, 133, 159
human transformation of, 76, 103, 113, 130
preconceptions of, 99, 112, 160

environmental
anxiety, 94, 160, 170
assumptions, 112
change, 54, 112, 131, 235
degradation, 104, 171
determinism, 131
feedback mechanism, 26, 29, 105, 127
history, comparative, 100
indicators, 83
knowledge, 177, 179, 180, 189, 234, 251
management, 132
manipulation, 100
rhythms, 184
science, 100
transformation, 94, 102
variability, 85
see also climate; weather

environments
controlled, 253
marine, 251–2
epidemics, 223
equinoxes, 200–1
erosion, 65, 68, 94, 108, 123, 124, 131, 150, 168, 169
Escape Cliffs (NT), 204
Esperance (WA), 161, 165
region, 169
Mallee, 161, 165
euthnography, 83
ethnologists, 222–3
Eucalyptus trees, 128
eugenics, 219
Europe, 122–3, 126, 129, 188, 204, 252
northern, 219
western, 84, 108, 180
evacuations, weather-induced, 67–8
evangelicals, 142
Evans, George, 53
Evans, Raymond, 218
Evening News (newspaper), 185, 187
Evening Post (newspaper), 234
(Figure 12.1), 241
(Figure 12.2)
Exclusive Economic Zone (NZ), 251
exercise, 225
exploration, 53, 54
explorers, 105, 111, 178, 183–5
explosions, for rainmaking, 76, 138–40, 144, 145, 148
Eyre, Edward John, 105

famine, 53, 70, 124, 132
relief: Indian Relief Fund, 70
Farina (SA, formerly Government Gums), 104
farmers, 48, 49, 51, 72, 87, 94, 101, 102, 106–8, 110–11, 163, 165, 168–71, 178, 181
ex-convict, 10, 46, 48–9, 54
farming, 2, 7, 9, 10, 11, 44, 46, 49–51, 55, 82, 101, 110, 137, 168, 182, 205, 219
advice, 86
dry-farming, 101, 151
economics of, 169, 182, 188
practices, 139, 149–50
techniques, 101, 151
farmland, 47, 66

farms, 76, 81
abandoned, 111 (Figure 5.2)
amalgamation, 171
dairy, 77, 91, 143, 149–50, 151, 162
finances, 137, 161, 168, 169, 182
New Land Farms Scheme (Australia), 168
New Zealand Land Company, 103
sheep, 110 (Figure 5.1), 187

fasting
religious, 142
for rain, 147
fatalism, aboriginal, 224
fauna, 198
federation, Australian (1901), 74, 219
Federation Drought (1895–1902).
See drought
INDEX

Fenby, Claire, 9–10
fencing, 101
Fernow, Bernhard, 123, 129, 133
Ferrel cell, 25
ferries, punt, 91
fertilizers, 11, 151
   artificial, 150
   guano, 237
   superphosphate, 102, 108
Fiji, 243, 245
financial markets, 100
fires, xiii, 29, 64–5, 69, 71–2, 74, 76, 113, 168
fishing, 82, 217
Fitzpatrick, Eugene A., 164
Fitzpatrick, Noel, 167–8
FitzRoy, Robert, 87, 88
Fleming, James (historian), 181
flights. See aviation
Flinders Ranges, 110 (Figure 5.1)
floodplains, 9, 44, 46, 48, 49, 55, 179
floods, xii, 27, 29, 43–4, 46
   (Figure 2.2), 47–50, 55, 61,
   64–9, 70–4, 83–4, 88, 90–1,
   92 (Figure 4.2), 93–4, 102,
   106, 109, 122, 126, 128, 131,
   150, 159, 168, 177, 179–80,
   182–5, 187–9, 200–1
control, 77
   “Great Flood” (NSW, March 1806),
   46–8
mitigation, 113, 189
prevention measures, 70, 74
records, 87
relief, 47–8, 69–70, 91
   Hawkes Bay Flood Relief
   Committee (1897), 70
flora, 198
flower bulbs, 206
flying boats, 233–4
fog, 83
Fokker triplane, 240
Foley, James C., 163
food
   animal, 67, 93, 143, 164
   importation, 53
   manufacturers, 71
plants, 82
prices, 53, 71
rationing, 47–8
re refrigerated meat, 86, 93
resources, 225
   supplies, 47–8, 51, 53, 71, 81, 151,
   222, 225
Forbes, George, 239, 243
forecasting. See weather
foreign relations. See international
relations
forest
   clearance, 125, 130
   conservation, 108, 123–5, 127, 130–3
   reserves, 108, 124, 131
foresters, 126
forestry, 108, 124–5, 141
forests, 34, 49, 81, 105–6, 108, 113,
   120 (Figure 6.1), 130
climatological role of, 5, 10,
   54, 108–9, 119, 121, 122
   (Figure 6.2), 123–33, 150,
   187 (see also afforestation;
   deforestation; trees)
conservators, 128
empire, 127
inspectors, 124
state, 124–5
Forrest, Sir John, 161
Fowler, Anthony, 65
Fraas, Karl Nikolaus, 123
France, 104, 123
fronts
   Polar, 21 (Figure 1.1), 23, 32
   Southern Antarctic Circumpolar
   Current, 21 (Figure 1.1), 23
   Subantarctic, 21 (Figure 1.1), 23, 32
   Subtropical, 21 (Figure 1.1), 22, 30
   (Figure 1.3), 32, 35
   Tasman, 21 (Figure 1.1), 22, 32
fruit, 205
fuel
   aircraft, 240
   wood as, 124
fundraising, 144, 148
Gabbedy, Jack, 163
Galileo Galilei, 201
Gammage, William (historian), 179
Garden, Don, 8–11
   Droughts, Floods & Cyclones: El Niños
   That Shaped Our Colonial Past
   (2009), 3, 4
gardening, 82, 205, 206
gases, greenhouse, 29
Gatty, Harold, 238, 239
Gemini (river steamer), 184
genetic science, 219
Gentilli, Joseph, *Australian Climate Patterns* (1972), 167
geographers, 131, 162, 167
geographical assumptions, 111
geography, 180, 188, 199
geologists, 105
geopolitics, 233, 235–7, 239, 242, 244–6, 251
George, Seymour, 149
Geraldton sandplains (WA), 161
Gergis, Joëlle, 9–10, 50, 65
germ theory, 215, 219, 226
Germany, 104
ghost towns, 104
Gibbs, William, 164
Gill, Walter, 108
Gippsland (Victoria), 68, 74, 125
glaciers, 34
Glacken, Clarence, 199
globalization, 171, 236, 246
gold mining, 66, 124, 162
Goldfinch, Shaun (historian), 234–5
Golinski, Jan (historian), 203
government
central, 91, 139, 144, 209, 220
departments, 12, 163, 240
Agriculture, 141, 163–8
Air, 245
Chief Protector of Aboriginals’ Office, 222–4
Civil Aviation Board, 244
Colonial Office, 127, 245
Commissioners for Crown Lands, 101
Commissioners of Woods and Forests, 127
Commonwealth Health Department, 224
Commonwealth Scientific and Industrial Research Organisation, 163–4
Defence Department (NZ), 238, 243
Dominions Office, 239
Home and Territories, 240
Marine Department (NZ), 11, 141
Organisation for National Security (USA), 243, 244
Post and Telegraph Department (NZ), 243
Public Works, 163; New Zealand, 91; Western Australia, 163
Scientific and Industrial Research (DSIR), 243
United States Bureau of Air Commerce, 233–4
United States Department of Agriculture, 128; USDA Forest Service, 129, 133
Victorian Board of Agriculture, 125
see also meteorological services
financial assistance, 102, 138–41, 149, 164–6, 170, 188
intervention, 172, 189
local, 70, 90–1, 138, 140, 143
officials, 99, 106–9, 121, 124, 139, 188, 213–14, 216, 220, 222–4, 226
planning, 177, 182
policy, 103, 121, 165, 170–1
regulation, 100, 102
relief measures, 67
state, 101, 110–11, 123, 160–1, 170, 179, 214, 220
subsidies, 237–8
surveillance, 215
self-government, 102
Government Gums (SA, later Farina), 104
governments
Australia
Whitlam Labor government (1972–75), 166
New Zealand
Liberal government (1891–1912), 141
Savage Labour government (1935–40), 240
South Australia
Hart government (1870–1), 101
Western Australia
Brand Liberal government (1959–71), 164, 168–71
Burke Labor government (1983–8), 169–70
INDEX 265

Court Liberal government (1974–82), 168
Forrest government (1890–1901), 168
McLarty government (1947–53), 161
Mitchell government (1930–33), 162, 168
National Party government (1919–24; 1930–33), 161–2
Goyder, George, 101, 106–10
Goyder’s line of reliable rainfall (South Australia), 101–2, 106–7, 110
Grain, 48, 51, 53, 103, 106, 111, 137, 143, 151, 159
Grasses
  broadleaf species, 86
  English, 93
  exotic, 86
  native, 111
Grasslands, 1, 34, 85, 104, 105, 108, 110, 111, 125, 137
Grazing, 7, 65, 69, 85, 86, 91, 103, 105, 110, 161, 179, 183
Great American Desert (Great Plains, USA), 105
Great Artesian Basin (eastern Australia), 77
Great Barrier Reef, 31
Great Britain. See Britain
Great Dividing Range, 53, 54, 177
Great Plains (USA), 5, 99–102, 104–5, 108–9, 111–12, 138
Great Sandy Desert, 33
Greece, 85
  ancient, 123, 195, 198–200
  archaic, 198
Greeley, Adolphus W., 128, 129, 133
American Weather (1888), 128
Gregg, Josiah, Commerce of the Prairies, or the Journal of a Santa Fé Trader (1844), 105
Gregory, J. W., The Dead Heart of Australia (1906), 104
Gregory Lakes basin, 33
Gregory XIII, Pope, 200
Grewar, Geoffrey, 169
Giffiths, Tom (historian), 4–5, 94
Grose, Lieutenant-Governor Francis, 49
Grove, Kevin, 235, 236
Grove, Richard (historian), 54
Guiana, 104
Gulf of Carpentaria, 31
Gundagai (NSW), 55n. 3, 180
guns, Steiger, 132
gunfire, as cause of rain, 76, 139
Gutenberg, Johannes, 203
Gympie (Qld), 66
Halley, Edmond, 204
Hardship
  as a national characteristic, 72
  of pioneering life, 73
Harrington, M. W., 129, 130, 133
Harrison, Mark, 223
Harvest times, 52, 82, 199
Hastings (Hawkes Bay), 68, 69
Hawaii, 123, 237, 238
Hawkes Bay, 68–70, 72
Hawkesbury River, 10, 46 (Figure 2.2), 47, 54
  basin, 44, 49
  floodplain, 55
  region, 43, 44, 46 (Figure 2.1), 49, 50, 51–2, 55
  settlements, 46, 48
Healing practitioners, traditional, 149
Health, 7, 13, 71, 204, 214–15, 226, 253
  aboriginal, 222–3, 225
  Europeans, 225
  mental, 217
  preventive, 226
  public, 220–2
  relationship with climate, 216, 252
  relationship with plants, 253
Heat waves, 61, 65, 67–9, 71, 76
Heathcote Valley (Christchurch), 86
Hector, James, 87
Heliopolis (Egypt), 200
Hempenstall, Peter (historian), 234
Henry, Matthew (historian), 12, 251
Herbs, sweet, 205
Heredity, 219
Hesiod, Works and Days, 199
Hettner, Alfred, 123
Hilderdorthe (Otago), 144
Himalayas, 26
Historiography, colonial, 215
history
  environmental, 3–5
  institutional, 4
  of science, 4
  transnational, 251
  tribal, 82
Hobart, 240
Hobart, Robert, Lord, 48
*Hobart Town Mercury* (newspaper), 88
Hokitika, 88
Holland, Peter, 9, 11, 252
homesteading, 101
homesteads, 111 (Figure 5.2)
Honolulu, 233, 237, 239, 242
Hooke, Robert, 204
Hooker, Joseph, 124
horses, 69
hospitals, 91
Hough, Franklin B., 123, 124
housing conditions, 71
Hulme, Mike, 4
Humboldt, Alexander von, 104, 109
  *Cosmos: A Sketch of a Physical Description of the Universe* (1852), 104
humidity, 105, 122, 204, 208, 216
humiliation, days of national, 75
hunger, 72
Hunt, H. G., 240
Hunt, R. A., 130
Hunter, Governor John, 44, 46, 47, 51
Hunter Valley, 71, 77
Hunters Hills (Canterbury), 87
hunting, 82
Huntington, Ellsworth, 131
Hutchinson, Francis, “Drought” (poem), 72
Hyden (WA), 167
hydrology, 180, 188
hygiene, 215, 225–6
ice ages, 29, 34
illness, 71, 72, 141, 204, 217, 218
  indigenous peoples of Australia, 222–4
  see also diseases; medicine
immigration. See Australia, immigrants;
migration
imou (season), 198
Imperial Airways, 233, 234
  (Figure 12.1), 238–40
India, xii, 5, 53, 123, 124, 126, 129, 138, 166, 182, 216, 217, 252
Indian Ocean, 19, 20, 27, 30
  (Figure 1.3), 33
Indian Ocean Dipole (IOD), 27, 28–9
indigenous peoples of Australia, 2, 6, 10, 13, 44, 46, 161, 177, 179, 184, 191n. 37, 198, 209, 213–26
  Chief Protector of Aboriginals, 222–4
Indonesia, 26, 27, 31
industrialization, opposition to, 102
industries, 168
  maritime, 218
infants, 71
influenza, 224
information
  environmental, 112
  exchange, 5, 82, 94, 120
  gathering, 99–100
infrastructural
  networks, 246
  technologies, 236
infrastructure, 11, 48, 69, 70, 71, 74, 76, 77, 90, 91, 94, 234
  communications, 244
  techno-scientific, 233
insects, 199
Institute of Foresters of Australia, 135n. 2
institutionalization, of indigenous peoples, 215
insurance industry, 252
international relations, 236–7, 239, 242–3
Intertropical Convergence Zone.
  See convergence zones
invasion threats
  Asian, 171
  Japanese, 162
Invercargill (Southland), 81, 85
investment, foreign, 161
Ipswich (Qld), 66
Ireland, 122–3, 203
irrigation, 10–11, 48, 72, 74, 77, 107, 129, 131, 135n. 47, 149, 150–1, 189, 193n. 63
isolation, geographical, 73, 164, 221, 222, 225
Italy, 129, 219
INDEX

Janković, Vladimir (historian), 146–7, 181

Reading the Skies: A Cultural History of English Weather (2000), xiii

Japan, 242–3, 245

Jerramungup area (WA), 169

Agricultural District Office, 169

jet streams

Circumpolar (CPJ), 28, 36

Southern Annular Mode (SAM), 28, 29

Subtropical (STJ), 25–6, 36

Jevons, William Stanley, 159, 180, 181

Job (Old Testament figure), 142

journalists, 144

journals, 86, 119, 121, 128, 133n. 2, 171, 185–6 (Figure 9.2), 187, 204, 237

scientific, 108

Julius Caesar, 200

Junk, Dr. David, 230–1n. 74

Jupiter (planet), 83

Jupiter (river steamer), 184

Kabi people, 223

Kaluli people (Highland Papua New Guinea), 198

Kansas, 101, 103, 113n. 1

Karbortang (mountain), 83

Karskens, Grace (historian), 46

Katanning (WA), 241 (Figure 12.2)

Kellerberrin (WA), 167

Kennedy District (Qld), 217

Kepler, Johannes, 201

kererū (wood pigeon, Hemiphaga novaeseelandiae), 82

Kidson, Edward, 240, 242, 243, 245, 246, 252

Kimberley Research Station (WA), 163–4

King, Philip Gidley, 47, 48

Kingsford Smith, Charles, 240

Knight, Charles, 11

knowledge

circulation of, 2, 5, 6, 119

communities of, 99, 112

indigenous, 11, 184

local, 12, 93, 146, 178, 184

traditional, 82

Kondinin (WA), 165

kowhai (Sophora microphylla), 83

Krichauff, Friedrich, 124

Kropotkin, Peter, 130

kūmara (sweet potato), 82

Kuzma, Julian (literary historian), 73, 76

La Niña, 26–8, 61, 64–6, 138

labor

indigenous, 214, 216, 225, 230n. 57

contract, 225

non-white, 13, 218, 219–20

indentured, 214

unfree, 215

valorization of, 73

white, 213–14, 218–21, 226

Lake King (WA), 164

Lake Wakatipu basin (Otago), 91

Lake Warkalilla (Callabonna Station, near the Flinders Ranges), 111

lakes, 111

Lambert, David, 5

land

acquisition, 81

arable, 106

availability, 53

clearance, 9, 65, 69, 101, 106–9

development, 170

distribution, 112

fertility, 105, 168

grants, 6, 49, 102

improvement, 94, 127–8

management, 11, 112

marginal, 10, 69, 101, 104, 106, 161–2, 164, 166–9, 171

ownership, 101, 127–8

plot size, 103

practice, 99

promotion (boosterism), 103, 112

purchase, 81, 110

release, 160, 164, 167–70, 172

Land Release Study Group, 169

sales, 6, 102

semi-arid, 101, 104, 112

settlement, 164, 168–70

speculation, 101, 106–7, 109, 112

use, 7, 9, 48, 51, 101, 161–2

landing rights, aircraft, 239
landscape
   - aesthetic value of, 73
   - change, 54
   - European norms, 102
   - hybrid, 94
languages, indigenous, 214
Last Glacial Maximum (LGM), 30
   - (Figure 1.3), 31–4, 35
   - (Figure 1.4), 36
Last Glacial Minimum (LGM), 19, 29
law, common, 77
Law, George, 123
Lawson, Henry, 72–3
   - “The Drover’s Wife,” 72
Lawson, William, 54
Leader (newspaper), 119
League of Nations, 245
leeks, 205
Legg, Stephen, 5, 10, 12
legislation, 101–3
   - Australia
      - Aboriginals Protection and Restriction of the Sale of Opium Act (1897), 214
      - Crown Lands Acts, 103, 112
      - Immigration Restriction Act (1901), 219
      - Pacific Islander Labourers Act (1901), 219
      - Settlement Acts, 103
      - Water Act (Victoria, 1905), 77
      - Water and Drainage Act (1902), 77
   - New Zealand
      - forestry (1871–2 and 1874), 124
      - Pastoral Tenants Relief Act (1895), 67
      - Tohunga Suppression Act (1907), 149
   - United States
      - Homestead Act (1862), 101
      - Homestead Bills, 103, 112
      - Kansas–Nebraska Act (1854), 101
leisure, 225
leprosy, 223, 224
Lester, Alan, 5
lettuces, 205, 206
levees (stopbanks), 70, 74, 77
libraries: National Library of Australia, 121
Lichfield, H. A., 240
Liebig, Justus von, 123
lightning, 204, 206
line-haulage (water supply), 170
literature
   - Australian, 73
   - migrant, 86
   - nationalist, 72
   - New Zealand, 73
   - promotional, 6
Little, J. A. G., 196, 206
livestock, 47–53, 65, 66, 67, 69, 71, 85, 86, 93, 105, 106, 137, 143, 151, 161, 163, 179, 180
   - diseases, 141
   - overstocking, 74
living conditions, 48
   - of indigenous people, 222
Livingstone, David (historian), 8
Lockyer, Sir Joseph Norman, 181–2, 188
   - Contributions to Solar Physics (1874), 181
Lockyer, William J. S., 188
locusts, 102
loess, 35
logs, ships’, 184, 204
London, 93, 240
   - Royal Botanic Gardens, Kew, 124
Long Drought (1895–1902/3).
   - See drought
Longstaff, Sir John, “Gippsland, Sunday Night, Feb 20th, 1898” (painting), 74
Lorrey, Andrew, 7–8, 251
Louisiana, 219
lunar
   - activity, 182
   - observations, 199, 201, 205
   - see also moon
Lynch’s Crater (Qld), 33
Lyttelton Times (newspaper), 86, 88
Macarthur, Elizabeth, 51
Macarthur, John, 51
Macartney, Hussey Burgh, Anglican Dean of Melbourne, 142
Macintyre, Stuart (historian), 48
Mackay (Qld), 66, 68
Macquarie, Governor Lachlan, 49, 52–4
Macquarie Ridge, 22
Magellanic Clouds, 83
magistrates, 214
Maitland (NSW, formerly West Maitland), 71, 75
maize, 48, 51, 85
malaria, 220
Malaya, xii
Mallee. See Esperance (WA)
malnutrition, 72, 220, 223, 225
manufacturers, aircraft, 240
Maori, 2, 6–8, 11, 29, 81–3, 87, 149, 192n. 37, 198
maps, weather, 181
Maritime Continent
(Australia–Indonesia–New Guinea region), 26
Marsh, George Perkins, 109
Man and Nature (1864), 109, 123
The Earth as Modified by Human Action (1874), 123
marshes, 81
Maryborough (Qld), 66, 70
Massey, William, 149
Matariki. See constellations
mateship, 73
mathematicians, 200
Matra, James, 43, 55
Matthews, John, 222–3, 225–6
Two Representative Tribes of Queensland (1910), 222–3
Mauritius, 123
Maxwell, Walter, 218
May, Cathie (historian), 218
Mayalīthā (season), 198
McBride, John, 208
McGregor, Russell, 218
McNeill, John, 236
McWilliam, T. H., 240
meat
preserved, 53
prices, 71
production, 151
refrigerated, 86, 93
Mechanics’ Bay (Auckland), 23, 234
(Figure 12.1)
medical
officers, government, 220
practitioners, 215, 221, 224
services, 222
supervision, 225
surveillance, 224
surveys, 224–5
medicine, 213, 226
colonial, 223
preventive, 221
proprietary, 71
traditional, 149
tropical, 213, 215–16, 219–22
Australian Institute of Tropical Medicine, 220–1, 229n. 47
Mediterranean climate, 85
Meeson, John, 150
Mein Smith, Philippa (historian), 234
Meinig, Donald, On the Margins of the Good Earth (1962), 103
Melbourne (Vic), 67, 130, 142, 242
Botanic Gardens, 124
National Gallery of Victoria, 74
meridian, hundredth. See agricultural expansion, frontiers
Mernoo Saddle, 32
Merredin (WA), 32
meteorological
information, 168, 244
network, 242–4
observations, 86–8, 183
records, 169, 178, 185
reports, 87–8
stations, 84, 88
meteorological services, 236, 242–3, 244–6
government services, 129, 180, 204
Bureau of Meteorology (Western Australia), 159, 163–4
Commonwealth Meteorological Bureau (Australia), 131, 167–8, 240, 242
Fiji Meteorological Service, 245
German Meteorological Forestry Service, 129
Meteorological Department (NZ), 11, 147, 240
Meteorological Office (UK), 164, 241, 244
New Zealand Meteorological Service, 240, 245
United States Meteorological Service, 240, 245
United States Meteorological Bureau, 133
United States Weather Bureau, 129, 130, 146, 244
World Meteorological Organization, 236
<table>
<thead>
<tr>
<th>Term</th>
<th>Page Numbers</th>
<th>Other Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>meteorologists</td>
<td>12, 54, 109, 123, 125–7, 137, 141, 144, 148, 172, 177–8, 180, 183, 185, 187–8, 236, 240, 252</td>
<td></td>
</tr>
<tr>
<td>government</td>
<td>129, 130, 132, 139, 144–50, 163–4, 167–8, 187</td>
<td></td>
</tr>
<tr>
<td>meteorology</td>
<td>2, 4, 5, 9, 11–12, 76, 84, 129, 130, 139, 151, 177, 179, 180–1, 189, 195, 199, 205, 216, 233–5, 240, 241 (Figure 12.2), 243–6</td>
<td></td>
</tr>
<tr>
<td>folk</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>military</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>orthodox</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>professionalization of</td>
<td>147, 151</td>
<td>status of, 179</td>
</tr>
<tr>
<td>meteors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>activity</td>
<td>182</td>
<td></td>
</tr>
<tr>
<td>influence on climate</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Methodsists, Wesleyan</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>Midawarr (season)</td>
<td>198</td>
<td></td>
</tr>
<tr>
<td>migration</td>
<td>7, 8, 13, 162, 189, 219, 252</td>
<td>Asian, 162</td>
</tr>
<tr>
<td>birds</td>
<td>198, 199</td>
<td></td>
</tr>
<tr>
<td>Chinese</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>European</td>
<td>218, 225</td>
<td></td>
</tr>
<tr>
<td>indigenous</td>
<td>214</td>
<td></td>
</tr>
<tr>
<td>non-European</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>Pacific Island</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>subsidized</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>transoceanic</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>urban drift</td>
<td>162, 171</td>
<td></td>
</tr>
<tr>
<td>see also Australia, immigrants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milankovitch, Milutin</td>
<td>131</td>
<td></td>
</tr>
<tr>
<td>Mildura (Vic)</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>infant formula</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>production</td>
<td>151</td>
<td></td>
</tr>
<tr>
<td>Milky Way</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>milling</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>Millward, Liz</td>
<td>235, 240</td>
<td></td>
</tr>
<tr>
<td>mining</td>
<td>124, 161, 217, 218</td>
<td>coal, 66, 145</td>
</tr>
<tr>
<td></td>
<td></td>
<td>gold, 66, 124, 162</td>
</tr>
<tr>
<td></td>
<td></td>
<td>lobby, 124</td>
</tr>
<tr>
<td></td>
<td></td>
<td>timber for mines, 124</td>
</tr>
<tr>
<td>ministries. See government departments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minoan civilization</td>
<td>198</td>
<td></td>
</tr>
<tr>
<td>missions</td>
<td>214 (Figure 11.1), 214–15, 223</td>
<td>Mississippi River, 101</td>
</tr>
<tr>
<td>Mitchell, James</td>
<td>161–2</td>
<td></td>
</tr>
<tr>
<td>Mitchell, Thomas</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>modernity</td>
<td>239</td>
<td></td>
</tr>
<tr>
<td>opposition to</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>Molineux, Albert</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>monsoon</td>
<td>26, 27, 34, 166, 196</td>
<td>moon, influence on weather, 76, 83, 84, 126</td>
</tr>
<tr>
<td>see also lunar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moon, Keith (historian)</td>
<td>93</td>
<td></td>
</tr>
<tr>
<td>Moore, George (junior)</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Moore, Willis L.,</td>
<td>130, 133</td>
<td></td>
</tr>
<tr>
<td>Moorhouse, Dr. James (Anglican Bishop of Melbourne)</td>
<td>142</td>
<td></td>
</tr>
<tr>
<td>moral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>degeneracy, fears of</td>
<td>219</td>
<td></td>
</tr>
<tr>
<td>ideology</td>
<td>147</td>
<td></td>
</tr>
<tr>
<td>morale, decline in</td>
<td>171</td>
<td></td>
</tr>
<tr>
<td>Morawa (WA)</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>morbidity</td>
<td>217, 223</td>
<td></td>
</tr>
<tr>
<td>morepork (native owl or ruru, Ninox novaeseelandiae)</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Morgan, Ruth</td>
<td>6, 8, 11</td>
<td></td>
</tr>
<tr>
<td>Mount Barker (WA)</td>
<td>169</td>
<td></td>
</tr>
<tr>
<td>Mount Cook (NZ)</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td>Mudie, Robert</td>
<td>203</td>
<td></td>
</tr>
<tr>
<td>Mueller, Baron Dr. Ferdinand von</td>
<td>124, 128–30</td>
<td></td>
</tr>
<tr>
<td>Mukinbudin (WA)</td>
<td>164</td>
<td></td>
</tr>
<tr>
<td>mullenizing (scrub clearance technique)</td>
<td>102</td>
<td></td>
</tr>
<tr>
<td>Mullewa (WA)</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>Mundaring Weir (WA)</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>Murihiku (the far south of the South Island, NZ)</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Murray, Andrew, South Australian Almanack, 205–6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murray River system</td>
<td>177, 178</td>
<td></td>
</tr>
<tr>
<td>(Figure 9.1), 179, 183, 193n. 63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Murrumbidgee River (NSW)</td>
<td>179–80</td>
<td></td>
</tr>
<tr>
<td>Napier (Hawkes Bay)</td>
<td>68–9</td>
<td></td>
</tr>
<tr>
<td>national</td>
<td></td>
<td></td>
</tr>
<tr>
<td>characteristics</td>
<td>72–3</td>
<td></td>
</tr>
<tr>
<td>image</td>
<td>73–4</td>
<td></td>
</tr>
<tr>
<td>prestige</td>
<td>240</td>
<td></td>
</tr>
<tr>
<td>pride</td>
<td>73</td>
<td></td>
</tr>
<tr>
<td>security</td>
<td>244</td>
<td></td>
</tr>
<tr>
<td>spirit</td>
<td>107</td>
<td></td>
</tr>
</tbody>
</table>
nationalism, 72–3, 130
nation-building, Australian, 213
nation-state, 2, 8, 220, 251
natural causation, 137, 142, 148, 252
natural disasters, 47, 49–50, 64, 66, 68–71, 75, 109, 170

see also floods; storms

nature
  concepts of, 199, 201
  scientific study of, 199

naval forces, 139
  New Zealand Torpedo Corps, 139
  United States Navy, 244–5

Naylor, Simon, 4

Nebraska, 101, 103, 105–7, 113n. 1

Nelson (NZ), 83, 85
neoliberalism, 170
Nepean River valley, 44
nervous disorders, 218
Nestlé foods, 72

networks
  meteorological, 241
  technoscientific, 235

Neugebauer, Otto, 200

neurasthenia, 218
neutrality, wartime, 244

New England, 203

New Guinea.  See Papua

New South Wales, xiii, 7, 9–10, 28–9, 43–4, 46 (Figure 2.1), 47, 50–1, 53–5, 65–9, 74–5, 77, 102, 108, 125, 128–9, 169, 177, 178 (Figure 9.1), 181, 183, 185, 187–9, 203–5, 217, 252

New York, 238

New York Tribune (newspaper), 108

New Zealand, xi, xiii, xiv, 1–12, 22, 26, 28–9, 30 (Figure 1.3), 31, 32, 34–5, 54, 61–2 (Figure 3.1), 68–9, 73–7, 85, 94, 102–3, 108–9, 124, 126, 129, 132–3, 137, 139, 151, 169, 181, 185, 187, 198, 233–5, 237–40, 242–6, 251–3

alleged equanimity of climate, 74
alleged similarity of climate to
  Britain, 73

North Island, 9, 11, 34, 61, 64, 65, 66–7, 76, 81–2, 85–6, 88–9, 93–4, 109, 137, 148, 240

see also Southern Alps

New Zealand Herald (newspaper), 233

Newbey, Kenneth, 169

Newcastle (NSW), 252

newspapers, 49, 52, 72, 83–4, 86, 88, 94, 101, 105–6, 108, 119, 120 (Figure 6.1), 121, 122 (Figure 6.2), 123–4, 126–7, 129–33, 139, 142–6, 179, 185, 187–8, 205–7, 209

see also under individual titles

Newton, Sir Isaac, Principia Mathematica (1687), 201–2

Ngapara (Otago), 143

Ngaruroro River (Hawkes Bay), 69

Nicholls, Neville, 208

Nile, River, 200

Nilpena Station (Flinders Ranges), 110 (Figure 5.1)

Niña, La. See La Niña

Niño, El. See El Niño

Niue, 237

North East Valley (Dunedin), 86

North Otago Times (newspaper), 146

The Northern Standard (newspaper), 206–7

Northern Territory, 105, 195–6, 197 (Figure 10.1), 198, 202–7, 208 (Figure 10.2), 217

Northland (NZ), 34

NSW Pocket Almanac and Colonial Remembrancer, 205

NT Times (newspaper), 206–7

Nyoongar people, 161

Oamaru, 76, 137, 138 (Figure 7.1), 139–40, 143–4, 146–8

St. Luke’s Anglican Church, 147–8

St. Paul’s Presbyterian Church, 147

Oamaru Mail (newspaper), 144–6, 149

O’Brien, Chris, 9, 12

observatories
  climate, 181, 216

Samoa, 242

Sydney, 130, 179, 185, 187
oceans, 30 (Figure 1.3), 127
circulation, 29, 33, 36
currents, 20, 21 (Figure 1.1), 22, 23, 27
Antarctic Circumpolar, 21 (Figure 1.1), 22–3, 32, 33, 35
East Auckland, 21 (Figure 1.1), 22
East Australian, 20, 21 (Figure 1.1), 22, 27, 31–2
East Cape, 21 (Figure 1.1), 22
East Cape Eddy, 22
Humboldt, 26
Indonesian throughflow, 20, 21 (Figure 1.1), 27, 31, 34–5
Indo-Pacific Warm Pool, 19, 20, 21 (Figure 1.1), 27, 31, 33, 35
Leeuwin, 20, 21 (Figure 1.1), 31
New Guinea Coastal Undercurrent, 20, 21 (Figure 1.1)
South Equatorial, 20, 21 (Figure 1.1), 27, 32
South Pacific tropical gyre, 20–1
Southland, 21 (Figure 1.1), 22
Wairarapa Eddy, 22
see also under individual oceans
O’Gorman, Emily, 12
Okalahoma, 113n. 1
O’Neill, W. M., 200
Ongerup (WA), 169
onions, 205
opium, 222
Oresme, Nicole, 201
Orion’s belt (asterism), 82
Ormerod, Robin, 208
oscillations. See atmospheric oscillations
Otago, 66–7, 76, 81, 85, 88, 89–90 (Figure 4.1), 92 (Figure 4.2), 93, 103
central, 29, 91
north, 5, 9, 133, 137, 138 (Figure 7.1), 139–51
south, 91
Otago Daily Times (newspaper), 88, 140, 141, 148
Otago Witness (newspaper), 74, 88
Otematata Station (Otago), 93
Otway Ranges (Victoria), 127
overcrowding, 53
owls, 83
Oxford English Dictionary, 239
Pacey, Chief Petty Officer William H., 139
Pacific Affairs (periodical), 237
Pacific islands, 28, 234, 237–8, 242–3
Western Pacific High Commission, 245
Pacific Ocean, 23, 25–6, 30 (Figure 1.3), 91, 93, 219, 233–8, 244–6
south, 12, 32, 81, 234, 242–3, 246
South Pacific Convergence Zone (see convergence zones)
southwest, 27–8, 243–5
western, 27
painting, 74
paleobotany, 33
paleoclimate records, 31, 35 (Figure 1.4), 36
Pall Mall Gazette (newspaper), 124
Palm Island reserve (Qld), 215, 224
Palmer, Thomas Fyshe, 46
Palmerston, Henry John Temple, third viscount, 141, 142
Pan-American Airways, 233, 234 (Figure 12.1), 235, 237–9, 242–3, 246
pandemic, influenza (1918–19), 224
Pandora (ship), 84
Papakaio (Big Hill, Otago), 145
paper making, 132
Papua New Guinea, 20, 23, 26, 31, 33, 34, 198
parasites, 219
Paris, 104
parish records, 204
Paroo River, 177
Parramatta (NSW), 46, 47
parsley, 205
Parsons, Meg, 13
pastoralism, 10, 11, 50, 65, 66–7, 69, 76, 81, 85, 86, 93, 103, 105–6, 110–12, 137, 143, 161, 162, 164, 179, 183, 187, 189, 198, 217, 218
see also agriculture
pastoralists, 127, 178, 183, 184
pasture, 50
growth, 85
Paterson, Banjo, “It’s Grand” (1902), 73
Paterson, Lieutenant-Governor
William, 49
INDEX

pathogens, 252
Pawson, Eric, 1
peas, 206
snow, 205
Perenjori (WA), 165
periodicals. See journals
Perkins, Maureen, Visions of
the Future (1996), 203
Perrin, George, 128
Perry, T. M. (geographer), 54
pests
animal, 7, 65, 69, 73, 102, 111, 168
insect, 102
Phillip, Governor Arthur, 49
philosophy, 199
Philp, Robert, 219
physicists, 185, 202
physics, early modern, 201–2
piety, 107
pigs, 48–9, 51–2
pilots, 236
Pitt Town (NSW), 49
plague, cattle, 141
planetary
cooling, 104
motion, observations, 201–2
planets, 83
plantations, 66
plants, 33, 168, 198–9
indigenous, 48
indoor, 253
native, 50, 94
relationship with health, 253
see also crops
plastics, 252
plowing, as cause of rain. See agriculture,
effect on climate
plows, 101–2
poetry, 72–3, 199–200
poisoning, of animal pests, 69
police officers, 214
political economy, 100, 103
politicians, 107, 121, 123, 124, 169,
236
politics, 6, 13, 112, 121, 132
pollen, 33–5, 252
pollution
air, 252
industrial, 181
Polynesia, 23
Polynesian peoples, 8
population, 7, 168, 217–18
growth, 53, 166, 180, 189
mobility, 7
Porpoise (ship), 47
Port Augusta Dispatch (newspaper),
105–6
Port Darwin (NT) Telegraph Station,
206
Port Molyneux (Otago), 91
ports, 70
postal services, 119, 180
potatoes, sweet, 82
poverty, 72
Powell, John Wesley, 106, 107, 128
prairies, 101, 104, 106, 111, 113n. 1
prayers, 75
efficacy of, 141–2, 148
for rain, 137, 141–4, 147–9, 151
special, on national issues, 141
thanksgiving, 143, 147, 151
precipitation, 9, 23, 26–9, 33–5, 47,
50, 84–5, 105, 108–9, 122,
125, 139, 216
see also rainfall; snow
Presbyterians, 141, 147
press, 49, 52, 72, 83, 86, 101,
105–6, 108, 119, 120–1,
123–4, 126–33, 139,
142–6, 179, 185, 187–8,
205–7, 209
The Press (newspaper), 88, 149
prime ministers and premiers, 101, 124,
161, 168, 238, 239, 243
progress, concept of, 61
property rights, private, 77
Protestantism, 142, 143
Protestants, 144, 147, 149
public opinion, 119
publications
scientific, 108
specialized, 5
see also literature
publishing, 203
pumping systems, 77
quarantine, 220–1
Chief Quarantine Officer
(Australia), 224
Quebec, 104
INDEX

Queensland, xiii, 7, 8, 13, 28, 33, 46
(Figure 2.1), 61, 65–6, 68–70, 76–7, 132, 178 (Figure 9.1), 187, 213, 214 (Figure 11.1), 215–16, 230n. 57
Queensland Plateau, 20
Queensland Trough, 31
Queenstown (Otago), 91
Raban, Jonathan, 103
rabbits, 65, 69, 73, 102, 111
race, 13, 204, 213–15, 217, 219, 222
degeneracy, fears of, 219, 221, 226
“doomed race” theory, 222–4, 226
exclusion, 223
hierarchy, 218–19
integrity of indigenous peoples, 222
miscegenation, 225
mixing, 226
segregation, 220, 225–6
toleration, 218
weakness, 224
radio
communications, 238
networks, 243
stations, 244
radishes, 205–6
Ragless, Frederick B., 111, 112
“Seventy Years Ago: The Journal of Frederick Brandis Ragless” (1936), 111
Ragless, Richard, 111, 112
railways, 69–70, 94, 101
rain gauges, 183
“rain follows plow” theory.
See agriculture, effect on climate
rainbows, significance of, 83
rainfall, 5–6, 9–10, 26–9, 33, 34, 44, 47, 50–5, 64–6, 68, 75, 83–5, 88–9, 91, 93, 99, 100–1, 104–5, 107–10, 112, 123, 125–8, 130, 137–41, 143–5, 147, 150–1, 159, 161–7, 170–1, 177, 183, 185, 187, 196, 208
12 inch rainfall isohyet, 101, 106
data, 75–6, 86–7, 120 (Figure 6.1), 169, 178, 182–3, 187–8, 198, 206–7, 208 (Figure 10.2)
“equalization,” 128
influence of forests on (see forests; deforestation; trees)
variability, 102, 106, 110, 180
rainmaking, 5, 10, 12, 76, 109, 132, 137, 138 (Figure 7.1), 139–49, 151
Rain-Making Committee (North Otago), 144–9
“rainshadow” effect, 64
Raki’s Table (Otago), 139, 144, 145
Ranson, Sir Alfred, 238
Ratcliffe, Francis, 131–2
rationalism, 137, 148, 151
Rattray, Alexander, 216–17
Ravensthorpe area (WA), 160, 168–70, 172
recreation, 225
red rust (crop disease), 102
reefs, coral, 31
reforestation, 123, 127
see also afforestation
religion, 137, 147, 148, 151
Judeo-Christian, 200
state, 143
religious
belief, 75, 94, 141–4, 147–9, 151
debates, 143
duty, 107
festivals, 201, 205
observances, 201
supplication, 142
Renmark (SA), 189
Renou, E., 126
reserves, aboriginal, 222–6, 228n. 53, 214 (Figure 11.1), 215
reservoirs, 77
Reynolds, Henry (historian), 218
rheumatism, 217
rice, 48
Richards, Ronald, 169
Richmond (NSW), 44, 49
river
boatmen, 183, 184
crossings, 91
engineering, 189
management, 104
Riverine Herald (newspaper), 71
rivers, 11, 44, 68, 77, 81–2, 92
(Figure 4.2), 93, 105, 107, 113, 125, 128, 177, 188–9
roads, 69–70, 90, 94
Robin, Libby (historian), 94
Rockhampton (Qld), 66, 68
Rocky Mountains (USA and Canada), 101, 150
Rodway, Leonard, 108, 109
Rogation Sunday, 205
Rome, 129
ancient, 195, 199, 201
Rose, Deborah, 198
Roth, Walter, 222, 224
Round Hill (Otago), 145
Royal South Australian Almanack for 1839, 205
royalists, English (17th century), 203
Rudd, Steele, 73
rural
credit, 110
life, difficulties of, 73
ruru (native owl or morepork, Ninox novaeseelandiae), 83
Russell, Henry Chamberlain, 12, 76, 126–30, 132–3, 177–9, 181–5, 186 (Figure 9.2), 187–9
Russia, 132
Sahel (Africa), 166
Said, Edward W., Orientalism (1978), 216
Salinger, Jim M. (climatologist), 9
salinity, 160, 161, 168, 169, 170, 172
Salis, Fane de, 126
Salmon Gums (WA), 167
saltbush, 105, 106
Salvation Army, 144
Samoa, 243
German, 237
observatory, 242
Western, 245
Samoa Clipper (flying boat), 233, 234
(Figure 12.1)
San Francisco, 233, 237
sand drift, 123, 132
sanitation, 68, 141–2
Santa Fé, 105
savannahs, 104, 110
Saxby, Stephen, 88
Schomburgk, Richard, 108–9, 124
ancient Greek, 199
climate, 123, 130, 179, 183
colonial and imperial, 100, 124
dirt, 100
“half-science,” 181–1, 187
instruments, 86, 181, 183
methodology, 146, 187
“non-science” (pseudoscience), 141, 146, 149, 151, 179
popular, 146, 151
principles of, 94, 104, 147–8
scientific societies
Australasian Association for the Advancement of Science, 129
Australian and New Zealand Association for the Advancement of Science, 164
Australian Academy of Science, 166
Australian branch of the Royal Meteorological Society, 166
Royal Societies
London, 87
New South Wales, 125–6, 181, 183, 185
Tasmania, 220
Victoria, 127
United States Association for the Advancement of Science, 124
scientists, 75, 99, 103–5, 107–9, 128–6, 131, 141, 164, 166, 171, 177, 179, 181–2, 189, 213, 215–16, 220–1, 224, 236
climates, 3, 76, 166–7
government, 86–7, 127, 133, 148, 170, 177–8
Scotland, 143, 203, 252
sea
ice, 30 (Figure 1.3), 32–3
levels, 31, 33
temperatures, 30 (Figure 1.3), 31–2, 64
Indian Ocean Dipole (IOD), 27, 28–9
seakale, 205
seas, inland, 111
seasons, 12, 180, 196–201, 203–7
seasonal awareness of, 82
seasonal conceptualizations of, 195, 198, 206–7
seasonal variation in, 85, 199
sectarianism, 143, 147, 151
secularism, 137, 148
security, politics of, 235
sediment, 34
segregation, racial, 213, 222
Septuagesima Sunday, 205
servants, domestic, 225, 230n. 57
Serviss, Garrett P., 131
settlement, 49, 53, 81, 99–104, 167–8, 215, 217
expansion of, 53–5
intensive, 101
land, 162
organized, 103
patterns, 166
practices, 99
town relocation, 180
white, 13, 220
settlers, 8–11, 43, 47–9, 51, 54–5, 71, 74, 81, 84–7, 94, 100, 102, 108, 110, 162, 177, 185, 188, 195
Shand, Mr. (fl. 1907), 144
Shaw, Hon. Alexander, 237
sheep, 9, 49, 52–3, 67, 74, 76, 81, 93, 105–6, 137, 161, 183
coarse-wool, 86
merino, 86
Sheldrick, Janis (historian), 106
Sherratt, Tim, Tom Griffiths, and Libby Robin (eds.) A Change in the Weather: Climate and Culture in Australia (2004), 3
shipping lines
Inter-Island Steam Navigation Company, 238
Matson Line, 237, 238
Peninsular and Oriental Steam Navigation Company (P. & O.), 237
Union Steamship Company, 237
refrigerated meat, 86
Shirres, William, 93
Short “Empire” class flying boats, 233, 234 (Figure 12.1)
shrub lands, 86
sin, natural disasters as punishment for, 75
Singapore
fall of (1942), 162
naval base, 243
smallholders, 101, 107
see also farmers
Smith, Henry Nash, 103
snakes, 72
snow, 8, 61, 64, 65, 66–7, 69, 71, 73, 74, 76, 84, 87, 91, 93
drifting, and forests, 132
“Great Snow” (South Island, NZ, 1895), 8, 61, 65, 66–7, 74, 76
social attitudes, 73
class differences, 46, 54, 70, 127
mobility, 218
scientists, 3
soil, 99, 104, 107, 168–9
conditions, 170
erosion, 124, 131
fertility, 49, 107
solar activity, 182, 185
observations, 199–200
Solomon, V. B., Northern Territory Times Almanac and Directory, 206
Solomon Islands, 23, 245
solstices, 200, 201
Somerset (Qld), 218
sorrel, 205
South Africa, 150
South Australia, 5–7, 9–10, 28, 46 (Figure 2.1), 66, 77, 93, 99, 100–12, 115–16n. 36, 124, 128, 187, 189, 202–6
South Australian Association, 103
South Australian Forest Board, 108
South Australian Woods and Forests Department, 128
South Burnett district (Qld), 223
South Creek (Hawkesbury River region), 47, 49
South Tasman Rise, 22
INDEX

Southampton, 233
Southern, Robert, 167–8
Southern Alps (NZ), 29, 34, 64, 66, 84, 92
Southern Cross (aircraft), 240
Southern Cross (newspaper), 87
Southern Cross (WA), 167
Southern Ocean, 19, 22–3, 30
(Sfigure 1.3), 32–3, 252
Southland (NZ), 81, 89–90
(Sfigure 4.1), 91, 92
(Sfigure 4.2), 143, 149
Southland News (newspaper), 85
sovereignty, 12, 235, 238, 239, 246
Spain, 85
spinach, 205
Sprat, Thomas, The History of the Royal-Society of London (1667), 204
squatters, 105, 107, 127, 129, 182
Sri Lanka, 124
St. Vincent, 127
stars
Canopus (Alpha Carinae), 82, 83
and interpretation of weather, 82
Rigel (Beta Orionis), 82
Vega (Alpha Lyrae), 82
steamers, river, 184
steppes, Russian, 132
Stern, Walter, 164
Steward Settlement (Otago), 150
stopbanks (levees), 70, 74, 77
storms, 73, 82, 87, 89–91, 93, 113
see also natural disasters
strawberries, 205
stress, emotional, 71
Stuart, John McDouall, 105, 111
Sturt, Charles, 105, 184
sugar, 66, 82, 218–20
Sumatra, 27, 33
sunshine, 6, 99
sunspot activity, 185, 188
influence on climate, 127, 135n. 47
sunstroke, 71
superstition, 130, 148, 203, 205, 224
surveying, 6, 233, 235
surveyors, 101, 106, 178, 183
Suva (Fiji), 245
Sweden, 129
Switzerland, 123
Sydney (NSW), 44, 46, 49, 51–3, 67, 121, 125–6, 181, 183, 185, 233, 238
observatory, 130, 179, 185, 187
region, 43, 54
Sydney Cove, 52, 102
Sydney Gazette (newspaper), 49, 52
Sydney Morning Herald (newspaper), 121, 124, 181, 187–9
syphilis, 223
Tahiti, 81
Tasman Sea, 20, 28, 30 (Sfigure 1.3), 31–2, 34–5, 233, 238, 240
Tasmania, xiii, 7, 20, 28, 32, 46
(Sfigure 2.1), 88, 125, 129, 220, 240
tau (season), 198
taxation, 67, 77, 219
Taylor, Griffith, 131
Australia (1911), 162
The Australian Environment (Especially as Controlled by Rainfall) (1918), 196
Te Wāi Pounamu, 82. See New Zealand, South Island
technical innovations, 102
technological
boosterism, 131
change, 171
innovation, 99, 101–2, 112, 246
technology, 99–101, 104, 166, 180, 235–6, 252
technoscientific
materialities, 240–1
networks, 240
telecommunications, 88, 94, 119, 180–1, 237, 244
temperatures, 32–5, 50, 52, 54, 64–5, 67, 84, 89, 104, 109, 122, 146, 206, 208, 216
measurement, 140, 204, 216
records, 75, 86–7
see also sea temperatures
Tench, Watkin, 50
territoriality, 240, 246
Teschemaker, Frederick, 85
Texas, 138, 140
theism, 148
theologians, 201
Copyrighted material – 9781137333926
Thistles, 199
Thomson, James, 51
Threlfall, Richard, 185
Thunder, 204, 206
Thursday Island (Qld), 218
Tides, 204
Tidal waves, 88
Tierra del Fuego, 84
Timber, 124
Time, concepts of, 12, 195–6, 201–3, 207, 209
Timekeeping, 200–2
Timor Sea, 20
Todd, Charles, 182
tobunga (Maori traditional healers), 149
Tokelau, 237
toleration, racial, 218
Toongabbie (Sydney), 46, 47
Torices, 203
Torlesse, Charles, 86
Torres Strait, 20
Torres Strait Islanders, 214, 218, 220, 222, 226, 228n. 53
torrid zone, 213, 216, 217, 221
town and Country Journal (newspaper), 119, 121
Townsville (Qld), 68, 220
Tozer, Horace, 222
Trade
oceanic, 238
routes, 237
Transport, 101
air, 233–5, 238–40, 244
networks, 237
river, 179
Transportation, convict, 7, 102
abolition of, 103
Travel, long-distance, 101, 237–8, 242–3, 246
Trees, 33, 82, 104–5, 108, 111, 125
(see also forests)
exotic, 123, 128
Flowering, as predictors of weather, 83
Fruit, 51
planting, 10, 94, 108, 125, 128, 150–1, 177
ring-barking (girdling), 127–9, 131
as windbreaks, 150
see also afforestation; deforestation; forests
Trove database (National Library of Australia), 121
Tsunamis, 88
Tuahiwi (Canterbury), 83
Tuberculosis, 223
Tuckwell’s Lagoon (NSW), 49
tuna (eel, Anguilla spp.), 82
Turner, J. M., 103
turnips, 143, 205–6
tussock grass, 86
Typhoid, 68, 71
Tyrrell, Ian (historian), 100
Ukraine, 166
Ulm, Charles T. P., 240
Unemployment, 70, 72, 162
Unger, Corrina, 236
Union of Soviet Socialist Republics, 132, 166
United Kingdom, 237, 239, 243, 244, 245
see also Britain; England; Scotland
Midwest, 102–7, 138
Universe, conceptualization of, 199
Universities
Monash, 166–7
Waikato, xi, xv
Western Australia, 164
Institute of Agriculture, 163, 164
Urban
Drift, 171
Life, 253
Urbanization, 223
Vaughan, Megan, 223
Vegetation, 34, 99
Native, 81–2, 94, 105–6, 161, 216
Removal of, 94
Vehicles, motor, 101
INDEX

Victoria, xiii, 5, 7, 46 (Figure 2.1), 65–6, 68–9, 74, 77, 109, 121, 123–5, 127–30, 142, 178 (Figure 9.1), 187, 189
Victoria River district (NT), 198
Vienna, 129
Austrian Academy of Sciences, 129
Vincent County Council (Otago), 90–1
violence, 179–80, 214
Virgil, *Georgics*, 200
viruses, 224, 226
Voelker (German scientist), 123
Vogel, Sir Julius, 124

Waihemo County (Otago), 91
Waitaki River valley, 85, 91, 93, 150
Waitemata Harbour (Auckland), 233
Wakefield, Edward Gibbon, *A Letter from Sydney* (1829), 102, 103

*A View of the Art of Colonization, in Letters between a Statesman and a Colonist* (1849), 102–3

Wakka Wakka people, 223
Walgett (NSW), 184
Walker, Captain Campbell, 124
Walton, F., 233
Wanganui, 68
Warrego River, 177
wars, 236
English civil, 203
first world, 132
second world, 162, 245
waste, 252
water, 10
conservation, 72, 74, 75, 77, 108, 165, 188, 189
management, 77
rights, 77
shortage, 50–1
storage, 11, 77, 185
supply, 10–11, 71, 77, 94, 108, 124–5, 159–61, 163–6, 170, 179, 189
Comprehensive Water Supply Scheme (WA), 165–6, 170
Farm Water Supply Committee (WA), 163, 165
Metropolitan Water Board (WA), 167

weather, 2–3, 7–8, 10, 27, 29, 54, 61, 65, 72, 74, 75, 100, 103, 195, 202–4, 206, 209, 233, 235, 252
balloons, 241 (Figure 12.2)
cycles, 179, 181–3, 185, 187–8
data, 12, 75–6, 86, 180–2, 184–5, 188, 204
divine intervention in, 75
extreme, 8, 64, 74, 76–7, 88, 89–90 (Figure 4.1), 91, 93–4
forecasting, 8, 11, 75–6, 82–4, 87, 141, 147, 163, 179, 181–2, 185–6, 187–8, 203, 233–4, 236, 240, 245–6, 251
knowledge, systematized, 102
manipulation, 102
memory for events, 52, 75, 83, 106, 207
misunderstandings about, 195
observations, 54, 84, 88, 181, 183–5, 196, 204, 207
patterns, xiii, 11, 35, 84, 88
prediction, 11–12, 82–3, 87–8, 179, 182, 188, 199, 203–4, 206
records, 64–5, 83–4, 87, 89, 92, 184, 195, 204
reports, 86, 206–7
science, 109 (see also meteorology)
services, military, 245
speculation about, 74–5
stations, 76, 242
statistics, 181
systems, 25
East Coast lows, 44
Polar Front, 21 (Figure 1.1), 23, 32
South Pacific Anticyclone, 25
Tasman Front, 21 (Figure 1.1), 22, 32
theories, 76
traditional interpretations of, 82–4, 109, 203, 207
variability, 85, 93, 169, 180, 203, 207–8
weeds, 7, 44, 199
*Weekly Times* (newspaper), 119
weka (woodhen, *Gallirallus australis*), 82
Wellington (NZ), 87, 241 (Figure 12.2), 244–5
Wellington Dam (WA), 165
wells, 77, 166
INDEX

Wentworth, William, 54
West Coast (South Island, NZ), 83, 88
West Indies, xii
West Maitland (NSW), 71, 75
Western Australia, 6, 11, 20, 27, 159, 160 (Figure 8.1), 161–2, 164, 167, 170–1
Western Farmer (periodical), 171
The Western Herald (newspaper), 187
Western Pacific High Commission, 245
Western Plains (NSW), 53–4
Wex, Gustav, 129
whakataukī (traditional Maori sayings), 83
whare kura (Maori places of learning), 82
wheat, 6, 46, 48, 102, 105, 107–8, 110, 159, 161
wheat belt (WA), 159, 160 (Figure 8.1), 161–5, 167–72
Whigs, 203, 205
White Australia policy, 13, 162, 213, 220, 224, 226
“White Queensland,” 215
Whitehouse, Airini E., 87
Whither, T. M., 143
wickedness, natural disasters as punishment for, 75
Wide Bay (Qld), 218
Wilber, Charles Dana, 107, 116n. 46
The Great Valleys and Prairies of Nebraska and the Northwest (1881), 106
Wilberforce (NSW), 44, 49
wildlife, 50, 111
Wilkes, Wing-Commander, 238
Williams, Jim, 9, 11, 252
Williams, Raymond, xi
winds, 23, 25, 27–9, 32–6, 44, 64, 68, 82–5, 88–9, 91, 93, 122, 132, 150, 169, 208, 216–17
measurement, 86, 87, 204, 216
Windsor (NSW), 49
Wiradjuri people, 180
wireless telegraphy. See radio
Wither, John, 91, 92
Woiekkoff, A., 128
women, 71, 73, 215, 240
wood pigeon (kererū, Hemiphaga novaeseelandiae), 82
wood supplies, 124
woodhen (weka, Gallirallus australis), 82
wool, 86
Woorabinda reserve (Qld), 215, 224
Worboys, Michael, 223
workers. See labor
working conditions, 225
Worster, Donald (historian), 102, 103
Wragge, Clement, 76, 132, 135n. 47, 252
Wright, Peter B., 164
Wyndham, Marivic, 234
Wyoming, 138
yams, 46
yeoman farmers, 102, 107
ideal, 6, 101
Young, W. J., 221
Yuravich, Edward, 233–4
zoological gardens, 113n. 1
zoologists, 131, 132