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About the Journal

International Review of Environmental History takes an interdisciplinary and global approach to environmental history. It publishes on all thematic and geographical topics of environmental history, but especially encourages articles with perspectives focused on or developed from the southern hemisphere and the 'global south'. This includes but is not limited to Australasia, East and South East Asia, Africa and South America.

International Review of Environmental History's editorial board includes historians, scientists, and geographers who work on environmental history and the related disciplines of garden history and landscape studies. This methodological breadth distinguishes *International Review of Environmental History* from other environmental history journals, as does its attempt to draw together cognate research areas in garden history and landscape studies.

The journal's goal is to be read across disciplines, not just within history. We encourage scholars to think big and to tackle the challenges of writing environmental histories across different methodologies, nations, and timescales. We embrace interdisciplinary, comparative, and transnational methods, while still recognising the importance of locality in understanding these global processes.

The Centre for Environmental History at The Australian National University sponsors the journal, and ANU Press will publish hardcopy and free electronic versions of the journal. It is also supported by the Historical Research Unit; Faculty of Arts and Social Sciences; and the Environmental Research Institute, University of Waikato, New Zealand. Our open-access policy means that articles will be available free to scholars around the world, ensuring high citation rates and impact in and beyond the field of history.

International Review of Environmental History is happy to consider future special issues focusing on themes drawn from conferences or collaborations.

Submission Details

Please send article submissions or abstracts to the Editor, Associate Professor James Beattie, History, University of Waikato, Private Bag 3105, Hamilton 3240, New Zealand. Email: jbeattie@waikato.ac.nz.

Abstracts should be no more than 200 words, and include a list of keywords. Articles should be in the range 5,000 to 8,000 words (including footnotes), although longer submissions may be considered after consultation with the editor.

Style and referencing: please use footnotes in Chicago Style, and follow British spelling. For more details on Chicago Style, please see www.chicagomanualofstyle.org/tools_citationguide.html.

INTRODUCTION

JAMES BEATTIE

History Programme
University of Waikato and
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Centre for Environmental History,
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The second volume of the *International Review of Environmental History* examines the diverse environmental legacies of colonialism around the world, from Qing (1644–1911) efforts at settling Xinjiang ('New Territory'), north-west China, to US attempts to curb bovine diseases in the Philippines; from the use of transnational US Dust Bowl images in an Australian film, to a methodology calling for closer intellectual collaboration among garden historians, environmental historians, and historians of health; and, lastly, to a study of how the mining lobby was responsible for conserving forests in Victoria, Australia.

Around the world, the mining lobby has rightly been held responsible for a host of environmental problems, from air and water pollution, to the destruction of soils and vegetation. In 'Political agitation for forest conservation: Victoria, 1860–1960', historical geographer Stephen Legg presents a fascinating counterpoint to the prevailing orthodoxy by showcasing the role of Victoria's mining lobby in agitating for the protection of forests and for developing forest plantations. Legg demonstrates that from the 1860s the mining lobby, motivated by fears of losing timber supplies for its industry, engaged in a sustained campaign for forest conservation and afforestation. To achieve its ends, it relied on lobbying ministers and newspaper-writing campaigns, and pressuring parliament to undertake commissions of inquiry into forestry. What Legg's pioneering articles does is to outline the length, depth, and sophistication of lobbyists involved in forest conservation from the nineteenth century. In illuminating the connections between nineteenth- and twentieth-century conservation campaigns, Legg's article is a must-read for anyone interested in the history of conservation and resource use, right up to the present day.

The next article examines soil and water management through a transnational framework. In 'Wartime political ambition behind one image of a dam in *Australia is Developing a Dust Bowl* (1943): US/Australian film imagery, environment, and nationalist storytelling', Janette-Susan Bailey analyses in depth the impact of a 1943 film that invoked imagery from the US Dust Bowl to press for Australian state development of water schemes in postwar New South Wales. By placing it in its cultural, social, and political history, she demonstrates how 'Hall's film fuses

aspects of US and Australian national myth, traces of US Depression-era and wartime hopes and fears, irrigation mythology, and technological optimism' to drive for the development of the Snowy River and associated irrigation projects. Bailey's article pushes the methodological boundaries of environmental history in Australia and the US through its innovative use of film, and opens up novel points of transnational comparisons between the US and Australia.

The next contribution in the volume turns to gardens. In 'New perspectives on methodology in garden history: Approaches towards writing about imported medicinal plants in colonial New Zealand', Joanna Bishop uses the case study of the use and introduction of imported medicinal plants to speak to wider historiographical and methodological concerns relating to the disciplines of garden history, environmental history, and health history. Through a sustained discussion of the methodological uses of a variety of sources on imported medicinal plants, Bishop both argues for the need for the three disciplines to speak to one another and presents an elegant case study of the benefits of such an approach in providing new perspectives on colonial environmental history, plant introductions, and plant uses.

Ts'ui-jung Liu and I-chun Fan move discussion of the impacts of colonisation and environmental change from Australasia to north-west China. Their article, 'The Tuntian system in Xinjiang under the Qing Dynasty: A perspective from environmental history', presents a novel examination of the nature, extent, and impact of the Qing Dynasty's (1644–1911) varied land settlement schemes in Xinjiang, using Geographic Information Systems (GIS) to map these changes. They highlight the several different systems of land settlement introduced into the region by Qing authorities: Bingtun (兵屯, land tilled by soldiers), Qitun (旗屯, land tilled by soldiers of the Banners), Qiantun (遣屯, land tilled by exiled criminals), Mintun (民屯, land tilled by civilians), and Huitun (回屯, land tilled by the Uyghur 維吾爾人). They argue that most early schemes relied on the development of public lands, but that over time they morphed into private schemes. The authors show that later schemes were the most successful at land development. Their article is particularly useful for the comparative dimensions it opens up with similar schemes of settlement and pacification in other parts of the world at the same time, where settled states tried to introduce agricultural schemes as a means of sedenterising and, as they saw it, civilizing nomadic peoples.

The final article of this volume is Arleigh Ross D. Dela Cruz's 'Epizootics and the colonial legacies of the United States in Philippine veterinary science'. This offers a new interpretation of the efforts of US colonial officials to eradicate rinderpest from its new colony. As Dela Cruz shows, in the first few decades of colonial rule, all US anti-rinderpest schemes failed, including inoculation and quarantine. They failed, as Dela Cruz argues, because of a combination of infrastructural

problems, scientific limitations, and local resistance to the measures that officials tried to enact. Ultimately, however, the development of an effective serum and inoculation programme in the 1920s succeeded in eradicating the disease from the island's cattle by 1939. Despite such success, the author demonstrates that the programme caused great resentment from among cattle owners, because it flew in the face of local customs regarding the treatment of animals.

I am delighted that the contributions to this volume uphold the journal's goal to provide a truly world coverage of environmental issues. Our contributors, from Taiwan, the Philippines, Australia, and New Zealand, each embrace interdisciplinary, comparative, and transnational methods, while still recognising the importance of locality in understanding global processes.

Editor's note: Janette-Susan Bailey

The editing of this volume is tinged with sadness at the passing of one of the contributing authors, Janette-Susan Bailey. With a PhD from the University of New South Wales, Australia, and a combined Honours degree in Film, Theatre and Performance Studies and Environmental Studies, Janette's work exemplifies the very best of environmental history in her cross-disciplinary approaches to historical research. Those wanting to read more of Janette's work can do so in *Dust Bowl: Depression America to World War Two Australia* (Palgrave Macmillan, forthcoming).

Journal aims

Before closing, I would like to summarise the journal's aims, look ahead to some of the papers in the next volume, and request contributions from particular regions. The journal publishes on all thematic and geographic topics of environmental history. It developed in part to enhance the strength of environmental history in places like Australia, New Zealand, India, Africa, and South and Central America—as well as East and Southeast Asia—to which no journals actively catered. In response to this urgent need, it especially encourages articles with perspectives focused on or developed from the southern hemisphere and the 'Global South'. This includes, but is not limited to, Australasia, East and Southeast Asia, Africa, and South America. The expertise of the editorial board reflects the desire for inclusivity and the focus of the journal on these areas.

A second key aim of the journal is to break down the barriers to scholarship and publication by providing a freely available, open-access journal. (For traditionalists, there is also a print-on-demand option.) Research has revealed that the high costs of access to academic journals unfairly disadvantages scholars working in places such as South America, Southeast Asia, and Africa, many of whose universities often do not have the funds to subscribe to expensive journals, even for online accounts.¹

A third motivation is to provide a forum for highly original—even contentious—scholarship that promises to reshape the field or to provide bold overviews of fields of use to teachers or students approaching the topic for the first time. A particular advantage of an online journal such as this is that it enables publication of scholarly articles that may be longer than most journals accept, or which may contain a large number of high-quality images.

The next volumes

The next volume of the *International Review of Environmental History* is already well underway and we have received several submissions. A second issue of the journal is also planned for 2017, drawn from papers presented at ‘Foreign Bodies, Intimate Ecologies—Transformations in Environmental History’, held at Macquarie University from 11–13 February 2016. The volume will be edited by Ruth Morgan and Alessandro Antonello.

I especially encourage submissions on topics in South Asian, Russian, South American, or African environmental history.

Submission details

See inside cover.

Acknowledgements

I am indebted to the support of so many for making this publication possible. The *International Review of Environmental History* is published with the support of the Centre for Environmental History, The Australian National University, whose Director, Professor Tom Griffiths, has enthusiastically backed this venture from the outset. In 2013, Professor Bruce Clarkson, then Director

¹ Much of this scholarship is summarised in: Right to Research Coalition, ‘Why Open Access?’ www.righttoresearch.org/learn/whyOA/index.shtml#Developing_Countries, accessed May 2015.

of Environmental Research Institute and now Deputy Vice Chancellor, Research, University of Waikato, granted me the time to devote to planning and preparing the journal by giving me teaching buy-out. I also thank Professor Greg Barton, who while at The Australian National University initiated discussions with ANU Press about the journal. Brett M. Bennett, Associate Editor, has taken a lead in soliciting papers and in reading and commenting on material, and I am especially grateful to him, and my supportive and active Editorial Board for enabling me to test ideas and share material with them. Further support for the journal has also come from Associate Professor Nicola Starkey, Associate Dean Research, and through a Small Research Grant, Faculty of Arts and Social Sciences, University of Waikato. Finally, I am thankful for the copyediting skills of Dr Austin Gee.

James Beattie, Editor
Dunedin, June 2016

POLITICAL AGITATION FOR FOREST CONSERVATION: VICTORIA, 1860–1960

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Abstract

Victoria has a remarkably long history of agitation to gain political influence over forest management. With much of the region being forested on the eve of European colonisation in the mid-1830s, more than a century ensued of government support for forest clearance and the exploitation of forest products. From the early 1860s, however, various interest groups engaged in lobbying, petitions, public protest meetings, strategy planning conferences, press campaigns, circularising, and deputations to pressure Victoria's parliament during, and between, elections to conserve the forests. By international standards, these campaigns came relatively early, were diverse, persistent and well coordinated, but at least initially met with little success. Furthermore, as was the case throughout Australasia and much of the British Empire, most of Victoria's forests were publicly owned and managed (as Crown land reserves) for various public purposes,¹ but were predominantly exploited by private industry.

The role of key parliamentarians, public servants and institutions governing the development and application of forest legislation is gradually being detailed.² However, there is a need to consolidate and develop the varied research that has been done on the contribution of the various non-government organisations and individuals. In particular, the influence of the popular press and the mining lobby has hitherto been seriously understated, while some modern environmentalists have tended to undervalue the long history of struggle, and dismiss its utilitarian emphasis.

1 Ray Wright, *Space and the Public Interest in Victoria, 1836–84* (Melbourne: Oxford University Press, 1989).

2 Joseph Powell, *Environmental Management in Australia* (Melbourne: Oxford University Press, 1976); Frank Moulds, *The Dynamic Forest: A History of Forestry and Forest Industries in Victoria* (Melbourne: Lynedoch, 1991); Leslie Carron, *A History of Forestry in Australia* (Canberra: Australian National University Press, 1985); Stephen M. Legg, 'Debating Forestry—An Historical Geography of Forestry Policy in Victoria and South Australia, 1870–1939' (PhD diss., Monash University, 1995); Wright, *The Bureaucrats' Domain*; Angela Taylor, *A Forester's Log: The Story of John La Gerche and the Ballarat–Creswick State Forest 1882–1897* (Melbourne: Melbourne University Press, 1998); Brian V. Doolan, 'Institutional Continuity and Change in Victoria's Forests and Parks' (MA diss., Monash University, 2015). These references document many of the conservation-minded politicians and bureaucrats who campaigned to save the forests, but who remain largely beyond the scope of the present paper.

Using a broadly chronological narrative, this paper outlines the purpose, methods, organisation and impact of lobbyists involved in three landmark disputes over forest conservation. It traces changing attitudes to, and major policies governing, Victoria's forests, focusing particularly on perceptions of the role of public forestry. In so doing, it demonstrates the length, breadth and complexity of the forest conservation campaigns.

Keywords: forest conservation, political agitation, lobbying, gold-mining, the press, Victoria

The press: An overview

A comprehensive analysis of the press lies beyond the scope of this paper, but a few strategic observations are useful to indicate the nature, timing and intensity of press coverage during the study period, as well as to contextualise the role of the press in lobbying for forest conservation. Figure 1 shows the historical distribution of the 1,565 items dealing directly with forest conservation published between 1863 and 1956, revealed by a survey of 73 newspapers from 59 communities across Victoria.³ Press coverage grew from the early 1860s due largely to debate on the need to conserve timber and firewood for consumption by the gold-mining industry and pressure from mining interests (see 'The mining lobby, 1865–1907' section below). This was followed by half a dozen notable episodes, mainly coinciding with parliamentary raids on forest reserves for settlement and failed parliamentary forestry bills, before peaking in 1887 with massive deforestation in the Otway Ranges, and around the general election in 1889 at which forest conservation was a minor but persistent issue. Apart from calls to secure mining timber supplies, largely through the introduction of government-run 'scientific forestry' on Crown land reserves, there was considerable contention about the need to preserve native forests and expand plantations to ensure the supposed climatic benefits of forests. The climatic value of forests received much attention during, but was not exclusively limited to, periods of drought (especially in the mid-1880s and the so-called Federation drought 1896–1902).⁴ Much of the conservation material presented was initially sourced from overseas and supported by the progressive local press. The sharp

3 Survey results from search string 'forest + conservation' in Trove historic newspaper digital database of 73 of Victoria's most prominent and long-lived metropolitan and provincial newspapers, 1840–1957. The survey comprised 12 titles from metropolitan Melbourne, 15 from outer Melbourne suburbs, five from provincial cities (Ballarat, Bendigo and Geelong) and 41 from small country towns.

4 Stephen Legg, 'Debating the Climatological Role of Forests in Australia, 1827–1949: A Survey of the Popular Press', in *Climate, Science, and Colonization: Histories from Australia and New Zealand*, ed. James Beattie, Emily O'Gorman, and Matthew Henry (New York: Palgrave Macmillan, 2014), 119–36.

decline in coverage in the 1890s owed much to the financial crisis and ensuing economic depression of the early 1890s as well as falling gold yields, both factors contributing to reduced timber consumption and temporarily less pressure on the forests. Other factors suppressing calls for forest conservation in the early 1890s included reduced forest clearance for agriculture, a dramatic decline in timber and firewood use by the Victorian Railways (for sleepers and firing locomotives respectively), and increasingly effective political organisation by rural interests.

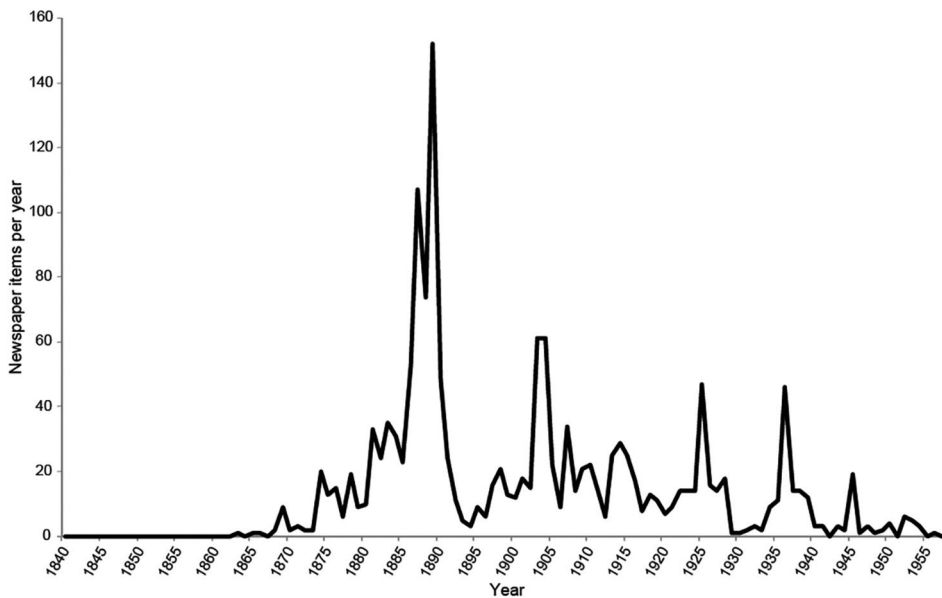


Figure 1: Press coverage of forest conservation issues in Victoria, 1840–1957.

Source: Analysis of all reports dealing explicitly with forest conservation published in 73 Victorian newspapers, 1840–1957.

Press coverage revived during the late 1890s as agitation grew for significant forest reforms. These were forthcoming with the establishment of a Royal Commission on Forests in 1897 and expansion of forest reserves under the 1898 Land Act. The commission produced 14 separate reports before closing in 1904, a year that saw intense public lobbying over forest exchanges between the Lands and Forests Departments. Conservationists' hopes were soon dashed by the popular clamour for 'Closer Settlement' through the excision (subdivision and sale) of Crown lands, rising fears that existing forest reserves harboured vermin and noxious weeds, the growing scientific criticism of the popular belief that forests attracted rain, and the increasing success of irrigation in agricultural regions. Nevertheless, the 1907 and 1918 Forests Acts both resulted in the establishment of more independent and professional forest services in Victoria as well as ushering in an era of relative institutional stability in public

forests management.⁵ The remaining peaks in press coverage were separated by a lull brought on by the exigencies of the Great Depression, World War II, and the postwar housing boom respectively (the first seriously reducing timber consumption and the latter two involving huge drains on timber supplies). The three intervening peaks related to intense struggles over the mountain forests between conservationists, water managers and the Forests Commission of Victoria (FCV) on the one side and agricultural and grazing interests on the other in the 1920s (see 'The Otway Forest dispute, 1923–25' section below), a split between conservationists and the Forests Commission over timber extraction on selected sites (see 'The Cumberland Valley dispute, 1923–43' section below), and concerted campaigns to 'Save the Forests' in the late 1930s, culminating in 1944–45 (see 'Diversifying Values, 1936–55' section below).

The popular press in Victoria, and elsewhere in Australia, was the largest single forum for information on forest conservation issues during the study period, especially before the end of World War II after which there was a notable decline in political activism by the press on most issues until the late 1960s. Forest conservation was widely canvassed by the 'progressive' press across Victoria during the study period, with support across the political spectrum from the conservative to the more liberal press, and with Labor party supporters particularly active in the first half of the twentieth century. The Victorian press was instrumental in popularising broader conservation-related concepts such as 'Forest Influences on Climate' (from the late 1850s), the 'Balance of Nature' (from at least 1861), an 'Ecological Awareness' (indirectly from at least the 1880s and directly from 1906), a 'Forest Conscience' (from 1912), and the importance of forest habitat to nature conservation (adding to the earlier species emphasis particularly from the 1920s). As pressure for game preservation rose from the 1880s, demands for forests as wildlife sanctuaries grew, and these calls gradually diversified during the following 70 years with campaigns for National Parks and wider recreational use of forests.⁶ Specialist 'natural history' and 'scientific' columns supported the growing interest in Nature, in which forests were seen to be increasingly important. Collectively, the press fuelled debate and positioned action with a regular and voluminous stream of summaries of relevant parliamentary debates and papers (the latter including departmental reports and committees of inquiry), deputations, election speeches, lobbyists' press releases and speeches, minutes from the local mining and forest boards as well

5 Doolan, 'Institutional Continuity', chap. 3.

6 Campaigns to preserve forests for wildlife habitat in Victoria became prominent from the 1920s: see Stephen Legg, 'Bunyips, battues and bears: Wildlife portrayed in the popular press, Victoria 1839–1948', in *Conservation of Australia's Forest Fauna*, ed. D. Lunney, 2nd ed. (Mosman: Royal Zoological Society of New South Wales, 2004), 150–74.

as local municipal council meetings, public lectures from Melbourne University and learned societies (in science, forestry and agriculture), book reviews, and gleanings from disciplines including economics, science and natural history.

Initially, newspaper conservation campaigns focused mainly on colonial/state government affairs, with reporters assiduously analysing parliamentary bills related to forest management and proposing their own legislation. Editors regularly attacked ministerial raids on the forests for settlement, usually from Lands and Agriculture ministers, lamented the influence of vested interests in parliament, and railed against inadequate controls over timber-getting, ring-barking and bushfire. In mining districts there was strong support for local control of forest management to stave off political pork-barrelling from afar. Up to the late 1930s, editors often proactively canvassed what was seen as examples of progressive forest management, the rationale during an era long dominated by agricultural clearance being that forests could only be saved from destruction if their utilitarian value was assured. Arboriculture for the lightly wooded regions was often promoted during the late nineteenth century to ameliorate climate and increase local wood supply. The importance of forests in water supply became prominent from the 1880s with the spread of irrigation, and from the 1920s with increasing efforts to control erosion in forested watersheds. Local government management of forests, such as municipal council by-laws protecting forests, the control of roadside trees, and regulation of timber cartage on local roads, were widely canvassed. Although the provincial press often 'boosted' the timber industry and agricultural clearance for local economic development, attempts by local councils and councillors to conserve forests were also occasionally promoted. Federal government policies (from Federation in 1901) received less attention in part because forest control was largely assigned to the states under the Constitution, and also because some Federal policies met with press resistance, e.g. over plans to relocate state forestry schools to the Federal capital, Canberra, early in the twentieth century, and persistently with tariff policies influencing the cost of timber imports.

For at least a century after the earliest campaigns were mounted in the 1860s, the press was exploited effectively by the various forest conservation lobby groups with the strategic use of press releases honed to an art form, and with letters to the editor a significant outlet for public opinion. Quite apart from the unprecedented forum offered by the newspapers, press owners and editors were among Victoria's most powerful conservation lobbyists. At least 16 Victorian newspapers consistently lobbied on the issue, and in many cases maintained persistent editorial lines that long outlived the activists and campaigns they supported. Dozens of other newspapers regularly published pro-conservation articles, even though their editorials were silent on the issue. Even in the most densely forested regions, where forests appeared an obstacle to agricultural

development and the timber industry was often exploitive, a few individual newspapers and editors were prominent activists.⁷ Much of the press lobbying emanated from the Melbourne metropolitan region and especially from the central and north-eastern goldfields—and it is to the goldfields agitation that I now turn.

The mining lobby, 1865–1907

Paradoxically, gold-mining was one of Victoria's major agents of forest degradation and yet also an industry that led the early public struggle for forest conservation.⁸ This leadership was in pursuit of self-interest, and arose because no other interest group was powerful enough to promote forest reservation against the other lobby groups. For more than 40 years from the mid-1860s, the organised mining interests and the parliamentary 'mining members' who represented the mining electorates maintained a surprisingly consistent, generally unified and ultimately effective political agitation. This was despite jealousies between different mining districts, the fickle nature of factionalism in the Victorian parliament, and the fact that the mining members rarely comprised more than a third of parliamentary seats. Mining interests fought to establish a system of well-regulated state forest reserves to stave off the depredations of settlers and timber getters. They also forced the establishment of a number of committees of inquiry into forest management (especially the State Forests Inquiry 1865, Foreign Industries and Forests Royal Commission 1871, and the Forests Royal Commission 1897–1904).⁹ They lobbied for effective regulation, shaped the introduction of more than a dozen forest bills, and with their allies succeeded in 1907 in having the first substantial Forests Act passed in the Victorian parliament. Although their political influence declined dramatically due to the collapse of gold yields from 1905, they managed to force the concession of a joint ministry of Mines and Forests (1904–09) and ensured that eight of the next 10 Mines ministers before November 1924 held the Forests portfolio simultaneously. Without in any way understating the widespread destruction wrought on forests by the mining industry in Victoria, their political

7 Stephen Legg, 'Forest Conservation and the Gippsland Press: A brief editorial survey, 1855–1962', in *Earth and Industry: Stories from Gippsland*, ed. E. Eklund and J. Fenley (Melbourne: Monash University Publishing, 2015), 20–36.

8 An overview is provided here as I have detailed some of these complex campaigns elsewhere: Stephen M. Legg, 'Mining and the Timber Question – early forest conservation movements in Victoria before 1918,' Asia-Pacific Economic and Business History Conference, University of Melbourne, February 2008; 'Passionate Advocates', in *Australia's Ever-Changing Forests VI*, ed. B.J. Stubbs, J. Lennon, A. Specht, A., and J. Taylor (Canberra: Australian Forest History Society, 2012), 187–200.

9 Mining interests also ensured the Royal Commission into Gold Mining 1889–91 dealt extensively with the shortcomings of forest management.

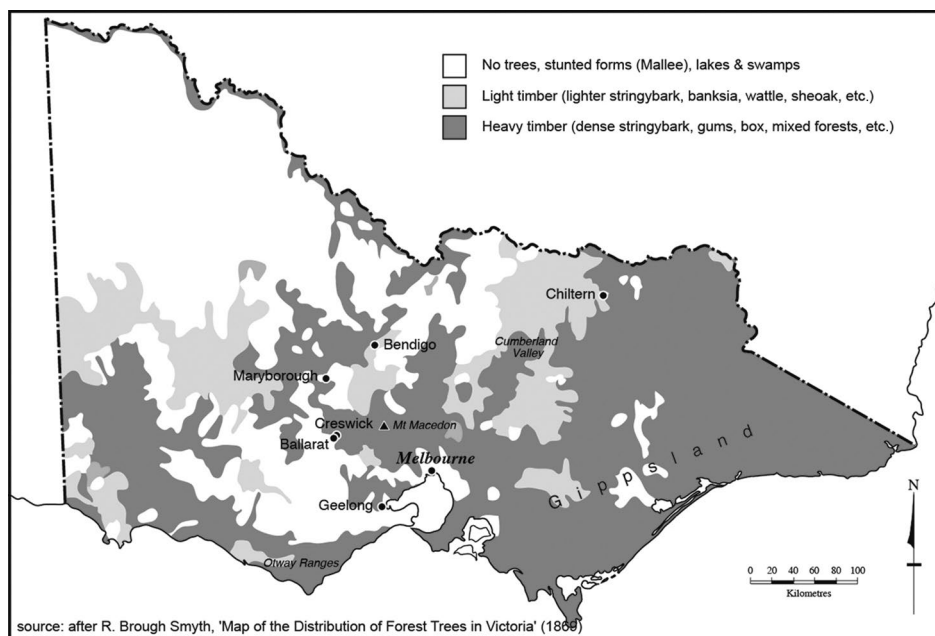
agitation to conserve forests was remarkable by international standards, and was arguably one of the earliest, longest, and most highly organised industrial forest conservation campaigns in the world.¹⁰

The agitation was led by representatives of the large deep lead and quartz mining companies. They dominated the industry from the late 1860s after the small individualistic surface miners had worked out the easily accessible alluvium. Their concern was to secure massive, cheap, permanent supplies of mining timber and laths for the shafts along with firewood to power the steam engines. The latter drove the quartz batteries, winched the mining cages and pumped water from the mines. But wood prices escalated as the supplies dwindled and were carted from increasingly distant forests. As well as the continued assault on the forests by the miners, local timber was depleted by forest clearance from many quarters. Prospective settlers clamoured for forest lands for agricultural purposes and to speculate on rising timber prices; graziers seasonally lit fires to promote fresh grass and their cattle depleted seedlings. And there was a wide range of destruction from poorly regulated timber getters, sleeper hewers, firewood collectors, and timber millers. The Amalgamated Miners' Association (AMA) became increasingly concerned to join the agitation from the 1880s as the miners' jobs became marginalised by rising timber prices and their lives were threatened by the deteriorating quality of pit props.¹¹ Parliament was lobbied on the matter by the various regional mine owners', managers' and directors' associations, the local stock exchanges, shareholders' associations, the miners' unions, the Chambers of Mines, and especially the mining boards who coordinated the agitation. There was strong support from many of the goldfields' municipal councils.¹² The popular press in Melbourne and on the goldfields notably from Ballarat, Bendigo and Maryborough (see Map 1) were particularly active in publishing international and local concerns over forest conservation.

10 Whereas the Victorian gold-mining industry avoided planting its own timber supplies and relied instead on agitating for public forestry, a few corporations elsewhere established their own forest plantations. These included the coal Mining Company of Ireland's pit-prop plantation at Glendalough from 1857 (www.mindat.org/article.php/368/A+History+of+Glendalough), experimental plantations from the early 1870s by various US railroad companies (John Ise, *The United States Forest Policy* (New Haven, CT: Yale University Press, 1920)), and the Gold Mining Estates' mining timber plantations on the Transvaal from 1903 (Grant Wardell-Johnson and Michael Calver, 'Toward sustainable management: Southern Africa's Afromontane, and Western Australia's jarrah, forests', in *A Forest Consciousness: Proceedings of the Sixth National Conference of the Australian Forest History Society Inc.*, ed. M. Calver et al. (Rotterdam: Millpress, 2005)). The (imperial) Nuremburg Reichswald was originally established in the fourteenth century after agitation from merchants concerned at fuelwood shortages that endangered the local metal industry (Otto Kandler, 'Historical Declines and Dieback of Central European Forests and Present Conditions', *Environmental Toxicology and Chemistry* 11 (1993): 1077–1093).

11 As prices rose, mines increased the spacing of new props and replaced decayed timber less frequently. Mine dividends and employment fell by about a third each during the 1880s: Legg, 'Debating Forestry', 145–6.

12 Support from some of the mining boards and municipal councils in densely forested areas such as Gippsland and the North-East was sometimes lacking.



Map 1: Victoria's forests, 1869.

Source: After R. Brough Smyth, 'Map of the Distribution of Forest Trees in Victoria' (1869).

The mining boards were alarmed at the land rush into the goldfields forests resulting from section 42 of the 1865 Land Act (and subsequent 'selection before survey' settlement legislation). The campaign's principal coordinator was Ballarat Mining Board secretary James Bickett until his retirement at age 87 in 1905. The mining boards successfully lobbied for the establishment of permanent state forests in 1865–66 and were instrumental in securing large portions of the main mining timber-supply forest at Bullarook, near Ballarat, in 1869. Forest reservation increased across Victoria, but many reserves remained subject to ministerial revocation without parliamentary approval. Ostensibly, wishing to better control the pork-barrelling that regularly saw Lands and Agriculture ministers agree to the alienation for settlement purposes of timber reserves and state forests, the mining interests fought successfully from 1872 for the establishment of local forest boards. Hamstrung by their inability to raise sufficient revenue and burdened by petty squabbling among the 13 local forest boards over control of neighbouring forests, the local boards were soon dismantled although, in the interim, they were coordinated by a newly established Central Forest Board (1874–88), which was the administrative precursor of the later Forests Branch. The Forests Branch was itself starved of funding and for most of its 19-year history was shuffled between the powerful Lands and Agriculture departments whose officials remained largely inimical to forest conservation. The mining interests campaigned to have the branch

controlled by the Mines department, which was more likely to align with their sectional interests, and this was achieved briefly in the early 1890s and then indirectly during most of the period from 1905 to 1918.

The lobbyists employed press campaigns, petitions, notices of motion in parliament and the stacking of committees of inquiry by the 'mining members', as well as increasingly powerful and widely represented deputations to the relevant ministers. As the forests were depleted, the agitation became consecutively dominated by the central goldfields around Ballarat, Maryborough and Bendigo, then the north-east around Chiltern, and finally Melbourne—the last through the central Chamber of Mines and representatives of some of the Gippsland mines.¹³ Figure 2 shows the timing of these deputations and the location of participating members during the study period. From the late 1880s, the rising price of mining timber from the continued depredations on the forests made the situation more urgent. Thereafter the degree of coordination, sophistication and breadth of interest group alignments increased markedly.¹⁴ The lobbyists included once peripheral groups such as the apiarists, once competitor groups such as the timber millers and merchants, and increasing involvement from the miners' unions.

The alienation of forests for settlement at Mount Macedon in 1879 and in the Otway Ranges in 1887 caused a furore in the parliament and press.¹⁵ The mining lobby were particularly alarmed at the loss of important mining timber supplies and more especially at the minister's flagrant rejection of the expert advice regarding the inevitable abandonment of these lands once the forests had been destroyed. The climatic, hydrological and silvicultural losses from the clearance were concerning especially as it was feared that many of those selecting Crown lands were merely speculators ('land jobbers').¹⁶ The Land Acts required bona fide selectors to annually 'improve' their land by clearing with axe and fire, and while many settlers simply acquired the land to sell off the timber, the forest was destroyed just the same.

13 The latter included the state coal mine at Wonthaggi after the Great War.

14 It is likely that the mining interests' campaign would have been largely dismantled had the railways been able to meet increasing demands for mining timber either by extension to new supply forests or lower freight charges, or if there had been adequate coal supplies to substitute for firewood.

15 Much to the delight of his conservative contemporaries, firebrand Melbourne *Age* editor David Syme's campaign against 'political influence' was compromised by his alleged pressure, via parliamentarian Alfred Deakin, to ensure Lands Minister Francis Longmore maintained the forest reserves surrounding Syme's Mount Macedon residence (*Gippsland Times*, 18 June 1879).

16 Settlers obtaining Crown lands under a series of land settlement laws between 1860 and the late 1890s were dubbed 'selectors' until they met all of the licence and lease requirements under the relevant Selection Act.

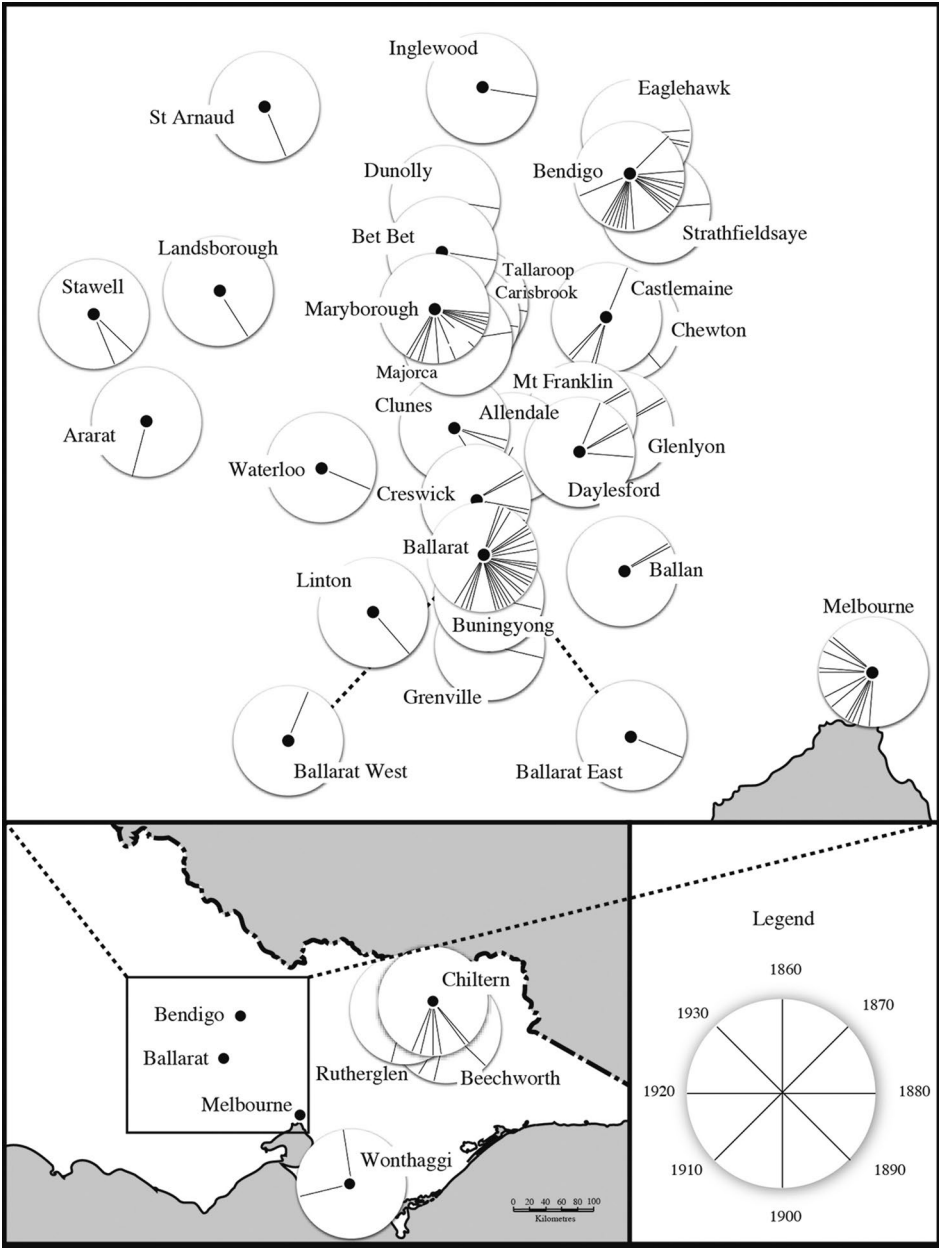


Figure 2: Mining timber deputations, 1864–1938.

Source: Analysis of reports of mining timber deputations published in 73 Victorian newspapers, 1840–1957.

From August 1888, the mining interests were joined in Bendigo by the Northern District Forests Conservation League (NDFCL). The group was a loose coalition of mine owners, municipal and commercial interests. Parliamentary mining

member James McColl and Bendigo timber merchant and Mayor Cr J. B. Hoskins as well as Mayor Cr J. Cohn were among the most prominent members—the NDFCL chair always being the incumbent Mayor of Sandhurst. The NDFCL regularly canvassed support from municipal councils throughout Victoria. They circularised parliamentarians requesting them to publicly pledge their position on forest conservation, promoted their own forests bill, lobbied and petitioned the minister, sent deputations, and strongly canvassed conservation in the 1889 general election.¹⁷ About a quarter of parliamentary candidates around Ballarat, Maryborough and Creswick showed some concern at forest destruction but there was little in the way of a consistent or comprehensive solution to the problem. The NDFCL forced more unified support for forest conservation among candidates in the northern electorates around Bendigo, but the government's promised forest bill was never delivered and the League was disbanded after June 1890.¹⁸ Mining interests managed to secure a massive increase in forest reserves from the 1898 Land Act, thanks mainly to the recommendations of a comprehensive 1897 report by Surveyor General S. K. Vickery and Chief Inspector of Forests J. Blackburne, as well as the efforts of the Royal Commission on Forests established two months later. James Blackburne was later embittered by his treatment by the government and frustrated at the general lack of reform in forestry management. He was also critical of the government's dealings with his mentor, Chief Conservator George Perrin, whose untimely death in 1901 gave Blackburne hope to lead the Forests department.¹⁹ Perrin's departmental reports recognised the importance of mining but he was often in dispute with the mining lobby over their resistance to both harsher forest regulations and the introduction of royalties. One of Perrin's last reports protested that a proposal to amalgamate the Forests branch with the Mining department would see conservation 'subservient to the timber requirements of the mining districts'.²⁰ Perrin was alternately allied with, and an obstacle to, the mining interests.

17 The NDFCL was predated by a dozen years by a few US Forestry Associations established from 1875. The US Associations had wider aims that encompassed arboriculture and climate amelioration compared to the mining-timber-oriented NDFCL, and despite its title the latter cannot strictly be regarded as 'the first conservation group in the world' (Tim Bonyhady, *The Colonial Earth* (Melbourne: Miegunyah Press, 2000), 182). Even earlier political agitation for forest conservation came from Forestry Associations formed in Switzerland and Austria in the 1840s, and the Scottish Arboricultural Society established in 1854.

18 See electoral speeches and political platforms by candidates and goldfields organisations for the March 1889 election in the *Ballarat Star*, *Ballarat Courier*, *Bendigo Advertiser*, *Bendigonian*, *Creswick Advertiser*, and *Maryborough Advertiser*, *passim*.

19 Blackburne clashed with Lands ministers throughout his career, notably as a young district forester resisting alienation of the Bullarook Forest (*Argus*, 10 February 1881) and later as Forest Inspector when his reports on the Fumina Lands were ignored in 1903 (Legg, 'Passionate Advocates', 196). His grievances included Cabinet's failure to ratify the Public Service Board's recommendation that he be appointed acting Conservator in 1901, the abolition of the position of Chief Forests Inspector 'for cost cutting reasons' in 1902, and government bungling of his pension thereafter (*Bendigo Advertiser*, 5 June 1901, 1 March 1902).

20 *Bendigo Advertiser*, 19 January 1891.

In 1903, the Forests branch was shifted yet again between the Lands and Agriculture departments, its Acting Conservator was removed, and it was unable to combat the government's release for agriculture of the densely forested and often inaccessible 'Blue Block' lands. In that year, the recently retired Blackburne was appointed secretary to the short-lived but powerful National Forests Protection League (NFPL). Initially based on Maryborough mining interests, it soon attracted groups from across all of the goldfields as well as an unprecedented alignment of once conflicting interests from throughout Victoria and a couple from other states. A Bendigo branch of the NFPL was formed by the same Councillor Hoskins who had led the NDFCL. The NFPL was mainly but not exclusively utilitarian in its forest values, and there was a well-considered strategy to include the hydrological significance of forests to placate agricultural interests, which were increasingly concerned with irrigation and erosion. The League proved highly effective in repositioning the debate at a time when gold-mining was on the verge of economic collapse. The executive committee's strategy included well-attended protest meetings, public lectures, conferences, and direct lobbying of relevant bureaucrats and parliamentarians, ministerial deputations, pamphleteering, regular contact with similar interest groups, and an intensive press campaign. The NFPL pressured groups as diverse as the provincial Stock Exchanges and the Amalgamated Miners' Union on the impact of deforestation on the loss of profits and jobs respectively. The AMA's annual conferences regularly canvassed the mining timber question between 1904 and 1907.

Nevertheless, in 1904 the NFPL was effectively bought off by the government. The Premier undermined support of some of the key mining members affiliated with it, reinstated the embittered Blackburne as Inspector of Forests in a reorganised Forests department, and as a precursor to the promised forest bill, instituted a wide-ranging field survey of the forests (by forester Arthur Tatham).²¹ Despite the promise, Premier Thomas Bent's Government was returned in a landslide mainly on a platform of expanded Closer Settlement, and settlement interests delayed the bill for another three years. In desperation, the Bendigo Mining Board mooted the formation of a 'United States' Forest Protection League' to bolster the flagging agitation early in 1904, but nothing came of the move. The NFPL's Maryborough and Bendigo branches were active through 1905, but by 1906 the League was only referred to as the Maryborough Forest Protection League and seems to have been disbanded soon after.

21 Tatham had extensive experience as a forester in Ceylon, and his was the third report invited by Victorian governments on forestry by foresters from the British Forest Services in the sub-Continent—the previous two were from Indian foresters Frederick d'Vincent in 1887 and Bertholdt Ribbentrop in 1896. All three reports were scathing of 'political influence' and the neglect of forest conservation. Ironically, Blackburne snidely reflected on Tatham as 'a so-called expert ... who knew little or nothing of Victoria's forests' (*Bendigo Advertiser*, 25 May 1904). Tatham's report brought about little fundamental change.

The mining interests were often joined in their forest conservation campaigns by the powerful and eclectic 'friendly society', the Australian Natives Association (ANA), formed in 1871. Although far from having a single focus, the ANA became the largest interest group to support forest conservation in Victoria during the study period.²² Its size and organisation made it a powerful political and cultural force. Various local branches began promoting forest conservation among their wide-ranging civic interests in 1885 and especially from the 1889 state election. Formalisation of the issue as an ANA policy priority came at the 1903 Annual Conference thanks largely to pressure from mining interests, including the NFPL.²³ The ANA organised parliamentary deputations calling for improved forest management in each of the three years between 1905 and 1907, and this was only the beginning of a lengthy campaign over the next 40 years.

The first comprehensive forest bill to be passed, the 1907 Forests Act, established an independent Forests department under its own Minister of Forests but in practice this portfolio was held jointly with Mines.²⁴ Settlement interests had insisted on a five-year period within which exchanges of land could be made between the Forests and Lands departments, in lieu of any outright loss of forest land. But the remaining parliamentary mining members had little power to bargain in a period when 'land hunger' was renewed, the gold-mining industry had collapsed and a renewed attack on the mining boards saw them eventually dismantled in 1914. Between 1908 and 1910, ANA campaigns to improve management of Victoria's mountain catchment forests were ignored by government largely due to pressure from grazing and timber interests.

22 By 1891 the ANA had grown to 8,000 members in 129 branches in Victoria, by 1941 there were 46,000 members in 330 branches, and 30 years later the number of branches had only increased by nine but there were then 83,000 members (J. E. Menadue, *A centenary history of the Australian Natives' Association, 1871–1971* (Melbourne: Horticultural Press, 1971), 26–31).

23 ANA delegate for the mining district of Rushworth, W. F. 'Mac' McNamara was instrumental in having the forest question placed on the ANA's 'national' policy platform in 1903. He worked for the Forests and Lands departments as a young man and agitated for forest conservation for over 20 years. He rose to be ANA President. McNamara led many deputations and organised campaigns on forest management, including agitation over what became the 1907 Forests Act, mountain forests in 1910 and the struggle for an independent Forests Commission 1916–18 (*Bendigonian*, 21 February 1918). He was also a founding member of the Australian Forests League in 1912. Another highly influential ANA member was 'mining member' parliamentarian Sir Alexander Peacock who was Forests Minister in the early 1920s and three-times Premier throughout his long parliamentary career (1889–1933). As a mine manager, Peacock had been heavily involved in mining timber agitation in the 1880s, and remained connected with mine management most of his adult life.

24 Previous draft bills were defeated in 1879, 1881, 1887, and 1892 (Doolan, 'Institutional Continuity', 115).

Reducing insularity, 1907–22

To fill the power vacuum left by the decline of the mining lobby, and partly to realise the potential of the ANA and the labour unions, conservationists began to rely on a more national perspective. Frustrated at the lack of progress in forestry and broader forest conservation, several foresters and scientists formed the Australian Forest League (AFL) in 1912. The League was proposed at the 1911 Interstate Forestry Conference in Sydney and developed by the Botany section of the Australian Association for the Advancement of Science.²⁵ The Victorian Branch was to remain the most powerful and active of the six state branches, a position it maintained over the next 34 years. Fittingly, it was Victoria's leading mining member, Maryborough MLA Alfred Outtrim, who publicly proposed the Victorian AFL branch.²⁶ However, by 1913 wood supply for the mines was becoming adequate for the first time in decades, thanks to the combination of three factors: the increasing substitution of wood by steaming coal on the northern goldfields by 1904, the dramatic fall in demand for mining fuel and timber from 1905, and increased forest planting by the Forests department from 1908.

The ANA was now joined by organisations led by a new breed of professional foresters and academics with important links to increasingly activist groups such as the Field Naturalists' Club of Victoria (FNCV), formed in 1881. The AFL's inaugural President, Melbourne University Botany chair and Government Botanist Professor Alfred Ewart, was a member of both the FNCV and the AFL, as were a number of others, including prominent Forests department staff member A. D. Hardy and the second president of the AFL, Russell Grimwade. The FNCV periodically lobbied for forest preservation from 1889, and by 1903 had joined Blackburne's NFPL as a corporate member.

The FNCV had strong links through its membership to Melbourne University and the Royal Society of Victoria, as well as natural history groups such as the Royal Ornithologists' Union. By 1907 the FNCV journal, *The Victorian Naturalist*, regularly canvassed the Forests departments' reports supplemented by lectures and papers from forest technician A. D. Hardy, Forestry School Head T. S. Hart, FCV Chairman Owen Jones and forester C. M. Ewart.²⁷ The AFL's journal, *The Gum Tree*, was established in 1917 to more directly lobby on forestry matters. It reciprocated by publicising the FNCV activities, and the

25 *The Gum Tree* (vol. 1, no. 1, March 1917, 5).

26 A mine manager early in his career, Outtrim was Minister of Forests in 1892, one of the Forests Royal Commissioners from 1897, had initiated what became the NFPL in 1903, and was later appointed Minister of Mines (and Forests).

27 Other passionate forest conservationists among FNCV members included biologist Professor Baldwin Spencer, historian Charles Daley and engineer/historian A. S. Kenyon.

two bodies were closely aligned on values—although the AFL was more overtly utilitarian in its view of the forests, and the FNCV was particularly focused on its political agitation to create more National Parks. Both groups regularly railed at the excesses of forest destruction around the state. The AFL, however, was periodically challenged by its strong support for and reciprocal links with the Forests department and after 1918 its successor the FCV.²⁸ Nevertheless, there was no financial support from government for any of the forest lobbies.²⁹

From 1909, leading timber manufacturers and workers' groups pressured governments for the substitution of timber imports with native timbers. They also agitated for the better utilisation of Victoria's hardwood forests through the establishment of a technically advanced state-owned seasoning works and sawmill. But governments reacted slowly. During the Great War, and especially at the 1914 and 1917 elections, the ANA, AFL and FNCV vigorously lobbied to eliminate political interference in forest management, establish adequate funding, reduce waste, expand softwood production, and address growing international concern at an impending 'timber famine'. The Victorian Chamber of Commerce, the Royal Victorian Institute of Architects (RVIA), the Apiarists' Association and various paper manufacturing interests joined the campaign. Valued support came from the ex-forester Governor-General Sir Ronald Munro-Ferguson, and a strengthened forests platform from the Labor Party. Wartime timber shortages and the prospect of employing returned soldiers in forestry work added urgency to the demands for an independent Forests Commission, but it was only by departing from the old departmental model that the increasingly technical operational requirements of a fully professional forest service could be met. Established in 1918, the FCV gained further legitimacy as interest in establishing an Empire Forestry movement peaked around 1920.³⁰

However, only three years after the establishment of the FCV, settlement interests in the Victorian Government lobbied by the powerful Victorian Farmers' Union again renewed the call for forest alienation. Throughout the next two decades, bitter struggles ensued in parliament to limit the FCV's powers.³¹ A range of Commonwealth and Victorian initiatives to bring local land together with British 'men, money and markets' was established in the early 1920s, including

28 'The FCV looked to the League [for] support in its enterprises and to educate the public in the aims and ideals of forestry.' *The Gum Tree* (vol. 6, no. 17, March 1921, 3). The AFL's patron, Governor-General Sir Ronald Munro-Ferguson, represented Australia on the Empire Forestry Association after its formation in 1920.

29 Co-founder of the AFL, V. B. Trapp complained of the lack of financial support at the RVIA and AFL Timber Conference at the Melbourne Town Hall (*Argus*, 29 November 1916).

30 On timber famine see American Forestry Association, 'Proceedings of the American Forest Congress,' H. M. Suter, Washington D.C., 1905; on the Empire Forestry movement see Joseph M. Powell, "'Dominion over Palm and Pine': the British Empire forestry conferences, 1920–1947", *Journal of Historical Geography* 33, no. 4 (October 2007): 852–77.

31 This complex period of political manoeuvring is described in Legg 'Debating Forestry', 263–313.

the Million Farms Scheme, Group Settlement, and a Mountainous Lands clause specifically designed to tackle the densely forested hill country that had resisted earlier settlement attempts.³²

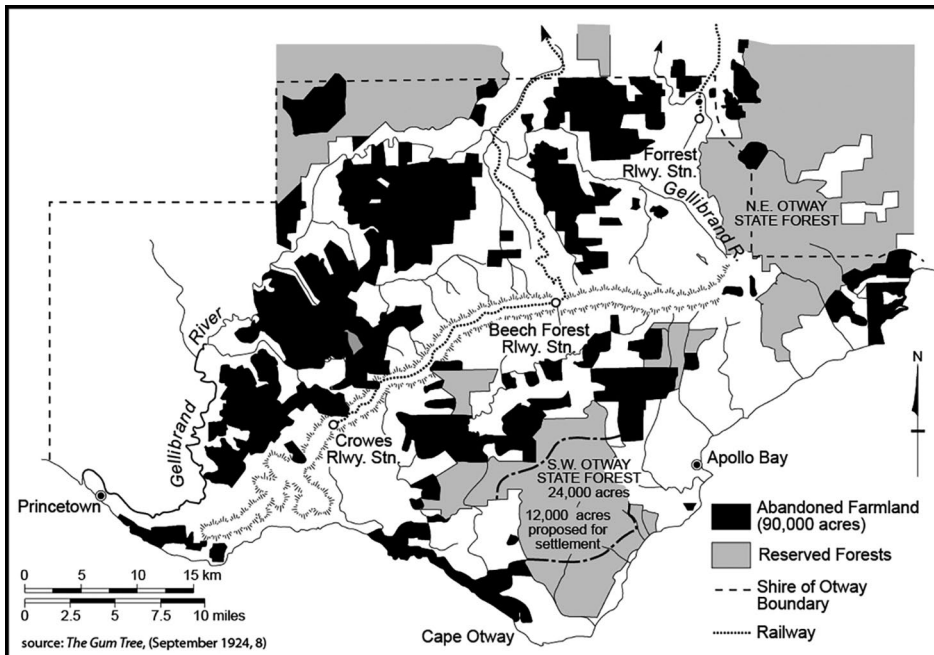
The Otway Forest dispute, 1923–25

The Lands Minister stated in 1921 that he would no longer consult with the FCV over land settlement. The first test case came in November 1923 when he announced a proposal to throw open nearly 27,000 acres of Crown forests for farming in the densely forested Otway Ranges, ironically in an area surrounded by 90,000 acres of abandoned farmland from previous settlement attempts (Map 2). Political agitation to support the FCV's opposition to the scheme was swift. The AFL, ANA, the Australian Women's National League, and the Hardwood Millers' Association mounted numerous deputations to the minister to prevent the proposed excisions. The metropolitan press, led by the *Argus*, *Australasian*, and the *Age* thundered at the scheme and the lack of due process. The deputations pointed to earlier futile attempts at farming in the area and suggested some forests were best left unsettled; the revival of the proposition that forests influenced climate was particularly notable during this dispute. The Millers pointed to the substantial losses in employment, income and royalties that the loss of a sustainable forest industry would cause, but they sided with the FCV's rejection of some conservationists' views that all of the Otway's farmlands should be reafforested. The Millers were later joined in the agitation by the Geelong Timber Merchants' Association who feared that forest clearance might flood the local market with Otway's timber.

In June 1925, the government finally rejected local demands for land, and shelved the scheme in the face of so much opposition. But the Country Party and its supporters did achieve some major outcomes over the next few years: the resignation of FCV Chairman Owen Jones, who later bitterly attacked parliament's neglect of forestry, the reinstatement of statutory exchanges of land between the Lands and Forests departments especially under the 1927 Forests Act (dubbed the 'Deforestation Act' by conservationists), a weakening of fire controls directed at graziers, an expansion of sawmill concession areas, and with the support of the powerful Municipal Association a return of control of

32 Stephen M. Legg, 'Arcadia or Abandonment—The Evolution of the Rural Landscape in South Gippsland, 1870–1947' (MA diss., Monash University, 1984).

'roadside timber' to local councils.³³ Political agitation over settlement expansion in the Otway Ranges and Beech Forest continued over the ensuing decades, but the rationalisation of land settlement in Victoria from the late 1930s and growing acceptance of the critical role in water supply of forested watersheds meant that only minor encroachment occurred.



Map 2: Otway Forest dispute, 1923.

Source: *The Gum Tree* (Vol. 8, No. 31, September 1924, 8).

Victoria's forest disputes from the 1920s were increasingly involved in conflict over control of Victoria's watersheds (Map 3). A major component of this was ongoing tension between the FCV and the leading urban water supply manager, the Melbourne Metropolitan Board of Works (MMBW), over the latter's closure of the catchment forests from 1891, and the FCV's insistence that judicious logging, as successfully practised in other countries, would not interfere with water

33 Local disputes over roadside trees were generally managed by municipal councils. Conflict arose between ratepayers, the councils and Victorian Government over shading and water logging of road surfaces, damage to fencing, access to timber and pasture, and use of strip plantations (the AFL and ANA consistently campaigned for roadside plantations). Control temporarily swung to the FCV in the 1920s, but it was shortlived due to municipal pressure. Newspaper coverage and municipal council minutes show that 'roadside timber' was one of the most persistent and frequent issues with which the public engaged with the matter of trees in public space throughout the study period.

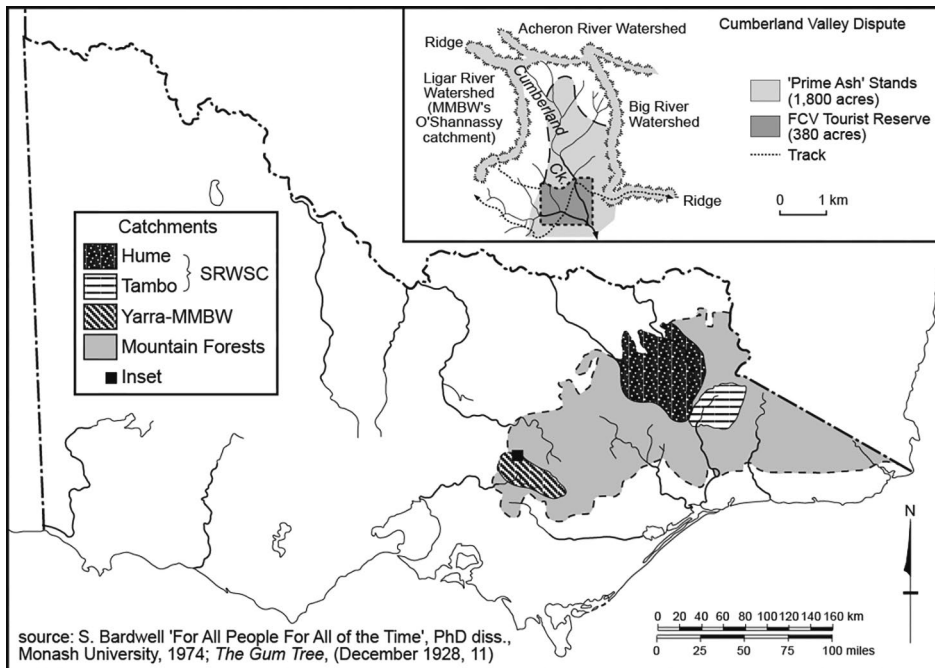
supplies.³⁴ While conservation groups sided with the MMBW, timber interests and local municipalities near the catchments lobbied to throw the catchments open for development lest they 'degrade to a worthless scrub of overmature, decaying trees'.³⁵ Growing concerns with upland erosion, fire prevention, and irrigation water supply heightened interest at this time.³⁶ Timber interests had some limited success lobbying to gain access to the watersheds: in 1891 over the proposed diversion of the Acheron River, in 1907 over access to parts of the O'Shannassy catchment, and in both 1910 and 1915 over the Upper Yarra catchment. The mountain forests represented 35 per cent of Victoria's forest reserves and 80 per cent of the commercial timber species, as well as encompassing Melbourne's major reservoirs—O'Shannassy, Maroondah and Silvan. In 1922, the FCV pushed for the reservation for forestry purposes of 170,000 acres of mountain forests in the headwater between the Tambo and Buchan Rivers in East Gippsland, and in the Hume catchment. The following year, the MMBW responded by requesting an additional 90,000 acres of catchments, however, the Forests Minister compromised by granting the MMBW half that amount and excluding logging from within 25 miles of any weir, but throwing the other 45,000 acres open to logging to appease the timber lobby. This included almost 40,000 acres of pristine forest in the Cumberland Valley (Map 3 inset).³⁷

34 Restrictive catchment management had been used around Yan Yean reservoir 1872–96 and in the Watts River catchment from 1885 (Legg, 'Debating Forestry', 287). See also T. Dingle and C. Rasmussen, *Vital Connections: Melbourne and its Board of Works, 1891–1991* (Ringwood, Vic.: McPhee Gribble, 1991); and Peter Evans, 'The Great Wall of China: Catchment Policy and the Forests beyond the Yarra Watershed: 1850–1950', in *A Forest Consciousness: Proceedings of the Sixth National Conference of the Australian Forest History Conference of the Australian Forest History Society*, ed. M. Calver (Rotterdam: Millpress Science Publishers, 2005).

35 Forests Commission of Victoria—Annual Report, 1925, *Victorian Parliamentary Papers*, 1925–26, vol. II, no. 6.

36 Prominent public critics of Victoria's watershed deforestation in the first half of the twentieth century included State Rivers and Water Supply Commission Chairs Elwood Mead (a co-founder of the AFL) and Sir Ronald East, FNCV member and SRSWC engineer Alfred Kenyon, and agricultural scientist Dr G. L. Wood.

37 Legg, 'Debating Forestry', 286–92.



Map 3: Victoria's major forested catchments.

Source: S. Bardwell 'For All People For All of the Time', PhD diss., Monash University, 1974; *The Gum Tree*, (Vol. 12, No. 48, September 1924, 11).

The Cumberland Valley dispute, 1923–43

The magnificent stands of Mountain Ash at the head of the Cumberland Valley near Marysville had already gained an international reputation as the tallest grove of hardwoods in the world and a pristine beauty spot. But in silvicultural terms, according to the FCV, the trees were fast approaching their optimum commercial age and would soon 'go to waste' if allowed to become 'senescent'. The implicit notion that forests needed human intervention lest they decay or 'rot' aligned with modern forestry economics versions of opportunity cost and declining marginal returns. The idea of decay had also been regularly used by earlier Lands and Agriculture ministers to justify forest clearance and even by some of the leaders of the AFL keen on maximising forest utilisation. It was already a source of division among 'conservationists' and 'preservationists'. The Forests Minister's insistence that 'scientific forestry' would ensure that no damage was done to the beauty spot and that it was the Cumberland Falls not the trees that attracted tourists merely inflamed the situation. The agitation was initiated by a well-crafted press campaign by the Marysville Tourist Board that was soon taken up by the Melbourne newspapers, and was immediately

supported not only by the FNCV but also by the AFL and ANA. Intervention by the influential Town and Country Planning Association (TCPA) led by eminent conservationist Charles Barrett soon followed, and a series of well-attended public meetings and deputations were held over the next few years. Prominent individuals such as painter Arthur Streeton noted the 'endless beauty of the green and living forest' and pleaded 'on behalf of all Australian artists' against the 'proposed vandalism'.³⁸ Forests Minister H. F. Richardson made minor extensions to the planned reserve, and promised a square mile reservation as a Soldiers' Memorial in 1929. The concessions could not placate the agitators, especially those in the FNCV and the TCPA who, unsuccessfully, called for the area to be declared a National Park.

The dispute dragged on for more than 20 years; the successive Forests ministers never lost sight of the opportunities for large royalties from the logging, and always resisted attempts at permanent reservation by Order in Council, which would make forest reserves safe from ministerial whim. Strong protests were again made in 1929 by 16 major and numerous minor organisations.³⁹ Mounting demands from neighbouring Warburton sawmillers to access the nearby forests added to the difficulties. The resurgence of gold-mining during the Great Depression saw the Cumberland groves threatened by water diversions from the Cumberland Creek for mining purposes and this set off a new round of agitation in 1934. The following year Barrett's TCPA vigorously renewed its campaign to establish the area as a National Park but little was achieved despite the FCV Chairman's insistence that the area would be preserved for all time. A few months later, agitation for logging was renewed by the Hardwood Millers' Association and listened to sympathetically by the new Minister of Forests. The AFL renewed its campaign in 1935, as part of its broader push to preserve the watershed forests. The campaigns continued over the next four years and the area, by then claimed to be Victoria's most popular tourist spot, only narrowly escaped destruction by the catastrophic Black Friday bushfires in January 1939. The Cumberland Valley forest was temporarily reprieved by timber supply from the enormous fire-killed timber salvage operations elsewhere that ensued through the war years. Nevertheless, parliament again entertained

38 *Argus*, 16 November 1928.

39 These included the FNCV, ANA, TCPA, AFL, Royal Society of Victoria, Historical Society of Victoria, Returned Soldiers' League, Royal Australian Ornithological Union, Bird Observers' Club, Seedsmen and Nurserymen's Association, Tree Planters' Association, Australian Wattle League, Melbourne Walking and Touring Clubs, Royal Automobile Club of Victoria, and Marysville and District Progress Association (*Argus*, 24 January 1929).

plans to log the area in 1948 to relieve the timber shortages during the postwar housing boom.⁴⁰ Unfortunately, most of the remaining 'big trees' were destroyed by storms over the next 30 years.⁴¹

Diversifying Values, 1936–65

The main legacy of the 1928 Empire Forestry Conference, that brought delegates to the Cumberland Valley, were discussions about the future establishment of a paper industry based on the novel utilisation of pulp from native eucalypt forests. Paper shortages had been canvassed in the Victorian press since 1909 and wood-based manufacture had been debated in various forms from 1916 with plans for pulping future spruce and pine plantations in Victoria's high country. Technological advances in pulping eucalypts in the 1920s and 1930s were a foundation for the Victorian Government's 1936 special legislation covering an agreement between the FCV for native timber supplies to Australian Paper Manufacturers (APM) for their new mill that became operational from 1940 at Maryvale in Gippsland. This was the centrepiece of a new age of industrial forestry in the state, although there had been earlier attempts by the Forests department and later FCV to benefit from associations with big companies. They brought economies of large scale, security of long tenure, and expanded income to reduce reliance on government financial votes and loans.⁴² With the FCV's primary goal of ensuring efficient forest utilisation, the simpler negotiations with only a few large firms were preferred.⁴³ The Great Depression put paid to 1920s plans to resettle the farmland abandoned in Victoria's semi-arid Mallee and the densely forested mountainous lands. Minister of Lands and Forests Albert Lind's radical new settlement policy of 1939 finally moved the state away from marginal settlement.⁴⁴ By 1940, the long history of encroachment on

40 The role of lobbyists engaging competing 'visiting experts' is notable. In 1928 delegates from the Empire Forestry Conference in Hobart were invited to the Cumberland Valley, the pro-conservation *Argus* proudly publishing Empire Forestry Commission Chairman Lord Clinton's remark about the trees that 'to cut them down would be a tragedy. They should be allowed to remain for all time as one of nature's monuments' (8 November 1928). In contrast, in 1948 MLA W. H. Everard's statement in parliament that visiting 'English forest expert' Lord Robinson was 'astonished that such magnificent timber be allowed to go to waste' was published in the pro-development local newspaper the *Healesville Guardian* (4 December 1948).

41 G. Munro, 'Cumberland Scenic Reserve', in *Secrets of the Forest: Discovering History in Melbourne's Ash Range*, ed. T. Griffiths (St Leonards, NSW: Allen & Unwin, 1992), 190–4.

42 Special legislation within the study period included the 1936 Woodpulp Agreement Act with Australian Paper Manufacturers Ltd, 1949 Forestry Pulp and Paper Company's Afforestation Contracts Act, Masonite Agreement Act 1956, and Forest (Pulpwood Agreement Act) 1959 with Commonwealth Sugar Refineries. Three more similar acts governing pulpwood and softwood supply were made in the 1960s.

43 Large companies dealt with by forest management in Victoria in the early twentieth century include the Australian Seasoned Timber Co. at Wandong, Cumming, Smith and Co.'s Wood Distillation Works and The Victorian Powell Wood Process Co. Ltd both at Powelltown, and the Goodwood Timber and Tramway Co. at Darriman.

44 The Royal Commissions into Soldier Settlement 1925 and Closer Settlement 1933, the decision to reafforest abandoned farmland for pulpwood supplies after 1936 and Lind's 1939 New Settlement policy were evidence of a more rational approach to settlement ratified by the 1943 Commonwealth Post-war Reconstruction Committee (Legg 'Arcadia or Abandonment', 403).

forested lands was at last ended, and plans were being considered to transform the geography of sawmilling as recommended by the scathing report of the Royal Commission into the 1939 fires.⁴⁵

The January 1939 bushfires and their aftermath are rightly regarded as a turning point in Victoria's forest history, but two factors are often forgotten. First, critical responses to the ensuing Royal Commission were delayed for up to five years, and second, calls for a radical change in policy approaches had already occurred two years earlier when the ANA began its major new coordinated campaign on interdependent forestry, water, and soil management. Convened by the ANA and supported by both the Victorian and Commonwealth governments, the 29 July 1937 soil erosion conference at the Melbourne Town Hall was unprecedented in the number, representation, authority and seniority of its attendees.⁴⁶ This was soon followed by a joint deputation to parliament demanding a new regime of land management.

Only a few weeks after the 1939 fires, the ANA's 'Future of Forests' campaign was expanded with support from 77 other organisations. The group called for unified control of the forests, with the now embittered AFL chair Russell Grimwade lamenting the 'hopeless situation' in which despite considerable expenditure 'the government had utterly failed to safeguard the forests'.⁴⁷ Expert guests lectured to many of the local ANA branches through the early 1940s on the new policy of 'Forests, Soil and Water'. But a much larger public education campaign was envisaged integrating earlier advances from the 1920s in school forestry and 'forest conscience' campaigns with a massive new public education strategy. In 1944, the Save the Forests Campaign largely usurped the outmoded AFL, which lingered under the tireless Hardy's presidency until at least 1953. Among the stimuli for radical change were the spectre of the catastrophic 1939 fires and dire predictions for the 1943–44 fire season, wartime timber shortages, postwar reconstruction schemes, and especially demands for a more holistic landscape management approach. The change also reflected the plans for industrial forestry, especially given the prominent role of business leaders. These included leading AFL member industrialist and philanthropist Russell Grimwade who

45 On the end of the era of settlement: see Doolan 'Institutional Continuity', 32–5. On the changing geography of sawmilling: see Stephen M. Legg, 'The Location of the Log-Sawmilling Industry in Victoria, 1939–1977' (MA Prelim. diss., Monash University, 1977).

46 The resolutions to establish a nationwide campaign against soil erosion were moved by ANA president J. W. Marrows and supported by leaders from the forest products industry (APM chair Sir Herbert Gepp and AFL president Russell Grimwade), forest management (FCV Chair A. V. Galbraith and Commonwealth Forestry Bureau's H. R. Gray), water management (SRWSC chair L. R. East), agriculture (Dean of Agriculture Prof. S. M. Wadham and Victorian Director of Agriculture H. A. Mullett) and education (Victorian Director of Education J. A. Seitz and Teachers' Union president C. A. Jordan). The biologist F. N. Ratcliffe represented the Commonwealth Scientific and Industrial Research organisation, and Melbourne University Chancellor and prominent conservationist Sir James Barrett seconded the motions (*Argus*, 30 July 1937).

47 *Argus*, 3 June 1939.

had championed ‘scientific forestry’ for 40 years from 1916 and APM Managing Director Sir Herbert Gepp who had been instrumental in Federal postwar reconstruction plans, and whose impassioned campaigns to prevent forest fire and ensure sustainable timber supplies were in part aligned with APM’s needs. Both men had promoted the interdependence of forests, water and soil since at least 1937, and the term became popularised by Stretton’s notion of an ‘inseparable trinity’ in the 1946 Royal Commission into Forest Grazing.

The 1944 Save the Forests Campaign, and its successor from 1952 the Natural Resources Conservation League (NRCL) maintained a strongly utilitarian stance (see Figure 3).⁴⁸ Both groups received wide-ranging support from the government, including a one-off grant to the campaign in 1947 and annual funding of the League by the FCV. There was also a substantial increase in forestry funding after the 1939 fires.⁴⁹ Collectively, the campaign and the NRCL included representatives from 50 organisations, including Victoria’s municipalities, all of the major conservation groups as well as most of their traditional enemies, and a total nominal membership of 100,000 across the state (thanks largely to the ANA), with district committees in 28 provincial centres and an emphasis on community involvement.⁵⁰ Financial and legal support was also forthcoming from APM, with the potential conflict of interests occasionally surfacing within, but contained by, the campaign’s executive. The decision to decentralise support for forest conservation into rural communities was a particularly important departure from the earlier metropolitan bias of the AFL (and to some extent the Victorian National Parks Association) and was to be a hallmark of the NRCL until the mid-1990s. This was enhanced by the NRCL nurseries’ supply of low-cost native trees to its farm and municipal members. From 1944, the League established community forests, adding a further dimension to the widespread Victorian Education Department’s School Endowment Scheme plantations that had been developed from the 1920s. The NRCL also maintained close links with the government through an executive who worked with natural resource departments and a succession of retired senior public servants who led the League.⁵¹ The NRCL generally avoided overt political agitation—although it was instrumental in the formation of the Conservation Council of Victoria in 1970, and some of its directors, such as George Thompson (1962–72), were highly effective conservation activists networking behind the scenes.

48 Poster painted by FCV forester Harry Sennett, who trained under renowned landscape artist Frederick McCubbin.

49 In his public lecture on forestry, FCV forester H. B. Ingle noted that ‘following the Royal Commission on the 1939 bush fires, money was almost unlimited for essential purposes’. *Camperdown Chronicle*, 16 June 1950.

50 Libby Robin, *Building a Forest Conscience: An Historical Portrait of the Natural Resources Conservation League of Victoria (NRCL)* (Springvale South, Vic.: Natural Resources Conservation League, 1990).

51 These included retired chairs of the Victorian Soil Conservation Authority (George Thompson), Vermin and Noxious Weeds Board (Geoff Douglas) and Forests Commission (Dr Ron Grose).

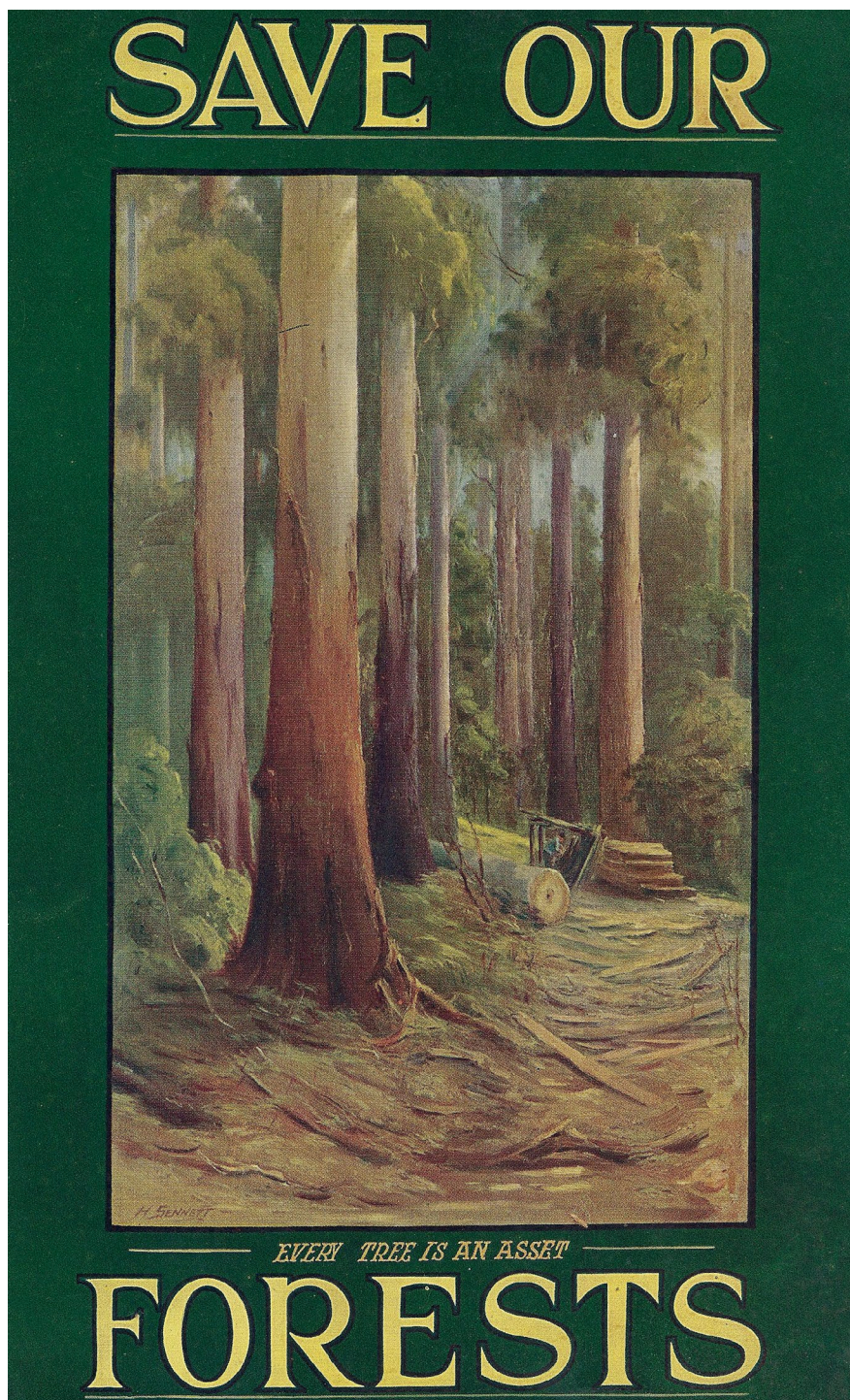


Figure 3: Save the Forests poster, FCV 1940s.

Source: Poster painted by Harry J. Sennett, lent with kind permission to the author by the artist's family.

Political instability in the late 1940s and early 1950s saw successive Victorian parliaments postpone conservation initiatives. The newly formed Save the Dandenongs League 1950, Wildflower Preservation Society 1951, and Victorian National Parks Association 1952, reacted against wartime neglect of reserves and the postwar ethos of development, especially targeting the 1955 election. Although an independent National Parks Authority was not forthcoming until 1956, the 1950s was a period of significant but hitherto unrecognised progress in institutional development for conservation in Victoria, even under deeply conservative governments.⁵² During a period in which the Victorian Government updated all of its major statutes, and thanks largely to lobbying through the NRCL, the 1958 Forests Act was passed. This Act further entrenched the modern era of industrial forestry, and although little recognised at the time arguably set the scene for later polarisation of forest interests. Although some conservationists opposed aspects of forestry during the era of unprecedented economic growth in the 1950s, the disputes were relatively minor.⁵³

In the late 1950s, there was a remarkable groundswell of interest in natural history and conservation in general. Between 1959 and 1960, the FCNV saw the circulation of its journal *The Victorian Naturalist* double to 1,200 copies and membership increase from 491 to 851. The number of conservation organisations affiliated with the FCNV increased from 16 to 23 in 1960 alone (including the Landscape Preservation Council), and there were rising sales of natural history books, as well as increasing membership of other conservation organisations including the NRCL. Across the state there were significant increases in National Park visits.⁵⁴ Beginning with some limited involvement with forest reserves for specific conservation purposes such as co-management with local authorities in Sherbrooke Forest with its renowned lyrebird population and in the Lower Glenelg Forest Reserve, the FCV began to significantly increase its engagement with the public over recreation and conservation issues.⁵⁵ The rising interest in alpine recreation, including skiing and bushwalking, was a factor here. Bushwalking clubs in particular had been prominent advocates for national parks in the 1930s and 1940s. Although some academic staff and students had periodically agitated on environmental issues since the 1880s,

52 See the conservation initiatives of ministers Henry Bolte and Bill Borthwick in Doolan, 'Institutional Continuity', chap. 4.

53 Occasional letters to editors during the 1950s related to threats to the Otways from a plan to establish a pulp mill, the extension of exotic plantations, and the expansion of logging in the mountain forests.

54 *The Victorian Naturalist* 79, no. 2 (June 1962): 31.

55 Compared to the 1920–59 average of correspondence per year in the FCV files dealing with conservation, there was a six-fold increase between 1960 and 1966 (FCV correspondence files, series 11563, Public Record Office Victoria, Melbourne).

Melbourne's universities played an increasingly radical role from the 1960s.⁵⁶ The tremendous increase in environmental concern across the community contributed to the formation of the Australian Conservation Foundation in 1964. The radicalisation of conservation groups that began a few years later was marked locally by the successful 1969–72 campaign to save Victoria's Little Desert from clearance for settlement and was consolidated by the campaign to establish an Alpine National Park.⁵⁷ It is likely that future research will reveal that the roots of the dissent that surfaced so overtly during the late 1960s owed more than is currently realised to the diversification of interests from at least the 1950s. And although there was a gradual increase in wildlife conservation and recreation throughout the 1880s, 1920s, and 1950s, the overwhelming priority in most of the earlier conservation campaigns over the contested spaces described above was on sustaining timber and water flows. As long as virgin forests remained to fuel forest industry expansion, the increasing inability of traditional forest institutions to deal with all of the competing demands through conventional multiple-use and sustained-yield forestry policies remained hidden.

Conclusion

The long political struggle before the 1940s to secure the public forests from alienation and degradation provided a firm foundation from which there was a major expansion of modern intensive, and increasingly export-oriented, forest-based industries from the 1950s. Ironically, it was less than 20 years before mainstream forest conservationists began agitating against the industrial forestry regime that had partly developed out of, and been sanctioned under, some of the earlier struggles—described above—that had attempted to ensure forest survival through enhanced forest product values. Led by a new generation of conservationists, a significant ideological shift occurred under this new 'environmentalist' discourse, especially from the late 1960s.

A pervasive non-utilitarian stance emerged with a much greater emphasis on biodiversity, a global or perhaps 'planetary' perspective, greater polarisation of urban and rural values over natural resource management, and a growing distrust of 'big business'. This was accompanied by a powerful critique

56 Between the 1880s and 1950s these included Melbourne University scientists such as McCoy, Spencer, Ewart, Wadham, Laver, Skeats, Morris, and Green, and both Grimwade and Barrett as Chancellors, as well as student outdoor recreational groups and subject associations.

57 Libby Robin, *Defending the Little Desert: The Rise of Ecological Consciousness in Australia* (Melbourne: Melbourne University Press, 1998); Joseph M. Powell, *An Historical Geography of Modern Australia* (Melbourne: Cambridge University Press, 1988); Dick Johnson, *The Alps at the Crossroads: The Quest for an Alpine National Park in Victoria* (Melbourne: Victorian National Parks Association, 1974).

aimed squarely at the FCV, which had earlier been generally perceived as an independent champion of conservation, except on those occasions, such as in the Cumberland Valley, where preservation interfered with 'progressive' forestry. These changes marked the end of what has been dubbed the 'first wave' of an Australian environmental movement with its utilitarian emphasis on conservation.⁵⁸ Arguably, however, there were two waves, the first before the late 1930s dominated by the threat of agricultural clearance and a reliance on timber imports, and with most conservationists accepting that better utilisation of forest products through 'intensification' could give forests a higher value than the land on which they grew or the imports with which they competed. With the forests effectively secured, a second wave gained momentum between 1937 and 1944, and the 1950s and 1960s brought hope of a new alignment of government with conservation, and forest-based industry capital with labour. The postwar era saw the expansion of both community-based and industrial forestry and a proliferation of forest values within which intensification and forestry itself became sharply challenged, especially over the increasingly evident unsustainability of native forests despite over a century of management under scientific forestry systems. With the many threats to the forests that had so riled the early conservationists before the 1950s now long forgotten, the inevitable ecological transformation wrought by forestry became the environmentalists' new battleground. Victoria's utilitarian natural resource management policies and the highly specialised, professional, public institutions that implemented them in the fields of forest, soil, water and even National Parks were finally dismantled in a wave of massive reforms from the early 1980s.⁵⁹

The 'forest wars' of recent years may reflect additional environmentalist contexts and concerns but they were neither the only nor the definitive environmental battles in a long and rich history of struggle. Many of the early campaigns were organised by non-government activist groups, but it would be misleading to ignore the critical role of the many conservation-minded bureaucrats and politicians who also worked tirelessly to save the forests. And while the cases of political agitation described above were largely confined to overt public practices, no doubt some lobby groups also had greater covert influence than others in dealing with governments. From the 1860s, there was a remarkably consistent use of techniques employed by both lobbyists and governments, but no single group championed the conservationist cause and no narrow set of values drove it. The ranks of Victoria's early forest conservationists spanned an enormous spectrum from both inside and outside the establishment.

58 Drew Hutton and Libby Connors, *A History of the Australian Environment Movement* (Melbourne: Cambridge University Press, 1999).

59 Doolan, 'Institutional Continuity', chaps 5 and 6.

WARTIME POLITICAL AMBITION BEHIND ONE IMAGE OF A DAM IN *AUSTRALIA IS DEVELOPING A DUST BOWL* (1943): US/AUSTRALIAN FILM IMAGERY, ENVIRONMENT, AND NATIONALIST STORYTELLING

JANETTE-SUSAN BAILEY

Abstract

This paper introduces *Australia is Developing a Dust Bowl*, an Australian film made by Ken G. Hall for the national filmmaker Cinesound Productions during World War II.¹ It also introduces an image of a scaled-down reproduction of Australia's Woronora Dam, which featured in several films of the period. The dam, this article argues, represents a broad set of ideas, many of them influenced by US conservation projects, that were being promoted in the print, film, and broadcast media of the time, and the postwar political visions driving these ideas. To identify then examine the meaning of the US ideas located in Hall's film, this paper takes a cultural and transnational approach in order to develop new insights into political and environmental history. Using this approach demonstrates that Hall's film fuses aspects of US and Australian national myth, traces of US Depression-era and wartime hopes and fears, irrigation mythology, and technological optimism. It shows that Australia's wartime politicians were determined to use this set of ideas to drive debate, gain traction, and bolster their credentials in pursuit of a nation-building, postwar water conservation scheme. I argue that Hall's image of a dam in *Australia is Developing a Dust Bowl* represents the determination of the Australian state of New South Wales to dominate the nation's major postwar development scheme by diverting the waters of the Snowy River westward and expand the capacity of Burrinjuck Dam and develop the Murrumbidgee Irrigation Area.²

1 *Drought Grips Riverina* is the first title on the reel and features opening credits. *Australia is Developing a Dust Bowl* is the second title on the reel, and although there is no second set of opening credits, because it has its own opening title and presents a new narrative, I treat the two as separate films for the purposes of discussion. Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), NFSA no. 0679.

2 The American Society for Environmental History supported the development of this paper with a travel grant to the ASEH 2012 conference in Madison, Wisconsin. Barry Muchnick, James Nash, and David Schorr provided important feedback. Thanks to Stephen Harris and Ruth Blair for feedback at Australia and New Zealand American Studies Association (ANZASA) 2012 and to ANZASA for the 2012 Paul Burke Travel Fellowship and a 2012 US Embassy Postgraduate Travel Bursary to support its development. Thanks to Ian Tyrrell and Grace Karskens for feedback on this developing paper at different times from 2010 through 2014, and to Elizabeth DeLoughrey for feedback at the US Studies Centre, Sydney 2014 Early Career Researcher Symposium. Thank you to my two anonymous reviewers for their contribution.

Keywords: World War II; Dust Bowl; US Bureau of Reclamation; western New South Wales, soil erosion, Soil Conservation Service; dust storm; Australian Constitution; Murrumbidgee Irrigation Area (MIA); Snowy River, Snowy Mountains Hydroelectric Scheme; documentary film; desert; irrigation

Introduction

Australia is Developing a Dust Bowl (1943) was a Cinesound Review newsreel film made by Ken G. Hall for Cinesound Productions, Australia's national filmmaker. Its creation was bolstered by the ascension of state and federal Labour³ governments determined to establish national soil and water conservation programmes. The film was made to promote the conservation vision of the Australian state of New South Wales and its Labour Government under William McKell, the state's premier from 1941. *Australia is Developing a Dust Bowl* has evaded commentary by environmental historians, along with a broader collection of films and radio broadcasts, such as Hall's undated *Conserve Water*, that have remained in preservation until now, virtually buried in the national archives. Yet such films make visible the set of ideas that drove politicians and were utilised by them in pursuit of a bold wartime conservation vision. That vision involved transferring the responsibility for soil conservation and water conservation from individual Australian states to the Commonwealth government.⁴

This research combines a cultural methodology with a transnational approach. The cultural aspect involves investigating archival material to trace the sets of ideas expressed in historical film, print, or broadcast media imagery. This enables the study to describe the way that ideas have been expressed, or brought to life, in historical imagery, and aids in recovering material evidence of what these perspectives looked and sounded like to their political backers, creators, and audiences. This enables the broader cultural, political, and environmental contexts that gave rise to its construction to be identified.

This kind of cultural approach to investigating a broad range of historical imagery, its influences, its impotencies, and the forces shaping it, has been established in the US historical context, particularly by scholars such as Finis Dunaway,

3 The use of the spelling 'Labour', as opposed to the American spelling 'Labor', has varied over time in Australia. 'Labour' was the original spelling used until the American spelling 'Labor' is said to have been officially adopted in 1912 and is officially used today. Despite this, 'Labour' was the spelling most commonly used during the mid-1940s, including the publications of the Australian Labour Party (ALP) that have been consulted for this study, so this paper follows that usage.

4 Cinesound Productions, *Australia is Developing a Dust Bowl*; Cinesound Productions, *Conserve Water* (undated), NFSA Title: 75364. For a sustained analysis of a group of 'dust bowl' narratives promoted in Australia during World War II, see Janette-Susan Bailey, *Dust Bowl: Depression America to World War Two Australia* (New York: Palgrave Macmillan, forthcoming 2016).

in *Natural Visions* and more recently in his *Seeing Green: The Use and Abuse of American Environmental Images*.⁵ The present study traces and describes the delayed employment of 'dust bowl' imagery in Australia. It explains the reasons it was partnered with one particular image of a dam, and describes the political context that gave this imagery its potency at this particular time in history.⁶

This article begins by describing both the environmental and cultural scholarship on the US Dust Bowl and New Deal-era conservation. This includes films of the period and the international scholarship describing their influence. It surveys the body of work on US–Australia transnational connections that traverse the Pacific. It then introduces a collection of 'dust bowl' imagery that has evaded attention in the Australian archives until now and considers the reasons for this in a discussion of methodology. It next describes the way that New South Wales wartime and postwar political ambitions for the Murrumbidgee Irrigation Area (MIA) gave rise to the fusion of US and Australian national narratives in films of the time where imagery evoking 'dust bowls' and the dam-building achievements of the US Bureau of Reclamation was common. Finally, it considers the benefits of the interdisciplinary methodology applied here to environmental history.

5 Finis Dunaway takes a wide range of media imagery into account, including popular literature, political prints, cartoons, film, and television in his *Seeing Green: The Use and Abuse of American Environmental Images* (Chicago: University of Chicago Press, 2015) and *Natural Visions: The Power of Images in American Environmental Reform* (Chicago: University of Chicago Press, 2005). In addition, on filmmaking and environmental contexts, see for example Gregg Mitman, *Reel Nature: America's Romance with Wildlife on Films* (Cambridge, MA: Harvard University Press, 1999).

6 Paired with the transnational aspect of this research approach is the cultural aspect, and this reflects the cross-disciplinary expertise of the researcher. For some of the fruits of this approach see Bailey, *Dust Bowl: Depression America to World War Two Australia*; "'Dust bowls'", TVAs and Snowy River waters: John Heyer, *The Valley is Ours* and an early post-war "image of Australia", *Environment and History* (forthcoming 2016), www.whp-journals.co.uk/EH/EHPapers.html, accessed 1 July 2015; 'Australian Soil Conservation Narratives of the 1940s: What can we learn?' trans. Gao Guorong, *Chinese Social Sciences Today* 5, no. 17 (special issue on sustainable development and ecology) (17 May 2013): 4–6. In its earliest stages of evolution, this research method was developed by taking an interdisciplinary approach, combining environmental studies and film, theatre, and performance studies methods to establish a dramaturgical model for an environmental performance. This interdisciplinary research method was developed under the leadership of creative arts/science researcher, environmental filmmaker, producer, and verbatim playwright Professor Paul F. Brown in the Environmental Studies programme at the University of New South Wales. See Janette-Susan Bailey, 'Wind Turbine Girl: A Dramaturgical Model for an Environmental Performance' (BA Hons diss., University of New South Wales, 2005); on Brown, see for example his project, *Nuclear Futures: Exposing the Legacy of the Atomic Age through Creative Arts* (2015), www.nuclearfutures.org; *Verbatim: Staging Memory and Community* (Sydney: Currency Press, 2010); [with the] Workers Cultural Action Committee, *Aftershocks*, revised ed. (Sydney: Currency Press, 2001); the theatre production [with the] Maralinga Research Group, *Half a Life* (produced at Leeds, NSW Central Coast and Sydney, 2006); *Learning for Sustainability (LfS) Research Synthesis, a report for the New South Wales Office of Environment and Heritage* (Sydney: New South Wales Office of Environment and Heritage, 2012); 'Toxic Waste in our midst: towards an interdisciplinary analysis', *Journal of Environmental Management* 90 (2009): 1559–66.

The US Dust Bowl and New Deal Era

This paper acknowledges the important body of work that has been created by scholars of the US on the Dust Bowl and New Deal-era conservation, among them Donald Worster, Douglas Hurt, Paul Sutter, Neil Maher, Sarah T. Phillips, Richard White, and Paul Bonnifield.⁷ However, focused on film imagery, this study takes a cultural approach, treating the Dust Bowl as an idea, iconic, and born of a time and place in the American experience that generated a major media event: its print, film, and broadcast media storytelling endures, filling the archives, museums and libraries of the US. This study also acknowledges the many and varied cultural studies created by those such as William Cronon, Brad Lookingbill, Charles Shindo, or Mark Andrew White.⁸ And while noting the claims of historians, such as Linda Gordon, who have described the Dust Bowl as a defining US national mythology, this paper adopts a transnational approach in order to acknowledge that its imagery was adopted and adapted around the world, including in Australia during World War II.⁹ ‘Dust bowl’

7 For example, see Donald Worster, *Dust Bowl: The Southern Plains in the 1930s*, 25th anniversary ed. (New York: Oxford University Press, 2004); Douglas R. Hurt, *The Dust Bowl: An Agricultural and Social History* (Chicago: Nelson-Hall, 1981); Paul Sutter, ‘New Deal Conservation: A View from the Wilderness’, in *FDR and the Environment*, ed. Henry L. Henderson and David B. Woolner (New York: Palgrave Macmillan, 2005); Neil M. Maher, *Nature’s New Deal: The Civilian Conservation Corps and the Roots of the American Environmental Movement* (New York: Oxford University Press, 2008); Sarah T. Phillips, *This Land This Nation: Conservation, Rural America and the New Deal* (New York: Cambridge University Press, 2007); Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995); Paul Bonnifield, *The Dust Bowl: Men Dirt Depression* (Albuquerque, NM: University of New Mexico Press, 1979).

On the American West, see for example Donald Worster, *Rivers of Empire: Water, Aridity and the Growth of the American West* (New York: Pantheon Books, 1985); Patricia Limerick, *Desert Passages: Encounters with the American Deserts* (Niwot, CO: University of Colorado Press, 1989); Patricia Limerick, *Something in the Soil: Legacies and Reckonings in the New West* (New York: W.W. Norton & Co., 2000). On the New Deal era, see for example David Kennedy, *Freedom from Fear: The American People in Depression and War* (New York: Oxford University Press, 1999); Richard White, *It’s Your Misfortune and None of my Own: A New History of the American West* (Norman, OK: University of Oklahoma Press, 1991); see also Ira Katznelson, *Fear Itself: The New Deal and the Origins of Our Time* (New York: Liveright Publishing Corporation, 2013).

8 Those who have described the Dust Bowl in cultural studies are too numerous and too varied in their focuses to list here in full. They include William Cronon, ‘A Place for Stories: Nature, History and Narrative’, *Journal of American History* 78, no. 4 (March 1992): 1357–63; Brad Lookingbill, *Dust Bowl USA: Depression America and the Ecological Imagination 1929–1941* (Athens, OH: Ohio University Press, 2001); Charles J. Shindo, *Dust Bowl Migrants in the American Imagination* (Lawrence, KS: The University Press of Kansas, 1997); Mark Andrew White, ‘Alexandre Hogue’s Passion: Ecology and Agribusiness in The Crucified Land’, *Great Plains Quarterly* 26, no. 2 (Spring 2006): 67–83.

9 Linda Gordon, *Dorothea Lange: A Life Beyond Limits* (New York: W.W. Norton & Co., 2009), 244.

imagery was employed in Australia during the wartime decade by various parties including soil conservationists and advocates for various rival water diversion schemes in the states of New South Wales, Victoria, and Queensland.¹⁰

‘Dust bowl’ imagery was utilised by Ken Hall in *Australia is Developing a Dust Bowl* to promote the development of the MIA (established in 1912) of south-western New South Wales. Like the broader set of media imagery produced during this period, Hall’s film evoked the US Dust Bowl and the achievements of the US Bureau of Reclamation to empower an Australian nationalistic storytelling. His narrative was focused on New South Wales’ ambitions for the diversion of Snowy River water westward to expand the existing capacity of Burrinjuck Dam (1928) that served the MIA (1912). The state’s vision involved developing the MIA through water provision to encourage regional industries and, in turn, contribute to the goals of full employment, immigration, and population growth, as well as the process of postwar reconstruction.¹¹

In early 2010, my research began to unearth a vast collection of print, film, and broadcast media ‘dust bowl’ imagery in Australian archives. While some of this material was literally buried in the nation’s film, print, and broadcast media archives, a great deal of it was also freely accessible in the national archives and state and national libraries, including in digitised collections. Despite the long history of drought and erosion in south-eastern Australia, and the strong US cultural connections suggested by this set of imagery, the historiography needed to locate, record, and explain it as a collection in its own right did not yet exist, let alone any work focused on Hall’s ‘dust bowl’ imagery. These cultural connections to the US Dust Bowl have been given attention elsewhere, including by Tom Brooking, Blaine Allan, and David Moon. They discuss the US Resettlement Administration film *The Plow that Broke the Plains* in the New Zealand, Canadian, and Russian contexts respectively. Works such as my *Dust Bowl: Depression America to World War Two Australia* and “‘Dust bowls’”,

10 The Murray River flows along the border of New South Wales and Victoria, then south into South Australia. South Australians saw little benefit for their state in proposals advanced by these three states. However, a major project to the benefit of South Australia was later proposed during the 1960s. The Chowilla storage dam was to cover 400 square miles with water where New South Wales, Victoria, and South Australia meet. The project was proposed as a major development and aspect of the Snowy Mountains scheme. It was supported by G. Vernon Lawrence of the Murray Valley Development League, who was an influential user of ‘dust bowl’ imagery during the 1940s. It was also supported by Prime Minister Gough Whitlam’s Labour Government. However the scheme never eventuated. See Alison Painter, ‘21 April 1960 Chowilla Dam project’, *SA 175* (South Australia: Professional Historians Association, 2011), www.sahistorians.org.au/175/index.shtml.

11 On the ALP, nation-building, and the goal of full employment, see Frank Bongiorno and Nick Dyrenfurth, *A Little History of the Australian Labor Party* (Kensington, NSW: University of New South Wales Press, 2011), 101–3. On postwar reconstruction in Australia, see Stuart Macintyre, *Australia’s Boldest Experiment: War and reconstruction in the 1940s* (Sydney, NSW: NewSouth Publishing, 2015); ‘Women’s Leadership in War and Reconstruction’, *Labour History: A Journal of Labour and Social History* 104 (May 2013): 65–80; on postwar reconstruction in the context of soil erosion and the soil conservation debate, see Bailey, *Dust Bowl: Depression America to World War Two Australia*.

TVAs and Snowy River waters', have since made a contribution to addressing that gap. However, when I first encountered this collection in early 2010, no serious study to examine it had yet been achieved.¹² This is partly due to the puzzle the whole collection of transnational 'dust bowl' imagery presented.

The US Dust Bowl occurred in the 1930s. South-eastern Australia suffered severe drought and wind erosion across a similar period. Australian soil conservationists were well aware of the US Dust Bowl problem, New Deal soil conservation initiatives, and the huge media event generated by them both. The Australian media portrayed the Dust Bowl as an American tragedy and one Australians should take heed of. However, the idea of a specifically *Australian* 'dust bowl' did not automatically gain currency. There was a time lapse in the transnational transfer of 'dust bowl' imagery that was to be interpreted in this way. It took hold in the media in the following decade. The delayed transfer of this imagery into World War II raised political and cultural questions that could not be explained simply by comparing the severe drought and erosion conditions of both countries in the 1930s.

The questions presented by this collection of imagery, as well as the question of a gap in the historiography, are also a reflection of the fact that, as historian of the US and Australia Ian Tyrrell has observed, 'American history has been given

12 For international perspectives, both cultural and scientific, see Tom Brooking, 'Applied Science to the Rescue', *Environmental History* 12 (special issue: Films Every Environmental Historian Should See) (2007): 292–4; Bailey, *Dust Bowl: Depression America to World War Two Australia* and "'Dust bowls', TVAs and Snowy River waters'; David Moon, *The Plough that Broke the Steppes: Agriculture and Environment on Russia's Grasslands, 1700–1914* (Oxford: Oxford University Press, 2013); Blaine Allan, 'Canada's *Heritage* (1939) and America's *The Plow that Broke the Plains* (1936)', *Historical Journal of Film, Radio and Television* 19, no. 4 (1999): 441–72; 'Making *Heritage*, a Canadian Government Motion Picture', *Prairie Forum* 29, no. 1 (Spring 2004): 85–102; 'A National "as distinct from Departmental" Film Board, and the Case of *Heritage*', *Canadian Journal of Film Studies* 2, no. 1 (Spring 2000): 30–54; Deane M. Williams, 'Heyer, John', in *Encyclopedia of Documentary Film*, vol. 1, ed. Ian Aitken (New York: Routledge, 2006), 558–9. 'International Documentary Filmmaker: John Heyer [14/9/1916–19/6/2001]', *Metro*, no. 129/130 (Spring 2001): 248–53. The following papers have discussed New South Wales and Victorian film imagery, including Ken Hall's Cinesound Review films: Janette-Susan Bailey, 'Australia's Dust Bowl: Reception and interpretation of an environmental idea' (paper presented at the American Society for Environmental History Conference, March 2012, Madison, Wisconsin); 'Australia is Developing a Dust Bowl: A heritage of transnational environmental ideas in one image of a dam' (paper presented at the United States Studies Centre/ANZASA conference, University of Sydney, December 2015); 'Watering Australia's "Dust Bowl": An American Idea in the Minds of Australians of the 1930s and 1940s' (paper presented at the ANZASA 2012 biennial conference, Brisbane); 'A Dust Bowl in Australia? US and Australian newsreels of the nineteen thirties and forties as transnational carriers of an environmental idea' (paper presented at the School of Humanities, History Postgraduate Seminar, University of New South Wales, 15 March 2012); 'Deserts, Old World civilizations and New World Dust Bowls: Something to fear in the nineteen-thirties and forties' (paper presented at the University of New South Wales School of History and Philosophy 3rd Annual Postgraduate Research Conference, 8 September 2011); "'Dust bowls", TVAs and Snowy River waters: Transnational environmental imagery' in John Heyer and Pare Lorentz, 'The River, The Plow and The Valley is Ours' (paper presented at Broken Images: A Symposium on Early American Photography in the Asia Pacific, 1850–1950, Griffith Centre for Cultural Research, July 2014); 'The Dust Bowl and Australia: A transnational study of the reception and interpretation of environmental ideas' (paper presented at the School of History and Philosophy Postgraduate Seminar, University of New South Wales, 14 October 2010).

little attention in the vast and influential area of environmental history practiced in Australia', where US developments have primarily been observed 'casually and imperfectly from a distance'.¹³ By focusing on one image of a model dam, this paper demonstrates the benefits to Australian political and environmental history of applying a combined transnational and cultural research approach. This approach has illuminated the place where Australian and US national narratives are fused in Hall's film imagery. In doing this, the methodology begins to address questions posed by the neglected broader collection of 'dust bowl' imagery to which Hall's film belongs. At the same time, this paper aims to make a contribution to the expansion of work on US–Australia transnational connections that traverse the Pacific.¹⁴

The body of work in this area includes Stephen Powell's 'Mothering, Husbandry and the State', a section of his doctoral thesis describing the 1930s establishment of soil conservation services within a US–Australia exchange of ideas; Donald Meinig's 1962 cultural landscape study *On the Margins of the Good Earth*; Kirsty Douglas' 'For the Sake of a Little Grass'; and David Goodman's study of the Californian and the Australian goldfields of the 1850s, *Gold Seeking*.¹⁵ Ian Tyrrell's *True Gardens of the Gods* is a transnational environmental history that investigates garden imagery—the idea or dream of transforming deserts to

13 Ian Tyrrell, 'From the Wet and Mud of Newcastle: Reflections on ANZASA and U.S. History in Australia, 1974–2012', *Australasian Journal of American Studies* 32, no. 1 (July 2013): 74; examples of efforts to draw attention to Australia's environmental, or related rural/social or economic, policy-making, or scientific parallels, similarities, or differences, through a retrospective application of 'dust bowl' terminology have included Neil Barr and John Cary, *Greening a Brown Land: The Australian Search for Sustainable Land Use* (Crows Nest, NSW: Macmillan Education Australia, 1992), 131–2; Libby Robin, 'Paul Sears: Deserts on the March, 1935', in *The Future of Nature*, ed. Libby Robin, Sverker Sörlin, and Paul Warde (New Haven, CT, and London: Yale University Press, 2013), 184; Cameron Muir, *The Broken Promise of Agricultural Progress: An environmental history* (Hoboken: Taylor and Francis, 2014), 128–32. On the terminology 'dirty thirties' (describing the US Dust Bowl and the Canadian case) see Worster, *Dust Bowl*, 13. For Australian context see also Libby Robin, 'Ecology: A Science of Empire?', in *Ecology and Empire: Environmental History of Settler Societies*, ed. Tom Griffiths and Libby Robin (Carlton South, Vic.: Melbourne University Press, 1997), 63–76.

14 This paper focuses on Australia but acknowledges that scholars such as Tom Brooking and James Beattie have drawn the US Dust Bowl and soil erosion issues into a discussion of South Asia and New Zealand contexts, in James Beattie, *Empire and Environmental Anxiety: Health, Science, Art and Conservation in South Asia and Australasia, 1800–1920* (Basingstoke: Palgrave Macmillan, 2011); 'Environmental Anxiety in New Zealand, 1840–1941: Climate Change, Soil Erosion, Sand Drift, Flooding and Forest Conservation', *Environment and History* 1, no. 9 (November 2003), 388; Brooking, 'Applied Science to the Rescue'.

15 Stephen Powell, 'Mothering, Husbandry and the State: Conservation in the United States and Australia, 1912–1945', (PhD diss., Monash University, 2000); Donald Meinig, *On the Margins of the Good Earth: The South Australian Wheat Frontier 1869–1884* (Adelaide: Rigby, 1962; 1970); Kirsty Douglas, "'For the Sake of a Little Grass': A comparative history of settler science and environmental limits in South Australia and the Great Plains", in *Climate, Science, and Colonization: Histories from Australia and New Zealand*, ed. James Beattie, Emily O'Gorman, and Matthew Henry (Basingstoke: Palgrave Macmillan, 2014), 99–117; David Goodman, *Gold Seeking: Victoria and California in the 1850s* (St Leonards, NSW: Allen and Unwin, 1994); Ian Tyrrell, *True Gardens of the Gods: Australian–Californian Environmental Reform 1860–1930* (Berkeley, CA: University of California Press, 1999), 2. Tyrrell describes the transnational influences behind the transformation of Mildura in northern Victoria's Mallee region.

irrigated landscapes.¹⁶ J. M. Powell, Tom Griffiths, Tim Sherratt, and Ian Tyrrell each have described Australia's Snowy Mountains Scheme as strongly influenced by the idea of US technologies capable of turning deserts into green oases.¹⁷ However, it is Tyrrell whose central focus is on activity both in and between California and Australia, and he takes this investigation up to the 1930s.

Despite this body of work, it is harder to find cultural studies that clearly show what transnational environmental imaginings of the past actually looked like or sounded like in Australian comparative or transnational contexts. An exception is the art historian Erika Esau's *Images of the Pacific Rim: Australia and California, 1850–1935*. Tyrrell has described Esau's work as 'the first to focus squarely on visual representations of Australian and Californian landscapes and culture in transnational perspective', adding that it contributes 'to a growing understanding of these cultural connections'.¹⁸ Esau's is a history of the circulation between California and Australia of commercial art, design, and architectural styles. She beautifully illustrates how a transnational idea from the past can be seen today. Esau recovers and draws together a collection of images expressing a transnational set of ideas that were shared between the US and Australia during the nineteenth and early twentieth centuries. Her collection, including posters, journals, and fruit box labels shows Californian scenes featuring Eucalypts and flowering gums that look as if they are set in Australia. We see images of the Australian landscape and architecture that could very easily be in California, or perhaps in Australia—with transnational images, as Esau's work demonstrates, it is difficult to tell.¹⁹

16 Outside of a cultural, transnational, or comparative Australian focus, among the US-centred studies focused specifically on water and the American West, are Worster's *Rivers of Empire*; White, *The Organic Machine*, 51–2; Marc Reisner, *Cadillac Desert: The American West and its Disappearing Water* (New York: Viking, 1986); Mohamed T. El-Ashry and Diana C. Gibbons, eds, *Water and Arid Lands of the Western United States* (Cambridge: Cambridge University Press, 1988). For a US–China comparative study, see Donald Worster, 'The Flow of Empire: Comparing Water Control in the United States and China', *RCC Perspectives* 5 (2011).

17 On 'America watching', see J. M. Powell, 'The Empire Meets the New Deal: Interwar Encounters in Conservation and Regional Planning', *Geographical Research* 43, no. 4 (December 2005), 344; on 'unmistakable echoes' of the TVA, see 339. On US influences, see Tyrrell, *True Gardens of the Gods*, 173; on the TVA model, see Tom Griffiths and Tim Sherratt, 'What if the northern rivers had been turned inland?', in *What If: Australian History as it Might Have Been*, ed. Stuart Macintyre and Sean Scalmer (Carlton, Vic.: Melbourne University Publishing, 2006), 238; see also Michael Cathcart, *The Water Dreamers: The Remarkable History of our Dry Continent* (Melbourne: Text Publishing, 2009), 241.

18 Ian Tyrrell, foreword to Erika Esau, *Images of the Pacific Rim: Australia and California, 1850–1935* (Sydney: Power Publications, 2010), 8.

19 Esau, *Images of the Pacific Rim*.

Along with my *Dust Bowl* and “‘Dust Bowls”, TVAs and Snowy River Waters’, this paper aims to expand the exploration of these transnational themes further into the World War II and early postwar years.²⁰ It is this cultural and transnational approach that has enabled the identification of issues that would otherwise remain undetected in Australian environmental history and has permitted it to reach into areas not usually accessed. This approach has also enabled the study to expand the discussion of ‘dust bowl’ imagery beyond the 1930s and locate Hall’s imagery, and its connection to the nation’s history, within the context of ‘a range of processes that transcend national boundaries’.²¹

Ken Hall: Transnationalism as a storytelling strategy

Described as one of Australia’s most successful pioneering filmmakers, Ken G. Hall was the first Australian to win an Oscar (in 1943), for the newsreel film *Kokoda Front Line!*²² He was head of Cinesound films for 25 years. Hall also produced ‘dust bowl’ imagery that expressed the wartime vision for a national conservation agenda.²³ Film expert Ray Edmondson has explained that while Hall was head of the company, Cinesound took ‘an explicit or implicit editorial line on issues ... certainly on the environment’.²⁴ His documentary films, such as *Drought Grips Riverina* and *Australia is Developing a Dust Bowl*, were treated as proof of the kinds of changes that were needed and inspired urgent calls for action from state and federal parliamentarians.²⁵

20 Bailey, “‘Dust Bowls”, TVAs and Snowy River waters’; Bailey also completed a PhD on transnational ‘dust bowl’ imagery in 2014; for a rich cultural study that explores the Russian context, see Dorothy Zeisler-Vralsted, ‘The Cultural and Hydrological Development of the Mississippi and Volga Rivers’, in *Rivers in History: Perspectives on waterways in Europe and North America*, ed. Christof Mauch and Thomas Zeller (Pittsburgh, PA: University of Pittsburgh Press Digital Editions, 2008).

21 Sharon Crozier-De Rosa and David Lowe, ‘Nationalism and Transnationalism in Australian Historical Writing’, *History Australia* 10, no. 3 (December 2013): 8–9.

22 War cameraman Damien Parer was killed while shooting this film footage at the time Australians halted the Japanese land forces at Milne Bay, defeating them on 2 November 1942 at Kokoda in the Owen Stanley Ranges—the infamous Kokoda Track. See Neil McDonald, ‘Parer, Damien Peter (1912–1944)’, *Australian Dictionary of Biography*, adb.anu.edu.au/biography/parer-damien-peter-11339/text20251.

23 ‘Filmmaker Ken G. Hall dead at 92’, *Canberra Times*, 10 February 1994, 1; ‘Obituary: Ken G. Hall’, *The Independent* [London], 27 August 2015; Ken G. Hall, *Directed by Ken G. Hall: Autobiography of an Australian Film-maker* (Melbourne: Lansdowne, 1977).

24 Ray Edmondson, ‘The Voice of Australia: Cinesound Review’, *Metro*, no. 137 (2003): 138–40.

25 See Bailey, *Dust Bowl: Depression America to World War Two Australia* for a discussion of films such as Movietone’s *Spectre of Drought* and Cinesound’s *Victorian Drought: Mallee Country Facing Ruin*, both describing a dust bowl in north-west Victoria’s Mallee wheatlands during the late 1930s and 1940s; on films focused on Victoria featuring ‘dust bowl’ and TVA imagery made by John Heyer for the National Film Board later in the decade, see Bailey, “‘Dust Bowls”, TVAs and Snowy River waters’.

The imagery Hall constructed reflects the set of ideas drawn from both the US and Australian experience that were circulating more widely at a time when south-eastern Australia was suffering under increasingly severe drought conditions. By time the war began, severe drought had already destroyed protective vegetation cover across the Australian continent.²⁶ Water shortages were common, and wind erosion brought dramatic dust storms—sand drift, dust haze, dramatic dust clouds, or dust fog were widespread.²⁷ The Australian Bureau of Meteorology has described these drought conditions as ‘more or less endemic’ for eastern Australia between 1937 and 1945, with record low rainfalls for New South Wales from 1937. Intensifying drought conditions occurred in other states the next year, while 1940 was ‘one of the driest years of the century for most of southern Australia’; by 1945 large rivers had ‘virtually dried up’.²⁸ Recent reports have confirmed that western New South Wales was among ‘the major wind erosion regions in Australia’.²⁹

Under McKell, the erosion survey of New South Wales had been completed by 1943 and its results were published in the first issue of the *Journal of the Soil Conservation Service of New South Wales* in April 1945.³⁰ It showed 18,650 square miles of ‘moderate’ and 974 square miles of ‘severe’ wind erosion across 184,869 square miles of agricultural land in the Eastern and Central Divisions, much of it ‘beyond economic reclamation’. However, the pastoral lands (ranches) of the western division—the focus of so much debate about ‘dust bowls’—were not included in this survey. The first coherent classification and map of the vegetation of western New South Wales was produced in 1948 by the botanist Noel Beadle (Map 1).³¹ As his findings confirmed, the overstocking of sheep was a major contributing factor; however, it was part of a set of interrelated

26 G. H. McTainsh, J. F. Leys, T. O’Loingsigh and C. L. Strong, *Wind Erosion and Land Management in Australia during 1940–1949 and 2000–2009*, report prepared for the Australian Government Department of Sustainability, Environment, Water, Population and Communities (Canberra: DSEWPoC, 2011), 17.

27 F. Loewe explained that ‘the duststorm phenomenon in Australia has been frequently described in literature in a non-scientific way’ in ‘Duststorms in Australia’, *Commonwealth Meteorological Bureau Bulletin*, no. 28 (Melbourne: H. E. Daw, Government Printer, 1943): 5–6. Part of the reason for this was that a clear understanding of the difference between ‘sand and dust in the atmosphere’ had not yet fully developed. Each term describes a different manifestation of wind behaviour and relates to the lifting of various soil types to different heights, with varied storm breadths, and travelling for different distances, or falling back to the ground over different time frames (i.e. lighter particles take longer to settle).

28 Australian Government Bureau of Meteorology, ‘The World War II droughts 1937–45’, reg.bom.gov.au/lam/climate/levelthree/c20thc/drought3.htm, accessed April 2010.

29 McTainsh et al., *Wind Erosion*, 9.

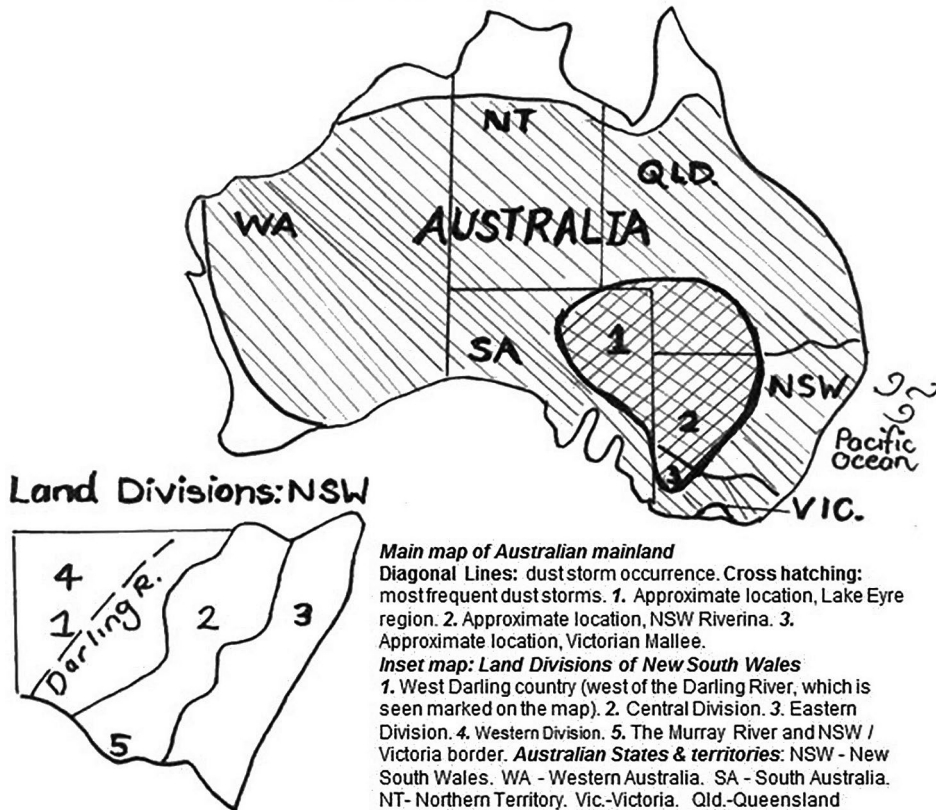
30 L. G. Kaleski, ‘The Erosion Survey of N.S.W. (Eastern and Central Divisions)’, *Journal of the Soil Conservation Service of NSW* (April 1945): 14. On McKell’s career, his environmental achievements, and environmental conditions, including erosion affecting central New South Wales, within a discussion of modern agriculture, see Muir, *The Broken Promise of Agricultural Progress*, particularly 109–39; on historical stocking rates, see 29; and on impacts on indigenous Australians, see 30–1. On pastoralism, Aboriginal Australians, and overstocking in late nineteenth century New South Wales, see Heather Goodall, *Invasion to Embassy: Land in Aboriginal Politics in New South Wales, 1770–1972* (Sydney: University of Sydney Press, 2008), 68, 72, 82–5.

31 Kaleski, ‘The Erosion Survey’, 14. At the time of the journal’s publication, final maps were still being drafted. On Beadle, see also Bailey, *Dust Bowl: Depression America to World War Two Australia*.

contributors. They included wartime manpower, transport, and other resource shortages that left the rabbit problem or grasshopper plagues unattended. Edible native vegetation was depleted by drought, and paddocks left bare of this feed led to the overstocking of sheep, which in turn caused further depletion of vegetation and left topsoil exposed to the wind. Across the wartime period, the south-eastern states sweltered under heatwave conditions, accompanied by severe water shortages, while for the nation, both war and drought came to an end together, in August 1945.³²

“Australian Dust Storm locations 1943 and New South Wales land divisions based on the NSW Crown Lands Acts.”

Janette-Susan Bailey (Sydney, 2011), adapted from Loewe, “Duststorms in Australia,” *Commonwealth Meteorological Bureau Bulletin*, no. 28 (1943), 7; New South Wales Department of Lands, *Map of New South Wales: showing all divisions for the purposes of the Crown Lands acts, 1907*, National Library of Australia.



Map 1: Australian dust storm locations 1943 and New South Wales land divisions based on the NSW Crown Lands Acts.

Source: Adapted from F. Loewe, ‘Duststorms in Australia’, *Commonwealth Meteorological Bureau Bulletin*, no. 28 (Melbourne: H. E. Daw, Government Printer, 1943); NSW Department of Lands, *Map, Crown Lands Acts (1907)* (Sydney, 2011).

32 On causes, see McTainsh et al., *Wind Erosion*.

With the fall of Singapore on 15 February 1942 and an escalation of the conflict in the Pacific, this was also a time of heightened patriotism and, consequently, concern about the war effort, enemies, traitors, and invasion. This wartime sentiment influenced the way that concerns over soil erosion were expressed and the publicity generated to address it by the newly established NSW Soil Conservation Service. In print, film and broadcast media imagery, graziers, sheep, erosion, expert-driven science, and soil conservation all came to be associated with the idea of another, even more serious battle being waged in the South-West Pacific.

The New South Wales state government had established the pioneering Soil Conservation Service in 1938 under the direction of Sam Clayton. The service promoted US-style innovations and became known for supporting the idea of expert-driven science and advice, while decentralising activity as was the American model in their soil conservation programme.³³ What McKell wanted in the 1940s was to see his own state's conservation funding and research achievements duplicated at the national level. He envisioned a national Australian soil conservation service. His vision was shared by Prime Minister John Curtin, state Labour leaders, Minister for External Affairs Bert Evatt, Minister for Information Arthur Calwell, and soil conservationists across the nation. Along with McKell, soil conservationists believed that constitutional change was needed if co-operation from the states was ever to be achieved on water and soil conservation management.³⁴ Under Curtin, the Labour Commonwealth Government sought constitutional change, calling for 14 powers to be transferred from the states to the Commonwealth to achieve postwar reconstruction—a transfer of powers that would have enabled them to take control over both water and soil conservation.³⁵ Along with fellow advocates, McKell was inspired by the New Deal and federally regulated initiatives that centralised control and decentralised activity. These included

33 See Powell, 'The Empire Meets the New Deal', 349; Roland Breckwoldt, *The Dirt Doctors: A Jubilee History of the Soil Conservation Service of NSW* (Sydney: Soil Conservation Service of NSW, 1998), 44.

34 Australian Labour Party, *Five Critical Years: The Story of the McKell Labour Government in New South Wales, May 1941 – May 1946* (Sydney: Australian Labour Party, 1946), 40.

35 On conservation visions and the 'fourteen powers' referendum, see also Bailey, *Dust Bowl: Depression America to World War Two Australia*; see also Macintyre, *Australia's Boldest Experiment*, 255–7.

the US Soil Conservation Service (established in 1935) and the US Bureau of Reclamation (1902), while the dam-building of the Tennessee Valley Authority (TVA, established in 1933) was also of interest.³⁶

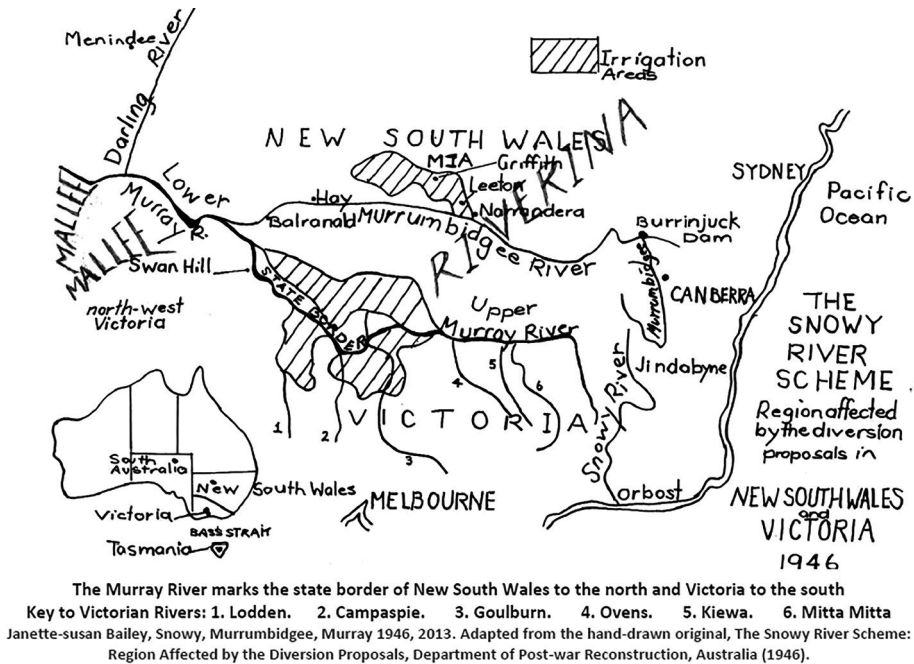
In May 1943, the Commonwealth Government Minister for Post-war Reconstruction, J. B. Chifley, called for proposals from the Australian states for a postwar national works programme with the twin goals of irrigation and hydroelectric power development. New South Wales was the only state government to submit a proposal in response to the National Works Council, a plan created by their own Water and Soil Conservation Advisory Committee.³⁷ What New South Wales wanted was to divert the waters of the Snowy River westward and expand the capacity of the Murrumbidgee River. In turn, this would develop the MIA in the drought-affected Riverina district (Map 2).³⁸ Rival proposals soon followed, including from the state of Victoria. Victorians proposed to develop the Murray River Valley at the border of both states. This led to extended debate over the entire decade.³⁹ The focus of this work, however, is on the year 1942 and on New South Wales and its nation-building vision for transforming the Riverina with Snowy River waters.

36 The period 1935 to 1938 is commonly understood as the New Deal period when an innovative focus on social reform and conservation ideas developed together in the US. Those agencies that worked directly to attack the problem of wind erosion on the Great Plains included the Department of Agriculture; the Forest Service, which planted shelter belts of trees; and the Soil Conservation Service, which collaborated with the Civilian Conservation Corps. On New Deal conservation ideas, see Donald Worster, *Nature's Economy: A History of Ecological Ideas*, 2nd ed. (New York: Cambridge University Press, 1994), 232. On a 'new agricultural conservation', see Worster, *Dust Bowl*, 190; Phillips, *This Land This Nation*, 22; on economic recovery, see 2–3; on the influence of New Deal resource management upon the modern American state, see 4; and on rural poverty, see 9; Dunaway, *Natural Visions*, 52, 47–51. On the TVA and the Civilian Conservation Corps as manifestations of 'total conservation' ideas, see Maher, *Nature's New Deal*, 203–10. On conservation programme as work relief, see Sutter, 'New Deal Conservation', 87–90. See also Joseph Gaer, United States Department of Agriculture, *Toward Farm Security: The Problem of Rural Poverty and the Work of the Farm Security Administration* (Washington, DC: G.P.O., 1941); McKell visited the TVA: see W. J. McKell, *Tennessee Valley Authority (U.S.A.)* (Parliament of New South Wales, 5 December 1945). On McKell's interest in the TVA and regional planning see Bailey, *Dust Bowl: Depression America to World War Two Australia* and "'Dust bowls'", TVAs and Snowy River waters'.

37 On electrical facilities, see Wigmore, *Struggle for the Snowy: The Background of the Snowy Mountains Scheme* (Melbourne: Oxford University Press, 1968), 103; on the Advisory Committee, see 103–4.

38 For the original map, see *The Snowy River Scheme: Region Affected by the Diversion Proposals*, 1946, Department of Post-war Reconstruction—Snowy River Diversion, National Archives of Australia, series A12542, item 12.

39 For analysis of film, print, and broadcast media imagery constructed to support the Victorian vision for a Murray Valley TVA, and on the role of the Murray Valley Development League under the leadership of G. Vernon Lawrence, see Bailey, *Dust Bowl: Depression America to World War Two Australia* and "'Dust bowls'", TVAs and Snowy River waters'.



Map 2: Snowy, Murrumbidgee, Murray 1946.

Source: Map adapted from the Department of Post-war Reconstruction's hand-drawn original, *The Snowy River Scheme: Region Affected by the Diversion Proposals*, 1946 (Sydney, 2013).

Irrigation areas are marked by diagonal lines. In New South Wales these areas include Narrandera, Leeton, and Griffith in the Murrumbidgee Irrigation Area to the north (Riverina region). The Murrumbidgee waters eventually meet the lower Murray River. The Murray marks the New South Wales–Victoria state border. The Snowy River can be seen rising in the Australian Alps in New South Wales.

Ken Hall dramatised this nationalistic vision in films such as *Australia is Developing a Dust Bowl*, *Drought Grips Riverina*, and *Conserve Water*. In these, he turned to aspects of both US and Australian national narrative, while also drawing on his understanding of the Pacific conflict and Australian wartime sentiment to empower his message. Throughout December 1941 and into early 1942, not long before the film was released, Curtin had pressured Winston Churchill to honour his commitment to send forces to defend Australia, because Australia's armed forces were locked in combat far from home, in Europe, the Middle East, and North Africa. During this period, the Japanese offensive advanced southward towards Singapore, but despite Curtin's efforts, little help

was forthcoming from Churchill, whose focus was a policy of 'beat Hitler first'.⁴⁰ Just before the new year in 1942 and fearing Japanese invasion, Curtin wrote a now famous message to the nation, in which he stressed the possibility of turning to the United States for assistance in the defence of Australia. Not long after he delivered that message, Australians were shocked when inadequate British defences in Malaya swiftly fell to advancing Japanese forces. British, Australian, and Indian troops then staged a desperate last defence at Singapore before they capitulated to the Japanese on 15 February 1942.⁴¹

Australian writers responded with fury. In March 1942 the *Australian Women's Weekly* published a poem, *Singapore*, by celebrated Australian Poet Dame Mary Gilmore (Figure 1). It was a gut-wrenching response expressing Australians' sense of anger, fear, and betrayal by the British. She described a beleaguered Singapore looking to the skies for Allied support, and the now 'dead and captive sons of Australia'. She called for revenge for 'allied incompetence and corruption' in Singapore.⁴² Known for his pacifist views, Curtin now warned Australians that there would be no turning back. He said, 'fate has willed our position in this war'.⁴³

40 On the competition for resources for the Pacific and European theatres of war, see Sean Brawley, Chris Dixon, and Beatrice Trefalt, *Competing Voices from the Pacific War* (Santa Barbara, CA: Greenwood Press, 2009), 69; on isolating Australia, see 96; and on not treating the Pacific as subordinate, see 12. On the Allies' policy of 'beat Hitler first' that split resources 30/70 between the Pacific and European theatres, see Brawley et al., *Competing Voices*, 49, 119; on beating Hitler first and the national alarm over the enemy advance, see also Bailey, *Dust Bowl: Depression America to World War Two Australia*; Macintyre, 'Women's Leadership in War and Reconstruction', 69–70 and *Australia's Boldest Experiment*, 91.

41 Pearl Harbor occurred in the early hours of 8 December 1941, eastern Australian time. For details of this series of events up until the new year, including War Cabinet decisions, see David Day, 'John Curtin—In Office', in *Australia's Prime Ministers* (Canberra: National Archives of Australia), primeministers.naa.gov.au/primeministers/curtin/in-office.aspx#section4. On Australians in the Middle East, see Barton Maughan, 'Tobruk and El Alamein', in *Australia in the War of 1939–1945*, vol. 3 (Canberra: Australian War Memorial, 1966), 401. For a list of the Australian divisions at Tobruk and a list of casualties, see Australian War Memorial, *Siege of Tobruk*, www.awm.gov.au/encyclopedia/tobruk/. See also Mark Johnston and Peter Stanley, *Alamein: The Australian Story* (Melbourne: Oxford University Press, 2002). On casualties at El Alamein, see Australian War Memorial, *El Alamein Battles*, www.awm.gov.au/encyclopedia/el_alamein/reading/. On the series of events across late 1941 and 1942, including Malaya, see Day, 'John Curtin—In Office'. See James Curran, *Curtin's Empire* (Cambridge and New York: Cambridge University Press, 2012), 11, on the much debated aspects of Curtin's speech.

42 Mary Gilmore, *Singapore*, in 'Dame Mary Gilmore's Poem: Singapore', *Australian Women's Weekly*, 14 March 1942.

43 For Curtin's reference to 'fate', see Day, 'John Curtin—In Office'.

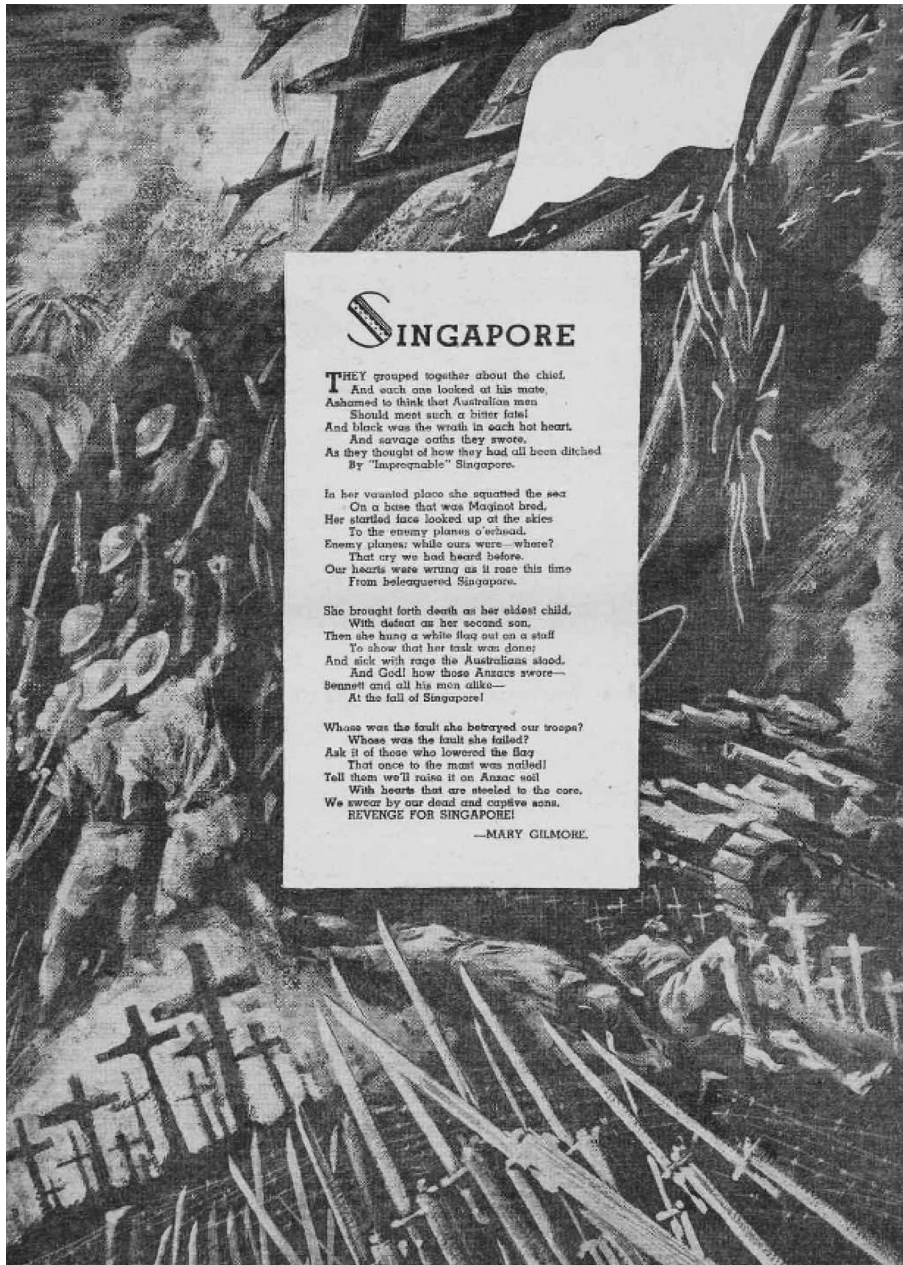


Figure 1: A visual expression of anger and fear. 'Dame Mary Gilmore's Poem: Singapore'. Soldiers can be seen strewn on the battlefield to the right below the text (leg raised), and below-centre (lying face down). Their graves rise from the image, as do bayonets in the foreground. Their fists are raised in defiance as enemy planes besiege Singapore and the white flag is raised above Britain's Union Jack at top right.

Source: *Australian Women's Weekly*, 14 March 1942.

Amidst bombing raids against northern Australia and midget-submarine attacks on Sydney, and while suffering under worsening drought and erosion conditions, Australia was under pressure to produce food for millions in the Pacific, India, and Britain. Meanwhile, Australia also prepared to provide food and shelter for an influx of hoped-for evacuees from Singapore and Malaya in the autumn with absolutely no knowledge of who or how many would arrive, or how far south the Japanese intended to push.⁴⁴ At a time when Australians were daily experiencing a heightened sense of national emergency, Hall aimed to appeal to the emotions of a broad wartime audience—both rural and urban.⁴⁵ For the nation, concerns about drought, dust storms, sand drift, food shortages, water shortages, heat waves, rabbit plagues, overstocking, sheep starvation, food rationing, increased food production quotas, and war—as Gilmore had so eloquently expressed it in *Singapore*—went hand in hand.⁴⁶

The sheep myth and US Dust Bowl irrigation dreams

Hall drew his knowledge of these wartime tensions, sentiment, and severe drought into a retelling of a powerful Australian national myth, that of ‘the nation riding on the sheep’s back’. He told a story about the Riverina in western New South Wales, a region famous for breeding some of the finest Merino sheep in the world and home of the MIA. The myth of the nation riding on the sheep’s back was based on the history of squatters (pastoralists) whose huge runs had given them a monopoly over the lands of western New South Wales. The industry of large landowners was said by some to provide an economic backbone to the nation, buoying primary industry with products such as wool.⁴⁷ Hall’s film was a commentary on a series of nineteenth- and early twentieth-century debates and legislation that eventually resulted in a more egalitarian distribution of lands. But with these changes, there was no corresponding amendment to the

44 On food supplies, see Australian Labour Party, *Five Critical Years*, 26; on eggs, see 28. On air raids, see Daniel Connell, *The War at Home: Australia 1939–1949* (Crows Nest, NSW: ABC Enterprises for the Australian Broadcasting Corporation, 1988), 28; on manpower, various shortages, and food for US and Australian troops, see 26, 103; on the calling-up of married and older men, see 88–9.

45 See Elizabeth Rechinewski, ‘Remembering The Battle for Australia’, *PORTAL* 7, no. 1 (January 2010): 6, epress.lib.uts.edu.au/journals/index.php/portal/article/view/1153. On the end of Japanese expansion, see Brawley et al., *Competing Voices*, 70. On Australia’s turning fortunes, see Curran, 88, and Brawley et al., *Competing Voices*, 71–2. On Curtin–Churchill disagreements, see Day, ‘John Curtin—In Office’.

46 Gilmore, *Singapore*. On rationing in Australia, see Bongiorno and Dyrenfurth, *A Little History of the Australian Labor Party*, 96.

47 On the history of ideas behind the breaking-up of larger squatters’ runs, see Richard Waterhouse, ‘Agrarian Ideals and Pastoral Realities: The Use and Misuse of Land in Rural Australia’, in *Great Mistakes of Australian History*, ed. Martin G. Crotty and David A. Roberts (Sydney: UNSW Press, 2006), 67, 69; and on closer settlement (the acquisition and subdivision of those large estates), see 70; on sheep, see Charles Massey, *The Australian Merino* (Ringwood, Vic.: Viking O’Neil, 1990).

1901 *Western Lands Act* limiting the number of sheep that could be held on a property. Such an amendment did not occur until after the drought, in 1949.⁴⁸ This encouraged overstocking of small blocks in good years, which is exactly what happened in the years leading up to the World War II droughts, when stock levels were the highest ever recorded.⁴⁹ When drought came, properties became overcrowded with sheep, native shrubs were eaten out, and dry topsoils were then exposed to the wind. The effects for sheep and other domesticated animals, for the soil, for saltbush, and for graziers were equally devastating. Seventy per cent of the sheep in the western Riverina—at least 1 million—had died by 1944. Graziers naturally were not solely responsible for all of this.⁵⁰ As described above, they were caught within a complex interplay of elements contributing to erosion, from inadequate transportation to acute wartime manpower shortages and plague-level rabbits.⁵¹

Despite this, filmmakers, broadcasters and the press laid various measures of blame on the grazier and his lack of ‘conservation mindedness’. In *Australia is Developing a Dust Bowl* and *Drought Grips Riverina*, Ken Hall reflected this view by using imagery suggesting that graziers who overstocked their land were to blame, at least in part, for Australia ‘developing a dust bowl’.⁵² Rather than as a symbol of economic progress, he portrayed sheep as ‘trampling across the face of Australia’.⁵³

With the south-east suffering under severe drought and erosion conditions, Hall was also able to draw on the power of irrigation myth—that dream of transforming arid and semi-arid lands into green garden oases.⁵⁴ *Australia is Developing a Dust Bowl* was a propaganda film that told a national story of decline and later progress with the intention of promoting the national

48 On the history of Western Lands legislation and leasehold arrangements, see Janice Cooper, ‘Land as Property or Natural Resource: The *Western Lands Act* of 1901–1910’, *History Australia* 10, no. 3 (December 2013), particularly 205. On drought conditions and overstocking in the late nineteenth century, see Christine Adams, *Way out West* (Joondalup, WA: Ocean Publishing, 2008), vi; see also Tom Griffiths, ‘One Hundred Years of Environmental Crisis’, *Rangeland Journal* 23, no. 1 (2001); Deb Verhoeven, *Sheep and the Australian Cinema* (Melbourne: Melbourne University Press, 2006).

49 McTainsh et al., *Wind Erosion*, 21.

50 On stock routes and transport needs, see Cooper, ‘Land as Property or Natural Resource’, 210; on the 1949 clause, see 194; on the 1901 Western Lands Act, see 205; on drought relief, see McTainsh et al., *Wind Erosion*, 26; on the formation of soil agencies, see 19; on the combination of overstocking, drought, and wind, see 20; see also 21; on closer settlement, see Waterhouse, ‘Agrarian Ideals and Pastoral Realities’, 67, 69, 70; on the issue of contributors, see Barr and Cary, *Greening a Brown Land*, 112.

51 On record high pre-drought stock levels, see McTainsh et al., *Wind Erosion*, 21; on rabbits, see Thomas Dunlap, ‘Ecology and Environmentalism in the Anglo Settler Colonies’, in *Ecology and Empire: Environmental History of Settler Societies*, ed. Tom Griffiths and Libby Robin (Carlton South, Vic.: Melbourne University Press, 1997), 79. On a complex interplay of contributors, see Barr and Cary, *Greening a Brown Land*, 112.

52 Cinesound Productions, *Australia is Developing a Dust Bowl*.

53 George Farwell, ‘William Hatfield sees ... the “Vision Splendid” For Australia’, *The Guardian*, 17 November 1944.

54 On the irrigation dream, see Tyrrell, *True Gardens of the Gods*, 110; also 107–8, 111, 112, 113, 133, 140.

conservation vision shared by the New South Wales state and Commonwealth Labour governments under McKell and Curtin. However, Hall used transnationalism as a storytelling strategy to sell an Australian nationalistic message, in doing so drawing on a variety of compelling ideas, in addition to wartime sentiment, Australia's sheep myth, and Australia's irrigation dreams in his conservation narrative.

As Australians further entered drought, fears of invasion, of existing desert going to waste, were combined with perceptions of an 'end' to the US Dust Bowl and dreams of watering and powering arid lands with US-style, large-scale engineering schemes.⁵⁵ In *Australia is Developing a Dust Bowl*, Hall drew on wartime drought sentiment by evoking the Dust Bowl, a US national narrative, which he laced with traces of New Deal rhetoric.⁵⁶ Hall's narrative, like others at the time, suggested that the scientific expert and conservation farmer were patriots, as opposed to those who neglected the soil while Australians were dying on foreign soil to save it. Hall did all of this to portray the idea of drought and erosion as a threat to the nation.

US Dust Bowl narratives described a place, a time, and a phenomenon—wind erosion of the 1930s on the southern Great Plains in south-eastern Colorado, north-eastern New Mexico, the northern two-thirds of the Texas panhandle, the western third of Kansas, and the Oklahoma panhandle.⁵⁷ But it was also a powerful idea that developed during a decade of drought and Depression and generated a huge collection of widely published and enduring imagery. This imagery described not only wind erosion on the southern Plains, but also drought beyond that region, water erosion, and soil infertility, and their effects through animal suffering and death, displacement, and poverty. This kind of Dust Bowl imagery had currency at the time in the US. It also found resonance in the following decade in Australia, and Ken Hall capitalised on this.

55 The Bank of New South Wales tried to expose this myth in 'Australia's Vast Empty Spaces', *The Western Australian Bank and the Australian Bank of Commerce Limited Circular* VI, no. 5 (August 1936).

56 On the Dust Bowl as national narrative, see Gordon, *Dorothea Lange: A Life Beyond Limits*, 244. On the Dust Bowl as an event of 'mythological proportions' that was 'defined by artists and by government bureaucrats', see Geoff Cunfer, *What Was 'The Dust Bowl'?* (2010), eh.net/encyclopedia/the-dust-bowl/; on Cunfer's perspective, the connections to James C. Malin, and Dust Bowl narratives in the US historiography, see William Cronon, 'A Place for Stories', 1347–76; on New Deal influences in the Australian context, see also Bailey, "'Dust bowls", TVAs and Snowy River waters' and *Dust Bowl: Depression America to World War Two Australia*.

57 On the location of the Dust Bowl, see Donald Worster, *Dust bowl: The Southern Plains in the 1930s* (New York: Oxford University Press, 1979), 12; and see 28–9; on dust storms beyond these borders, see 13; and on drought conditions across the US, see 11.

Water conservation imagery also had value. An image of water falling over the perfectly designed sections of a massive dam spillway expressed the optimism of an age associated with high modernism, and could certainly be used to peddle visions of a utopian postwar world. Hall was aware of this. To further empower his storytelling, in *Australia is Developing a Dust Bowl*, he took inspiration from a second aspect of the American story, evoking the dam-building achievements of the US Bureau of Reclamation (1902) in the American West and the TVA in the east. In reality, neither agency applied large-scale engineering projects as a remedy to the US Dust Bowl, while the TVA was in a different region altogether. Australian political and environmental conditions, such as rainfall, differed to those in the east and west of the USA, where these American agencies had established their projects.⁵⁸ But Australian storytellers such as Ken Hall drew on the powerful reputations of these engineering projects nonetheless, and in Australian wartime narratives, enormous dams became associated with salvation from ‘dust bowls’. Imagery promoting water conservation schemes in New South Wales, Victoria, and Queensland used the threat of a ‘dust bowl’ to promote their desired schemes, a very different set of imagery to that describing the US Dust Bowl.

In *Australia is Developing a Dust Bowl*, US references were designed to boost New South Wales’ nation-building credentials in debate over the most suitable postwar water conservation scheme. Hall’s use of dam imagery stretched the truth about the US Bureau of Reclamation’s projects and water conservation by suggesting that large-scale engineering projects had been the solution to the Dust Bowl on the southern Great Plains, even though they had not. Ignoring reality, then, he inferred that they would also be the solution to drought and wind erosion problems plaguing the more arid western New South Wales Riverina region.⁵⁹ The way to achieve such a parallel solution in Australia, the film suggested, was to look to the credentials of New South Wales—it had

58 For details of TVA influences in Australia (with some reference to international influences), see Bailey, *Dust Bowl: Depression America to World War Two Australia*.

59 On water conservation strategy for the Great Plains, see Morris Llewellyn Cooke, *The Future of the Great Plains: Report of the Great Plains Committee* (Washington DC: G.P.O., Great Plains Committee, 1936), 76–7; in his *Land of the Underground Rain: Irrigation on the Texas High Plains 1910–1970* (Austin, TX: University of Texas Press, 1973), 134–5, Donald E. Green discusses water facilities legislation that provided only for ‘the installation of pumping plants’, and even then, did not even specifically mention them. See also Worster, *Dust Bowl*, 252–3.

already built the Burrinjuck Dam on the Murrumbidgee by 1928.⁶⁰ Hall drew parallels between New South Wales, its potential to expand on the achievement of Burrinjuck Dam, and federal government dam-building achievements in the USA. He did this to promote the viability of a Commonwealth government-backed nation-building scheme that would expand the MIA. There was also a promise of postwar employment built into this water conservation imagery, which linked to Labour's goal of full employment and the promise of an enormous population of settlers thriving on all that diverted Snowy River water (Map 2).

Australia is Developing a Dust Bowl reflects a broader set of ideas that were being dramatised more widely in the print, film, and broadcast media of the decade. For example, transnational imagery promoting a national scheme appeared in newspaper articles supporting the work of Australian documentary filmmaker John Heyer, who promoted a rival Victorian water diversion scheme later in the decade for the Murray River.⁶¹ They materialised in newspaper articles about the Murrumbidgee Valley Water Users' Association (MVWUA, established 1939), which supported the MIA scheme and appeared in books by the popular author Ion L. Idriess, the Queensland water conservation advocate Fred Timbury, and the activist Michael Sawtell.⁶² Their Queensland vision was one that tried to out-compete New South Wales by promoting the Bradfield/Idriess scheme, based on the 1938 Bradfield Plan for Watering Inland Australia. They frequently conjured the threat of a 'dust bowl' moving east across the continent from Lake Eyre and contrasted this against what gigantic dams modelled on the projects of the US Bureau of Reclamation could do to counter it. Speaking at a Millions Club luncheon in Sydney, Idriess argued that a major water diversion scheme was needed to open up the interior for settlement

60 Under expert guidance from Elwood Mead. On Mead, see Tyrrell, *True Gardens of the Gods*, 159; on the establishment of the MIA, see B. R. Davidson, *Australia, Wet or Dry? The Physical and Economic Limits to the Expansion of Irrigation* (Melbourne: Melbourne University Press, 1969), 68–9; on Burrinjuck Dam or 'Barren Jack Dam and Murrumbidgee Canals construction' [1906], see 68–9; Emily O'Gorman in her *Flood Country* (Melbourne: CSIRO Publishing, 2012), 47, describes the effect of the Burrinjuck Dam on Murrumbidgee River hydrology. On earlier water conservation initiatives in south-eastern Australia, including the Hume Dam (1936) on the Upper Murray River, see Australian Government, Murray Darling Basin Authority, 'Hume Dam' (2015), www.mdba.gov.au/river-information/running-river-murray/hume-dam. The Hume Dam was enlarged in 1954 to allow for water diverted by the Snowy Mountains Scheme.

61 On Heyer and transnational imagery used to promote the Victorian rival scheme for a 'TVA for the Murray River', see Bailey, "'Dust bowls", TVAs and Snowy River waters' and *Dust Bowl: Depression America to World War Two Australia*.

62 The writer has not located a direct link between the creation of Hall's film and the MVWUA; however, the Association may have indirectly influenced the creation of the film. This occurred in the parallel Victorian case where their later rival scheme calling for a TVA for the Murray was backed by the Murray Valley Development League, which under G. Vernon Lawrence pushed the Australian National Film Board in the Department of Information to produce John Heyer's *The Valley is Ours* (1948). See Bailey, "'Dust bowls", TVAs and Snowy River waters' and *Dust Bowl: Depression America to World War Two Australia*.

of thousands of people, make the 'dead heart' of Australia blossom like a garden, kill the 'dust bowl' of Australia, which had already reached the Darling River, and check the onslaught of drought in western New South Wales.⁶³

This set of ideas drawn from US and Australian narratives was dramatised in imagery circulated by newspapers such as the Melbourne *Argus* and in the *Sydney Morning Herald*. In the *Sydney Morning Herald* in 1944, a columnist (writing under the name of a New South Wales flower, 'Waratah') argued that Burrinjuck Dam in New South Wales was already a 'shining dual purpose example'.⁶⁴ Surely, he believed, 'the great Boulder, Coulee and the two Tennessee Valley dams' would inspire support for a scheme that would further irrigate western New South Wales.⁶⁵ This kind of US/Australian imagery was also circulated by the Australian Broadcasting Commission's⁶⁶ *Nation's Forum of the Air*; by Cinesound in films such as *Conserve Water*; in journals such as *Australasian Engineer*; and even by the *Australian Women's Weekly*. When it featured in an article by retired public works architect A. J. Macdonald on 'Australia's greatest internal question', *Australasian Engineer* included images of US dams to 'stress the importance of water conservation to Australia'.⁶⁷ To illustrate the need for 'souls that do or dare' (brave men risking their lives on dangerous dam-building projects), nine photographs were reproduced, of the Shasta, Coulee, and Friant

63 First published much earlier, in 1938, the Bradfield Scheme was designed by Australian civil engineer J. J. Bradfield and outlined in a 1941 issue of *Rydges Weekly*. It aimed to capture the waters of northern Queensland rivers that flowed into the sea, and turn them inland across the Great Dividing Range. See Commonwealth Meteorological Bureau, *Bradfield Scheme for Watering the Inland: Meteorological Aspects*, Bulletin no. 34 (Melbourne: Government Printer, 1945); 'The Bradfield Scheme', *Journal of the Royal Australian Historical Society* 95, no. 1 (June 2009): 38–51; the name of the Millions Club reflected the club's goals to increase both population and immigration. For the Millions Club quotation, see Ion Idriess, 'Ambitious Plan: Converting Desert into Garden-Irrigation Scheme for Central Australia', *Sydney Morning Herald*, 21 November 1944. Also see Idriess' story in 'Ambitious Plan: Converting Desert into Garden-Irrigation Scheme for Central Australia', *Canberra Times*, 21 May 1941; Fred R. V. Timbury, 'Australia's Future Depends on Battle for the Interior', *Daily Mirror*, 17 January 1945; Fred R. V. Timbury, *Battle for the Inland* (Sydney: Angus and Robertson, 1944); Ion L. Idriess, *Onward Australia: Developing a Continent* (Sydney: Angus and Robertson, 1944) and *The Great Boomerang* (London: Angus and Robertson, 1941); Jill Roe, 'Sawtell, Olaf (Michael) (1883–1971)', *Australian Dictionary of Biography*, adb.anu.edu.au/biography/sawtell-olaf-michael-13186/text23871; Cathcart, *The Water Dreamers*, 237; J. M. Powell, *Plains of Promise, Rivers of Destiny: Water Management and the Development of Queensland 1824–1990* (Bowen Hills, Qld.: Boolarong Publications, 1991), 161; Robert Wooding, 'Populate Parch and Panic: Two Centuries of Dreaming about Nation Building', in *Australia Under Construction*, ed. John Butcher (Canberra: ANU E Press, 2008), 66, press-files.anu.edu.au/downloads/press/p118181/pdf/ch069.pdf; Andrew Gillanders in 'Mirage of the Inland Sea: The Bradfield Scheme', *Journal of the Royal Australian Historical Society* 95, no. 1 (June 2009): 38–51, notes the scheme was conceived at the same time as the Snowy scheme.

64 The waratah, *Telopea speciosissima*, was proclaimed the official floral emblem of New South Wales on 24 October 1962. 'Waratah' is the Aboriginal name for the species, adopted by early Sydney Harbour settlers. See Australian National Herbarium, 'Floral Emblems of New South Wales' (Australian National Botanic Gardens and Centre for Australian National Biodiversity Research, Canberra), www.anbg.gov.au/emblems/nsw.emblem.html.

65 Waratah, 'Irrigation is our Major Need', *Sydney Morning Herald*, 29 September 1944.

66 Formerly the Australian Broadcasting Company, now the Australian Broadcasting Corporation.

67 And at the time, to suggest a Mountain Lake in Canberra as a possible solution.

Dams.⁶⁸ Macdonald reiterated this appeal in 1945, calling for a national water conservation scheme.⁶⁹ Without it, he warned, the Murray River Basin on New South Wales' southern border would be 'gripped with water famine, to become a sunburnt, sand-blown wilderness strewn with the bleached bones of dumb animals, bearing silent testimony to economic ruin'.⁷⁰ Macdonald promoted both US engineering possibilities and this dust bowl imagery to argue that 'the waters of the Snowy River should be diverted'.⁷¹ In this, he was far from being alone.

Despite the fusing of this set of US and Australian ideas in the transnational imagery employed by Hall, the filmmaker has been described as a 'brilliant propagandist', his films strongly nationalistic and exhibiting 'a palpable love of rural Australia and the environment'.⁷² Unlike films made by Movietone, Cinesound's are said never to have used an imported story, while all their content was created by Australians.⁷³ However, Hall modelled the narrative structure of Cinesound films on the techniques of the Hollywood studio system. And although *Australia is Developing a Dust Bowl* is full of both textual and visual US references, Hall was expressing a nationalist *Australian* perspective. Australian historian Frank Bongiorno has described this in his recent discussions of 1940s politics, arguing that 'there was more than one way of being nationalist'.⁷⁴ Like many of his contemporaries, including Australian international documentary filmmaker John Heyer, Hall used transnationalism as a storytelling strategy.⁷⁵

68 Shasta Dam is in Central Valley, California, and served northern Californian war plants. The Grand Coulee Dam, in eastern Washington, served the Columbia Basin and Pacific North-West industry. Friant Dam was an irrigation dam serving the San Joaquin Valley, California, and all were projects of the US Bureau of Reclamation; on the transformation of the Columbia River and US water conservation ideas, see White, *The Organic Machine*.

69 On Macdonald's career, see Anne Neale, 'A. J. Macdonald: Enigma and Romance in the Public Service', *Fabrications* 10, no. 1 (August 1999): 115–35; Diane Firth, 'A Mountain Lake for Canberra', *The National Library Magazine* (June 2013): 18.

70 A. J. Macdonald, 'Canberra and Water Power: A Plea for the Mountain Lake—Illustrated with American Dams to stress the importance of water conservation', *Australasian Engineer*, Yearbook (November 1944): 7. Macdonald submitted this article to the Rural Reconstruction Commission. See A. J. Macdonald, Elsternwick, Melbourne, to Prime Minister John Curtin, 10 April 1945 (P.M. File No. A.423/1/2), Rural Reconstruction Commission—Snowy River Electric Scheme—representation on behalf of municipalities and organizations, National Archives of Australia, series A9816, item 1944/485. W. G. Tweedie of Ivanhoe responded to Macdonald in a letter to the editor in which he referred to a report by the Sydney division of the Institution of Engineers that Victorian Premier Albert Dunstan had questioned in 'Diverting the Snowy River', *Argus* [Melbourne], 28 February 1945. See also A. J. Macdonald, 'Diverting the Snowy River' [letter to the editor], *Argus*, 19 February 1945. Macdonald attacked Dunstan and the Victorian Country Party for their lack of support for a water scheme.

71 Macdonald, 'Diverting the Snowy River'.

72 Ray Edmondson, email to author, 6 August 2012.

73 Edmondson, 'The Voice of Australia', 2.

74 Frank Bongiorno, 'Comment: Australia, nationalism and transnationalism', *History Australia* 10, no. 3 (December 2013): 81.

75 John Heyer's *The Valley is Ours* (1948) was a propaganda film supporting the rival water conservation scheme planned by the state of Victoria and the Murray Valley Development League. For an in-depth analysis of Heyer's use of transnationalism as a storytelling strategy in *The Valley is Ours*, see Bailey, "'Dust bowls", TVAs and Snowy River waters' and *Dust Bowl: Depression America to World War Two Australia*.

Hall loaded his films with American referents to help him to pose a question for his audience. Using imagery contrasting dams against ‘dust bowls’, he promoted the New South Wales scheme and strengthened a nationalistic message about the Australian environment. But most importantly, what Hall’s imagery and that of Idriess, Macdonald, Heyer, and others did was to understand and tap into the fears, hopes, and dreams they knew to be playing out in the minds of their wartime audience. Hall’s contrasting imagery challenged Australians by asking what kind of postwar future they really wanted. Did they want to live in a US-inspired modern utopia that the New South Wales Government could readily provide by expanding on the existing achievement of Burrinjuck Dam? Or would they prefer a bleak future of US-style ‘dust bowls’, bringing drought and wind erosion that would eventually lead to sheep, and even human, extinction? Contrasted against such a powerful symbol of modernity in the form of the dam, Hall’s portrayal of a ‘developing dust bowl’ only accentuated the meaning of large-scale engineering projects and what, with Snowy River water, one ambitious state could do for the nation.⁷⁶

Noel Beadle, sand, saltbush, sheep, and a model dam

Despite Hall’s significant reputation, the films discussed here are not widely remembered, even by cultural and environmental historians. This might be related to the fact that *Australia is Developing a Dust Bowl* reflects some of the many questions being raised in its time over the quality of Australian films. At a 1941 conference of Commonwealth and state governments on the non-theatrical exhibition of films, attendees expressed the concern that if Australian films had a message, it was ‘not dramatized enough or projected sufficiently clearly’. Audiences felt there were ‘too many pictures’ in the films. They meant that the editor was cutting from one image to the next too often, too suddenly, and without explanation.⁷⁷ Reflecting such issues, the Cinesound films discussed here often jump suddenly to and from one image—that of a dam—without explanation. From a transnational research perspective, however, this technical awkwardness is illuminating. Rather than presenting a seamless integration of ideas, it clearly highlights Hall’s attempts to connect US-inspired ideas about dams to US-inspired ideas about ‘dust bowls’—and give that connection an Australian meaning. The out-of-place appearance of the dam image is what inspired this research project to trace the set of ideas and set of circumstances giving rise to its clumsy appearance in Hall’s film. The single image of a dam used by Hall was of a scaled-down

⁷⁶ Cinesound Productions, *Australia is Developing a Dust Bowl*.

⁷⁷ Agenda for conference between Commonwealth and state governments on non-theatrical exhibition of films, held at the State Lands Department Sydney, Wednesday 26th March, 1941, 35. National Archives of Australia, series SP107/1, bundle 2.

reproduction of the Woronora Dam (built between 1927 and 1941) that services southern Sydney, far from the Riverina.⁷⁸ This image appeared in a number of Cinesound newsreel or documentary films about soil erosion. The model dam was built for National Productions Limited in a 'rented space on the lot of the closed down Pagewood Studios' in Sydney so that it could be blown up in the feature comedy, *Dad Rudd M.P.* (released in 1940), the last film Cinesound were able to make before World War II (Figure 2).⁷⁹



Figure 2: An expression of the optimism of the age associated with high modernism, and visions of a utopian postwar world. Ken Hall's model of Woronora Dam as seen in Cinesound Productions, *Australia is Developing a Dust Bowl* (1943).

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

War, however, did not mean an end to all filmmaking. Rather, it facilitated the development of a documentary movement, first established in the 1930s and Australian Government film propaganda proliferated and developed.⁸⁰ During the process, motion picture footage such as Hall's dam sequence was often cut and pasted into Australian newsreel or 'documentary' films. This accounts for the rather out-of-place and often sudden appearance of Hall's dam in various newsreel films. In *Australia is Developing a Dust Bowl* and *Conserve Water*,

78 Woronora Dam was built between 1927 and 1941 to service metropolitan Sydney up to 1960, and is the last of five water supply dams built prior to World War II. New South Wales Government Office of Environment and Heritage, 'Heritage sites: Woronora Dam' (updated 10 September 2009), www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=5051466.

79 Ken Hall built this model dam to create 'a tremendous action climax of the flooding and destruction of the dam—a remarkable technical achievement for this country', in *Dad Rudd M.P.* See Hall, *Directed by Ken G. Hall*, 155. See 155–6 for details of the model's construction. For the national symbolism of the dam in *Dad Rudd M.P.*, see Michael Cathcart, *The Water Dreamers*, 235; on location film footage being edited into newsreels, see Helen Ennis, *Exposures: Photography and Australia* (London: Reaktion, 2007), 91.

80 See Ina Bertrand and Diane Collins, *Government and Film in Australia* (Sydney: Currency Press, 1981).

the model dam conveyed a political message.⁸¹ It reflected Commonwealth government attempts to extend their constitutional powers over soil and water conservation. And it reflected New South Wales' determination to control any national water scheme that ensued. At a 1942 Constitutional Convention, the states unanimously agreed to pass legislation that would transfer powers to the Commonwealth.⁸² The aim was to avoid a referendum in wartime.⁸³ But the corresponding legislation needed was not successfully passed by all the states, due to a political tactic employed by Victorian premier Albert Dunstan⁸⁴ that forced the Commonwealth to consider achieving their aims via a referendum.⁸⁵ These plans were postponed due to Curtin's fear of losing favour at an impending federal election.⁸⁶ They were also complicated by an impending trip to Washington and London and by his return, which came against the whole atmosphere of the June 1944 Normandy landings. '[T]he greatest amphibious operation of all time' and 'the beginning of the end of Nazi tyranny in Europe' was not an ideal time to call Australians to a referendum.⁸⁷

Soil and water conservation were not the only issues under consideration at the August 1944 referendum. Had it been a success, however, the Commonwealth government might have seen soil and water conservation transferred from the

81 *Conserve Water* is undated. For an analysis of this film, see Bailey, *Dust Bowl: Depression America to World War Two Australia*.

82 On the Constitutional Convention, see also Bailey, *Dust Bowl: Depression America to World War Two Australia*; Macintyre, *Australia's Boldest Experiment*, 254. On the exclusion of women from the Convention, see Macintyre, 'Women's Leadership in War and Reconstruction', 75 and *Australia's Boldest Experiment*, 137.

83 For discussion of how 'uniform laws' were needed, particularly for New South Wales and Victoria, see Con Hartnett, *Curtin and McKell, Architects of Regionalism in Australia*, interim ed. (Tighes Hill, NSW: Hunter Valley Research Foundation, 1984), 61. On expanding constitutional powers, see Bongiorno and Dyrenfurth, *A Little History of the Australian Labor Party*, 98–9.

84 On Dunstan's politics and his lack of support for soil conservation in his state of Victoria, including his evasion of the whole issue of the US Dust Bowl and its relevance to Australia, see Bailey, *Dust Bowl: Depression America to World War Two Australia*.

85 In 1948, Keith O. Campbell noted the 'peculiar appeal' for the general public that made 'conservation' a useful tool for political propaganda: 'The Development of Soil Conservation Programmes in Australia', *Land Economics* 24, no. 1 (February 1948): 67; the first reading of the 1942 War Aims and Reconstruction Bill (Commonwealth) (or Constitution Alteration Bill) occurred in the Commonwealth Parliament House of Representatives on 1 October 1942. The Attorney-General, Dr H. V. Evatt, did not hesitate to quote the four essential human freedoms from President Roosevelt's Atlantic Charter in order to promote change in Australia, according to Brian Galligan, *A Federal Republic: Australia's Constitutional System of Government* (Melbourne: Cambridge University Press, 1995), 144; W. J. Waters, 'Australian Labor's Full Employment Objective', 49; on the 1942 War Aims and Reconstruction Bill, see also Macintyre, 'Women's Leadership in War and Reconstruction', 72 and *Australia's Boldest Experiment*, 137–8.

86 Macintyre, *Australia's Boldest Experiment*, 254.

87 Hartnett, *Curtin and McKell*, 62, 64; Commonwealth Government of Australia, *You and the referendum* (Canberra: Commonwealth Government of Australia, 1944). see also Bailey, *Dust Bowl: Depression America to World War Two Australia*; on public interest in a referendum see 140–1; on the media publicity campaign see 259–61; and on the timing of the referendum, delayed until 1944, see Macintyre, 'Women's Leadership in War and Reconstruction', 74 and *Australia's Boldest Experiment*, 141, 258.

states into their hands.⁸⁸ However, the referendum failed. In continued pursuit of their conservation vision, the Department of Information screened Hall's *Australia is Developing a Dust Bowl* to Premier McKell and members of the state government at Film House, Canberra, in November 1944 at the height of the drought.⁸⁹ A second screening took place one week later for a private audience of federal parliamentarians and officials, as dust storms swept across the south-east. Crayton Burns reported for the Melbourne *Argus* that, combined with the screenings, the blanket of dust sweeping across Canberra was giving Labour parliamentarians a 'lesson' in the realities of wind erosion. He described the hot, dry conditions and heavy dust pall prevailing across the capital. This, he said, created a potent 'atmosphere' that accentuated the meaning of this 'grim visual demonstration' for its audience.⁹⁰ What did this 'grim visual demonstration' look like?



Figure 3: A dramatic cinematic score creates a sense of unease and impending disaster. 'That was a crop in the drought area. Now it is part of a potential dust bowl. Wind whips the surface soil away from the stunted crop.' This imagery suggests salvation is urgently needed for the nation's Riverina food bowl if a 'dust bowl' is to be prevented: opening scenes from *Australia is Developing a Dust Bowl*.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

88 Commonwealth Government of Australia, *You and the referendum*. In 1944, Leslie Haylen (mentioned above as the Member for Parkes) was the publicity officer for the 'fourteen powers' referendum. See R. E. Northey, 'Haylen, Leslie Clement (Les) (1898–1977)', *Australian Dictionary of Biography*, adb.anu.edu.au/biography/haylen-leslie-clement-les-10466/text18565.

89 This screening was reported on in 'No Fodder Reserves Available[;] Relief Likely in Summer', *Sydney Morning Herald*, 8 November 1944.

90 Crayton Burns, 'Conference Urged on Erosion', *Argus*, 17 November 1944. On 'lessons' and grim visuals, see Burns, 'MPs Warned of Dust Bowl Danger'. Conditions were described in 'Heat and Dust in Sydney', *Argus*, 14 November 1944, using reports by NSW Divisional Meteorologist David Mares.



Figure 4: Images of wind having blown surface soil away are evidence of a 'dust bowl' threat.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.



Figure 5: 'Most of the surface soil gone, leaving small oases. They will go too.' Ken Hall's imagery both feeds on and reflects the 'dust bowl' fears of the time as expressed across different media.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.



Figure 6: 'Farmlands are literally blowing away and the subsoil that is left is comparatively valueless.' This imagery suggests that unless conservation action is taken, the Riverina will become a sandy desert.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

Australia is Developing a Dust Bowl opens with a warning: 'that was a crop in the drought area. Now it is part of a potential dust bowl.' Narrator Peter Bathurst further warns us that 'Farmlands are literally blowing away' (Figures 3–6).⁹¹ The film cuts to Condobolin Government Station. Here we see the pioneering work of Noel Beadle on his vegetation regeneration project for the New South Wales Soil Conservation Service (Figure 7). During the 1940s, Beadle produced the first coherent classification and map of the vegetation of western New South Wales. He was the first person ever employed by the Soil Conservation Service to conduct such a survey of western New South Wales. His work was frequently cited by contemporaries such as the economic geographer Arthur G. Lowndes, whose thousands of photographs and notes documented soil erosion conditions on farms and stations across the continent for the Bank of New South Wales.⁹²

91 Cinesound Productions, *Australia is Developing a Dust Bowl*; on the British actor, see Imdb, 'Peter Bathurst: Biography' (2014), www.imdb.com/name/nm0061105/bio?ref_=nm_ov_bio_sm, accessed 2 February 2014.

92 Bank of New South Wales economic geographer Arthur G. Lowndes travelled widely overseas, created transnational publications, and travelled across Australia undertaking surveys of soil erosion in every state: see Bailey, *Dust Bowl: Depression America to World War Two Australia*. The fruits of his efforts included thousands of photographs as well as numerous references to the work of contemporaries Noel Beadle and Francis Ratcliffe. See C. V. Janes and A. G. Lowndes for the Bank of New South Wales, *Photographs of Soil Erosion*, c. 1936–56, State Library of New South Wales, PXE 1257; Strathfield Council, 'Strathfield Heritage: all about the history and heritage of Strathfield. Arthur Lowndes—Arthur George LOWNDES CBE, M.Sc. (1911–1994)', strathfieldheritage.org/local-government/council/mayors-of-strathfield-council/arthur-lowndes/.

Beadle's research is considered today a benchmark study in the field.⁹³ He was able to continue this work throughout the war because Soil Conservation Service director Sam Clayton, a World War I veteran himself, would not allow his soil men to enlist.



Figure 7: The expert portrayed as patriot. The botanist Noel Beadle (centre) and colleagues with 'land saving seedlings' at Condobolin Government Station in western New South Wales.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

At his headquarters we see Beadle and his team. They are growing saltbush and other shrubs 'to replant the devastated land', with results 'already being achieved with the land-saving seedlings' (Figure 7).⁹⁴ From Condobolin, Beadle started out in the late 1930s with just a Chevrolet sedan for transport. From here he produced a landmark study, published by the Soil Conservation Service in 1948 as *The Vegetation and Pastures of Western New South Wales, with Special*

93 Noel C. W. Beadle, *The Vegetation and Pastures of Western New South Wales, with Special Reference to Soil Erosion* (Sydney: Department of Conservation of New South Wales, 1948). On fine native pasture, see his 'Soil Erosion in Western New South Wales', *Journal of the Soil Conservation Service of New South Wales* 1 (April 1945): 1. Beadle resigned from the Soil Conservation Service in 1946, became senior lecturer in botany at the University of Sydney, and in 1954 was made Foundation Professor of Botany at the University of New England. He authored a number of publications on vegetation of the Sydney region and the continent and received recognition for his achievements from the University of Sydney, the University of New England, the Royal Society of New South Wales (1982), the Ecological Society of Australia (1985), and the Soil Conservation Service of New South Wales (1988). See Whalley Head, 'Beadle, Noel Charles William (1914–1998)', Council of Heads of Australasian Herbaria, Australian National Herbarium (2007), www.anbg.gov.au/biography/beadle-noel.html; Breckwoldt, *The Dirt Doctors*, 117–18.

94 Cinesound Productions, *Australia is Developing a Dust Bowl*; Beadle, 'Soil Erosion in Western New South Wales'.

*Reference to Soil Erosion.*⁹⁵ The map is still used by many who 'marvel at its accuracy' given the conditions under which he produced it. In July 1944, the *Sydney Morning Herald* described Beadle's report as a 'monumental' survey of '150,000 square miles of semi-arid and arid grazing country' in the west. He had mapped 25 different vegetation areas and their corresponding soil types and noted the vulnerability of those soils to erosion, while he recorded the changes caused to them by overstocking.⁹⁶ Beadle was passionate about protecting new pasture growth in the west from the destructive impacts of sheep overstocking.⁹⁷ Along with a range of US and Australian experts in the 1940s, he acknowledged a wide range of interrelated factors contributing to wind erosion. Among them were drought and wartime pressures, including the lack of transport to move stock out. But his research confirmed that 'the cause of all erosion in western New South Wales can be traced ultimately to either over-grazing or timber removal or to a combination of these two factors'.⁹⁸ His findings were reiterated in the print and film media who put graziers (sheep farmers) on notice.

To emphasise and interpret this message, in *Australia is Developing a Dust Bowl*, Hall introduces an actor playing the role of a conservation farmer. He introduces himself: 'I speak as a farmer.' He warns that 'land devastation and erosion is largely due to ignorance and exploitation', to 'over-destruction of natural timbers and herbage', and to 'overstocking of the land'. Our 'farmer' acknowledges economic and other pressures that contribute to overstocking. But his emphasis on culpability builds as he is framed in dramatic close-up to highlight the idea that 'If we continue to flog the productive earth to death for a little more profit, posterity will pay a bitter price'.⁹⁹ Then the tone of the farmer's voice shifts. He adds angrily, 'that is fatal. If we do not turn from

95 NSW Soil Conservation Zones and Condobolin Station are shown in 'Soil Conservation Zones', *Journal of the Soil Conservation Service of New South Wales* 1 (July 1945): 36; Beadle, *The Vegetation and Pastures of Western New South Wales*.

96 Head, 'Beadle, Noel Charles William (1914–1998)'; 'On the Land: Soil Erosion in West', *Sydney Morning Herald*, 31 July 1944.

97 Breckwoldt, *The Dirt Doctors*, 118; on Beadle's experimentation with contour furrows in western New South Wales, see 117.

98 See also Hugh Hammond Bennett, who quoted J. Macdonald Holmes, *The Erosion-pastoral Problem of the Western Division of New South Wales* (Sydney: University of Sydney, 1938) in *Soil Conservation* (New York: McGraw-Hill, 1939), 935. On Holmes, see G. P. Walsh, 'Holmes, James Macdonald (1896–1966)', *Australian Dictionary of Biography*, adb.anu.edu.au/biography/holmes-james-macdonald-10527. For earlier reporting, and on South Australia, see Francis Ratcliffe, *Flying Fox and Drifting Sand: The Adventures of a Biologist in Australia* (Sydney: Pacific Books, 1970); Jock Pick, *Australia's Dying Heart* (Melbourne: Melbourne University Press, 1942).

99 On close-ups and mid-shots in newsreels of the period discussed in the American context, see Dunaway, *Natural Visions*, 45.

exploitation to conservation we shall without question destroy our national heritage' (Figure 8). The 'farmer' heaps blame on his fellow farmers in a terrible warning, while the narrator, Peter Bathurst, turns to biblical themes, reminding us that 'the land of milk and honey can become a desert and drought is not entirely to blame'.



Figure 8: The camera brings the farmer 'up-close and personal' in a tight shot to emphasise the effects of overstocking: 'That is fatal'.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

Illustrated newspaper features and films of the time dedicated much space to capturing shocking images of sheep either being hand-fed scarce feed supplies, dying from starvation and thirst, or dead. The reasons for this were that sheep numbered over 100 million, the idea that 'the nation rides on the sheep's back' was a powerful national myth, and the Riverina was famous for breeding the Merino. All this meant that if images of fat, healthy sheep graced the screens of theatres, Australians could be sure that neither their environment nor their economy were endangered. But as audiences witnessed, in one after another alarming sequence of Hall's film, the sheep of the Riverina were in a shocking condition (Figures 9–11).



Figure 9: 'The nation riding on the sheep's back'? Turning national myth on its head. Some of these sheep lay dead. But many have been filmed as they lay dying, and all of them lay close to potential feed on the other side of a fenceline. All this indicates an overstocked paddock is to blame.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.



Figure 10: These sheep are alive. In this film sequence they can be seen dying, with no water, feed, or help in sight. Again they are close to potential feed on the other side of a fenceline. This and other such imagery circulating at the time suggests an unpatriotic grazier is at least partly to blame.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

As Hall's 'dust bowl' sequences unfold, we see a series of images showing tree roots exposed by wind erosion, sand drift and fencelines buried, farms 'blowing away', and huge sand dunes engulfing homesteads.¹⁰⁰ Symbolic of Australian civilization and national progress, a bullock, sheep, even a horse, and rabbits that were often blamed for erosion, lay dead surrounded by scenes of desolation, still confronting today. Repeated here and throughout other Cinesound erosion films are also stock images of 'crumbling ruins'. They suggest that the process of the decline of Australian civilization to desert is underway. All of this is classic 'dust bowl' imagery—the sound, visuals, and text.¹⁰¹ At Condobolin, we have seen Noel Beadle and his team, sleeves rolled up, working to cultivate native shrubs such as saltbush in the battle against a 'dust bowl'.

But how else, Cinesound asks, could this 'potential dust bowl' be stopped? The next combination of images comes as a bit of a surprise to the viewer. This is not a story ending in decline. There is technological salvation. A terrible future can be avoided by 'water conservation plus land conservation. Undeniably,' we are told, 'that is the major post-war job for Australians.' We see litres of fresh water gushing over a dam spillway (Figure 2). In *Australia is Developing a Dust Bowl*, along with this brief yet dramatic dam scene, there is no text, no narration, no character that mentions methods of water conservation, federal planning authorities, engineering schemes, New South Wales' plans for the Snowy River, the MVWUA, or political campaigns of any kind. We see the dam (Figure 2). Then, as quickly as it flicks across the screen, the film jumps back to images of 'desert' and 'ruined civilizations'.

100 On farmlands 'literally blowing away', see Cinesound Productions, *Drought Grips Riverina*.

101 It cannot be known whether or not, like his contemporaries, popular writer Ion L. Idriess and filmmaker John Heyer, Ken Hall was directly influenced by the Pare Lorentz US Resettlement Administration film *The Plow that Broke the Plains*. It is most likely that as a documentary filmmaker of standing who had spent time working in the US, Hall was very familiar with Lorentz' work. However, what is certain and of most interest here, is that Hall was familiar with the US national Dust Bowl narrative and the key sets of imagery utilised to express it. On the films of Lorentz, see Dunaway, *Natural Visions* and 'New Deal Jeremiads', *Environmental History* 12, no. 2 (April 2007): 308–12; for a transnational analysis of the films of John Heyer and Pare Lorentz in the Australian/US context, see Bailey, *Dust Bowl: Depression America to World War Two Australia* and "'Dust bowls", TVAs and Snowy River waters'; Williams, 'Heyer, John'; 'International Documentary Filmmaker', 248–53.



Figure 11: 'Victims of ruthless exploitation'. At a 1944 MVWUA meeting, members argued that diverting the Snowy's waters 'as far westward as is humanly possible' would save sheep from 'extinction' and prevent soil erosion.¹⁰² Hall shows sheep that are both dead and dying, yet are often close to pasture on the other side of a fenceline in final scenes that shock. A further comment on both patriotism and the nation riding on the sheep's back.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

What does this sudden switch from dam to 'desert' mean? Was Cinesound predicting that without the New South Wales dam-building vision, the nation would see its food bowl turn to 'dust bowl'? Yes, narrator Peter Bathurst warns, 'in north-west New South Wales, the sands of the desert creep eastward, creep up to good properties, creep over them, forced inexorably on by the wind that comes from the west' (Figure 12).

¹⁰² Mr Heason of Hay district feared 'extinction' due to 'want of conserved fodder'. Mr Washington (Leeton Shire) argued for diversion westward in 'Notes of a Deputation which Waited on the Acting Prime Minister on the 22nd May, 1945', Representing the Murrumbidgee Valley Water Users' Association, Commonwealth of Australia Department of Post-war Reconstruction, Snowy River Hydro Electric Scheme—Representations by or on Behalf of Municipalities and Organisations: File No. /44/485, National Archives of Australia, series A9816, item 1946/307 Part 9.



Figure 12: Classic 'dust bowl' imagery as captured by US filmmakers and US photographers, including Arthur Rothstein in his Farm Security Administration photographs of Cimmaron County, Oklahoma, and Amarillo, Texas.¹⁰³ Here, sand drift appears to 'creep up to' New South Wales properties and 'creep over them'.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

If the New South Wales water conservation proposal does not go ahead, more of civilization will disappear just like this—he adds: 'this ... was a homestead. This ... was a township' (we see crumbling ruins). Here, the fertile soil has 'gone in a red pall blowing towards the sea and the men and women who had wrestled with this country have moved on'. The message is that dust bowl migration has begun in the north-west and now this 'dust bowl' is spreading into the Riverina, the New South Wales food bowl. 'Back in the Riverina,' we are warned, 'a dust storm is gathering.' Here, the surface soil is 'gone. Not temporarily, but for good.' The symbol of the dam is now pertinent to all that follows. The music whips into a frenzy as a storm sweeps away topsoil (Figures 12 and 13). An image of a little lamb replaces images of hundreds of sheep, dead, dying, or caught in the swirling dust as a storm stirs. The little lamb struggles to its feet. It symbolises Australian prosperity but it also has a double meaning. The new-born lamb symbolises 'America's effort', which, if emulated by the Australian nation, would see Australia and its great symbol of economic progress—the sheep—again rise to its feet (Figure 14). Cinesound tells us that although America has 'not yet conquered the evil', it has made 'great forward strides' in the battle against erosion. By 'rising up unitedly', Bathurst explains, 'America' has 'fought its Dust Bowl problem'.

103 For example, see Arthur Rothstein, *Abandoned farm in the dust bowl area. Oklahoma*, April 1936, Library of Congress Prints and Photographs Division, hdl.loc.gov/loc.pnp/pp.print.

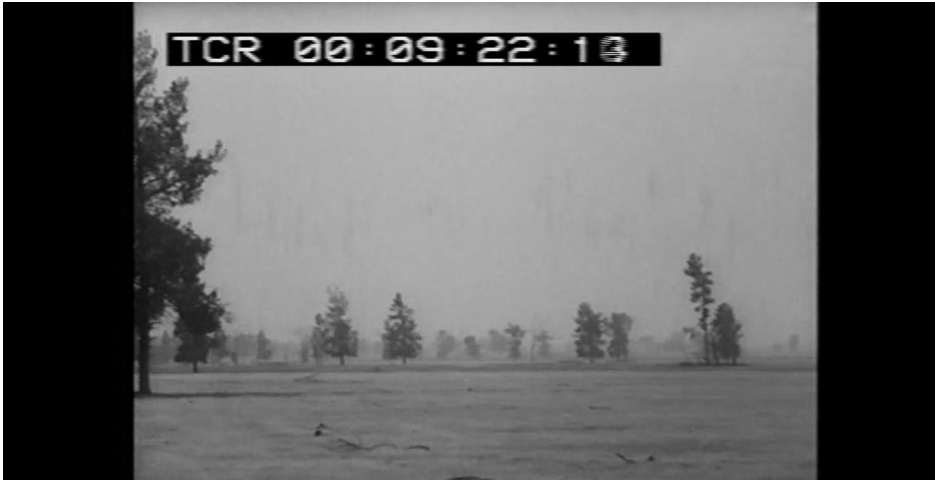


Figure 13: Airborne dust is captured on film rising in the Riverina, a warning that there may be more to come.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.



Figure 14: In *Australia is Developing a Dust Bowl* a little lamb symbolises 'America's effort' to fight its 'Dust Bowl problem'. Australia too, can again rise to its feet like this.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

Soil conservation is promoted, as noted, in this film. The image of the dam, however, indicates more—that the American 'great forward strides' against the Dust Bowl involved the building of enormous dams.¹⁰⁴ However, it was a distortion to suggest, as this and other imagery then in circulation did,

¹⁰⁴ Cinesound Productions, *Australia is Developing a Dust Bowl*.

that these dams ‘beat America’s Dust Bowl problem’ on the southern Great Plains.¹⁰⁵ The US Bureau of Reclamation did build dams in the arid west, such as Boulder Dam on the Colorado River (more commonly known today as Hoover Dam) and Friant Dam in San Joaquin Valley, California. Nonetheless, Hall argues, ‘we Australians must do the same because we have exactly the same problem’.¹⁰⁶

Nor was the New South Wales problem of overstocking ‘exactly the same’ as the primary issue of over-ploughing for wheat on the southern Great Plains as reiterated in US Dust Bowl narratives. Huge dams were unlikely to solve either problem—but the meaning to Australians and Americans of that much-invoked concept of a ‘dust bowl’ was that they were very much ‘the same problem’. This is clear in Hall’s overarching message that permanent civilization is doomed to fail in Australia if the New South Wales plan to divert Snowy waters westward for irrigation does not go ahead. We see the sheep and the grazier who are blamed for the developing ‘dust bowl’, as national mythology is turned on its head: ‘millions and millions of sheep on the move powder the dry soil into dust’, while ‘the rest is easy for a high wind’ (Figures 15 and 16).¹⁰⁷



Figure 15: Again, the national symbolism of the grazier and his sheep is reinterpreted as ‘millions and millions of sheep on the move’ are seen to ‘powder the dry soil into dust’, raising it to obscure their own presence in this ‘developing dust bowl’ image.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

105 On water strategies for the Dust Bowl, see Donald E. Green, *Land of the Underground Rain*, 134–5; Cooke, *The Future of the Great Plains*, 76–7.

106 Boulder Dam is located at the Nevada–Arizona border. Boulder Dam was actually officially named Hoover Dam after the nation’s 31st President, Herbert Hoover. Unofficially, after he left office, the name Boulder Dam was commonly used and it was only officially restored in 1947.

107 The ‘millions of sheep’ scene was originally created by Ken Hall for an earlier film called *The Squatter’s Daughter*. Verhoeven, *Sheep and the Australian Cinema*, 65.

Then *Australia is Developing a Dust Bowl* closes with a caution accentuated by the lowering pitch of a threatening musical score:

We and our descendants want to live here permanently and found the good earth for permanence. For the earth in the long run supports our cities and our secondary industries too. It is not too much to say that if we do not face up to and meet this problem determinedly, then the future of our nation is at stake.¹⁰⁸



Figure 16: With this imagery, Hall suggests that 'The future of our nation is at stake', due to graziers and sheep, obscured by the dust they are raising in this imagery.

Source: Cinesound Productions, *Australia is Developing a Dust Bowl* (1943), National Film and Sound Archive.

Screening the film: 'Grave danger' of a 'dust-bowl similar to that of the U.S.A.'¹⁰⁹

In *Australia is Developing a Dust Bowl*, the appearance of Hall's model dam is brief. Yet contrasted against 'dust bowl' imagery, when screened to parliamentarians, it generated expressions of a real faith in engineering as the answer to aridity, soil erosion, and drought. After viewing *Australia is Developing a Dust Bowl* and *Drought Grips Riverina*, Premier McKell called for public screenings 'in all

108 Cinesound Productions, *Australia is Developing a Dust Bowl*.

109 Mr Fadden, in Prime Minister's Department, 'Extract from House of Representatives Debate, 16 November, 1944: Inland Australia' sighted (signed) by J. J. Dedman, Minister for War Organisation of Industry and C.S.I.R. Dewar Wilson Goode Collection, series 5: Arid Zone, Box 33, item GOOD00215, 'Watering Inland Australia 1944', July–December, State Library of Victoria.

picture shows'. He believed this would inspire all members of the public to support his government's soil, forest, and water conservation efforts, including, no doubt, diversion of the Snowy River westward to develop the MIA.¹¹⁰

Crayton Burns reported for the *Argus* on urgent discussions that immediately followed the second Canberra screening. When panicked parliamentarians described dust storms, the emergency needs of graziers, and the need for a Snowy scheme, they reflected Hall's combination of imagery—one dam, set against so much suffering and decay, and all of this framed by an acute awareness of the US Dust Bowl.¹¹¹ Newspapers described the 'erosion menace', quoting the federal member for Darling, J. J. Clark: 'my electorate is being blown into sea'. In the days following the screening, parliamentary members Charles Adermann (for Maranoa), Albert Smith (for Wakefield), and Leslie Haylen (for Parkes) responded to the footage by calling for urgent financial relief for farmers.¹¹² They hailed the efforts of 'newspapers and film companies' in publicising drought and erosion 'so forcibly'. Haylen hoped Australia would 'not continue to convert good farming land into dust bowls'. Along with Prime Minister's Press Secretary Don Rodgers and Capitol Theatre manager M. J. Moir, Haylen called these 'splendid' films and called for them to be screened to the public, to stimulate their thinking.¹¹³ Federal Country Party leader Arthur Fadden reacted with a warning to the House of Representatives of a 'grave danger' at home of a 'dust-bowl similar to that of the U.S.A.'¹¹⁴ Visiting Canadian High Commissioner Thomas C. Davis had just returned to Canberra from a visit to the Riverina and the press reported his 'alarm and distress at signs he had seen of the dust bowl in Australia'. As a solution, he encouraged the Snowy diversion plan, stressing that with water 'many difficulties of drought and soil erosion by wind can be overcome'. Minister for Commerce and Agriculture William Scully argued that '£25 million would be needed for water conservation and irrigation schemes for the eastern areas of Australia' and he called on the government to support

110 See 'No Fodder Reserves Available[;] Relief Likely in Summer'.

111 In 'Conference Urged on Erosion', Burns described scenes from *Australia is Developing a Dust Bowl*, where 'even rabbits' were seen to be 'dying from hunger and thirst'.

112 Adermann was the Country Party representative for the seat of Maranoa, Queensland; Smith (Labour) held the South Australian seat of Wakefield; poet, nationalist, and politician Haylen (Labour) held the seat of Parkes in south-west Sydney.

113 Adermann referred to the footage on 17 November 1944: Commonwealth of Australia Parliamentary Debates, 17th Parliament, 2nd session (26th September – 1 December 1944) 180: 1894. See Gaha's comments on 1949, Smith's on 1973–4, and Haylen's on 2117. For the comments on Rodgers' international documentary films, and Moir's comments on 'non-fictional films' see 'Readers' Views', *Canberra Times*, 24 November 1944.

114 Mr Fadden, in Prime Minister's Department, 'Extract from House of Representatives Debate, 16 November, 1944: Inland Australia', sighted (signed) by J. J. Dedman, Minister for War Organisation of Industry and C.S.I.R. Dewar Wilson Goode Collection, series 5: Arid Zone, Box 33, item GOOD00215, 'Watering Inland Australia 1944, July–December', State Library of Victoria.

the 'huge post-war water conservation scheme being planned by New South Wales'. Without such a water conservation scheme for inland areas, he argued, 'any form of post-war rural development was worthless'.¹¹⁵

Parliamentarians had seen the dust blowing outside and on screen. They had seen and heard the sounds and sights of crop failure, heat, animal suffering and death in the Riverina they lived in and represented. On screen, they saw a 'dust bowl' moving from Broken Hill towards the Riverina and they heard of a catastrophic threat to the nation. And in contrast, just for a moment, they saw Hall's one image of a dam suggesting a simple way to dominate and control aridity, drought and erosion in inland areas, kill 'dust bowls', save millions of sheep, develop their region under the auspices of a Commonwealth project, and spur national progress in a modern, postwar world—something, the film suggested, America had done. When the war was over, Australia could do this too.

Hall's films had an impact but they did not help to provide a quick solution. Across the decade, advocates for a Murrumbidgee diversion scheme, driven by the efforts of the MVWUA, were to become increasingly frustrated. The state of Victoria's claims on Snowy River water, and their corresponding rival narratives, continued to threaten the New South Wales dream of doubling the Murrumbidgee Valley's capacity for irrigation.¹¹⁶ Finally, in 1949 the Commonwealth took control of the Snowy project.¹¹⁷ An independent body, the Snowy Mountains Hydroelectric Authority, was finally established by agreement with Victoria and New South Wales, while McKell, now Australian Governor-General, pressed the button that set off the first blast. But, in the end, no one state was to control

115 'Mr. Clark Says the Darling Electorate Being Blown into Sea: Erosion Menace', *Barrier Miner*, 15 November 1944. The press of the day often gave films various titles. This writer identified this film as 'Ken Hall's documentary film "Soil Erosion and the current Drought"'.
116 For details of the Victorian rival vision and the film, print, and broadcast media imagery constructed to support their campaign, see Bailey, "'Dust bowls'", TVAs and Snowy River waters' and *Dust Bowl: Depression America to World War Two Australia*.
117 On the Commonwealth taking control under Australia's defence powers, see Wigmore, *Struggle for the Snowy*, 141–2. On Snowy waters' increasing carrying capacity, see 'Snowy River Diversion Advocated'.

all that water.¹¹⁸ The waters of the Snowy River were diverted to both the MIA and the Murray River Valley. Both irrigation and hydropower were developed through a construction process that was completed in 1974, on a project that has been hailed as ‘an international historical engineering landmark’ by the American Society of Civil Engineers.¹¹⁹

Conclusion

Hall placed the deafening sound of water rushing over an enormous dam wall, the sight of water splashing, pouring, flooding—only momentarily—against ‘dust bowl’ imagery where wind could be heard howling and sand drifted as far as the eye could see. His dam sequence was momentary. Yet this contrasting imagery in wartime soil and water conservation films, such as *Australia is Developing a Dust Bowl*, triggered emotionally charged debate about water diversion at the national and state levels. There is a great deal of meaning embedded in Hall’s one brief image of a dam. It reflected a wider circulation of the same contrasting imagery in print and on radio that grew out of a period of wartime national grief, unthinkable levels of personal loss, and great cultural and technological change—along with the ascension of Labour governments. With barely a word about water, Hall’s model dam suggested ‘dust bowl’ salvation for Australia. When he contrasted the dam against long sequences portraying devastation in the Riverina, Hall provided a real justification for the kind of postwar happy ending Australians already imagined, the kind they *wanted*. It was one filled with water, a population of many millions, thriving sheep, hydropower, employment for all, and most importantly, those longed-for irrigated green garden landscapes that, fed by enormous dams, would once and for all eliminate deserts—at least in New South Wales anyway.

118 On McKell and the first blast, see National Archives of Australia, ‘60 years of the Snowy Mountains Hydro-Electric Scheme’ (2015), naa.gov.au/collection/snapshots/power/index.aspx; The Snowy Hydro authority more recently became a corporation with the states as shareholders; eventually 99 per cent of Snowy River water was diverted west. On this history of debate surrounding the projected and realised environmental impacts, see Claire Miller, *Snowy River Story: The Grassroots Campaign to Save a National Icon* (Sydney: ABC Books, 2005); George Sedden, *Searching for the Snowy: An Environmental History* (St Leonards, NSW: Allen & Unwin, 1994); Wigmore, *Struggle for the Snowy*; Grahame Griffin, ‘Selling the Snowy: The Snowy Mountains Scheme and National Mythmaking’, *Journal of Australian Studies* 79 (2003). On the Snowy construction (1951–75), see Brad Collis, *Snowy: The Making of Modern Australia* (Canberra: Tabletop Press, 1990). In the early stages of construction, Kaiser Walsh Perini Raymond (KWPR), an American consortium, built Tumut Pond Dam, the Tumut 1 Pressure Tunnel and Surge Tank, the Eucumbene-Tumut Tunnel, and the largest dam, Eucumbene. On KWPR and a tunnelling medal awarded to Max Stermole, see Museum Victoria, ‘Snowy Mountains Scheme, Australia, 1956’, item NU 42218 Medal—Snowy Mountains Scheme, Australia, 1956 (November 2012), collections.museumvictoria.com.au/items/415673.

119 Grahame Griffin, ‘Selling the Snowy’, 1.

With his model of Woronora Dam in *Australia is Developing a Dust Bowl*, Hall tried to connect to this sentiment by posing a question. His image offered Australians a choice between an arid, drought-stricken, soil-eroded past and a new beginning after the war. As Richard White has described it in the American case, this suggested water conservation in terms of a maximum use of resources through an improved, controllable, machine-like nature.¹²⁰ It suggested salvation from US-style 'dust bowls'. And not just any salvation, but deliverance inspired by the engineering achievements of the US Bureau of Reclamation in the American west and the TVA. It drew attention to Burrinjuck Dam as a magnificent example of similar dual-purpose projects at home. It suggested that the example of Burrinjuck and the expansion of the Murrumbidgee River's capacity was crucial to the development of the state. Most importantly, that one dam sequence symbolised the connection between all of this and the state of New South Wales as the saviour of the nation. Central to it all was the image of one little lamb struggling to its feet. It indicated that the US and Australia had the same environmental problems of aridity, drought and erosion and could apply the same solutions—engineering. This entire set of ideas—sheep myth, irrigation hopes, enthusiasm for US dam-building achievements, wartime sentiment, 'dust bowl' fears, political ambition, national vision, and a transnational perspective—existed not just in 1943. These historical ideas and perspectives can still be seen and heard today. All that is needed is to sit back and watch and listen to this footage of a model dam that had been built by Ken Hall in a 'rented space on the lot of the closed down Pagewood Studios' in Sydney.¹²¹

120 On the contemporary idea of a machine-like nature, see White, *The Organic Machine*.

121 Hall, *Directed by Ken G. Hall*, 155. See 155–6 for details of model construction. For a description of the narrative linking dams to nationhood in *Dad Rudd M.P.*, see Cathcart, *The Water Dreamers*, 235.

NEW PERSPECTIVES ON METHODOLOGY IN GARDEN HISTORY: APPROACHES TOWARDS WRITING ABOUT IMPORTED MEDICINAL PLANTS IN COLONIAL NEW ZEALAND

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Abstract

This paper demonstrates how combining methodological approaches from garden history and medical history can present new perspectives on the history of gardens and health in colonial New Zealand, and recover the prominent associations between health and the environment in settler society within the context of modern historical research. It appeals to researchers to 'cast their net wide' when searching for source material, an approach that situates the study of medicinal plants within a wider, interdisciplinary historiographical framework.

Keywords: garden history, methodology, medicinal plants

Introduction

Garden histories of colonial New Zealand first appeared in the 1930s, but lacked academic rigour given the infancy of the discipline.¹ Only really from the 1980s has a handful of rich and regionally specific studies been produced.² Supported by a number of prominent researchers, garden history in New Zealand has subsequently grown into a small but multi-disciplinary field

1 Robert Nairn, 'The Early History of Horticulture in New Zealand', *Supplement to the Journal of the Royal Society of Horticulture* 3, no. 2 (1932); Alan Hale, *Pioneer Nurserymen of New Zealand* (Wellington: A. H. and A. W. Reed, 1955); M. J. Barnett, H. G. Gilpin, and Clarence J. Metcalf, *A Garden Century: The Christchurch Botanic Gardens, 1863–1963* (Christchurch: Christchurch Botanic Gardens, 1964).

2 This scholarship is summarised in James Beattie, 'The Empire of the Rhododendron: Reorienting New Zealand garden history', in *Making a New Land: Environmental Histories of New Zealand*, ed. Tom Brooking and Eric Pawson, 2nd ed. (Dunedin: Otago University Press, 2013), 241–57; James Beattie and Katie Holmes, 'Reflections on the history of Australasian gardens and landscapes', *Studies in the History of Gardens & Designed Landscapes* 31, no. 2 (2011): 75–82.

that examines a wide range of topics, including the exchange of plants and botanical information, the impetus for garden-making, and the iconography and symbolism of gardens.³ Despite the diversity of the subject matter, very little has been written on the methodologies employed by New Zealand garden historians up till now.⁴

Through a case study of health and gardens, this article contributes to the broader examination of garden historical methodology by discussing the benefits of a multi-source and multi-disciplinary approach in writing the history of medicinal plants in New Zealand. Specifically, it explores the advantages of using a variety of source materials in combination with methodological approaches drawn from garden history and medical history.

A history of medicinal plants in colonial New Zealand re-establishes links between health and the environment in the context of modern historical research. It offers new perspectives on environmental change in New Zealand and colonial medical culture by asking historians to explore the motivations for introducing, cultivating, and distributing medicinal plants during the nineteenth and early twentieth centuries and to consider the medicines and medicaments that played such an important role in the history of health. In addition, it appeals to researchers to explore health-related interactions between Māori and European in colonial New Zealand.

This paper begins by accounting for the absence of medicinal plants from New Zealand's garden and medical historiography, and then provides a discussion of a variety of different primary sources as a means of connecting these two subject areas.

3 Prominent works include Matthew Bradbury, ed., *A History of the Garden in New Zealand* (Auckland: Viking, 1995); Helen Leach, *1000 Years of Gardening in New Zealand* (Wellington: A. H. & A. W. Reed, 1984); Matt Morris, 'A History of Christchurch Home Gardening from Colonization to the Queen's visit: Gardening culture in a particular society and environment' (PhD diss., University of Canterbury, 2006); Beattie and Holmes, 'Reflections on the history of Australasian gardens'; examples of its diversity include John Dwyer, 'Weeds in the Victorian Colonial Garden 1800–1860', *Studies in Australian Garden History* 2 (2006): 1–23; Ian Hoskins, "'It is inevitably a people's park': Ceremony and democratic sentiment at the opening of Centennial Park, 1888', *Studies in Australian Garden History* 1 (2003): 55–70; Duncan Campbell, 'Transplanted Gardens: Aspects of the design of the Garden of Beneficence, Wellington, New Zealand', *Studies in the History of Gardens & Designed Landscapes* 31, no. 2 (2011): 160–6; James Beattie 'Making Home, Making Identity: Asian Garden-Making in New Zealand, 1850s–1930s', *Studies in the History of Gardens & Designed Landscapes* 31, no. 2 (2011): 139–59; Matt Dallos, 'Seeing Landscape: Geography, Autobiography, and Metaphor', *Studies in the History of Gardens & Designed Landscapes* 34, no. 2 (2014): 146–50.

4 An exception to this omission is Beattie, 'The Empire of the Rhododendron', 241–57.

Garden history and medical history: A combined approach

In modern western academic contexts, the study of medicinal plants is typically divided into scientific or social-scientific studies of individual species. The first commonly focuses on the plant's 'discovery', before examining its chemical constituents and synthetic modification, while the second provides histories of specific institutions, disciplines, or philosophies, and their founders, advocates, and achievements.⁵ In addition, self-help herbal guides often include a generic history of medicinal plants, but the information presented is typically divorced from its social context, or designed simply to promote a growing resistance to modern pharmaceuticals.⁶ In New Zealand, research on medicinal plants has followed a similar trajectory, with biochemical analyses of native medicinal plants and their constituents, and medical histories that focus on public institutions, such as providers of public health.⁷ The absence of medicinal plants in New Zealand's medical and garden historiography is arguably a consequence of this division of scholarly knowledge.

5 Suzanne Taylor and Virginia Berridge, 'Medicinal Plants and Malaria: An historical case study of research at the London School of Hygiene and Tropical Medicine in the twentieth century', *Transactions of the Royal Society of Tropical Medicine and Hygiene* 8 (2006): 707–14; Felipe Fernández-Armesto and Benjamin Sacks, 'The Global Exchange of Food and Drugs', in *The Oxford Handbook of the History of Consumption*, ed. Frank Trentmann (Oxford: Oxford University Press, 2012), 127–45; Joanne Birch, 'A Comparative Analysis of Nineteenth Century Pharmacopoeias in the Southern United States: A case study based on the Gideon Lincecum Herbarium', *Economic Botany* 63, no. 4 (2009): 427–40; Frank Dikötter, Lars Laaman, and Xun Zhou, 'China, British Imperialism and the Myth of the Opium Plague', in *Drugs and Empires: Essays in Modern Imperialism and Intoxication, c. 1500 – c. 1930*, ed. James H. Mills and Patricia Barton (Basingstoke: Palgrave Macmillan, 2007), 19–39. Outside New Zealand, historians have produced a number of histories of specific plants, such as the history of the opium poppy and reports on localised herbal systems that provide some analysis and exception to this trend. For example, R. Cambie and J. Ash, *Fijian Medicinal Plants* (East Melbourne: CSIRO, 1994); Martin Booth, *Opium: A History* (London: Simon & Schuster, 1996); Leslie Taylor, *The Healing Power of Rainforest Herbs: A Guide to Understanding and Using Herbal Medicines* (New York: Square One, 2005); W. Arthur Whistler, *Samoan Herbal Medicine: 'o lā'au ma vai fofō o* (Hawaii: Isle Botanica, 1996); Paul Petard, *Raau Tahiti: The Use of Polynesian Medicinal Plants in Tahitian Medicine* (Noumea, New Caledonia: South Pacific Commission, 1972).

6 Literally hundreds of herbal manuals have been published since the revival of western herbalism in the 1970s. Most include a generic global history of medicinal plants. For example, Barty Phillips, *The Book of Herbs: An Illustrated A–Z of the World's Most Popular Culinary and Medicinal Plants* (London: Arcturus, 2007); Deni Brown, *The Royal Horticultural Society Encyclopedia of Herbs and their Uses: The Definitive A–Z Guide to Herbs* (London: Dorling Kindersley Limited, 2002); Ben-Erik Van Wyk and Michael Wink, *Medicinal Plants of the World: An illustrated scientific guide to important medicinal plants and their uses* (Pretoria, South Africa: Briza, 2004); Antoine Al-Achi, *An Introduction to Botanical Medicines: History, Science, Uses, and Dangers* (Westport, CT: Praeger, 2008); Frank Lipp, *Herbalism* (London: Macmillan in association with Duncan Baird, 1996).

7 S. G. Brooker, R. C. Cambie, and R. C. Cooper, *New Zealand Medicinal Plants* (Auckland: Heinemann, 1981); Christina Macdonald, *Medicines of the Māori: From their Trees, Shrubs, and other Plants, Together with Foods from the Same Sources* (Auckland: Collins, 1973); Derek Dow, *Safeguarding the Public Health: A History of the New Zealand Department of Health* (Wellington: Victoria University Press, 1995); Frances Sydney Maclean, *Challenge for Health: A History of Public Health in New Zealand* (Wellington: Government Printer, 1964).

Yet the connection between medical and garden writing is remarkably long-lived and significant. In the West, from antiquity, scholars such as Hippocrates recognised the integral relationship between the environment and human health, and connections among particular environments and sickness and wellness.⁸ By the eighteenth century, scientific discoveries, investigation, and understanding drove the introduction into and use of medicinal plants in newly founded colonies. Anxieties relating to health and wellness in specific colonial settings, when combined with existing medical knowledge, led to conclusions about certain environments and the medicinal virtues of specific plants.⁹ Nineteenth-century New Zealand settlers expressed similar ideas as they chose seemingly healthful environments and climates in which to live and created 'green spaces'—parks and village greens—conducive to healthy living. Indeed, in nineteenth-century New Zealand, 'urban settlements—as much as rural areas—were important sites for debates about environmental change and human health'.¹⁰ The desire to stay healthy and create healthy environments in the young colony was among the motivations for introducing plants to New Zealand during European colonisation.¹¹ But, with the exception of scholarship by James Beattie and the author, despite its importance, examination of medicinal plants or plants considered by colonists to be conducive to health is largely absent from garden historical scholarship.¹² A focus on medicinal plants brings health-related motivations into clarity and demonstrates how, as Beattie notes, 'in nineteenth-century settler culture, landscape and vegetation figured as more than simply backdrops to human affairs'.¹³

Up till now, New Zealand garden and environmental historians have concentrated on the themes of making home, of reshaping the land, and of colonisation in general. Many of these historians turn the lens towards the environment and examine the networks through which plants moved, but have largely overlooked the influence of health and perceptions of healthy environments,

8 Hippocrates posited the humoral theory of disease that decreed that good health relied on maintaining a balance of four bodily constituents or humours: blood, phlegm, black bile, and yellow bile. These humours were thought to exist in equilibrium and in relation to external elements such as climate, seasons, and celestial bodies, as well as internal processes such as age and emotion. Ill health of body or mind reflected an imbalance of humours and could be consequently restored by addressing the imbalance. Roberta Bivins, *Alternative Medicine? A History* (Oxford: Oxford University Press, 2007), 9; G. Foster and B. Anderson, *Medical Anthropology* (New York: John Wiley and Sons, 1978), 51–66; Vivian Nutton, 'Humoralism', in *Companion Encyclopedia of the History of Medicine*, vol. 1, ed. W. F. Bynum and Roy Porter (London: Routledge, 1993), 281–2.

9 James Beattie, *Empire and Environmental Anxiety: Health, Science, Art and Conservation in South Asia and Australasia, 1800–1920* (Basingstoke: Palgrave Macmillan, 2011).

10 James Beattie, 'Colonial Geographies of Settlement: Vegetation, Towns, Disease and Well-Being in Aotearoa/New Zealand, 1830s–1930s', *Environment and History* 14, no. 4 (2008): 583–610.

11 Beattie, 'Colonial Geographies of Settlement', 583–610.

12 Beattie, 'Colonial Geographies of Settlement'; Joanna Bishop, 'The Role of Medicinal Plants in New Zealand's Settler Medical Culture, 1850s–1920s' (PhD diss., University of Waikato, 2014).

13 Beattie, 'Colonial Geographies of Settlement', 584.

prominent factors and ideas in colonists' lives.¹⁴ Medical historians have similarly overlooked connections between health and environment. Moreover, until recently, medical historians in New Zealand have largely ignored lay or domestic healers and herbalists, and rarely mentioned medicinal plants. A focus on professional practitioners has largely sidelined analysis of domestic health practices and relationships, while cooperation among healers is only rarely discussed.

Instead, medical history in New Zealand has followed a trajectory characterised by an initial emphasis on the achievements of male doctors, to an account of public health services and institutions, and more recently, critically informed social and cultural historical research that incorporates elements of class, gender, and race in its analysis.¹⁵ During the 1950s and 1960s, scholarship was dominated by autobiographies written by mainly rural doctors for an audience drawn to the image of community service and colonial hardship.¹⁶ With doctors in the dominant role, plants appear only rarely as adjuncts to anecdotes and the heroic work of the medical practitioners themselves. The 1960s, an era of institutional health histories, was marked by the work of Frances Sydney Maclean, which addressed the role of the state and public health policy in

14 International historians have addressed the connection between health and environment. For example, Londa Schiebinger, *Plants and Empire: Colonial Bioprospecting in the Atlantic World* (Cambridge, MA: Harvard University Press, 2007). Richard Drayton discusses medicinal plants in relation to the creation of botanical gardens and economic botany in his *Nature's Government: Science, Imperial Britain, and the 'Improvement' of the World* (New Haven, CT: Yale University Press, 2000), 6–19, 26–30.

15 Robert Valpy Fulton, *Medical Practice in Otago and Southland in the Early Days. A Description of the Manner of Life, Trials, and Difficulties of some of the Pioneer Doctors, of the Places in which, and of the People among whom, they Laboured* (Dunedin: Otago Daily Times and Witness Newspapers Co., 1922); D. Macdonald Wilson, *A Hundred Years of Healing: Wellington Hospital, 1847–1947* (Wellington: A. H. & A. W. Reed, 1948); F. O. Bennet, *Hospital on the Avon: The History of the Christchurch Hospital, 1862–1962* (Christchurch: North Canterbury Hospital Board, 1962); Sir Charles Hercus and Sir Gordon Bell, *The Otago Medical School under the First Three Deans* (Edinburgh: E. & S. Livingstone, 1964); Laurie Gluckman, *Tangiwhai: A Medical History of New Zealand prior to 1860* (Christchurch: Whitcoulls, 1976); Lynda Bryder, 'History of Medicine in Australia and New Zealand', in *The Oxford Handbook of the History of Medicine*, ed. Mark Jackson (Oxford: Oxford University Press, 2013), 302–21; Rex Wright-St. Clair, *A History of the New Zealand Medical Association: The First Hundred Years* (Wellington: Butterworths, 1987); Pamela Wood, *Dirt: Filth and Decay in a New World Arcadia* (Auckland: Auckland University Press, 2005); Barbara Brookes, 'The Making of a Controversy: History, Medicine and Politics', in *The Cartwright Papers: Essays on the Cervical Cancer Inquiry 1987–88*, ed. J. Manning (Wellington: Bridget Williams Books, 2009), 100–17; Lynda Bryder, ed., *A Healthy Country: Essays on the Social History of Medicine in New Zealand* (Wellington: Bridget Williams Books, 1991); Catharine Coleborne, 'Health and Illness, 1840s–1900s', in *The New Oxford History of New Zealand*, ed. Giselle Byrnes (Auckland: Oxford University Press, 2009); Dow, *Safeguarding the Public Health*; Michael Belgrave, 'The Rise of the Health Professional in New Zealand, 1860–1939', in *A Healthy Country: Essays on the Social History of Medicine in New Zealand*, ed. Lynda Bryder (Wellington: Bridget Williams Books, 1991), 7–25.

16 For example, Bernard Myers, *The Reminiscences of a Physician* (Wellington: A. H. & A. W. Reed, 1949); Elaine Grundy, *Who'd Marry a Doctor? A Chatham Islands Casebook* (Christchurch: Whitcombe and Tombs, 1968); Dorothea Joblin, *Harvey Come Quick: The Story of the Little Doctor of Waverley* (Auckland: Paul's Book Arcade, 1963); Doris Gordon, *Doctor Down Under 1890–1956* (London: Faber, 1957); R. Burns Watson, *The Doctor Must Get Through: 50 Years a General-Practitioner-Surgeon* (Wellington: Reed, 1971).

New Zealand and provided statistics for further analysis.¹⁷ Institutional histories such as Maclean's focus on the changing nature of medical theory and practice. However, they often ignored the elements and nature of care, producing a top-down history that overlooks the experience of health and wellness in its myriad forms.

By the 1970s, a new wave of historians aimed to broaden the scope of this research and include people previously marginalised, such as women and patients.¹⁸ In New Zealand, during this period, historian Laurie Gluckman, although still largely committed to doctors' stories, moved closer towards this approach.¹⁹ Through a series of potted biographies, Gluckman, in his investigation into New Zealand's medical services prior to 1860, reveals an interest in native medicinal plants expressed by European doctors and scientists. Biographies of medical practitioners, such as those presented by Gluckman, can uncover the multiple perceptions, viewpoints, and contested nature of medico-botanical knowledge in New Zealand and provide excellent insight into the movement, process of exchange, and adaptation of knowledge.²⁰

'Casting a wide net': The advantages of weaving multiple sources

It is possible to recreate connections between health and medicinal plants, extend research, and include aspects of society and people otherwise overlooked in historical scholarship by using diverse or little-used primary and secondary source material. This section gives specific examples of the benefits of using such source material and shows what they can reveal about the use of medicinal plants in colonial New Zealand. Traditional and obvious primary sources often analysed by medical historians include 'herbals'—manuscripts that describe and detail the uses of medicinal plants—and pharmacopoeia.²¹ Typically written by male medical practitioners, herbals and pharmacopoeia shed light on the

17 Maclean, *Challenge for Health*; Wilson, *A Hundred Years of Healing*; Bennet, *Hospital on the Avon*; Hercus and Bell, *The Otago Medical School*.

18 Susan Reverby and David Rosner, "'Beyond the Great Doctors' Revisited: A Generation of the 'New' Social History of Medicine", in *Locating Medical History: The Stories and Their Meanings*, ed. Frank Warner Huisman and John Harley (Baltimore, MD: Johns Hopkins University Press, 2007), 167–94. *The Social History of Medicine*, published on behalf of the Society for the Social History of Medicine, started in 1988 and is a prominent forum for this research: shm.oxfordjournals.org/.

19 Gluckman, *Tangiwaiti*.

20 Bronwyn Dalley and Bronwyn Labrum, *Fragments: New Zealand Social and Cultural History* (Auckland: Auckland University Press, 2000), 4.

21 The historian Agnes Arber describes herbals as books or manuscripts that contain the names and descriptions of plants along with their properties and virtues. Agnes Arber, *Herbals: Their Origin and Evolution: A Chapter in the History of Botany, 1470–1670*, 2nd ed. (Cambridge: Cambridge University Press, 1938), 14.

professional side of health advice and medico-botanical knowledge. In contrast, non-traditional sources, such as personal collections of medical 'receipts' (recipes), uncover lay attitudes to health and healing and the use of medicinal plants. In colonial New Zealand, new editions of British herbal manuals, such as William Turner's *A New Herball* (1564) and John Gerard's *Herball* (1597), were advertised for sale by local bookshops and contained information on plants that were being introduced and dispersed in the colony at a rapid rate.²² These texts often contained information from, or were English translations of, much earlier works such as *De Materia Medica*, written by the Roman physician Pedanius Dioscorides between AD 50 and 70. They included plants from around the Greek and Roman world as well as Chinese plants that entered Europe through the Silk Road—an extensive network of trade routes established during the Han Dynasty (BC 206 – AD 220) used by Arab, Indian, Persian, and Roman traders.²³

While herbals such as Gerard's and Turner's remained in circulation, by the nineteenth century they were gradually being replaced in medical universities and centres of learning in Britain and America by officially sanctioned pharmacopoeia and pharmacological textbooks. Most of New Zealand's earliest physicians were educated in British universities and, from 1870 to 1920, as the subject of pharmacology became increasingly defined, doctors in New Zealand developed a medical curriculum that maintained strong ties with British, particularly Scottish, institutions where the study of plants was an important component of the medical curriculum.²⁴ For example, in 1883 Edinburgh graduate Dr John Macdonald was appointed Professor of *Materia Medica* at the Otago Medical School, and taught the subject for 17 years in what doctor–historians Charles Hercus and Gordon Bell describe as 'the Edinburgh tradition'.²⁵ Macdonald relied heavily on William Hale-White's textbook, *Materia Medica, Pharmacology, Pharmacy and Therapeutics*, originally published in London

22 Advertisements for these can found in early New Zealand newspapers accessible through Papers Past, an online repository of 84 New Zealand newspapers and periodicals published between 1839 and 1945: paperspast.natlib.govt.nz/cgi-bin/paperspast; Marcus Woodward, *Gerard's Herball: The Essence thereof distilled by Marcus Woodward from the Edition of Th. Johnson, 1636* (London: Spring Books, 1964), xv–xvii.

23 Jane Kilpatrick, *Gifts from the Gardens of China* (London: Frances Lincoln, 2007), 15–16; *British Pharmacopoeia, published under the direction of the General Council of Medical Education and Registration of the United Kingdom, Pursuant to the Medical Act, 1858* (London: Spottiswood & Co. for the Medical Council, 1885), 126; Dioscorides included Chinese day lilies, *Hemerocallis lilioasphodelus* in *De Materia Medica* and Chinese medicinal rhubarb, *Rheum palmatum*, became and remained a popular medicine in western countries up until the late nineteenth century. See Maggie Campbell-Culver, *The Origin of Plants: The People and Plants That Have Shaped Britain's Garden History* (London: Transworld Publishers, 2004), 18–33.

24 About half of New Zealand's earliest doctors, 82 out of 166 registered in 1867, gained their degrees at English universities, while the majority of the remainder qualified at Scottish institutions: Belgrave, "Medical Men" and "Lady Doctors" The Making of a New Zealand Profession, 1867–1941', (PhD diss., Victoria University of Wellington, 1985); Gluckman, *Tangiwhai*; Wilson, *A Hundred Years of Healing*; John Armstrong, 'The Common-Health and Beyond: New Zealand Trainee Specialists in International Medical networks, 1945–1975' (PhD diss., University of Waikato, 2012).

25 Hercus and Bell, *The Otago Medical School*, 264; Dorothy Page, *Anatomy of a Medical School: A History of Medicine at the University of Otago, 1875–2000* (Dunedin: Otago University Press, 2008), 31.

and Philadelphia in 1892. His 'orthodox' teaching of the subject involved visual recognition of plants, memorisation of lists of drugs, and, assisted by the hospital dispenser, the preparation of pills, ointments, and potions in the hospital dispensary.²⁶

An analysis of nineteenth-century pharmacopoeia and pharmacological textbooks such as Hale-White's reveals that the plants used and prepared by doctors during the period of their publication can also shed light on broader influences, developments, and trends in the field. For example, the third American edition of Hale-White's text, published in 1895, defined pharmacology as 'the study of *materia medica* and therapeutics including the origins, history, properties and uses of drugs and medicines'. Pharmacy is 'the art of preparing drugs in a form suitable for use as remedial agents, and of dispensing them'.²⁷ According to this book, doctors should never attempt pharmacy; they should, however, be familiar with chemical processes so they may judge intelligibly the services provided by chemists.²⁸ This pragmatic advice would have appealed to doctors in New Zealand, where boundaries between chemists and doctors were more fluid than those in Britain.²⁹

A large number of inorganic compounds and elements is included in Hale-White's textbook, such as arsenic, mercury, copper, and zinc.³⁰ Yet, the majority of medicinal compounds in Hale-White's text are 'organic vegetable *materia medica*'; 243 plants are described as pharmacopoeial vegetable drugs. For every plant, the textbook provides a brief botanical classification and description, lists the forms in which the drug is generally used, and explains the actions and therapeutic qualities of the drug. The book's retention of botanical information, and Macdonald's expectation that all doctors visually recognise popular species, suggests that doctors continued to use plants in their natural or whole form, despite a growing tendency for doctors to isolate constituents and process plants beyond recognition.

26 Hercus and Bell, *The Otago Medical School*, 278.

27 William Hale-White, *Materia Medica, Pharmacy, Pharmacology and Therapeutics*, 3rd American ed. (Philadelphia, PA: P. Blakiston, Son & Co., 1895), 9.

28 Hale-White, *Materia Medica*, 11.

29 Belgrave, "'Medical Men'", 287.

30 Arsenic was a powerful caustic used in dentistry to treat dyspepsia and to remove skin growths. Mercury was a powerful antiseptic, also used to relieve skin itching and inflammation of the joints. Copper treated diarrhoea, laryngitis, bronchitis, and tinea tarsi, while zinc was applied to remove external growths.

Nineteenth-century doctors' attachment and reliance on pharmacopoeia—which gave scientific weight to the plants that they listed—helped them assert themselves as scientific and progressive.³¹ In contrast, nineteenth-century herbalists retained a loyalty to the old herbals, a practice that helped to define them as different from physicians. Written in the vernacular of the common man as opposed to the scientific terminology of pharmacopoeia, herbals were also increasingly associated with domestic or lay medicine, and while pharmacopoeia converted the early herbals into scientific terms, the translation of this knowledge within domestic medical manuals made this information available to healers in the home.

By the nineteenth century, most western physicians agreed on the basics of health maintenance and, through domestic medical manuals, provided a constant flow of information, translated into popular terms.³² Prescriptions in late eighteenth-century and early nineteenth-century domestic medical manuals were often simple, with crude measurements, such as 'one to two teaspoons of herb' or 'handful of dried plant material'. Unlike official pharmacopoeias, which contain precise and seemingly indisputable advice, early domestic manuals often included anecdotal information and acknowledged a variety of sources. From these texts, healers selected recipes and often combined them with anecdotal information in their own handwritten personal collections of 'receipts'. This combined approach to health care and advice was a distinguishing feature of domestic medicine in New Zealand during the nineteenth and early twentieth centuries

31 See Bishop, 'The Role of Medicinal Plants', 211–48; [Sir Thomas Richard] Fraser, 'An Address Delivered at the Opening of the Section of *Materia Medica* and Pharmacology', *British Medical Journal* 2, no. 1075 (1881): 227–30. The British Medical Association in its campaign against 'unscientific' medicines published *Secret Remedies: What they Cost and What they Contain* in 1909, which provided a scientific analysis of many popular patent medicines, seemingly proving their uselessness and the fraudulent nature of their manufacturers.

32 Henry M. Lyman, Christian Fenger, H. Webster Jones, and W. T. Belfield, eds, *The Practical Home Physician and Encyclopedia of Medicine: A Management of Disease; Giving the History, Cause, Means of Prevention and Symptoms of all Diseases of Men, Women and Children and most Approved methods of Treatment with Plain Instructions for the Care of the Sick, Australasian Edition* ([Canada]: The World Publishing, c. 1880); John Harvey Kellogg, *Ladies' Guide in Health and Disease* (London: International Tract Society, 1895); Edward Foote, *Plain Home Talk: Embracing Medical Common Sense, About the Human System, the Habits of Men and Women, the Causes and Prevention of Disease, Our Sexual Relations and Social Natures, Embracing Medical Common Sense, Applied to Causes, Prevention, and Cure of Chronic Diseases, the Natural Relations of Men and Women to Each Other, Society, Love, Marriage, Parentage Etc.* (New York: Murray Hill, 1873); Alvin Wood Chase, *Dr. Chase's Third, Last and Complete Receipt Book and Household Physician, or, Practical Knowledge for the People, from The Life-Long Observations of the Author, Embracing the Choicest, Most Valuable and Entirely New Receipts in Every Department of Medicine, Mechanics, and Household Economy; Including a Treatise on The Diseases of Women and Children, in fact, The Book for the Million, with Remarks and Explanations which adapt it to the Every-Day Wants of the People, Arranged in Departments and most Copiously Indexed* (Dunedin: Malcolm & Grigg, 1887); O. Phelps Brown, *The Complete Herbalist, or, The People their own Physicians by the use of Nature's Remedies Describing the Great Curative Properties Found in the Herbal Kingdom* (Jersey City, NJ: The author, 1867).

and made domestic health care fluid and adaptable, necessary characteristics in a colonial environment without a developed health infrastructure and with isolated settlements.

In colonial New Zealand, domestic medicine or medical care given in the home played a vital and important role. It was a selective and subjective system that combined numerous philosophies and approaches. As well as medical regimes and lifestyle advice, domestic healers used medicinal plants with which they were familiar—species introduced from their homelands—while they experimented with native plants growing in their immediate environment.³³ Evidence of this can be found in colonial domestic health guides and colonists' handbooks.

As the extent of colonisation increased and as discourse on the influence of climate upon health assumed prominence, writers produced manuals intended specifically for New Zealand emigrants.³⁴ Colonial handbooks and guides, such as the second edition of *Brett's Colonists' Guide* published in 1897, encouraged emigrants to learn simple first aid, travel with medicine chests, and obtain handbooks on domestic medicine.³⁵ For example, as late as 1897, Brett's guide suggests learning how to bleed, set a broken limb, and bind wounds.³⁶ It also included a small but comprehensive section on homeopathic medicines.

Most nineteenth-century medical manuals were written by male doctors and the information they contained, although less structured and ordered than university texts, was that advocated and practised by educated male physicians. For example, by the 1880s, domestic medical manuals reflected the widespread acceptance in medical institutions of scientific theory and analysis by including discrete sections on anatomy and physiology, and by recommending scientifically tested plant-based remedies and patent medicines.³⁷ However, alternative sources, such as personal collections of medical recipes, show that the use of medicinal plants by domestic healers often went beyond that which was advocated by scientific medical curricula or pharmaceutical research—'evidence' was broad and evaluated in relation to factors such as efficacy,

33 Medicinal plants were important and integral components of domestic health care, often deemed safer than the inorganic compounds containing arsenic and mercury that many doctors relied on. Ever since domestic medicine was described as a distinct system by early authors such as William Buchan, it has been proclaimed safer than that prescribed by a physician. William Buchan, *Domestic Medicine; or, the Family Physician* (Philadelphia, PA: R. Aitken, 1774), ix–xvii.

34 Anonymous, *All About New Zealand: Being a Complete Record of Colonial Life*, facsimile ed. (Christchurch: Kiwi Publishers, 1996); John Broadbent, *The Australian Botanic Guide, Being a Family Handbook of Botanic Treatment* (Melbourne: Centennial Printing and Publishing, c. 1880); John Hill Burton, *The Emigrant's Manual. New Zealand, Cape of Good Hope and Port Natal* [NZ sections only] (Edinburgh: William and Robert Chambers, 1851), accessed July 2014, www.enzb.auckland.ac.nz/document?wid=2951&page=1&action=null.

35 Thomas Wilson Leys, ed., *Brett's Colonists' Guide and Cyclopaedia of Useful Knowledge* (Auckland: H. Brett, 1897).

36 Leys, *Brett's Colonists' Guide*.

37 Kellogg, *Ladies' Guide in Health*; Foote, *Plain Home Talk*; Chase, *Dr Chase's ... Receipt Book*.

popularity, monetary value, testimony, and authority.³⁸ Experimentation, experience, and anecdotal information remained important indicators of worth. Exploring the use of medicinal plants by domestic healers, therefore, requires a broad and overlapping methodological approach.

Unlike published medical material, personal collections of medical ‘receipts’ can reveal women’s perspectives and a system of health care otherwise unrecorded.³⁹ The crinkled paper and splattered pages of notebooks, such as that illustrated in Figure 1, used to collect seemingly miscellaneous household information, conjure images of ‘kitchen physic’, and reveal anxieties and concerted attempts to stay healthy and mitigate sickness. Collections of medical ‘receipts’ were an essential part of the ‘domestic medical curriculum’ that guided domestic healers and made their opinions, assessment, and use of medicinal plants different from that of doctors, who relied primarily on pharmacopoeia.

This is evident with the biography of Elizabeth Jane Locke (1849–1942) and her husband Frederick Joseph (1847–1914), who arrived from Guernsey at Port Chalmers (Otago) on 16 February 1873. They brought with them five books for use in New Zealand that contained medicinal ‘receipts’ collected by Jane, who had worked as a cook at Castle Eden in County Durham prior to their departure.⁴⁰ The earliest, dated 1739–40, includes plants used routinely by British practitioners, such as liquorice, opium, and tansy. It also includes remedies deemed as ‘folk’ by nineteenth-century doctors, such as the following cure for ‘fits’:

Take earth moles just as they are taken out of the earth, then dry them in an oven with the hair, blood, guts and everything till they powder very fine, let the person or the child take as much as will lie upon a sixpence three times a day before they expect to fit or any symptoms of fitting are coming and to repeat until the changing moon, but be sure never to take it if the fits are upon them. When the moles are taken out of the oven they should be hung in a paper bag and so powdered when you want them.⁴¹

38 Hocken Library, Dunedin, Archives and Manuscripts, AG-561-04, Dorothy Harvey, Book of Receipts 1739–40; AG-561-06, Recipe Book (1810–28); AG-561-07, Recipe Book inscribed ‘Albenia Tathwell 1828’ (c. 1800–35); AG-561-08, Recipe Book (n.d.); Hamilton City Library Archives, MS, 190, 1881, William Rysdale, papers.

39 Elaine Leong and Sara Pennell, ‘Recipe Collections and the Currency of Medical Knowledge in the Early Modern “Medical Marketplace”’, in *Medicine and the Market in England and its Colonies, c. 1450 – c. 1850*, ed. Mark S. R. Jenner and Patrick Wallis (Basingstoke: Palgrave Macmillan, 2007), 133–52.

40 Hocken Library, Dunedin, AG-561-04, Dorothy Harvey, Book of Receipts 1739–40; AG-561-06, Recipe Book (1810–28); AG-561-07, Recipe Book inscribed ‘Albenia Tathwell 1828’ (c. 1800–35); AG-561-08, Recipe Book (n.d.).

41 Hocken Library, Dunedin, AG-561-04, Dorothy Harvey, Book of Receipts 1739–40.

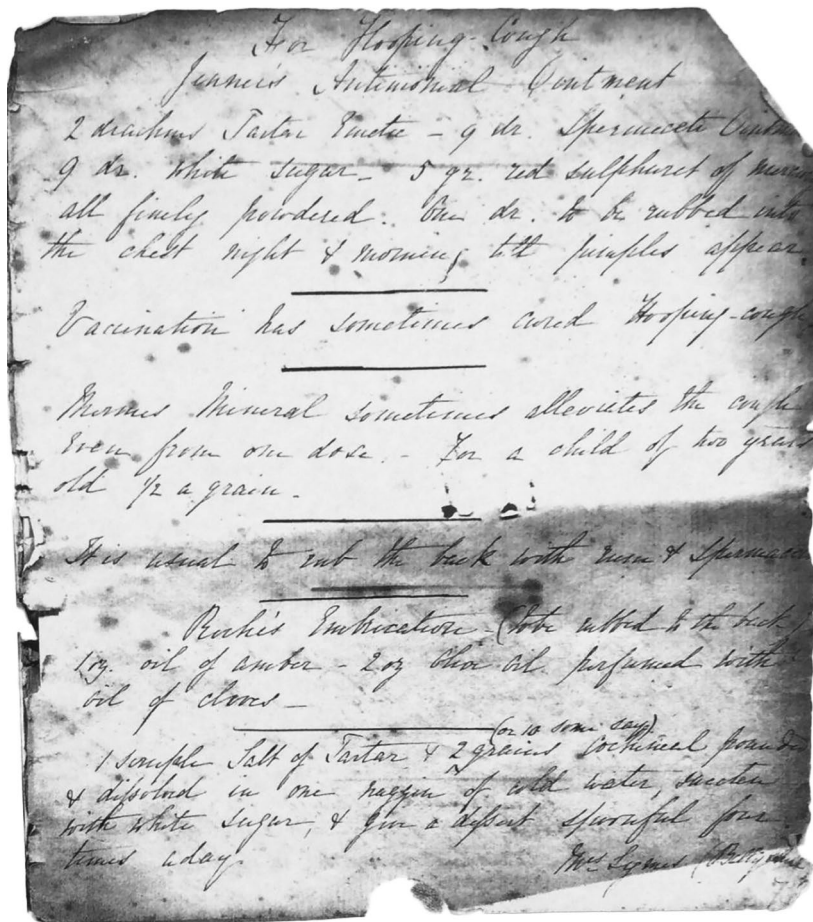


Figure 1: An example of a medical 'receipt' showing notes by the author.

Source: Alexander Turnbull Library, Wellington, MS-Papers-7262, McKain, Douglas Mary, 1789–1873, Diary and commonplace book, transcribed by J. B. Moles.

Dated 1820, the second book in this series includes remedies for rheumatism, biliousness, headaches, jaundice, coughs, colds, weak stomachs, and toothaches—examples of the ailments and illnesses treated regularly during this period.⁴² Directions in this collection are more complicated than the earlier 'receipts' and reflect developments in the pharmaceutical industry. Instructions on how to prepare pills, lozenges, boluses, plasters, and poultices showcase the repertoire of domestic medical care. Household ingredients, such as soap, eggs,

42 Hocken Library, Dunedin, AG-561-06, Recipe Book (1810–28).

sugar, and syrup, helped bind and provided a medium for medicinal plants, and unlike the previous collection, the only animal product recommended is hartshorn (powdered red deer antler).⁴³

Sources and methodologies applied by garden historians also help to re-establish links among health, the environment, and medicinal plants in historical scholarship. Plant nursery catalogues are becoming increasingly popular sources used by environmental and garden historians to gain insight into the introduction, cultivation, popularity, and distribution of plants.⁴⁴ According to the garden historian Anna Pavord, British and American plant catalogues catered to a growing number of gardeners and remain for some an 'index of horticultural taste'.⁴⁵ In New Zealand, catalogues were produced by nurserymen who established a blooming trade in the colony from as early as 1840. The inclusion or absence of certain plants in catalogues, I argue, can be indicative of their popularity or accessibility. In relation to medicinal plants, that particular species were sold continually by nurserymen indicates they were still in demand and in use throughout the nineteenth century.

Most of New Zealand's early nurserymen trained in Britain, and many hailed from Scotland.⁴⁶ According to Paul Star, they formed an informal network and sent and received plants from right across the British Empire. The historian Alan Hale characterises their life in New Zealand as hard with little reward. Many, he writes, would dig up and burn their stock after a few seasons, choosing instead to sow grass and make a living from agriculture, or wait for London market conditions to improve. However, while New Zealand nurserymen maintained strong ties with Britain, they also created and formed associations among themselves and with other colonies and countries.⁴⁷ Exploring trans-Tasman connections, then, is another avenue for enquiry into medicinal plants.

43 Made from the antlers of male red deer, this product was credited with sudorific qualities (it promotes sweating) and was used to treat fever and dysentery. Brown, *The Complete Herbalist*, 303, 344; Hocken Library, Dunedin, AG-561-06, Recipe Book (1810–28).

44 James Beattie, Jasper M. Heinzen, and John P. Adam, 'Japanese Gardens and Plants in New Zealand, 1850–1950: Transculturation and Transmission', *Studies in the History of Gardens & Designed Landscapes* 28, no. 2 (2008): 219–36.

45 These books differ from earlier catalogues produced in seventeenth-century Europe by wealthy European aristocrats to showcase their exotic collections and were first printed in book form in the 1830s. See Anna Pavord, *The Tulip* (New York: Bloomsbury, 1999), 80; Alice Krinsky Formiga, 'A Short History of the Seed & Nursery Catalogue in Europe & the U.S.', scarc.library.oregonstate.edu/omeka/exhibits/show/seed, accessed 25 May 2012.

46 Hale, *Pioneer Nurserymen*; Robert Cooper, 'Early Auckland Gardens', *Garden History* 1, no. 2 (1973): 26–40.

47 Paul Star, 'New Zealand's biota barons: Ecological transformation in colonial New Zealand', *ENNZ: Environment and Nature in New Zealand* 6, no. 2 (2002): 1–12, environmentalhistory-au-nz.org, accessed 9 May 2014; Sydney Challenger, 'Pioneer nurserymen of Canterbury, New Zealand (1850–65)', *Garden History* 7, no. 1 (1979): 25–64.

Many plants and seeds introduced into New Zealand came from Australian growers or nurseries, which traded with plant collectors.⁴⁸ New Zealand nurserymen also grew a great number of plants from seeds and cuttings that circulated internally. Nurserymen advertised in national newspapers and many wrote columns to enhance their visibility in the community. For example, Christchurch's first mayor, Scottish nurseryman William Wilson, also known as 'Cabbage' Wilson, wrote a series of articles for the *Lyttelton Times* entitled 'Calendar of Garden and Farm Operations'. William Swale, a contemporary of Wilson's and also based in Christchurch, contributed to the 'Gardeners' Chronicle' in the same newspaper.⁴⁹ Newspapers, therefore, are equally important sources, being the main forum through which plants and tools were advertised until the 1860s, after which time printed plant catalogues began to be produced in significant numbers.

According to Alice Krinsky Formiga, curator at the University of Oregon, the omission of a medicinal plant section from most American and British catalogues by the mid-nineteenth century reflects a decline in the private cultivation of medicinal plants.⁵⁰ In contrast to Britain and North America, New Zealand catalogues included medicinal plants until the early twentieth century, while evidence in personal correspondence and collections of medical 'receipts' suggest that settlers remained loyal to the remedies made from these plants. A strong culture of domestic healing and the need to propagate medicinal plants in isolated settlements where doctors were scarce and supplies of medicine inconsistent, arguably supported the continued propagation and supply of medicinal plants by New Zealand nurserymen. In 1873, for example, the Martin Brothers of Auckland included in the *Herbs, Roots etc.* section of their catalogue chamomile, fennel, garlic, horseradish, lavender, rue, rosemary and thyme.⁵¹ In their 1891 catalogue, D. Hay and Sons of Montpellier Nursery, Auckland, had a *Herbs and Miscellaneous Root* section in which rue, lavender, thyme, horehound, and horseradish appear. In 1893, Dunedin's George Matthews had an extensive herb section and advertised horehound, hyssop, lavender, rosemary, tansy, wormwood, balm, rue, and thyme. In their Spring 1907 catalogue, Howden and Moncrief of Dunedin included a *Sweet and Pot Herbs* section in which anise, balm, chamomile, horehound, hyssop, lavender, pennyroyal, rosemary, and rue are listed.⁵²

48 Beattie, 'The Empire of the Rhododendron', 241–57, 365–7.

49 *Lyttelton Times*, 4 December 1852, 7.

50 Formiga, 'A Short History of the Seed & Nursery Catalogue in Europe & the U.S.'.

51 Alexander Turnbull Library, Wellington, Eph-A-HORTICULTURE-1899-01, Ephemera and horticulture sales catalogues issued by New Zealand plant nurseries, 1870–1899.

52 D. Hay & Son, *Nurserymen: Descriptive Catalogue 1899–1900, With Novelty List. Montpellier Nursery (Established 1855), near Parnell, Auckland, New Zealand* (1899); Alexander Turnbull Library, Wellington, Eph-A-HORTICULTURE-1870/1899; 'Messrs Howden and Moncrief's Catalogue', *Otago Witness*, 11 July 1889, 9, natlib.govt.nz/records/9054854, accessed 21 December 2013.

References in diaries, letters, and personal correspondence written by New Zealand's colonists can also provide insight into their relationship with, and use of, medicinal plants. These anecdotes may well align with evidence in the scientific literature, such as botanical surveys, strengthening and supporting findings that show the spread of medicinal plants, sometimes as weeds. Plantain, for example, first recorded in New Zealand in 1839, was a particular favourite of healers. It was included in medical recipes and described in medical manuals.⁵³ It also appeared in botanical surveys, which describe it as growing readily in various locations and 'quite as general[ly] as in England'.⁵⁴ Watercress, described in early botanical reports as threatening to choke the Avon River in Christchurch, was also reportedly used in cases of eye infections.⁵⁵ The common dock, which according to botanists almost certainly arrived by accident in agricultural seed mixes and quickly spread throughout the colony, was applied to stings and wounds, and used as a blood cleanser.⁵⁶ Combining analyses of scientific reports and personal correspondence ensures the examination of both professional and lay use of plants.

By the 1860s, scientists in New Zealand were producing scholarship designed to assist the colonial government to further economic development. The official journal of the New Zealand Institute (the primary scientific institute during the period, renamed the Royal Society of New Zealand in 1933), *The Transactions and Proceedings of the New Zealand Institute*, began in 1867 and became a forum for the publication of scientific work.⁵⁷ This journal includes botanical surveys that can be used to help determine the introduction and distribution of medicinal plants as well as the role of the state in medicinal plant trials and experiments. Reports on government endeavours are also contained in the *Appendices to the Journals of the House of Representatives*, another useful and readily available official source.⁵⁸

53 Murdoch Riley, *Māori Healing and Herbal: New Zealand Ethnobotanical Sourcebook* (Paraparaumu: Viking Sevenses N.Z., 1994), 222–5; James Neil, *The New Zealand Family Herb Doctor: A Guide to Recipes and Herbal Remedies* [first published 1889] (Twickenham: Senate, 1998), 493.

54 Riley, *Māori Healing and Herbal*, 222–5.

55 Riley, *Māori Healing and Herbal*, 247; John Armstrong, 'On the naturalized plants of the province of Canterbury', *Transactions and Proceedings of the New Zealand Institute* 4 (1871), 284–90.

56 Riley, *Māori Healing and Herbal*, 317–18; Maida Barlow, 'Harrold, Agnes', *Dictionary of New Zealand Biography: Te Ara—The Encyclopedia of New Zealand*, www.teara.govt.nz/en/biographies/1h10/harrold-agnes, accessed 11 May 2014; Barbara Harper, *Petticoat Pioneers: South Island Women of the Colonial Era*, vol. 3 (Wellington: A. H. & A. W. Reed, 1980), 94–7.

57 In collaboration with the National Library of New Zealand Te Puna Mātauranga o Aotearoa, the Royal Society digitised their original volumes, which are now available online. The original volumes are held at the Alexander Turnbull Library. *The Transactions and Proceedings of the Royal Society of New Zealand*, rsnz.natlib.govt.nz.

58 *Appendices to the Journals of the House of Representatives* (AJHR), atojs.natlib.govt.nz/.

As the historian Karen Harvey points out, objects can be valuable sources that can enrich historical research, while domestic medical commodities, such as sickroom requisites, and patent and proprietary medicines, can also provide insight into domestic medical culture.⁵⁹ An analysis of patent and propriety medicines, for example, can reveal medical fashions and trends often difficult to assess by other means. Examining their ingredients provides insight into the plants processed by the pharmaceutical industry at the time of production. Table 1, for example, presents the plants included in two popular patent medicines, Holloway's Pills and Page Woodcock's Wind Pills.⁶⁰ While some patent medicines combined only two or three ingredients, others combined every plant known to possess similar qualities, in an approach that mirrored domestic medical practices.

Table 1: Compound formulas published in *The Chemists' and Druggists' Diary* (1881).

Holloway's Pills	Grammes	Page Woodcock's Wind Pills	Ounces
Sulphate of Soda	0.20	Extract of gentian root	10 oz
Saffron	0.20	Extract of camomile flowers	7 oz
Pepper	0.45	Powder of extract of aloe	4 oz
Rhubarb	1.70	Powder of Turkey rhubarb roots	4 oz
Socotrine aloes	4.00	Powder of Jamaican ginger	2 oz
		Powder of gum myrrh	2 oz
		Powdered Castile soap	4 oz
		Powder of ipecacuanha	1 ½ oz
		Compound extract of colocynth	2 oz
		Essential oil of peppermint	1 drachm
		Essential oil aniseed	1 drachm

Source: *The Chemists' and Druggists' Diary* (London: Chemist and Druggist, 1881): 88–9.

Similarly, the marketing and promotion of these medicines often reflected popular opinions relating to medicine and consumerism. In nineteenth-century New Zealand, the popularity and consumption of patent and proprietary medicines were great. Increasing tariffs on patent and proprietary medicines from the 1880s onwards caused constant concerns to wholesalers and consumers, and fed debate on the worth of patent medicines.⁶¹ While some manufacturers claimed that the consumption of patent medicines was a sign of wealth and 'civility', others argued that it was an expression of ignorance.⁶² Regardless,

59 Karen Harvey, ed., *History and Material Culture: A Student's Guide to Approaching Alternative Sources* (London: Routledge, 2009), 6.

60 *Chemist and Druggist of Australasia*, number and edition unknown (1881), 88–9.

61 *Thames Star*, 29 August 1900, 4; *Auckland Star*, 31 May 1888, 8; *Wanganui Chronicle*, 29 August 1900, 2.

62 In 1893, a correspondent writing for the *Otago Daily Times* reported the opinion of H. R. Packard of Chicago, who proposed there could be no better test of prosperity and civilization of a community than the quantity of patent medicines it consumed. Arguing this point, the columnist Thackeray James wrote that 'in the colonies the ignorant and half-educated have more money at [their] command than the same elsewhere and can afford themselves luxuries—patent medicines to wit'. *Chemist and Druggist of Australasia*, 8, no. 4 (1893), 8–9.

for many of New Zealand's domestic healers, patent medicines were useful and readily available, and their pervasiveness arguably suggests a perception of respectability associated with their use.

By the turn of the twentieth century, several doctors, incensed by what they claimed was false advertising and swindling by unscrupulous patent medicine manufacturers, sought to control the sale and manufacture of patent and proprietary medicines. The Quackery Prevention Act (1908), advocated by many doctors, was passed to assert such controls.⁶³ The Act stated that it was an offence to publish false information relating to the ingredients, composition, and efficacy of any medicine or medical practice. It fed into, and drew upon, rhetoric expressed in such publications as *Secret Remedies: What they Cost and What they Contain* (1909), issued by the British Medical Association, that supported scientific analysis as a measure of efficacy. In response, manufacturers of patent and propriety medicines—who were not required to disclose the ingredients of their medicines until 1946—advertised their drugs as 'scientific', despite the absence of either standardised tests or controls. The advertisements for Gatenby's Blue Flag Liver Cure (Figure 2), for example, described it as scientific. However, proof of its reliability and efficacy appeared to stem solely from 'the experience of hundreds of men, women and children'.⁶⁴

By the late nineteenth and early twentieth centuries, as the production of patent and proprietary medicine grew exponentially, the production of medical implements and medicines also increased. Evidence for this can be found in advertisements from the period.⁶⁵ Well-known manufacturers produced domestic treatments and associated implements and presented them in a way that supported the value and respectability of domestic medical practices. Analysing advertisements provides another little-used line of enquiry into how plants were used and featured in domestic health practices.

63 'Quackery Prevention Bill Committee', *AJHR* (1907): I-14, 1–70.

64 *Wanganui Herald*, 7 February 1903, 4.

65 In a New Zealand Farmers' Trading Co. catalogue distributed in 1921, a selection of sickroom requisites—including eye baths, enema kits, thermometers, ear syringes, and douche cans—showcase the nature and extent of domestic care. Two pages dedicated to patent medicines indicate the prevalence and continued popularity of these medicines. Farmers' Trading Company Limited, *Catalogue May 1931* (Auckland: The company, 1931), 60–3, 237.

TAKE a sensible course in dealing with these distressing complaints. Take a well-proven, thoroughly reliable medicine. In plain words take

**Gatenby's
Blue
Flag
Liver
Cure.**

Here is a scientific compound proved reliable by the experience of hundreds of men, women, and children in the Wellington-Wanganui and surrounding districts. It clears the bowels of all obstruction, cleanses the system, purifies the blood, restores the appetite, and brings back good health and vigour.

Sold by all
Chemists and Storekeepers at
2/6 per bottle.

Post Free from
R. M. GATENBY,
Wanganui.

Figure 2: Advertisement for Gatenby's Blue Flag Liver Cure.

Source: *Wanganui Herald*, 7 February 1903, p. 4.

Conclusion

Medicinal plants played an integral role in New Zealand's colonial medical and botanical culture. These plants were studied and used by different medical practitioners; investigated and trialled by botanists; and cultivated, sold, and exchanged by nurserymen. Studying them, therefore, affords an opportunity to link aspects of medical history and garden history. It permits researchers

to collate a number of scattered and fragmented references in primary and secondary sources, and with that recollection, enable them to explore connections among healers, botanists, pharmacists, gardeners, and others.

For centuries, gardens and plants have been studied from various perspectives and garden historians have become adept at referring to, and traversing, the literature and ephemera produced. Exploring the history of medicinal plants affords a unique opportunity to contribute to historiographies of medicine, gardens, the environment, pharmacy, and science. It requires an overlapping and inclusive methodology that involves both qualitative and quantitative analyses of a wide range of source material, and which also encourages an interdisciplinary approach to research. An eclectic collection of primary and secondary sources can corroborate and strengthen findings and encourage cooperation between scholars from seemingly different disciplines such as science and history. Blurring disciplinary lines creates new avenues for enquiry and widens the appeal of garden history.

THE TUNTIAN SYSTEM IN XINJIANG UNDER THE QING DYNASTY: A PERSPECTIVE FROM ENVIRONMENTAL HISTORY¹

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Abstract

The aim of this paper is not to reinvestigate the Tuntian system (屯田制度, the system of land tilled by colonists), but rather to explore its significance as it developed in Xinjiang during the Qing Dynasty (1644–1911) from the perspective of environmental history. This paper consists of four sections. First, it applies a Geographical Information System (GIS) technique to demonstrate spatial and temporal changes brought about by the Tuntian system in Xinjiang, based on available studies. Second, it analyses this land system from the viewpoint of property rights. Third, it discusses the landscape as shaped by colonists of various statuses, and finally, it traces the environmental changes in Xinjiang through the observations of Lin Zexu in 1842 and Xie Bin in 1917.

Key words: Tuntian System, Xinjiang, property right, landscape, environmental changes

Introduction

The Tuntian system (屯田制度, the system of land tilled by colonists) in China was first set up in the Western Han Dynasty (206 BC – AD 8); its nature and scale varied in later periods. It is not necessary to trace all studies here; however, it should be noted that more than 20 years ago, Lanzhou University gathered

¹ The Chinese version of this article is included in Chen Yung-fa 陳永發, ed., *Ming Qing diguo jiqi jinxiandai zhuangxing* 明清帝國及其近現代轉型 [The Ming-Qing Empire and its Modern Transformation] (Taipei: Yunchen wenhua, 2011), 203–65. This English version incorporates some revisions.

many scholars to research this system and published a series of studies.² This collective effort undoubtedly provided novel comprehensive knowledge regarding the Tuntian system in north-west China. Moreover, in recent years there have been at least three books on this subject. One focuses on the relationship between the land tilled by colonists and agricultural development in Xinjiang.³ The other two provide important findings regarding environmental changes in the region.⁴ The only deficiency of these books is that they do not have maps for helping readers to conceive the spatial distribution of land tilled by colonists.

The aim of this paper is not to reinvestigate the Tuntian system in Xinjiang during the Qing Dynasty (1644–1911), but rather to explore the significance of this land system, making use of previous studies, from the perspective of environmental history; in other words, the emphasis is on understanding the interaction between the Tuntian and the environment. Wang Xilong's book is the major reference of this paper and we acknowledge our thanks to him here.

This article first presents the distribution of the Tuntian established in Xinjiang, based on the materials assembled by Wang Xilong, and applies a Geographical Information System (GIS) technique to illustrate the spatial and temporal dimensions of this system. The second section will analyse this land system from the viewpoint of property rights. The third section will discuss the landscape shaped by the colonists' activities. Finally, the fourth section will try to trace environmental changes from observations by Lin Zexu 林則徐 (1785–1850) in 1842 and Xie Bin 謝彬 (1887–1948) in 1917.

1. The Tuntian system developed in Xinjiang

This section will discuss briefly the Tuntian system as it developed in Xinjiang and present some maps to illustrate its changing overall spatial and temporal distribution (Maps 1–5) and the situations at different localities (Maps 6–11). These maps use the administrative divisions of 1820 as a basis and the digital system of 'Chinese Civilization in Time and Space' (中華文明之時空基礎架構)

2 Liu Guanghua 劉光華, *Handai xibei tuntian yanjiu* 漢代西北屯田研究 [Study on the Land tilled by Colonists in Northwest China in the Han Dynasty] (Lanzhou: Lanzhou University Press, 1988). Wang Xilong 王希隆, *Qingdai xibei tuntian yanjiu* 清代西北屯田研究 [Study on the Land tilled by Colonists in Northwest China in the Qing Dynasty] (Lanzhou: Lanzhou University Press, 1990). Zhao Lisheng 趙儷生, ed., *Gudai xibei tuntian kaifashi* 古代西北屯田開發史 [History of Exploiting the Land tilled by Colonists in Northwest in Ancient China] (Lanzhou: Gansu Culture Press, 1997). Some findings of the first two books are also included in the third one.

3 Hua Li 華立, *Qingdai Xinjiang nongye kaifashi* 清代新疆農業開發史 [History of Agricultural Exploitation in Xinjiang during the Qing Dynasty] (Haerbin: Heilongjiang Education Press, 1998).

4 Huang Shengzhang 黃盛璋, ed., *Lüzhou yanjiu* 綠洲研究 [The Oasis Study] (Beijing: The Science Press, 2003); Zhao Zhen 趙珍, *Qingdai xibei shengtai bianqian yanjiu* 清代西北生態變遷研究 [Study on Northwest Ecological Changes in the Qing Dynasty] (Beijing: The People's Press, 2005).

created by the GIS team of Academia Sinica, based on *The Chinese Historical Atlas* (中國歷史地圖集) edited by Tan Qixiang 譚其驤.⁵ Laid on top of each map is the NASA Landsat 7 satellite image. In addition, this section uses *The Map of the Western Region made by Imperial Order* (欽定皇輿西域圖志) and *The Draft Local Gazette of Xinjiang* (新疆鄉土志稿) to identify the distribution of the Tuntian.⁶

The Tuntian system that developed in north-west China during Qing Dynasty included five categories: Bingtun (兵屯, land tilled by soldiers), Qitun (旗屯, land tilled by soldiers of the Banners), Qiantun (遣屯, land tilled by exiled criminals), Mintun (民屯, land tilled by civilians), and Huitun (回屯, land tilled by the Uyghur 維吾爾人). Each category had different institutional arrangements.⁷ In the Qing period, there were 127,000 colonists in Xinjiang; of them 22,200 were soldiers of the Green Standard Army (綠營兵屯), 14,800 were soldiers of the Eight Banners (八旗兵屯), 37,500 were civilians, 4,300 were Uyghur, and 9,200 were exiled criminals. The total land area tilled by the colonists measured 3,020,000 mou (畝, 2,012.83 million m²), of which 64 per cent was in northern Xinjiang where the agricultural oases existing today were formed mostly during the Qing period.⁸ (See Map 1.)

The Bingtun system in north-west China was established in response to the war against the Dzungar (or Zhungar 準噶爾), who occupied Hami (哈密) in 1715.⁹ The Qing Government sent armies to fight against the Dzungar and set up Bingtun in western Mongolia, to the east of Jiayuguan (嘉峪關), and to the west of Turfan (吐魯番) for supplying military grain.¹⁰ From 1716, Bingtun were set up in Xinjiang consecutively at Balikun (巴里坤), Turfan and Hami. In the 1730s, Bingtun was interrupted when the Qing Government negotiated peace with the Dzungar. Later, the Qing Army entered Xinjiang to pacify rebellions and re-establish Bingtun. In 1757, three Bingtun of the Green Standard Army were established at the Gan (甘), Liang (涼) and Su (肅) garrisons. Until 1765, there were 18 Bingtun of various scales.¹¹

5 This database, available at ccts.ascc.net/index.php?lang=zh-tw, was created by the GIS team of Academia Sinica under the leadership of I-chun Fan, co-author of this paper. We would like to thank Miss Pai Pi-ling 白璧玲 of the GIS team in helping to draw maps included in this paper. There is no conflict of property rights.

6 Fu Heng 傅恒 et al., comps, *Qinding huangyu xiyu tuzhi* 欽定皇輿西域圖志 [The Map of the Western Region made by Imperial Order] (Lanzhou: The Lanzhou Ancient Bookstore, 1990). Ma Dazheng 馬大正 and Hua Li 華立, eds, *Xinjiang xiangtuzhi gao* 新疆鄉土志稿 [The Draft Local Gazette of Xinjiang] (Beijing: China National Microfilming Center for Library Resources, 1990).

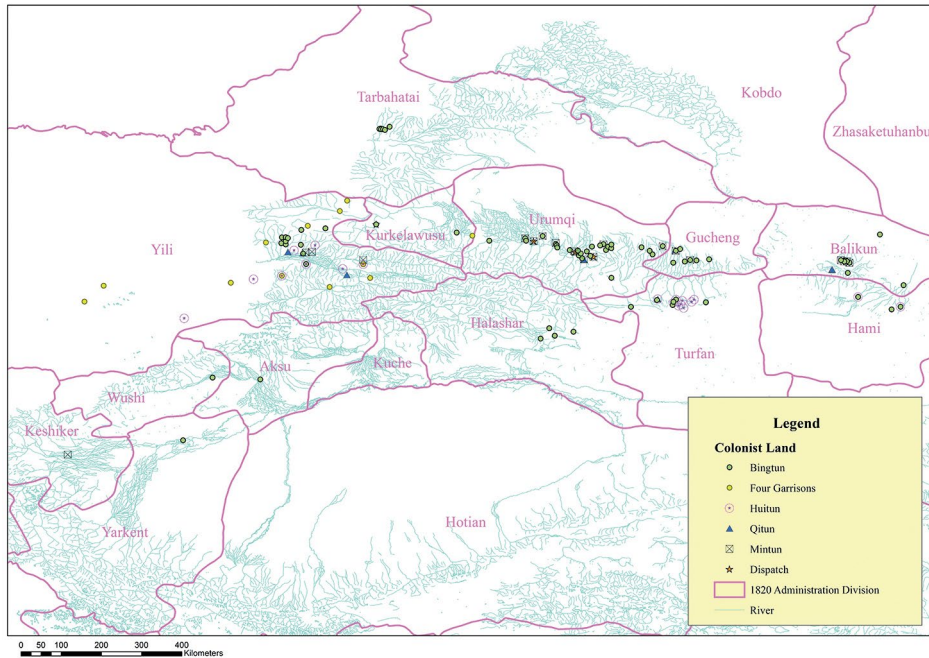
7 Wang, *Qingdai xibei tuntian yanjiu*, 9.

8 Huang, *Lüzhou yanjiu*, 30.

9 Peter C. Perdue, *China Marches West: The Qing Conquest of Central Eurasia* (Cambridge, MA: Harvard University Press, 2005), chaps 5, 6, and 7 for details of conflict between the Qing and the Dzungar; chap. 9 for military colonies (based mostly on Wang Xilong's work).

10 Wang, *Qingdai xibei tuntian yanjiu*, 38–41, 44–45.

11 Wang, *Qingdai xibei tuntian yanjiu*, 47–51.



Map 1: The overall distribution of Tuntian in Qing Xinjiang.

The peak period of developing Bingtun in Xinjiang was from 1736 to 1820. From 1821 onward, the Qing Government managed to develop agriculture in areas both to the north and to the south of the Tianshan (天山) Mountain; however, some Bingtun were withdrawn one after the other. In 1840, seven Bingtun at Turfan were withdrawn. In 1843, Bingtun at Altishahr (哈喇沙爾) and Wushi (烏什, i.e. Uchturpan) were also withdrawn. In 1853, the soldiers at Yili (伊犁) were withdrawn and 210 soldiers at Tarbahatai (塔爾巴哈台) were also removed. In 1863, Bingtun at the Middle, Left and Right garrisons of Urumqi (烏魯木齊), as well as those at Balikun, Mulei (木壘), Gucheng (古城), Kucha (庫車), and Jingho (精河), divided the land among soldiers, whose salaries were paid with agricultural produce.

The labour of Bingtun comprised two categories: 'shifting' or migrant soldiers (換班屯兵) and soldiers with families (攜眷屯兵). In the beginning, the lands of Bingtun were cultivated mainly by migrant soldiers. In 1762, Balikun started to introduce soldiers with families, and then this practice was adopted at other localities. By 1850, there were more than 6,100 soldiers with families (71 per cent) and 2,517 migrant soldiers (29 per cent).¹²

12 Wang, *Qingdai xibei tuntian yanjiu*, 60–5. At Khobdo (科布多), the Bingtun had 100 migrant soldiers which are not included here as the locality is in Mongolia.

After the Dzungar were pacified, the Qitun in Xinjiang was managed by garrisons of the Eight Banners. During the period 1764–74, the Qing Government dispatched 11,500 Manchu and Mongol Banner soldiers from Liangzhou (涼州), Zhuanglang (庄浪), Xi'an (西安), Ningxia (寧夏), and Rehe (熱河) to stations at Yili, Urumqi, Balikun, and Gucheng. In 1780, the Manchu garrison at Turfan was established and a section of Eight Banners soldiers was sent to Urumqi. As the population of Eight Banners garrisons in Xinjiang doubled from the 1790s to the first decade of the 1800s, the Qing Government adopted various strategies to solve the problem of their livelihood. One way was to establish Qitun. The proposal was made in 1764 but was not put into practice until the early 1800s. According to the Yili General Song Yun 松筠 (1752–1835), the delay was because Manchu Banners hesitated as they worried that military budgets might be cut once the Qitun land was cultivated. In 1802, Song Yun determined to solve the problem. He first asked the Manchu garrisons at Huiyuan (惠遠) and Huining (惠寧) to dispatch 360 soldiers for an experiment in cultivating the land. He personally conducted field investigations around the area, sent personnel to build hydraulic works to open a large canal along the north bank of Yili River, and to search for sources of spring water in the north-west part of Xinjiang, to build irrigation channels, and finally to obtain 120,000 mou of land for cultivation.¹³

In addition to soldiers of the Manchu and Mongol Eight Banners transferred from Shaanxi (陝西) and Gansu (甘肅), officers and soldiers of the Chahar (察哈爾), Xibe (錫伯), Solun (索倫) and Ulet (厄魯特) garrisons were also dispatched in 1764–65 from Zhangjiakou (張家口), Shengjing (盛京), Heilongjiang (黑龍江) and Rehe to establish Qitun at Yili.¹⁴

Qiantun in north-west China was founded in 1724. At that time, Nian Gengyao 年羹堯 (1679–1726), the Frontier Pacifying General-in-Chief (撫遠將軍), dispatched criminals in the provinces of Zhili (直隸), Henan (河南), Shandong (山東), Shanxi (山西) and Shaanxi to till the land at Datonghe (大通河) and Bulongjier (布隆吉爾). The Qing Government agreed to dispatch criminals with their wives to Bulongjier to till the land and sow it with seed that was officially provided, and to pay taxes after three years. The main purpose of dispatching exiled criminals to till the land at Bulongjier was to supply grain for the garrisons. In 1758, the Censor Liu Tsongwei 劉宗魏 (Jinshi 進士 [imperial examination], 1748) proposed to dispatch exiled criminals to Xinjiang to supplement the Bingtun labour force. After his proposal was approved, the Board of Punishments drew up a regulation for dispatching criminals to Xinjiang. This regulation was amended several times in the reigns of Qianlong

¹³ Wang, *Qingdai xibei tuntian yanjiu*, 85–91.

¹⁴ Wang, *Qingdai xibei tuntian yanjiu*, 99–100.

(1736–95), Jiaqing (1796–1820), Daoguang (1821–50), and Xianfeng (1851–74). However, the work continued without interruption. During the years 1862–77, when Xinjiang was disturbed by a Muslim revolt, criminals were dispatched to Heilongjiang, Yunnan (雲南), and Guizhou (貴州) instead. After recovering Xinjiang in 1877, the old practice of dispatching criminals was resumed. Throughout the Qing period, exiled criminals were dispatched to both northern and southern Xinjiang. The lands of Qiantun tilled by criminals were mostly located around the garrisons of the Green Standard Army. In addition to the Qiantun set up at Anxi (安西) in Gansu, nine were established in Xinjiang, of which four at Hami, Balikun, Urumqi, and Pizhan (辟展) were set up in 1761, three at Kurkelawusu (庫爾喀拉烏蘇), Jinghe, and Yili in 1766, one at Tarbahatai in 1775, and the other at Qarashar (喀刺沙爾) in 1796.

After arriving at Xinjiang, most exiled criminals were engaged in tilling Bingtun land. They were classified into one of two groups according to the degree of their crimes: to become slaves of soldiers, or to till a certain share of land; both groups were, however, under the control of soldiers. At Urumqi, Manas (瑪納斯), Jinghe, Kurkelawusu, and Tarbahatai, each exiled criminal was given 12 mou of land, and an additional 5 mou was given to each one who had a family. The Qing Government set up regulations for rewards and punishments for exiled criminals who cultivated a share of the land. It also gave three choices to the exiled criminals in Xinjiang when their terms of punishment ended: to become a soldier, to return home, or to settle down at the frontier. Most exiled criminals chose the last. Moreover, there were some exiled criminals who were not dispatched to military colonies but instead to civil colonies at places such as Urumqi; they were known as situated households (Anchahu 安插戶). Their origin, management, and treatment differed from those dispatched to military colonies.¹⁵

In 1884, when Xinjiang Province was established, the Qing Government considered dispatching exiled criminals again. But the first Governor, Liu Jintang 劉錦棠 (1844–94), considered that the old practice was no longer suitable for the new situation. Therefore, he decided to have them placed by local officials by implementing the Regulation of Colonies in Xinjiang (新疆屯墾章程), also known as the Regulation of Civil Colonies (民屯章程). This regulation brought forth a great change in the nature of exile for criminals in Xinjiang—to dispatch them to civil colonies instead of military ones.¹⁶

Mintun began in Xinjiang after the pacification of the Dzungar. From 1761 the Qing Government started to set up Mintun in northern Xinjiang. The cultivators of Mintun consisted of two categories: those recruited from

¹⁵ Wang, *Qingdai xibei tuntian yanjiu*, 119–21.

¹⁶ Wang, *Qingdai xibei tuntian yanjiu*, 125–9, 139–48.

the interior (內地招募) and those who came from the frontier voluntarily with an agreement (塞外認墾). The cultivators recruited from the interior were mainly jobless people and tenant farmers from the area of the West Corridor (Hexi 河西). The cultivators who came from the frontier voluntarily were mostly hired labourers and craftsmen living in northern Xinjiang. In 1762, the managerial official Jing-e-li 旌額理 (d. 1777) memorialised that the families of those who applied to cultivate frontier land would be sent there with official support. In 1772, the Shaan-Gan Governor-General Wen Shou 文綬 (d. 1784) suggested that the procedures for examining documents for passing through Jiayuguan should be simplified; he also used the official budget to repair the road leading to Urumqi. These favourable conditions attracted quite a number of civil households to go to cultivate the frontier land voluntarily.¹⁷

The distribution of Mintun in northern Xinjiang extended quite widely. From Balikun to Urumqi and Yili, wherever there were Bingtun there were Mintun. The peak period for the establishment of Mintun was 1736–1820. In 1789, at Balikun and Urumqi, the population of voluntary cultivators with agreements reached 120,537. In 1803, the number increased to more than 150,000; by counting those in Jinghe, Kurkelawusu, Yili, and Tarbahatai together, the total number of voluntary cultivators was 155,000. It can be estimated that there were 200,000 people by 1820. As for the land area, by 1795 the total cultivated voluntarily at Balikun and Urumqi was 1,014,879 mou; at Tarbahatai it was 3,000 mou. By 1820, Yili had 60,193 mou under cultivation. Thus, it can be estimated that by 1820 the acreage of Mintun in northern Xinjiang was more than 1,080,000 mou.¹⁸

In southern Xinjiang, Mintun started in the early 1820s. The region was an agricultural district with a long history. After the Dzungar were pacified in 1755, the emphasis was put on northern Xinjiang, and only a certain number of migrant soldiers were sent to southern Xinjiang. From about 1820, the leader of White Mountain faction, Jahangir Khoja 張格爾 (1788–1828), disturbed southern Xinjiang frequently. In 1826, he mobilised his people to attack and occupy the four cities Kashgar (喀什噶爾), Yengisar (英吉沙爾), Khotan (和闐), and Yarkent (葉爾羌). In 1828, Khoja was captured and sent to Beijing to face the death penalty. However, two years later, his elder brother, Yusuf Khass 玉素甫, attacked Kashgar and Yarkent. The turmoil in southern Xinjiang exhausted the energy of the Qing Army and the migrant garrison was not able to adapt to the situation. In 1827, the advisory official Wu Longa 武隆阿 (d. 1831) proposed setting up garrison forces at four cities in southern Xinjiang and recruiting people from the interior to cultivate the land. In the

¹⁷ Wang, *Qingdai xibei tuntian yanjiu*, 149–51.

¹⁸ Wang, *Qingdai xibei tuntian yanjiu*, 173–7.

same year, the Censor Qian Yiji 錢儀吉 (1783–1850) also recommended imitating northern Xinjiang by setting up Mintun. In 1831, the Yili General Chang Ling 長齡 (1759–1839) further proposed measures for recruiting cultivators to till the land in the western part of southern Xinjiang. Thus, two localities with available land started to recruit cultivators: one was Kelaheyi (喀拉赫依) around Kashgar and the other was Barchuke (巴爾楚克) at Yarkent.¹⁹

After a decade of turmoil, Xinjiang Province was established in 1884 and the first Governor, Liu Jintang, considered that the most urgent task was to establish land for colonists and to recruit people to cultivate wastelands. Moreover, there were also some changes in the organisation of Mintun. According to the Regulation of Civil Colonies issued by Liu Jintang, the organisation of Mintun was similar to that of the Yingtian (營田, camping field system), in which one Tunzhang (屯長, head of colony) was appointed for every 10 households, one Tunzheng (屯正, principal of colony) for every 50 households, and one Weiyuan (委員, commissioner) to supervise every five Tunzheng. This system was much more rigorous than the old one, which was managed only by household heads.²⁰

Huitun was the land tilled by the Uyghur who had settled in Xinjiang. Basically, the nature of Huitun was similar to that of Mintun. During the period when southern Xinjiang was occupied by the Dzungar, the Uyghur living at Hami and Turfan attached themselves to the Qing Government. After pacifying the Dzungar, the Qing Government moved the Uyghur from southern Xinjiang to cultivate the land along the Yili valley.²¹

Huitun at Yili had been maintained for more than a century. This was not only due to favourable agricultural conditions around Yili—the fertile land, abundant water resources and moderate climate—but also because the Uyghur had lived there before; they had fled to southern Xinjiang during the wars and they were willing to return to Yili. Moreover, although the tax rate was high, the farm animals were provided by officials and there was no other burden, and thus it was possible for them to have a more stable livelihood.²²

The significance of Lin Zexu's investigation in southern Xinjiang should be noted here. He was dismissed to go to Yili in 1842 after the Opium War. In 1844, Lin Zexu completed the hydraulic work of conducting the water from the Hashi River (喀什河) into the Qiwasu (齊烏蘇) channel; this work was praised by the Yili General Buyantai 布彥泰 (1791–1880), who suggested to the throne that Lin Zexu be reappointed to a position. Thus, the Daoguang Emperor ordered Lin Zexu to take up the responsibility of investigating cultivable land in southern

19 Wang, *Qingdai xibei tuntian yanjiu*, 177–9.

20 Wang, *Qingdai xibei tuntian yanjiu*, 182–83.

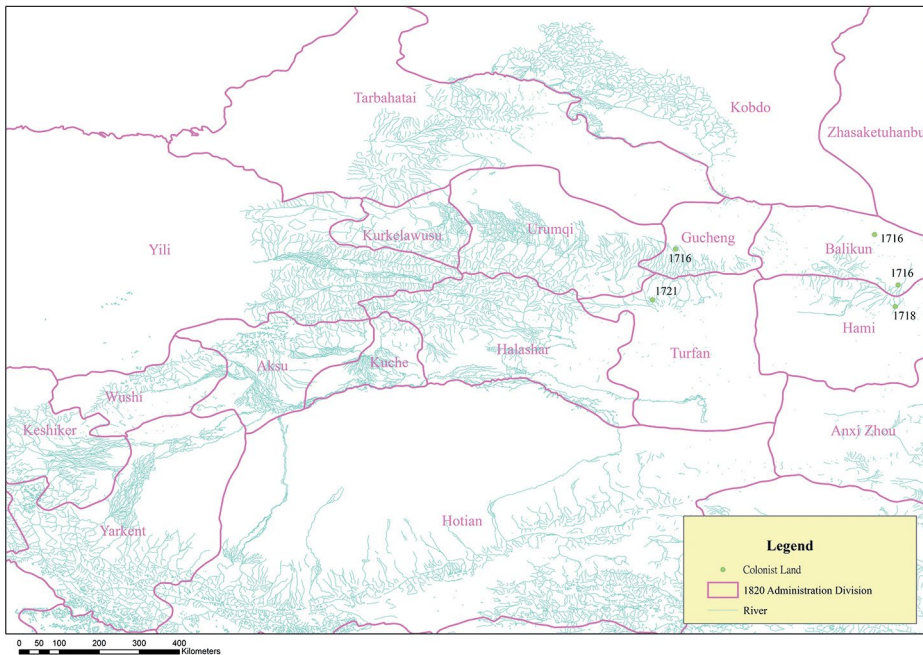
21 Wang, *Qingdai xibei tuntian yanjiu*, 190–93, especially Table 3, 190.

22 Wang, *Qingdai xibei tuntian yanjiu*, 194.

Xinjiang. In December 1844, he went south from Yili to Qarashar and met the managerial official Quan Qing 全慶 (1802–82) to carry out the mission, which lasted about a year and covered eight cities. The investigation included local hydraulic works and the measurement of cultivable land, which accounted for about 600,000 mou distributed among eight localities, of which six were: Kucha (68,000 mou), Wushi (103,000 mou), Khotan (100,000 mou), Yarkent (98,000 mou), Kashgar (83,000 mou), and Qarashahr (10,000 mou). The results demonstrated the great potential of agricultural development in southern Xinjiang. However, the Qing Government was not able to efficiently move the people from the interior; the only option was to recruit the Uyghur to cultivate 95 per cent of the land. Lin Zexu and Quan Qing relayed the local reality to the Qing Government and thus helped the development of Huitun in Xinjiang.²³

These maps illustrate the temporal changes in the early stage (1716–21), middle stage (1756–78), and later stage (1802–84). (See Maps 2–4.) Map 5 shows the acreage of each category of land at various locations.

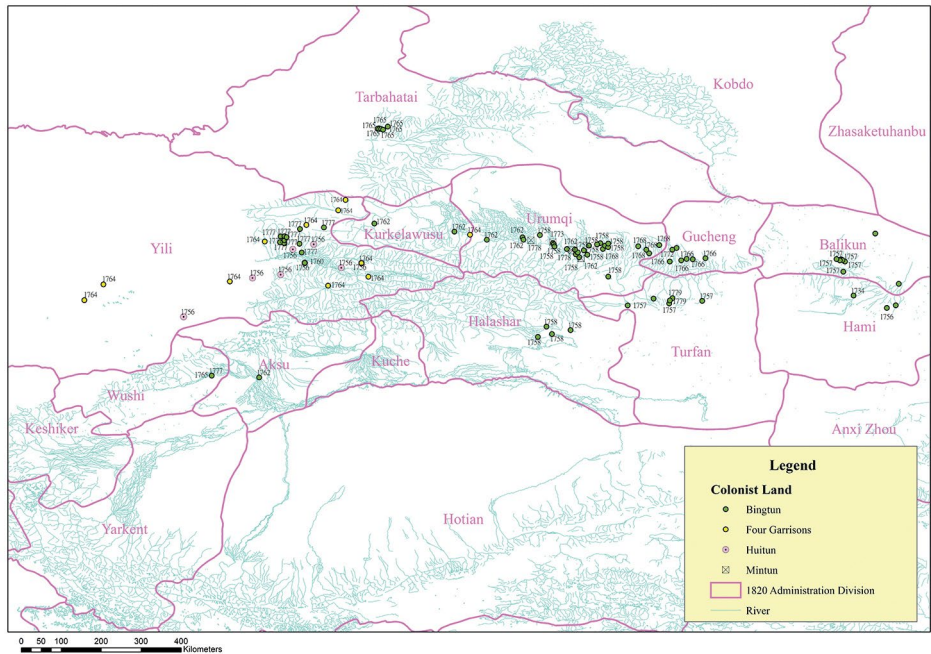
In the early stage, five Bingtun were established.



Map 2: The distribution of Tuntian in Xinjiang: The early stage (1716–21).

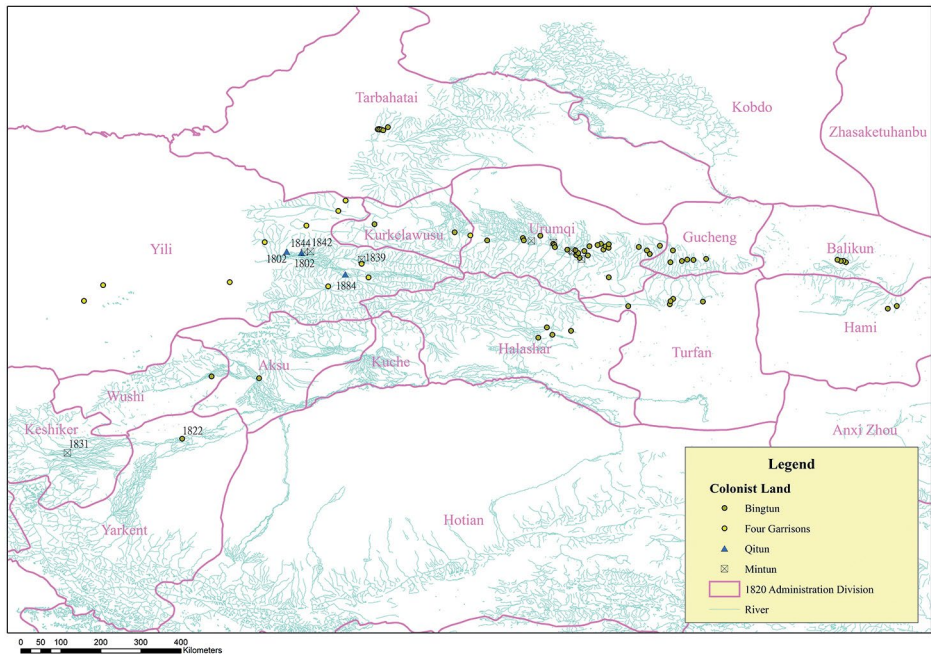
In the middle stage, 84 colonies of Bingtun, Qitun, Huitun, and Mintun.

23 Wang, *Qingdai xibei tuntian yanjiu*, 217–18.



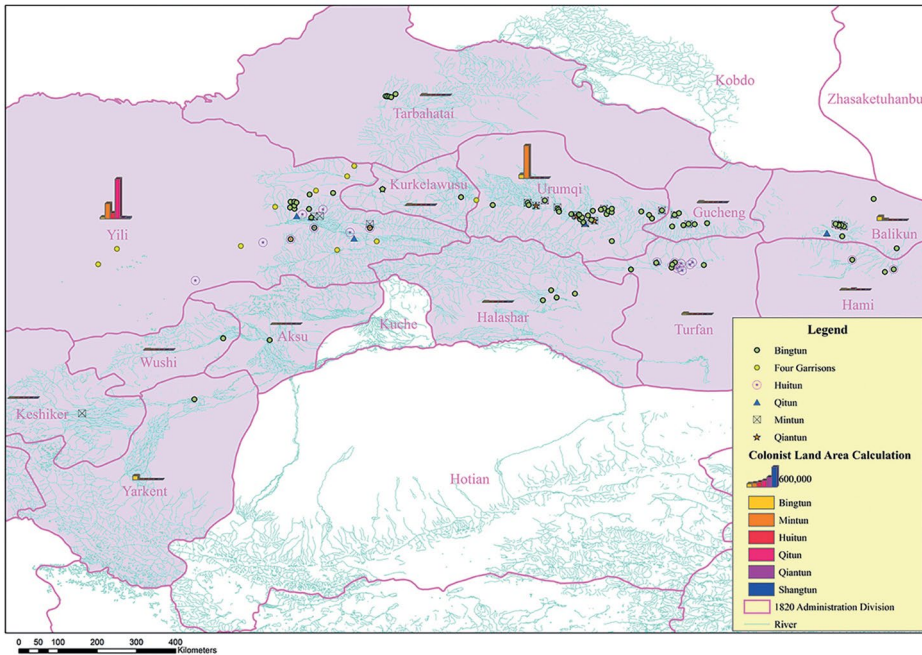
Map 3: The distribution of Tuntian in Xinjiang: The middle stage (1756–78).

In the later stage, 72 colonies of Bintung, Qiantun, and Mintung existed.



Map 4: The distribution of Tuntian in Xinjiang: The later stage (1802–84).

As mentioned before, the total land area tilled by the colonists in Xinjiang was 3,020,000 mou.



Map 5: The distribution and acreage of each category of Tuntian at various locations.

We next discuss the distribution of the colonised lands developed at various localities, using GIS maps.

1.1 Bingtun and Mintun at Balikun (see Map 6)

Balikun, located at the eastern end of the northern slope of the Tianshan Mountain, was in a strategic position. In spring 1716, a Bingtun of the Green Standard Army was established with 500 soldiers to cultivate the land. Thereafter, the military forces at Balikun were strengthened with 23 garrisons of Manchu and Mongol Banners within a radius of 200 li 里 (100 km). Correspondingly, the Bingtun system was also expanded. Three Bingtun were set up at Tuhuluoke (圖呼魯克), Durborjin (杜爾博爾金) and Kara-usu (哈喇烏蘇). In 1726 when the Qing Government negotiated peace with the Dzungar, the Bingtun were abandoned. In 1729, the Qing Army, led by the Ningyuan (寧遠) General Yue Zhongqi 岳鍾琪 (1686–1754), entered Balikun and established Bingtun again. According to Yue's report, more than 5,000 soldiers of the Green Standard Army were sent to cultivate the land. If it is estimated at 20 mou per soldier, then the

total area of Bingtun at Balikun was 100,000 mou, which made it the largest Bingtun in Xinjiang. In 1734, the Qing and the Dzungar negotiated for peace, the Qing Army was withdrawn, and Bingtun were abandoned for a second time.²⁴

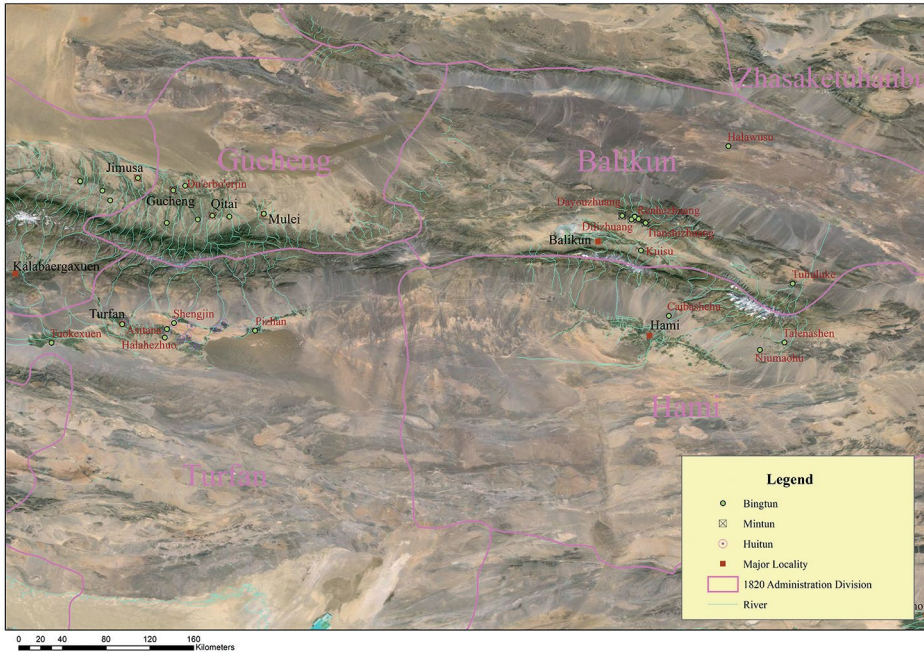
In 1757, the Commander Chou Da 丑達 tried to cultivate lands at Puchengzi (朴城子) and Kuisu (奎蘇) under the jurisdiction of Balikun. These two places were originally Bingtun of the western route. At Puchengzi, the land was gradually brought into cultivation using irrigation channels built by soldiers from the Gan, Liang, and Su garrisons. Later, the quota of soldiers increased to 500 and the land area to 20,000 mou, in four villages. At Kuisu, Bingtun were also set up in 1757 by the Gan, Liang, and Su garrisons but were abandoned in 1771.²⁵

At Balikun in 1761–64 there were 166 civilian households recruited from the interior to till Mintun land, which totalled more than 12,280 mou. Moreover, 180 civilian households volunteered to come to till the land at Balikun from three counties around Dunhuang (敦煌). In 1765, the Shaan-Gan Governor-General Yang Yingju 楊應琚 (1696–1766), memorialised that 25,000–26,000 mou of land was cultivated by civilians at Balikun, and these lands were irrigated with three channels. In autumn 1771, the Shaan-Gan Governor-General Wen Shou (in office 1771–72) observed that the extended lands were irrigated by the Tianshi (天時), Dili (地利), Renhe (人和), and Dayou (大有) channels and that they were very beautiful, with abundant crops. The grain was cheap and the households' requirements for their livelihood could be satisfied easily; therefore, more and more people came.²⁶

24 Wang, *Qingdai xibei tuntian yanjiu*, 185–9. In addition, when Lin Zexu was in Hami, the local soldiers and civilians once lodged their complaints against private occupation of land by the Uyghur Chief, Boxier 伯錫爾. Therefore, Lin Zexu and Quan Qing made a joint announcement pointing out that the land opened by the Uyghur chief at Dongxin zhuang 東新庄 was private; that, after being measured, the total area was more than 10,000 mou, including the uncultivated areas; and these lands were all included in the quota for cultivation. See Qi Qingshun 齊清順, 'Lin Zexu Hami kantian xintan—cong xinjian Lin Zexu soxie de bugou xinjian tanqi' 林則徐哈密勘田新探—從新見林則徐所寫的布告、信件談起 [A new exploration of Lin Zexu's land investigation at Hami—a discussion from the newly discovered announcements and letters of Lin Zexu], *Xibei Yanjiu* 西北研究 [Northwest Studies] 2 (1997): 17–28.

25 Wang, *Qingdai xibei tuntian yanjiu*, 42–3.

26 Wang, *Qingdai xibei tuntian yanjiu*, 48. Based on records in the *Comprehensive Scrutiny of Documents: Qing Dynasty* (清朝文獻通考) (Taipei: Xinxing shuju, 1963) and *The Veritable Record of the Qianlong Reign* [大清高宗純(乾隆)皇帝實錄], ed. Qing Gui 慶桂 (Taipei: Hualian Publishing Co. 華聯出版社, 1964).



Map 6: The distribution of Tuntian at Balikun and Hami.

1.2 Bingtun and Huitun at Hami (see Map 6)

Bingtun at Hami were founded at Talenaqin (塔勒納沁) and Caibashi (蔡把什), located respectively at 120 li and 20 li to the north-east of Hami city. In 1724, more than 1,700 shi (石, a unit of weight) of grain tax were collected at Talenaqin. In the 1730s when the Qing Government negotiated peace with the Dzungar, the Bingtun system was retained at Talenaqin and the grain tax was used to supply soldiers stationed at Hami as well as for animal feed. In 1742, the harvest was poor and sowing was suspended. In 1734, the Deputy General Zhang Guangsi 張廣泗 (d. 1748) appointed some subordinates to investigate at Caibashi and obtained 50,000 mou of land that could be planted with 5,000 shi of seeds. He ordered soldiers to build irrigation channels and to cultivate the land in order to pay taxes to support the garrison army. In 1739, the Guyuan (固原) Commander Li Shengwu 李繩武 (d. 1757) memorialised that the Green Standard Army from the Gan and Liang garrisons had cultivated 10,000 mou of land at Caibashi and harvested a total of 9,253 shi of wheat and millet. But in 1742, the Bingtun was withdrawn and the land was given to the Uyghur to cultivate and enable them to pay taxes.

After the withdrawal of the Bingtun at Hami in 1742, the irrigation channels silted up and the land lay in waste. In 1756, the Shaan-Gan Governor-General Huang Tingkui 黃廷桂 (1691–1759) memorialised to assign officers and soldiers to cultivate the land. In the next year, the soldiers started to dredge the irrigation channels and three colonies were established in turn. The first one, located at Talenaqin, had 5,000 mou of land and 200 soldiers; the second one, at Caibashihu, had 4,000 mou of land and 100 soldiers, and the third one, at Niumaohu (牛毛湖), had 200 mou of land, confiscated from the lieutenant in charge of the colonists' land.²⁷

Huitun at Hami were also established at Talenaqin and Caibashihu. According to a memorial (dated 17 November 1718) of the Attending Official Hai Shou 海壽, prior to 1718, the Huitun at Talenaqin was cultivated by the Uyghur, led by Emin Hezhuo 額敏和卓 (1694–1777). The land was a part of the Bingtun on the West Route. Moreover, granaries were built at Talenaqin to supply the Qing Army. In 1720, the Qing Army occupied Turfan and established Bingtun with garrison soldiers. Emin led his people to cultivate the land at Turfan. In 1723, owing to the fact that the Uyghur were not accustomed to the climate there, he appealed to the Qing Government to allow 400 Uyghur to return to Hami to cultivate the land at Talenaqin. Afterwards, the scale of the Huitun was enlarged. In 1730, the harvest of wheat and highland barley (qingke 青稞) reached 6,400 shi and the annual planting of 500 shi of seed and tax payment of 4,000 shi of grain became standard practice. In 1736, Emin memorialised that the annual payment of grain from Huitun at Hami amounted to 27,500 shi.

At Caibashihu, Huitun was established in 1712. At that time, because 300 soldiers at Hami were withdrawn, it was impossible for the remaining soldiers to cultivate the original area of land; therefore, the Chuan-Shaan Governor-General Yin Jishan 尹繼善 (1695–1771) transferred 10,000 mou of Bingtun land at Caibashihu to the Uyghur. In 1753, Yusuf Khass, who was given the title of Hami Beise (貝子), reported that the Uyghur were too exhausted to cultivate the land. The local official investigated and discussed the matter with Yin Jishan, deciding that the Uyghur could cultivate the land with no obligation to turn in their harvest to Qing officials. This meant that the Huitun at Caibashihu was suspended.²⁸

27 Wang, *Qingdai xibei tuntian yanjiu*, 177–8.

28 Wang, *Qingdai xibei tuntian yanjiu*, 44.

1.3 Bingtun and Huitun at Turfan (see Map 7)

Turfan neighbours Hami and is at the junction of roads leading to both northern and southern Xinjiang. In 1678, Galdan 噶爾丹 (1644–1697), the leader of the Dzungar, occupied southern Xinjiang and controlled 17 cities around Turfan. In 1715, the Qing Army of the West Route entered Balikun. In 1720, General Fu Ning'an 富寧安 (d. 1728) attacked Urumqi and in 1721 the Qing Army entered Turfan. They immediately moved in cattle and seed to establish Bingtun. But at Turfan, the Bingtun system was suspended after 1725. In 1729, the Qing Army entered Balikun again and some soldiers were also sent to Turfan to cultivate the land together with the Uyghur. From April 1731 to June 1732, the Dzungar attacked Luguqing (魯谷慶) and Halahozhou (哈喇火州) four times, preventing the parts of the Qing Army distributed among seven cities contacting each other. The Qing Army at Balikun went to help several times and became exhausted. In November 1732, the Qing Government moved the Uyghur living at Turfan to Guazhou (瓜州), and about the same time the Qing Government gave up the Bingtun at Turfan.²⁹

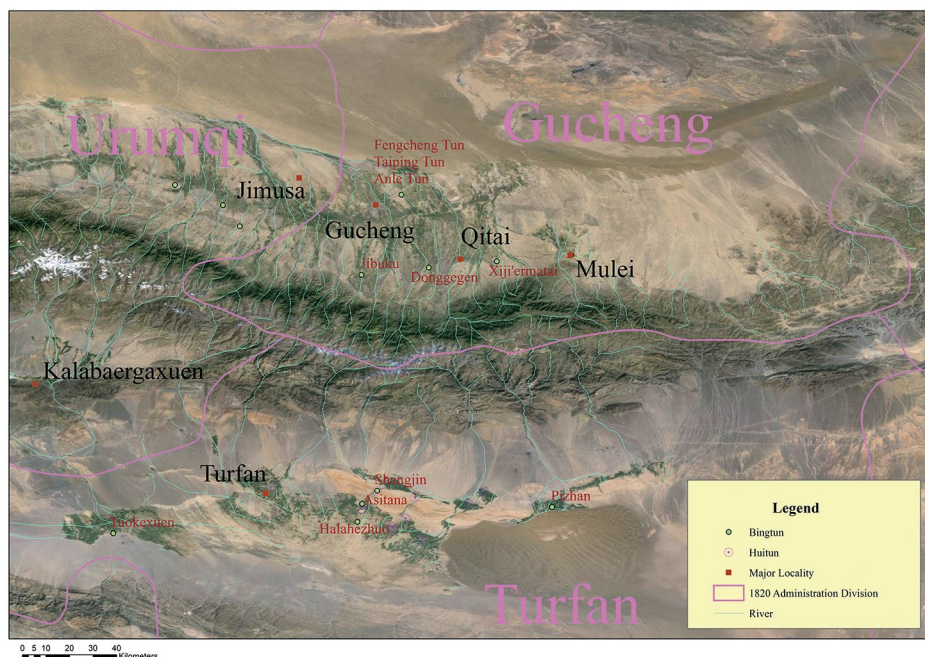
In 1757, when Bingtun were established again at Turfan, they were located at Pizhan (辟展), Halahozho (哈喇和卓), and Tokesun (托克遜). In 1760, Pizhan had 13,633 mou of land and 800 soldiers; Halahozho had 6,000 mou of land and 300 soldiers; and Tokesun had 14,253 mou of land and 1,000 soldiers. In 1761–62, the colonist soldiers at Turfan were moved to Urumqi and Yili and the land was transferred to the Uyghur; after that, there was no Bingtun at Turfan. In 1779, the Turfan Marquis Su Laiman 蘇賚璘 (d. 1780) was convicted and his private property, with 14,700 mou of land, was confiscated. It was distributed to seven Bingtun with 700 soldiers as follows: Tokesun (100), Anzhan (安展, 250), Halahozho (100), Asitana (阿斯塔納, 100), Hesertula (和色爾圖喇, 50), Shengjin (勝金, 50), and Pizhan (50).³⁰

At about the same time as the Bingtun system was established at Turfan, the Uyghur led by Emin Hezhou also started to cultivate the Huitun land. He submitted to Qing authority in 1720 and led his people to cultivate the land and pay taxes for seven years; his contribution was praised by the Qing Government. In 1731, Galdan Tseren 噶爾丹策零 (1695–1745) attacked Turfan several times, so the Qing Army moved east. In 1732, more than 10,000 Uyghur living in cities around Turfan followed the Qing Government's suggestion and moved east, led by Emin Hezhou. They first arrived at Talenaqin, and the following year moved further east to Guazhou. As there were great losses during the journey,

29 Wang, *Qingdai xibei tuntian yanjiu*, 48.

30 Wang, *Qingdai xibei tuntian yanjiu*, 197–201. Hai Shou's memorial was recorded in *The Veritable Record of the Kangxi Reign* [大清聖祖仁(康熙)皇帝實錄], ed. Ma Qi 馬齊, Zhang Tingyu 張廷玉, and Jiang tingxi 蔣廷錫 (Taipei: Hualian Publishing Co. 華聯出版社, 1964).

only 8,013 persons (including men, women, and children) arrived at Guazhou in September 1732. The Qing Government had the Uyghur settle down at five castles. In 1755, the government again sent the army to pacify the Dzungar. Emin Hezhou followed the Qing Army to Turfan to investigate the local situation and he obtained an agreement with the Qing Government to move back to Turfan from Guazhou. From 1733 to 1756, the Uyghur lived at Guazhou and made a considerable contribution to the cultivation of land there.³¹



Map 7: The distribution of Tuntian at Turfan and Gucheng.

1.4 Bingtun at Gucheng (see Map 7)

At Gucheng, Bingtun lands were developed at Mulei and Qitai (奇台) in 1766. Later, the quota of the soldiers was set at 500 and the land at 10,000 mou, to be distributed at Mulei, Qitai, Xijirmatai (西濟爾瑪台), Donggege (東格根), and Jibuku (吉布庫). In 1770, these Bingtun were abandoned and the soldiers withdrawn, with only 150 soldiers and 3,300 mou of land retained at Jibuku. Moreover, at Gucheng, Bingtun were started in 1772 with 500 soldiers and 12,100 mou of land distributed at Fensheng (豐盛), Taiping (太平), and Anle (安樂).

³¹ Wang, *Qingdai xibei tuntian yanjiu*, 43–4.

1.5 Bingtun, Mintun and Qiantun at Urumqi (see Map 8)

Bingtun were set up at the Middle, Left, and Right garrisons of Urumqi in 1758; at Manas in 1762; and at Jimusa (濟木薩) in 1768. Table 1 shows the scale of Bingtun at Urumqi in 1777. Altogether 109,000 mou of land and 5,473 soldiers were distributed among 36 locations.

Table 1: The scale of Bingtun at Urumqi in 1777.

Location	Land (mou)	Soldiers	Distribution of soldiers
Middle Garrison	22,000	1,066	133 each at Jihuaicheng (輯懷城); Tudunzi (土墩子), Huaiyibao (懷義堡), Lufengbao (屢豐堡), Xuanrenbao (宣仁堡), Huilaibao (惠徠堡); 90 each at Toudaowan toukong (頭道灣頭工) and Toudaowan erkong (頭道灣二工); and 88 at Fukangcheng (阜康城).
Left Garrison	22,000	1,066	148 each at Toukong (頭工), Erkong (二工), Sankong (三工) and Sikong (四工); 147 each at Baochangbao (寶昌堡) and Lequanbao (樂全堡); and 90 each at Ganbiao Toutun (甘標頭屯) and Ganbiao Ertun (甘標二屯).
Right Garrison	22,000	1,066	153 each at Toukong (頭工), Erkong (二工), Sankong (三工), and Sikong (四工); 152 each at Wukong (五工) and Liukong (六工); and 150 at Tugulike (土古里克).
Manas	28,000*	1,400	The Left and Right garrisons each had 7 Bingtun each had 100 soldiers.
Jimusa	15,000**	875	230 each at Jimusa (吉木薩) and Shuangchahe (雙岔河); 201 at Santai (三台); 155 at Liushuhe (柳樹河); and 50 at Tenagercha (特訥格爾差).
Total	109,000	5,473	

* 1,700 mou in 1768; **20,000 mou in 1768.

Source: This table is based on Wang, *Qingdai xibei tuntian yanjiu*, 49.

As for Mintun at Urumqi, Table 2 shows the origin and number of civil households at Urumqi during 1762–78. With regard to their origins, ‘With local agreement’ and ‘New local recruitment’ were more common than other sources. In the course of 17 years, ‘From the interior’ was recorded only in 1762, 1765, 1766, 1772, 1777, and 1778, while in other years, civilians came mostly as a result of local agreement, local new recruitment, divisions of households among soldiers’ descendants, merchants moving in their families, and divisions of Vietnamese households. Those who came from the interior were mostly from Suzhou, Ganzhou, Anxi, and Dunhuang.³²

32 Wang, *Qingdai xibei tuntian yanjiu*, 50–1.

In addition to the numbers listed in Table 2, 10,454 households were moved from Gansu to Balikun and Urumqi in 1761–80.³³ However, the actual number was much larger. For instance, a memorial dated 13 September 1777 by the Urumqi Commander Sonomu Celeng 索諾穆策凌 (1739–82) reported that since 1761, 11,741 households had moved to Urumqi and other places; in 1778, he reported a further 11,854 poor households had moved there.³⁴ Moreover, around 1778, there were 9,293 civil households, of which 5,133 had paid tax. Each household cultivated 30 mou of land, the total being 153,990 mou. Each mou paid 0.08 shi of fine grain in tax; in total 12,319.2 shi of fine grain was paid. Those not yet paying the tax comprised 4,260 households.³⁵

Table 2: The origin and distribution of civil households at Urumqi (1762–78).

Year	Origins	Location and Number of Households	Total
1762	From the interior	Dihua (迪化) 216, Ningbian (寧邊) 210	426
1763	With local agreement	Dihua 134, Ningbian 43	177
1764	With local agreement	Dihua 28, Ningbian 89, Fukang (阜康) 102	219
1765	From the interior and with local agreement	Dihua 125, Ningbian 866, Fukang 15	1,006
1766	From the interior and with local agreement	Dihua 107, Ningbian 573, Fukang 909	1,589
1767	With local agreement	Dihua 76, Ningbian 100, Fukang 179	355
1768	With local agreement	Dihua 79, Ningbian 126, Fukang 66	271
1769	With local agreement	Dihua 22, Ningbian 18, Fukang 37	77
1770	With local agreement	Dihua 10, Ningbian 25, Fukang 15	50
1771	Local recruitment	Dihua 6, Ningbian 19, Fukang 6	31
1772	Merchants with agreement	Dihua 20, Ningbian 12	32
	From the interior	Jimusa (濟木薩) 400	400
	Merchants with wives	?	126
1773	With local agreement	Dihua 117, Changji (昌吉) 29, Jimusa 205, Jinghua (景化) 26	377
	Merchants with wives	Dihua 2, Changji 2	4
1774	With local agreement	Dihua 74, Changji 48	122
1775	Local recruitment	Dihua 118, Fukang 1, Jimusa 2, Changji 81	202
1776	Local recruitment	Dihua 110, Fukang 18, Jimusa 13, Changji 9	150

33 Hua Li 華立, *Qingdai Xinjiang nongyeh kaifashi* 清代新疆農業開發史 [History of Agricultural Exploitation in Xinjiang during the Qing Dynasty] (Harbin: Heilongjiang Education Press, 1998), 61–4.

34 China's First Archives 中國第一檔案館, 'Qianlong nianjian ximin tunken Xinjiang shiliao 乾隆年間徙民屯墾新疆史料' [The source materials of migrants to the colonized land in Xinjiang during the Qianlong Reign], *Lishi danan* 歷史檔案 [Historical Archives] 2 (2002): 27, 29.

35 *Urumqi zhenglue* 烏魯木齊政略 [A Brief of Political Affairs at Urumqi], cited in Wang Xilong 王希隆, *Xinjiang wenxian sizhong jizhu kaoshu* 新疆文獻四種輯注考述 [Annotation and Verification of Four Collections of Xinjiang Documents] (Lanzhou: The Gansu Documentary Press, 1995), 59.

Year	Origins	Location and Number of Households	Total
1777	From the interior	Fukang 120, Hutubi (呼圖壁) 94, Manas (瑪納斯) 428	642
	Divided households of soldiers' descendants	Manas 278	278
	Local recruitment	Dihua 319, Jimusa 8, Changji 52	379
1778	Divided households of soldiers' descendants	Manas 102, Gucheng (古城) 46	148
	From the interior	Qitai (奇台) and other places 530, Tugukeli (土古克里) 165	695
	New local recruitment	Dihua 180, Jimusa 21, Changji 29	230
	Divided households of soldiers	Qitai 37	37
	Divided households of Vietnamese at Dihua	Dihua 11	11
	Divided households of local aborigines	Toutun (頭屯) 39, Lucaogou (蘆草溝) 45, Taxihe (塔西河) 46	130
	Merchants moved their families to the colonies	Dihua 559, Fukang 173, Jimusa 287, Changji 65, Manas 33, Hutubi 19	1,136
Total			9,300

Source: This table was prepared by the authors based on the anonymous *Urumqi zhenglüe* 烏魯木齊政略 [A Brief of Political Affairs at Urumqi], cited in Wang Xilong 王希隆, *Xinjiang wenxian sizhong jizhu kaoshu* 新疆文獻四種輯注考述 [Annotation and Verification of Four Collections of Xinjiang Documents] (Lanzhou: The Gansu Documentary Press, 1995), 57–9.

The total acreage of Mintun was 987,789.3 mou, including three items: the land cultivated continuously from 1762 on, the land obtained during the measurements in 1786–87, and the Bingtun land withdrawn from Jimusa in 1790. Of the total acreage, 683,686.2 mou was distributed among six Mintun at Dihua, Changji, Suilai, Fukang, Jimusa, and Hutubi; this acreage consisted of 458,624 mou originally transferred, 14,451 mou withdrawn from Jimusa, and the extra 210,611.2 mou found in the measurement. At Toutun, Lucaogou, and Taxihe there were 44,210.7 mou, of which 42,793 mou was originally transferred and the extra 1,417.7 mou was found in the measurement. At Yihe and Qitai of Zhengxi Prefecture, there was 259,892.4 mou, of which 162,729.3 mou was originally transferred and the extra 97,163.1 mou was found in the measurement.³⁶ It is notable that the extra land found in the measurement

36 Yong Bao 永保, comp., *Urumqi shiyi* 烏魯木齊事宜 [Matters concerning Urumqi], cited in Wang, *Xinjiang wenxian sizhong jizhu kaoshu*, 127–8.

formed 32 per cent of the total, and the land originally transferred 46 per cent at Dihua, even reaching 60 per cent at Yihe. The large percentage of extra land revealed that Mintun was very active in the early stage of development.

Table 3 shows the number of households and the population at the end of 1795. Compared with 9,300 households up to 1778, the 20,787 households in 1795 indicated that the number more than doubled in 17 years.

Table 3: The population of civil households in Urumqi (1795).

Location	Civil Households		
	Households	Males	Females
Dihua zhou 迪化州	3,326	14,322	12,386
Changji xian 昌吉縣	3,252	8,847	6,665
Sulai xian 綏來縣	2,913	6,661	4,664
Fukang xian 阜康縣	1,964	6,102	5,032
Jimusa 濟木薩	2,674	7,502	5,336
Hutubi 呼圖壁	1,064	4,942	2,838
Kelabarkesun 喀喇巴爾噶遜	200	607	505
Zhenxi fu 鎮西府 Yihe xian 宜禾縣	601	3,931	2,889
Zhenxi fu Qitai xian 奇台縣	3,426	18,422	12,703
Toutun 頭屯*	447	1,085	467
Lucaogou 蘆草溝*	496	990	444
Taxihe 塔西河*	424	1,064	280
Total 合計**	20,787	74,475	54,209

* The original text said at 'These three places are civil colonists'. This should refer to the exiled criminals who chose to stay in the locality at the end of their designated term.

** The total numbers are slightly different from the original records of 20,662 households with a total population of 129,642 men, women, and children.

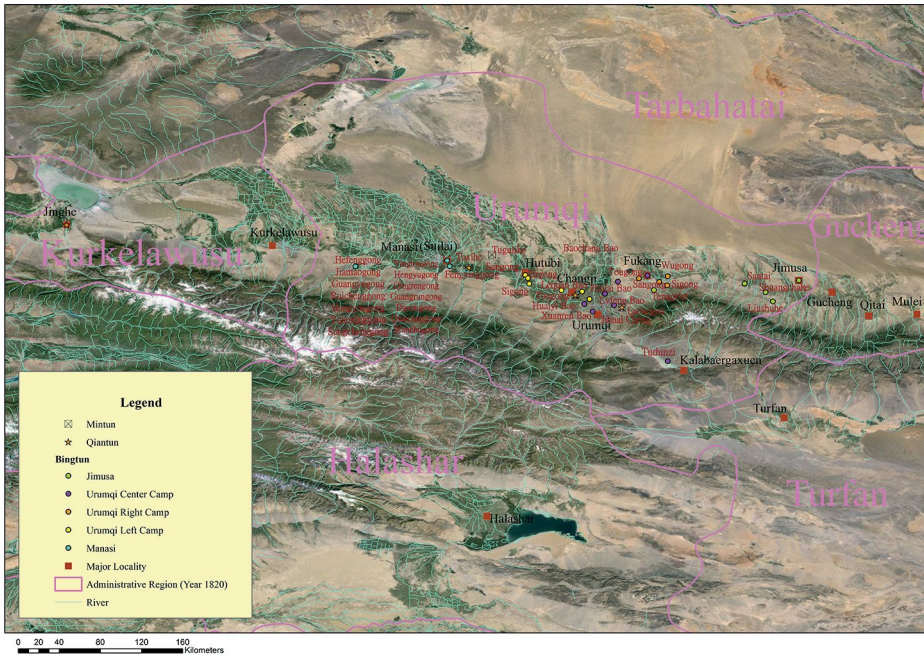
Source: This table was prepared by the authors based on Yong Bao 永保, comp., *Urumqi shiyi* 烏魯木齊事宜 [Matters concerning Urumqi], cited in Wang, *Xinjiang wenxian sizhong jizhu kaoshu*, 126–7.

In addition to civil households, in 1795, 11,545 merchant households were included in the local policing system (Baojia 保甲) at Urumqi, with a total population of 43,791. These merchant households were different from those engaged in the local market gardening business. Other statistics showed that at Urumqi there were 498 merchant households engaging in market gardening, cultivating 27,090 mou of land.³⁷

As for the exiled criminals, Ji Yun 紀昀 (1724–1805), a dismissed official at Urumqi in 1768–71, said in a poem: 'The small houses clustering together were homes of all newly exiled criminals.' He added that exiled criminals resided in

37 Yong, *Urumqi shiyi*, 127–8.

Changji, Toutun, and Lucaogou.³⁸ During the Qianlong period, the number of exiled criminals converted to civilian households was as follows: Toutun 512, Lucaogou 505, and Taxihe 225; together there were 1,242 households, of which 1,234 paid taxes. They cultivated 30 mou each and altogether they cultivated 37,020 mou of land.³⁹ Compared with the number listed in Table 3, in 1795 there were 447 households at Toutun, 496 at Lucaogou, and 424 at Taxihe. In 1842 when Lin Zexu was on the way to Yili, he noted at Taxihe: 'There are several hundreds of descendants of exiled criminal households from Zhangzhou (漳州) and Quanzhou (泉州). In recent years, exiled criminals from Fujian and Guangdong provinces were also dispatched to Taxihe.'⁴⁰



Map 8: The distribution of Tuntian at Urumqi, Kurkelawusu, and Jinghe.

38 Ji Yun, *Urumqi zashi* 烏魯木齊雜詩 [Miscellaneous Poems written at Urumqi], in Wang, *Xinjiang wenxian sizhong jizhu kaoshu*, 170.

39 Anonymous, *Urumqi zheng-lue*, 59.

40 Lin Zexu 林則徐, *Hege jicheng* 荷戈紀程 [Record of journey carrying an axe], an edition of Xiaofanghuzhai chaoben (小方壺叢鈔本) included in Xu Lihua 徐麗華, ed., *Zhongguo shaoshu minzu guji jicheng* 中國少數民族古籍集成 [Collection of Ancient Books of China's Nationalities] (Chengdu: Sichuan Nationality Press, 2002), 76: 558.

1.6 Bingtun at Kurkelawusu and Jinghe (see Map 8)

Bingtun at Kurkelawusu and Jinghe were established in 1762: Kurkelawusu had 5,400 mou of land and 270 soldiers, and Jinghe had 4,050 mou of land and 270 soldiers. In 1765, the numbers were reduced: Kurkelawusu had 3,636 mou of land and 180 soldiers, and Jinghe had 3,360 mou of land and 168 soldiers. Lin Zexu observed in 1842 there were more than 200 exiled criminals settled at Jinghe and they were all engaged in cultivating the land and providing services. Half of these exiled criminals were from Fujian and Guangdong provinces.⁴¹

1.7 Bingtun at Tarbahatai and Halashar (see Map 9)

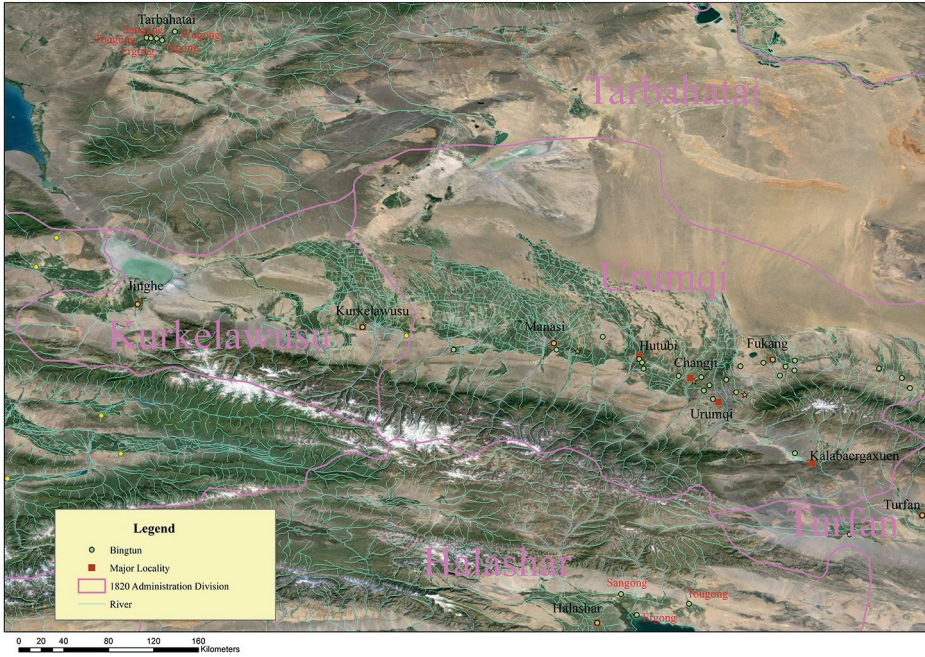
Bingtun at Tarbahatai started in 1765. In 1777, there were 17,000 mou of land and 850 soldiers. In 1794, the number of soldiers was reduced to 400 and distributed among five colonies with 80 soldiers each. The locations of these colonies relative to Tarbahatai were as follows: Toukong at 4 li to the west, Erkong at 2 li to the south, Sankong at 8 li to the south-east, Sikong at 12 li to the south-east, and Wukong at 30 li to the east. Together they cultivated 8,000 mou of land.⁴²

Bingtun at Halashar were set up in 1758 and by the next year had 9,675 mou of land. In 1777, there were 362 soldiers and 7,440 mou of land. The colonies were at three locations near Halashar: Toukong at 60 li to the north-east, Erkong at 70 li to the east, and Sankong at 220 li to the east; the last place was also known as Wushaketar (烏沙克塔爾).⁴³

41 Lin Zexu, *Hege jicheng*, 76: 558.

42 Wang, *Qingdai xibei tuntian yanjiu*, 50.

43 Wang, *Qingdai xibei tuntian yanjiu*, 51.



Map 9: The distribution of Tuntian at Tarbahatai and Halashar.

1.8 Bingtun, Qitun, land of Four Garrisons, and Huitun at Yili (see Map 10)

Bingtun at Yili began in 1760, and some 16,000 mou of land was opened up in the following year. In 1777, the acreage increased to 50,588 mou and the number of soldiers to 2,500. At Yili, Bingtun were divided into 25 units, each with 100 soldiers, as follows: Lamagou (喇嘛溝) and Lucaogou (蘆草溝), located to the north of Suiding (綏定) city, had one unit each; Tarqi (塔爾奇) city had three units; Huoerguosi (霍爾果斯), to the west of Tarqi, had three units; Chahanwusu (察漢烏蘇) had seven units; to the north-west of the city, Qingshuihe (清水河) had two units; Dushanzi (獨山子) had one unit; and to the north of the city, Daxigou (大西溝) had two units; Dadonggou (大東溝) and Xiaodongguo (小東溝) each had one unit; to the south, Huining city had three units.⁴⁴

Qitun of the Eight Banners garrisons at Yili were started in 1802 by General Song Yun. Irrigation channels were built and 120,000 mou of land was conferred on Eight Banners garrisons at Huiyuan and Huining. These lands were distributed in 14 units, of which Huiyuan had 9 and Huining had 5, as is shown in Table 4.

⁴⁴ Wang, *Qingdai xibei tuntian yanjiu*, 50.

Table 4: Qitun at Huiyuan and Huining in Yili.

Eight Banners Garrisons at Huiyuan		Eight Banners Garrisons at Huining	
Banner	Location of Land	Banner	Location of Land
Five Zuoling 佐領 of Bordered White Banner	South-east of the City: Hongliuwang (紅柳灣)	Four Zuoling of Plain Yellow and Plain Red Banners	East of the city
Five Zuoling of Plain Yellow Banner	North-east of city: around the mountain area	Four Zuoling of Bordered Yellow and Plain White Banners	East of the city
Five Zuoling of Plain Blue Banner	North-east of the city: Shuiquanzi (水泉子)	Four Zuoling of Bordered Red and Bordered Yellow Banners	East of the city
Five Zuoling of Bordered Yellow Banner	Banner land at Xinbeitun (新北屯)	Four Zuoling of Bordered White and Plain Blue Banners	North of the city
Five Zuoling of Plain White Banner	East of the city: Huitongqu (通惠渠) and extended to the north	Eight Banner Public Land	Northwest of the city
Five Zuoling of Bordered Blue Banner	East of the city: Fenshuizha (分水閘) and extended to the north		
Ten Zuoling of Plain and Bordered Red Banner	North-west of the city: Yikeshu (一棵樹) to the south-west and north-west		
Eight Banner Public Land	East of the city: Banner's rice field		
Eight Banner Public Land	East of the city: Qiligou (七里溝) to the east of the rice field		

Source: This table was prepared by the authors based on Wang, 91.

After Qitun were established at Yili, changes appeared very soon. First, the undivided public land of the Eight Banners was converted to land managed by each Banner. In 1812, after a survey by the Yili General Jin Chang 晉昌 (1759–1828), more than 20,000 mou of the public land, which was expected to receive irrigation water, was divided into eight parts for the Eight Banners. Later, the land tenant system appeared. In 1830, the Yili General Yu Lin 玉麟 (1766–1833) memorialised to set up the land tenant system for the Manchu Banners; afterwards, the additional adult males in the Eight Banners were no longer engaged in cultivation, so a large area of land was rented out to civilians.⁴⁵

45 Wang, *Qingdai xibei tuntian yanjiu*, 93–4.

A period of turmoil lasted more than a decade from 1864 in Xinjiang, and the soldiers of the Eight Banners garrisons and civilians of all nationalities suffered a great deal. In 1884, Xinjiang Province was established, and the Yili General Jin Shun 金順 (1831–86) gathered the remaining forces of the Eight Banners to restore the garrison system. At that time, there were only 2,000 soldiers, less than a third of the original number.⁴⁶

At Yili, when the original Manchu garrisons were restored in 1884, land was given to the original Banners for cultivation, but not to the new Manchu garrisons. In 1895, General Chang Geng 長庚 (in office 1890–1901 and 1905–09) memorialised to reduce the number of soldiers and to increase their salaries in order to improve discipline. He ordered two Banners to cultivate the land and six Banners to be stationed at strategic locations. A Qitun was set up to the south of the Yili River, named Toqquz Tara (特古斯塔柳). Chang Geng managed to repair the irrigation channels and to build castles for the soldiers. In 1903, General Ma Liang 馬亮 (1845–1909) memorialised to add 240 soldiers to the new Manchu garrisons and to have them cultivate the land at Tegusitaliu with their families.⁴⁷

The Qitun system at Tegusitaliu was different from the old one. Firstly, the old system did not require soldiers of the Eight Banners to cultivate land. At Tegusitaliu, on the contrary, soldiers of two Manchu Banners engaged directly in both cultivation and garrison duties. Secondly, the old system provided animals for cultivation only once. At Tegusitaliu, seed, animals, and agricultural implements were all officially provided each year. Thirdly, the old system let the Eight Banners manage their own land, while at Toqquz Tara, Qitun imitated Bingtun in giving a certain share of land to each soldier but cultivating it collectively; the harvest was all collected officially and a system of regulation of reward and punishment was adopted. At the end of 1903, General Ma Liang memorialised that 37,700 shi of unhusked grain had been collected since 1896, which he suggested be distributed to soldiers when the harvest was poor. In 1904, General Guang Fu 廣福 (in office 1904–06 and 1909–11) proposed to convert official land to private land and to distribute it to soldiers according to the size of their families. The soldiers were expected to provide their own seed and animals and to pay tax, the quota being based on the first year's harvest. This practice might have been helpful for frontier stability, but as the Qing Dynasty collapsed soon after, the Qitun at Yili was also brought to an end.⁴⁸

46 Wang, *Qingdai xibei tuntian yanjiu*, 95–6.

47 Wang, *Qingdai xibei tuntian yanjiu*, 97.

48 For details, see Wang, *Qingdai xibei tuntian yanjiu*, 97–9.

In 1917, Xie Bin went to Xinjiang to investigate the taxation system. He stayed overnight at Tegusitaliu and recorded that there were more than 200 households of the new Manchu garrison residing at Xiaoyingpan (小營盤) and more than 100 households inside Dayingpan (大營盤) city. Around the city there were more than 30 households cultivating the land. These people were all Manchus.⁴⁹ This revealed that even though Qitun had been suspended, the Manchus were still cultivating the land as before.

In addition to the Manchu Eight Banners, in 1764–65, officers and soldiers were also transferred from Chahar, Xibo, Solun, and Ulet garrisons to cultivate the land at Yili. Table 5 shows the distribution and the water sources of these colonists' lands.

Table 5: The distribution and water sources of the colonists' land of four garrisons.

Garrison	Location of the Land	Water Source
Xibo Garrison: 8 colonies 1. The Bordered Yellow 2. The Plain White Banners 3. The Plain Red Banner 4. The Bordered white Banner 5. The Plain Yellow Banner 6. The Bordered Red Banner 7. The Plain Blue Banner 8. The Bordered Blue Banner	1. Hejiger (額吉格爾) 2. Hejiger 3. Batumengke (巴圖蒙柯) 4. Zhohelo (鎔豁囉) 5. Tashibulake (塔什布拉克) 6. Ergemutolohai (額爾格穆托羅海) 7. East of Zhohelo 8. West of Zhohelo	1 and 2: spring water 3 to 8: river water
Solun Garrison: 2 wings 1. The Left Wing 2. The Right Wing		1: the West Alimatu River (西阿里瑪圖河) 2: Turgen River (圖爾根河)
Chahar Garrisons: 2 wings	Lands were all located along the bank of the Yibolola River (依博羅拉河).	The land to the north of the river used the mountain springs while the land to the south conducted the river water for irrigation.
Ulet Garrisons: 1. The Upper Three Banners: at 4 places 2. The Lower Five Banners: at 16 places	1. Dundachawusu (敦達察烏蘇), Huoyituchahanwusu (霍依圖察罕烏蘇), Termotu (特爾莫圖), Tamuha (塔木哈). 2. Changman (昌曼), Hashi (哈什), Chunjibulake (春稽布拉克), Subutai (蘇布台), Hundolai (渾多賴), Gunzuoteha (袞佐特哈), Kurkulei (庫爾庫壘), Nileha (呢勒哈), Dajiergelang (大吉爾噶朗), Suanzhutu (算珠圖), Teleke (特勒克), Mingbulake (明布拉克), Tegusutaliu (特古斯塔柳), Shalaboguoqin (沙喇博果沁), Bahalake (巴哈拉克), Nuchugun (努楚袞)	They all used the water available locally.

Source: This table was prepared by the authors based on Wang, *Qingdai xibei tuntian yanjiu*, 99–104.

49 Xie Bin 謝彬, *Xinjiang youji* 新疆游記 [Travels in Xinjiang], comp. Yang Lian 楊謙 and Zhang Yiqing 張頤青 (Urumqi: The Xinjiang People's Press, 2001), 90.

Of these four garrisons, Ulet and Chahar were mainly nomadic and only engaged partly in agriculture, but Xibe and Solun were mainly engaged in agriculture. The most effective colonised lands were those managed by the Xibo garrison. In 1903, among the officers and soldiers selected to manage the lands at Tegusitaliu, quite a large number were from the Xibo garrison.⁵⁰

During the period 1821–50, the colonists' land at Yili made great progress. In 1839, General Yi Shan 奕山 (1790–1878) memorialised that there were 1,000 Uyghur households settled at Tashitubi (塔什圖畢) and 500 households at Sandaowan (三道灣), together cultivating 164,881 mou of land. In 1840, Buyantai 布彥泰 was assigned to the Yili general and under his management the hydraulic works and land cultivation entered a new stage. According to Buyantai's reports, the cultivated acreage in 1842 was as follows: Sankeshu (三棵樹) 25,350 mou, Hongliuwan (紅柳灣) and its surrounding area 8,000 mou, and Alepusi (阿勒卜斯) 161,000 mou. Moreover, after 1844, 100,300 mou were obtained at Aqiwusu (阿齊烏蘇). The above figures made up a total of about 460,000 mou of land.⁵¹

As for the Huitun system at Yili, it was initiated in 1756 when General Zhao Hui 兆惠 (1708–64) led the army into the region and observed that there were only about 30 Uyghur. For supplying grain to the army, the Qing Government decided to transfer some soldiers of the Green Standard Army and the Uyghur from southern Xinjiang to cultivate the land at Yili. The first group of 300 Uyghur who went to Yili were from Aksu, Wushi, and Cailimu (賽哩木). In 1760, they carried animals, agricultural tools, seed, and grain to Yili under the guard of 500 officers and soldiers led by Deputy General Yi Zhu 伊柱. They climbed over the mountain of Musurdaban (穆蘇爾達坂) and marched for a fortnight to arrive at Yili. They settled at Hainukean (海努克安), a site to the south of the Yili River originally cultivated by Uyghur. They immediately built villages, repaired ditches, and started to plant seeds. Afterwards, they moved their families to Yili. The planting time in 1760 was somewhat late, but there were still some harvests in the autumn. In early 1761, the second group of Uyghur, comprising 500 households, arrived at Yili. In the sixth month of the same year, another 200 households arrived to help in harvesting. The number of Uyghur households reached 1,000 in 1761, as had been expected by the Governor-General Yang Ying-ju. Owing to the extensive land and abundant water resources, the Huitun were a remarkable achievement. As a result, the Qing Government ordered Uyghur to move continuously to Yili. By 1768, there were 6,388 Uyghur households there, so the Qing Government decided to stop the migration.⁵²

50 Wang, *Qingdai xibei tuntian yanjiu*, 99–104.

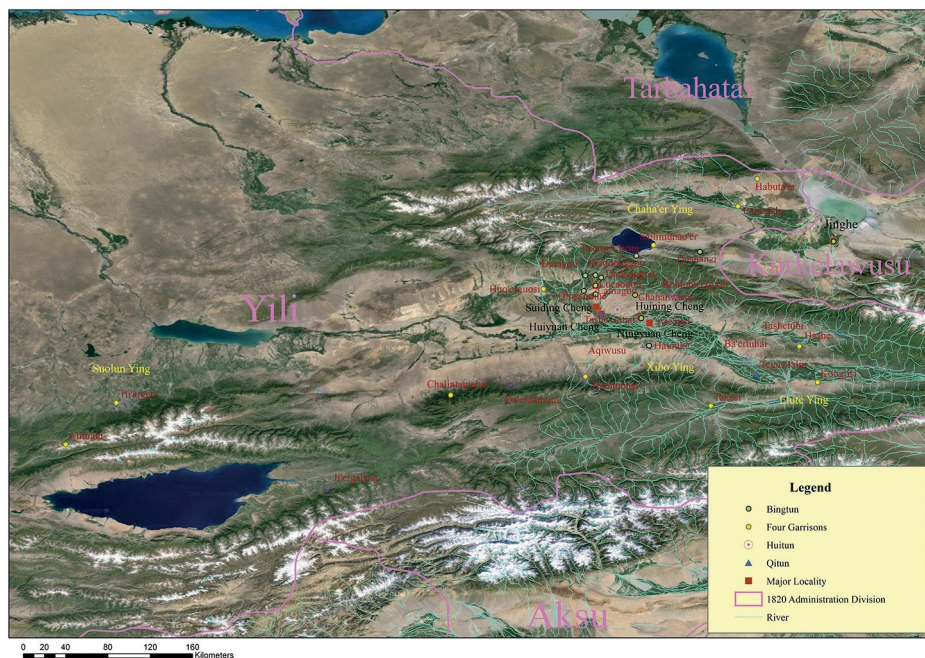
51 Zhao Zhen, *Qingdai xibei shengtai bianqian yanjiu*, 140; Wang, *Qingdai xibei tuntian yanjiu*, 185–6, does not provide the acreage of land at each place.

52 Wang, *Qingdai xibei tuntian yanjiu*, 208–9.

In 1773, the Yili General Yiletu 伊勒圖 (d. 1792) memorialised to divide the Uyghur households at Yili into nine colonies. There were seven colonies using the mountain spring: Hainuke (海努克, 600 households), Jirgelang (濟爾噶朗, 900), Tashuesitan (塔舒鄂斯坦, 400), Eluositan (鄂羅斯坦, 600), Bartuhai (巴爾圖海, 600), Huonohai (霍諾海, 800), Dardamutu (達爾達木圖, 500); and two colonies using the river water: Hashi (哈什, 500) and Boluoburgesu (博羅布爾噶素, 1,100).⁵³

The acreage of Huitun was estimated by measuring the quantity of seed planted. This practice was popular in Gansu and Hexi as well as southern and northern Xinjiang. The regulation required each household to plant 1 shi of wheat and barley as well as 0.5 shi of millet. This quantity of seed required 30 mou of land. Thus, it could be estimated that the total land area cultivated by Huitun at Yili was about 180,000 mou.⁵⁴

In July 1871, the Russian army occupied Yili, starting a colonial period that lasted 10 years. In 1881, under the Treaty of Yili China ceded to Russia more than 70,000 km² of land, including Huitun at Dardamutu. Moreover, more than 100,000 residents of Yili were forced to move to Russia. With this lost, after being developed for more than 100 years, the Huitun at Yili disappeared forever.⁵⁵



Map 10: The distribution of Tuntian at Yili.

53 Wang, *Qingdai xibei tuntian yanjiu*, 211. The data were taken from *Knowledge about Xinjiang compiled by Imperial Order* (欽定新疆識略).

54 Wang, *Qingdai xibei tuntian yanjiu*, 208–15.

55 Wang, *Qingdai xibei tuntian yanjiu*, 218–19.

1.9 Bingtun at Wushi and Aksu (see Map 11)

In 1765, Bingtun at Wushi started with 20,000 mou of land. In 1777, 8,000 mou of land and 400 soldiers were distributed at Baoxingkong (寶興工), Chongyukong (充裕工), and Fengyingkong (豐盈工). There were also 70 soldiers at Toukong (頭工), 101 at Erkong (二工), and 130 at Sankong (三工).⁵⁶ In 1762, Bingtun at Aksu had 150 mou of paddy fields with 15 soldiers.⁵⁷

1.10 Mintun at Kashgar and Yarkent (see Map 11)

In 1831, the Yili General Chang Ling proposed to establish Mintun at Kelaheyi on land originally cultivated by the Uyghur. After the turmoil caused by Jahangir Khoja, the Uyghur fled and scattered, and Kelaheyi was taken to establish Mintun. After the Uyghur returned, Chang Ling assigned some lands of the rebellious officials to them; the Mintun at Kelaheyi was also known as 'exchanged land (Huanhuidi 換回地)'. In 1832, according to a report by Chang Ling, there was more than 200 mou of land, and more than 500 cultivators were recruited. In 1835, the leading official of Kashgar, Xi-lang-a 西朗阿, reported of the situation of Mintun that there were 22,062 mou of 'exchanged land' and 506 recruited households; 1834 was the year for collecting tax, a quota of 607 shi of wheat being collected and stored in the granary. This report revealed that each colonist household was given 40 mou of land. Tax began to be paid after the land had been cultivated for three years, and each mou of land paid 0.03 shi of wheat. As for the origin of the colonists at Kelaheyi, they were mostly merchants according to some records.⁵⁸

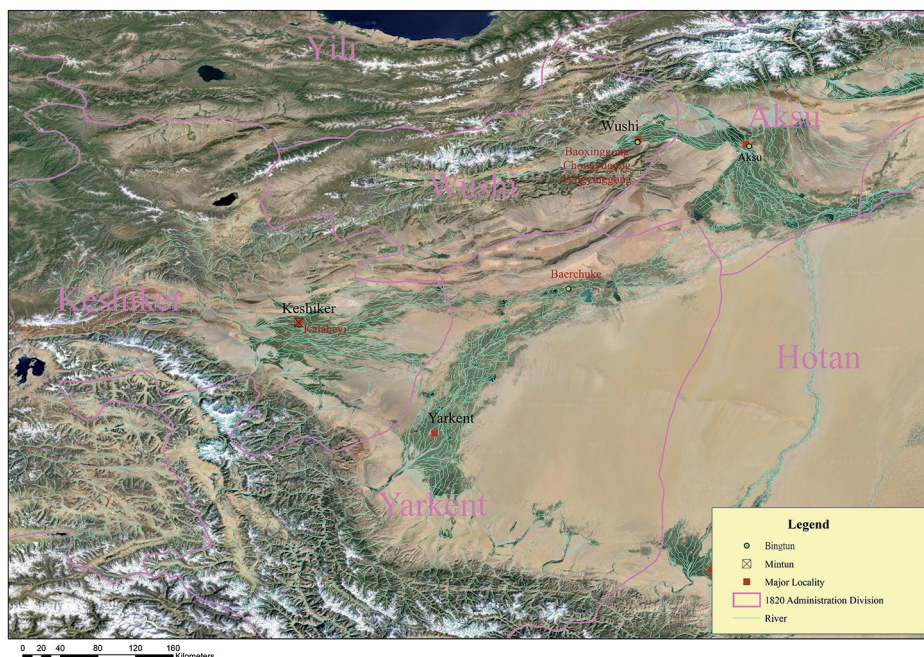
Barchuke was originally a wilderness in the jurisdiction of Yarkent. In 1822, the Yarkent managerial official Bi Chang 璧昌 led a group of 1,000 soldiers to open the land, build the city, dig the irrigation channels, and recruit cultivators; he spent a total of 10,000 taels of silver on these tasks. Up to 1824, the total cultivated land exceeded 24,000 mou, and 360 households had been recruited. The Mintun at Barchuke was similar to that at Kelaheyi: both had the practice of collecting tax after three years with the quota set at 0.03 shi of wheat for each mou of land. The colonists' land at Barchuke used the water from Daheguihunshui (大河拐渾水), which wound for about 800 li. Such a long channel was rather rare in the colonised lands of north-west China. The success of hydraulic works helped to expand the area of cultivated land. In 1836, Barchuke already had more than 100,000 mou of land. However, the corresponding number of cultivators was not recruited. Thus, the Qing Government agreed to let the Yili general enable the dismissed officials at Yili and Urumqi to contribute by recruiting

⁵⁶ Wang, *Qingdai xibei tuntian yanjiu*, 51, 57.

⁵⁷ Wang, *Qingdai xibei tuntian yanjiu*, 51.

⁵⁸ Wang, *Qingdai xibei tuntian yanjiu*, 183–4.

people to cultivate the land. The official would be rewarded if 100 households were recruited. But in more than 10 years, only one official was able to obtain this reward.⁵⁹



Map 11: The distribution of Tuntian at Wushi, Aksu, Kashgar, and Yarkent.

2. The Tuntian System viewed from the Perspective of Property Rights

When economists discuss the issue of property rights, they mostly contend that resources can be utilised more efficiently when a property right is defined clearly. For instance, Harold Demsetz emphasises that it is possible to utilise resources more efficiently when public land is converted to private land. Barry Field points out that when public landowners reach an agreement and transaction costs increase faster than exclusion costs, privatising that resource is more efficient; in the opposite circumstances, the public land system will be more efficient.⁶⁰

59 Wang, *Qingdai xibei tuntian yanjiu*, 184–6.

60 See Harold Demsetz, 'Toward a theory of Property Rights', *American Economic Review* 52, no. 2 (1967): 347–59; Barry C. Field, 'The Evolution of Property Rights', *Kyklos* 42, no. 3 (1989): 319–45.

From the viewpoint of property rights, it is possible to see that no matter whether it was Bingtun, Qitun, Qiantun, Mintun, or Huitun, the public land system prevailed in the beginning, but during the process of development, there was a tendency to convert to private land.

In Xinjiang, each soldier of the Green Standard Army in Bingtun was given a share of 20 mou of land (though some had 21 mou, 22 mou, or 22.5 mou). In addition to the land, farm animals, agricultural implements, and seed were all provided officially according to a certain quota. The variety of seeds included wheat, barley, highland barley, millet, broom-corn millet, rice, and sesame. Each colonist soldier was given 1.1 shi of seeds of various kinds.⁶¹ In other words, the colonist soldiers only had the right to use production factors, not property rights.

The rent system of Bingtun was one that came with a certain quota of labour service. Each soldier had to pay a certain amount of the harvest from his share of the land to the official granary, but his livelihood and that of his family were supported by the officially provided salary. Under this system, there was no direct relation between the rent and the salary. To keep soldiers working hard in cultivation, besides military control, there was a practice of reward and punishment; however, since the tax payment quota was relatively high, the chance of being rewarded was relatively low.⁶²

At Yili, the Qitun system started to transform soon after its establishment in 1802. First, the public land of the Eight Banners was transformed to land managed by each Banner. In 1812, the Yili General Jin Chang investigated the Qitun situation and found that there were 24,000 mou of land already equally divided among the Eight Banners, and there was 40,000 mou of undivided land that was cultivated by additional soldiers of the Eight Banners. He discovered that, for many years, the undivided land could not provide the same level of surplus as the divided land. One reason was that the undivided land was located higher than the divided land and thus did not have adequate irrigation. The other reason was that the divided land was considered private, and this affected the harvest. With the planning of Jin Chang, more than 20,000 mou of irrigated land was obtained and divided into eight portions to add to the share of divided land cultivated by the Eight Banners. Moreover, the land tenant system appeared. Originally, it was forbidden to rent or sell Qitun land. In 1814, Song Yun even tried to stop the private practice of land renting. However, in 1830, the Yili General Yu Lin memorialised to let the two Manchu garrisons rent out the land. From then on, large areas of Qitun land was rented out to civilians.⁶³

61 Wang, *Qingdai xibei tuntian yanjiu*, 65–72.

62 Wang, *Qingdai xibei tuntian yanjiu*, 72–6.

63 Wang, *Qingdai xibei tuntian yanjiu*, 93–5.

The Qitun system at Yili was re-established in 1903, but basically adopted the Bingtun practice of the Green Standard Army. In 1904, General Guang Fu memorialised to have the Qitun land privatised by dividing it equally among the soldiers according to the size of their households; they no longer received money for repairing agricultural implements, and had to provide their own seed and farm animals, and pay a certain quota of the annual harvest. In 1911, Guang Fu memorialised again to have the land for the training army divided and given to the new Manchu Banners for cultivation, but this proposal was not put into practice as the Qing Dynasty collapsed soon afterwards.⁶⁴ Overall, Qiantun was carried out basically following Bingtun practice. In the late Qing period, Qiantun was converted to Mintun, as discussed above.

As for Mintun, in the beginning the land, agricultural implements, and seed were all officially provided and the farm animals were rented. Each household was given a quota of 30 mou of land, but in general, colonists could increase their landholdings by their own means. Tax began to be paid after the land had been cultivated for six years. In the late Qing, the conditions applying to officially provided land began to change: each two-person household was given 60 mou of high-grade land, 6 taels of silver for agricultural implements, 8 taels for repairing the house, 24 taels for two head of cattle, three shi of seed, 90 catties of noodles, and 1.8 tael for salt and vegetables. From the tilling in spring to the harvest in autumn, eight months was allowed for, and the price of seed was calculated at the current market price; thus the above items would need more than 73 taels of silver, which could be borrowed from the government—half to be repaid at the beginning of the year and the remainder the following year. Compared with the old practice, the burden of the colonist's household became heavier. But the period of tax payment was reduced from six to three years.⁶⁵ The payment of tax meant that the colonists became self-employed farmers, but in northern Xinjiang, the movement of colonist households was still strictly controlled, meaning they were not able to freely leave their place of residence.⁶⁶

At Yili, Huitun adopted a rent quota practice proposed by the managerial official A Gui 阿桂 (1717–97) in 1761: except for 1.5 shi of seed to be reserved by each person, the payment of tax was set at 16 shi, including 8 shi of wheat and highland barley and 8 shi of millet and broom-corn millet. If there was a poor harvest of wheat, highland barley, millet, or broom-corn millet, other kinds of grain could be paid as tax instead. In a good harvest year, a colonist household that planted 1.5 shi of seed could harvest 40 shi; the quota of tax was 16 shi, but after counting losses in measurement and to predation by hamsters, the

64 Wang, *Qingdai xibei tuntian yanjiu*, 98–9.

65 Wang, *Qingdai xibei tuntian yanjiu*, 179–80, 192.

66 Wang, *Qingdai xibei tuntian yanjiu*, 181–2.

actual tax payment was 17.2 shi, which was 43 per cent of the harvest. When the harvest was poor, the rate of tax was even higher. Compared with the ratio of 4:6 at Caibashi (Hami), the rent of Huitun at Yili was somewhat higher.⁶⁷

In short, the colonization of land in Xinjiang during the Qing Dynasty was started with resources provided by the government; however, there was a tendency of converting public land to private land, and after Mintun had paid the tax, the land formally became privately owned.

3. The landscape shaped by the Tuntian

Before going on to discuss the landscape shaped by the Tuntian system, it is notable that James A. Millward has provided ample evidence of Xinjiang's environmental history based on studies of land, climate, mountains, and water, as well as colonial efforts.⁶⁸

As discussed in Section 1, the land area of Bingtun was usually quite large, except at Aksu where the acreage of paddy fields was very small. In 1768–71, Ji Yun observed at Urumqi that the fields were cultivated alternately to allow soil fertility to recover, and farmers did not fertilise the land. He also noted the practice of crude sowing by hand without regular distribution in each furrow.⁶⁹ About 1780, when the pasture of Ulet at Yili was opened up for cultivation, the land was left to lie fallow for two to three years after having been planted for one year. Later, the Yili General Yi-le-tu 伊勒圖 suggested that the fallow cycle should be extended to seven years. In 1804, the Commander Na-er-song 納爾松 suggested that the cycle should be cut to five years.⁷⁰ In 1917, Xie Bin observed at Tegustaliu that the fallow cycle was six years for the land of new Manchu garrisons.⁷¹ From the viewpoint of the evolution of land utilisation, at places where the population was relatively low compared to the area of available land, the land fallow system tended to prevail.⁷² In Xinjiang, the short fallow system

67 Wang, *Qingdai xibei tuntian yanjiu*, 216.

68 James A. Millward, 'Towards a Xinjiang Environmental History: Evidence from Space, the Ground, and in Between', in *Studies on Xinjiang Historical Sources in the 17–20th Centuries*, ed. James A. Millward, Shinmen Yasushi, and Sugawara Jun (Tokyo: The Toyo Bunko, 2010), 279–303.

69 Ji, *Urumqi tsashi*, 171.

70 Zhao Zhen, *Qingdai xibei shengtai bianqian yanjiu*, 182–83.

71 Xie, *Xinjiang youji*, 90.

72 Ester Boserup, 'Environment, Population, and Technology in Primitive Societies', in *The Ends of the Earth: Perspectives on Modern Environmental History*, ed. Donald Worster (Cambridge: Cambridge University Press, 1988), 27–8.

was adopted after the 1850s and this revealed that the population conditions were not yet ready for adopting the refined land cultivation system adopted for paddy fields in eastern China.⁷³

In the early stage of the cultivation of colonised land, the harvest was abundant. For instance, Ji Yun wrote a poem about the landscape around Urumqi saying that in autumn, there were continuous furrows of spring wheat and the green scene extended to Jingho for a thousand miles.⁷⁴ Moreover, in 1770, the Shaan-Gan Governor-General Ming Shan 明山 (in office 1769–71), who was entrusted with investigating the colonists' land around Jimusa after being absent from Xinjiang for 13 years, memorialised:

When I proceed along the route, I observe that not only the wilderness of bush has been turned into abundant products, [but also] the population in the city is rather dense and merchants gather to do business, [and] the scene of neighborhood is all new and it cannot be compared with the old days.⁷⁵

In order to obtain harvests from the colonised land, the most important factor was to have irrigation water in addition to the input of labour. According to Huang Shengzhang, in the Qing Dynasty, the irrigation works in Xinjiang were first centred at Yili and extended from a northern to a southern route; in the later stage, it was centred at Hami and developed from east to west. In Xinjiang, there were five irrigation methods: (1) building a large channel, (2) diverting river flow, (3) using a water trough (槽引水法), (4) digging wells, and (5) using snow water and other water resources. Of these methods, that of conducting water in a water trough was quite special to Xinjiang. This method was first developed in the Chang-an (長安, today's Xi'an) area in Shaanxi and then transferred to many other places. In the beginning, it was used to conduct water for city supply and, later, for farming. This method appeared in Xinjiang in the early Qing period, and extended more than 100 li between Jianshanzi 尖山子 and Kuisu 奎蘇, with water conducted from the southern mountain in nine main channels. Moreover, this method was also used around Yili. For instance, in the colonised lands north-west of Huiyuan city and south-west and north-west of Yikeshu (一顆樹), the water trough was constructed to conduct the spring water from the north of Talechi (塔勒奇) city for irrigation. The natural conditions in Xinjiang made this method suitable for adoption in many places. It was very useful for preventing leakage, saving water, and irrigating more land.

73 Li Bozhong 李伯重, 'Tian, di, ren de bianhua yu Ming Qing Jiangnan shuidao shengchan 天、地、人的變化與明清江南水稻生產' [Changes in Heaven, Earth, and Man and Rice Production in Jiangnan], *Zhongguo Jingjishi Yanjiu* 中國經濟史研究 [Studies on Chinese Economic History] 4 (1999): 103–21.

74 Ji, *Urumqi tsashi*, 165.

75 China's First Archives 中國第一檔案館, 'Qianlong nianjian ximin tunken Xinjiang shiliao 乾隆年間徙民屯墾新疆史料' [Historical source materials on moving the people to cultivate land in Xinjiang], *Lishi Dangan* 歷史檔案 [Historical Archives] 3 (2002): 20.

But the usage of this method rose and fell. In 1886, the Dihua Sub-Prefect Pan Xiaosu 潘效蘇 (b. 1838) changed to the use of wooden troughs (mujiang 木枧) for conducting the water step by step in order to make it flow smoothly. This experiment was not only successful but was also considered at that time the most effective method of conveying water.

In addition, Xinjiang had abundant sources of snow water, which provided conditions conducive to irrigation. Large-scale utilisation of snow water began only after the 1750s and the establishment of the colonised lands at Yili and other places. During the period 1796–1820, the water source for the colonised land was only once seriously affected due to the shortage of snow water. The snow water was utilised at Yili in addition to the water conducted from the Yili River. At Hami, the snow water was also used for irrigating the colonised land.

The hydraulic works in Xinjiang during the Qing period were larger in scale and the technology more complicated than in earlier periods. Similar to the practice in the Han Dynasty (206 BC – AD 200), the introduction of a large-scale irrigation system into Xinjiang was managed by experienced officials from the interior. For instance, during the first half of the nineteenth century, the big channels built at Yili were all managed by the Yili General using methods developed in the interior. At Yili, in 1802–16 when Song Yun built hydraulic works such as Tonghuiqū (通惠渠), irrigation driven by waterwheel was introduced into Xinjiang.

The use of groundwater with karez (Kanrjing 坎兒井) introduced from Central Asia was a speciality of Xinjiang. The Chinese term ‘Kanrjing’ is a translation of ‘karez’, meaning an underground waterway. The karez in Xinjiang was mainly constructed in the Turfan area, where the earliest record of its use is in 1820 at Yarhu (雅爾湖, i.e. Yarkhoto 雅爾和屯), 20 li to the west of Turfan, for the irrigation of 252 mou of land. Up to the 1821–50 period, the karez was used only at Turfan. In 1844–45, when Lin Zexu assisted Quan Qing in building hydraulic works in Xinjiang, they finally decided to conduct the water from Yilalike (伊拉里克) River in a main channel with branches above ground instead of using a karez. After Lin Zexu was recalled to Beijing in winter 1845, Sa Yinga 薩迎阿 (d. 1857) became the Yili General, and he completed Lin Zexu’s plan of building more than 60 karez. This was the first large-scale project of karez construction outside Turfan, though it was still within the Turfan Basin.

The second large-scale development of karez was in 1880 after Zuo Zongtang 左宗棠 (1812–85) suppressed the rebellion of Muhammad Yaqub Bek (Agubo 阿古柏, 1820–77). According to a memorial submitted by Zuo in 1880, 185 karez

had been constructed at Turfan.⁷⁶ As for the karez in places outside Turfan, they were mostly constructed in the early twentieth century with techniques transferred from Turfan.

The oases in Xinjiang are mostly located on plains at the foot of mountains or in rings around the desert. When rivers flow to plains at the foot of the mountains, they disappear underground. For solving this problem and saving water resources, three methods were applied in Xinjiang: (1) paving fells at the bottom of the channel (lining it with woollen blankets), put into practice at Hami, Turfan and Urumqi; (2) using grass or sandstone at the bottom of channels; (3) constructing a torrent dam (laoba 澇壩), first found in the Qianlong period and widely adopted in Xinjiang. The torrent dam was used to store water, to conduct storm water, or to extract water from channels and rivers for use in times of water shortage. The Uyghur called this kind of dam 'Bositang' (伯斯塘). The laoba in Xinjiang was developed first for the storage of water as an element in the irrigation system, but only later did it become an important component of the irrigation system.⁷⁷

In addition to the landscape created by irrigation and farming activity, there were also other landscapes shaped by humans. In Bingtun districts, walled villages were usually built to accommodate soldiers, surrounded by land for them to till.⁷⁸ During the period 1762–71, the walled villages built around Dihua included Huilaibao (惠徠堡, i.e. Liudaowan 六道灣), Lufengbao (屢豐堡, i.e. Qidaowan 七道灣), Xüanrenbao (宣仁堡, i.e. Tougong 頭工), Huaiyibao (懷義堡, i.e. Ergong 二工), Lequanbao (樂全堡, i.e. Sangong 三工), Baochangbao (寶昌堡, i.e. Sigong 四工), Yuchangbao (育昌堡, old name Shuangchahe 雙岔河), Shihebao (時和堡, old name Liushugou 柳樹溝). The length of the village walls was usually 1.7 li (0.85 km; 1.55 li or 0.775 km for the latter two villages), and their height about 1.1 or 1.2 zhang (3.3 or 3.6 metres), and each village had three gates and 300 rooms for soldiers. Moreover, the walled villages of Suilaibao (綏來堡, i.e. Manas 瑪納斯), Suichengbao (遂成堡, i.e. Kerkelawusu

76 See Kim Hodong, 'Eastern Turki Royal Decrees of the 17th Century in the Jarring Collection', in *Studies on Xinjiang Historical Sources in 18–20th Centuries*, ed. Millward, Yasushi, and Jun, 73, for a discussion of ownership of karez in the Mongol period. Also see Éric Trombert, 'The Karez Concept in Ancient Chinese Sources: Myth or Reality?' *T'oung Pao* 94, no. 1–2 (2008): 115–50, for an examination of the historical process of the development of the karez technique in China.

77 Zuo Zongtang 左宗棠, 'Banli Xinjiang shanhou shiyi ze 辦理新疆善後事宜摺' [A memorial regarding measures taken in Xinjiang after pacifying the rebellion], in *Zuo Wenxiangong quanji 左文襄公全集* [Complete collection of the works of Zou Zongtang] (Taipei: Wenhai Publishing Co., 1964), 2254. For a study of developing karez by Zuo Zongtang, see Peter Lavelle, 'Cultivating Empire: Zuo Zongtang's Agriculture, Environment, and Reconstruction in the Late Qing', in *China on the Margins*, ed. Sherman Cochran and Paul G. Pickowicz (Ithaca, NY: Cornell University Press, 2010), 43–64, especially 53.

78 For details of the above discussion on irrigation methods, see Huang Shengzhang 黃盛璋, 'Xinjiang shuili jishu de chuanbo he fazhan 新疆水利技術的傳播和發展' [The Transmission and Development of Hydraulic Technology in Xinjiang], *Nongye Kaogu 農業考古* [Agricultural Archaeology] 1 (1984): 78–86; 2 (1984): 172–83.

庫爾喀喇烏蘇), and Fengrunbao (豐潤堡, i.e. Jinghe 精河) were all built by soldiers themselves without official management; therefore, their length and height were not recorded. Inside the walled villages, in addition to houses for soldiers and their families, there were also storehouses for agricultural implements and weapons, granaries, offices, and residences for the managing officials. Most of these walled villages developed later into large villages or towns—some of them have even retained their old names to the present day.⁷⁹

For providing cattle and horses for use by the colonists, from 1760 on the Qing Government established pastures at Yili, Urumqi, Balikun, and Tarbahatai. To provide agricultural implements, an iron foundry was set up in 1764 at Reshuiquan (熱水泉), to the north of Dihua city.⁸⁰ These are also components of the landscape shaped by humans.

Stations such as Juntai (軍臺, military patrol station), Duntang (墩塘, beacon-mound, also known as Yingtang 營塘), Izhan (驛站, post-stage), and Kalun (卡倫, the Manchu word meaning a post) were set up along the roads for delivering official documents and materials, accommodating travelling officials, and investigating deserters. Juntai and Duntang, however, were not set up at all places. From Yili to Tarbahatai and Jinghe, there were Juntai but no Duntang. From Jinghe to Urumqi, there were both Juntai and Duntang. From Urumqi to Balikun and then to Hami, there was no Juntai but there were Duntang. From Turfan to Hami, from Keshiger to Turfan, and from Hami to Jiayuguan, there were Juntai but no Duntang.⁸¹ As for Izhan, they were set up only between Balikun and Dihua for delivering documents after the administrative divisions were changed to zhou (州) and xian (縣), because it was no longer possible to deliver documents through military patrol stations.⁸²

Among these facilities, the one most directly related to the colonised land was Kalun, which specialised in investigating deserters. There were seven Kalun at Tarqi (塔爾奇), located to the north of Yili city and the ford of the Yili River; there were also seven at Yarkent city from the south-west to the north-east; five at Kuche city from the north-west to the south; two at Kelashar city from the north-east; six at Turfan city from the south-west to the east; and four in the north-east of Hami city.⁸³ These stations and posts also formed a part of the landscape shaped by humans.

79 Wang, *Qingdai xibei tuntian yanjiu*, 56.

80 Anonymous, *Urumqi zhenglue*, 68–70; Wang, *Qingdai xibei tuntian yanjiu*, 59–60.

81 For details, see Wang, *Qingdai xibei tuntian yanjiu*, 231–52.

82 Qi Yunshi 祁韻士, *Xichui yaolie* 西陲要略 [A Brief History of the Western Frontier], in *Zhongguo shaoshu minzu guji jicheng*, ed. Xu 徐麗華, 76: 514.

83 Anonymous, *Urumqi zhenglue*, 46.

4. Observations of Lin Zexu and Xie Bin

This section will compare the observations of Lin Zexu in 1842 and Xie Bin in 1917 in order to understand changes in Xinjiang's landscapes from the mid-nineteenth to the early twentieth century.

After the defeat of the Qing Army in the Opium War, the Daoguang Emperor had Lin Zexu, the official in charge of dealing with opium, dismissed and sent to Yili on 28 June 1841. At that time, he was on a mission to close breaches of the Yellow River. Nevertheless, the Emperor ordered Lin to go to Xinjiang on 18 March 1842, and he went once the river work was completed.⁸⁴ Lin left Xi'an on 11 August 1842 and arrived at Yili on 10 December. His diary of this trip was collected in *Hege jicheng* (荷戈紀程). In addition, Lin went to southern Xinjiang in 1844 to investigate the situation of land cultivation; part of his diary for this period was collected in *Nanjiang kanken riji* (南疆勘墾日記).⁸⁵

Three quarters of a century later, Xie Bin was entrusted by the Ministry of Finance of the Peking Government (1912–28) to go to Xinjiang and Artai (阿爾泰) to investigate financial conditions. He left Peking on 6 December 1916 and arrived at Shuzhou on 5 February 1917. Then he departed from Shuzhou and arrived at Yili on 10 May. His observations en route were collected in *Xinjiang youji* (新疆游記).⁸⁶

The journeys of Lin and Xie were divided into three sections: (1) from Shuzhou to Hami, (2) from Hami to Dihua, and (3) from Dihua to Yili. The routes followed by them from Hami to Dihua differed. There are three routes available from Hami to Urumqi: north, south, and middle (the small south route). Lin took the small south route.⁸⁷ But Xie encountered strong winds during his journey and could not get off his chariot when passing by Dashitou (大石頭) along the middle route; therefore, he changed routes, going from Shanshan (鄯善) to Turfan and from there to Dihua.⁸⁸ (See Map 12.) Moreover, in Lin's *Nanjiang kanken riji*, a section of the route from Dihua to Turfan was the same but was taken in the opposite direction. Below, the observations of Lin and Xie are compared at some selected points.⁸⁹ The purpose of the account is to illustrate changing perceptions of the same places by placing the two records side by side.

84 Qi Yunshi, *Xichui yaolüe*, 513–14.

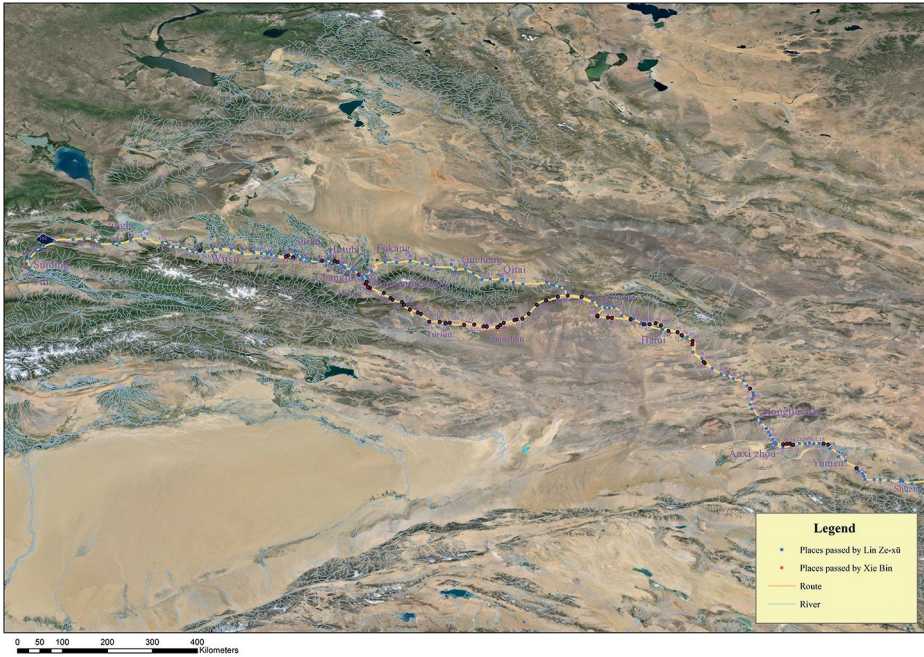
85 *Qingshigao* 清史稿 [The Draft of Qing History], chüan 19: 683, 686; chüan 369: 11493.

86 Lin Zexu, *Nanjiang kanken riji* 南疆勘墾日記 [Diary of an Investigation into Land Cultivation in Southern Xinjiang], in *Gan Xin youtsong huibian* 甘新遊蹤彙編 [Collection of Travels in Gansu and Xinjiang], ed. Library of Central Ethnic College 中央民族學院圖書館 (1983).

87 Xie, *Xinjiang youji*, 1–14.

88 Lin Zexu, *Hege jicheng*, 556.

89 Xie, *Xinjiang youji*, 26.



Map 12: The westward routes taken by Lin Zexu (1842) and Xie Bin (1917).

4.1 The disappearance of red willow (Hongliu 紅柳, *Tamarix ramosissima*)

There was a place named Hongliuyuan (紅柳園) 160 li to the north-west of Anxi zhou (安西州) of which Lin Zexu said: 'I am not sure how the local name was given. There is no[t] the so-called red willow, nor a single tree.' Xie Bin also noted: 'There is actually no willow tree.'

Forty-five li before arriving at Xingxingxia (星星峽), there was also a place named Hongliuhe (紅柳河). Lin said: 'This is no willow tree, too.' Fifty li after passing Xingxingxia, there was a place named Small Hongliuyuan, but Lin still did not see any red willow tree. He asked the natives and they replied: 'The trees were all cut down for firewood, thus the scene was so rough and clear.' But Xie saw a forest of red willows at Yangjiazhuang (楊家庄), located about 20 li to the east of Anxi zhou. Lin noticed that the three places with the name 'red willow' were all located to the west of Anxi zhou; it is difficult to conclude that the disappearance of red willow from this area was related to the development of colonised land, but it seemed possible.

4.2 Changes in the landscapes shaped by humans along the route

Both Lin and Xie recorded much about the residents living in the walled villages along the road. Comparing the two accounts reveals changes possibly related to destruction caused by the Muslim rebellion of 1862–73: at Shajingzi (沙井子), 50 li to the north-west of Hongliuyuan, Lin observed that there were dozens of households, but Xie saw only three abandoned shops and no residents.

At Toubao (頭堡), 40 li toward Hami, Lin observed: ‘There was a walled city with more than 100 Uyghur households living inside the city and more than 20 Han households outside.’ However, Xie recorded: ‘The walled village was very small, there was only one post-stage and one temple. There were also three chariot shops, five Han households, 12 Uyghur households, and 18–19 households of Turbaned Moslems’ (纏民).

At Sanbao (三堡), 60 li from Hami, Lin said there was a place named Longshengtian (隆盛店) where the population of the Han and Hui peoples was about the same as at Toubao. However, Xie found its wall was already ruined and there were 15 Han households, 12 Uyghur households and 22 Turbaned Muslim households.

At Hutubi (呼圖壁), more than 90 li from Changji xian (昌吉縣), Lin noted only that there was a walled city, but by Xie’s time the wall was ruined and it was desolate inside the city; business took place only in the southern suburb. Before the Muslim rebellion, there had been more than 2,000 households under the jurisdiction of this city, but now there were little more than 600.

At Sandaohe (三道河), 120 li from Suilai xian (綏來縣), Lin said that there were about 1,000 households, but Xie recorded only about 20.

At Anjihai (安濟(集)海), 145 li from Suilai xian, Lin said there were 5,000 households; Xie said there were 40–50 residents’ shops. At Kuidun (奎墩, i.e. Kuitun-I 奎屯驛), 90 li from Anjihai, Lin said there were more than 100 households, but Xie said there was only one chariot shop and three small shops.

At Ganhezi (乾河子), 30 li to the south-west of Wusu xian (烏蘇縣), Lin saw small shops at the side of the road; Xie saw only one broken shop.

On entering Sitai (四臺) at the border of Yili, Lin said the houses were very small and there were only a few of them and two rather humble inns; Xie said there was one dirty, rustic inn that provided a mere footing.

Lin found 600 Han soldiers stationed at Dalucaogou (大蘆草溝, i.e. Guangren city 廣仁城), about 90 li from Yili, and the inn inside the city was cleaner than the one along the road, but Xie said the city wall was mostly ruined and there were about 200 shops and residential houses in a suburb.

Between Dihua and Turfan, Lin and Xie travelled in opposite directions, but their observations can still be compared. At Daban city (達坂城), about 185 li to the south-east of Dihua, Lin saw more than 100 households; Xie recorded about 60 households and shops, and around the neighbourhood there were more than 500 farming households, of which three quarters were Uyghur. At Sankequan (三個(角)泉), 100 li to the south of Daban, Lin said there were about 10 households; Xie saw no residents, and only two shops and one temple. At a place about 30 li before he reached Turfan, Lin saw karez and noted:

The cave well is called kajing (卡井) which can conduct the water to flow horizontally; from south to north, the water is conducted higher and higher, the water flows through the cave under the earth, it is indeed something inconceivable. At this place cotton is produced in a great amount which is the benefit of water brought forth by kajing.⁹⁰

Xie did not mention karez here, though he did at Qiketengmu (七克騰木), located 90 li to the north-east of Shanshan (鄯善), at Sanshilidun (三十里墩), 60 li from Qiketengmu, and from Ergong (二工, 53 li to the west of Shanshan) to Subashi (蘇巴什, 42 li to the west of Ergong).

4.3 Descriptions of natural resources and landscapes

Both Lin and Xie mentioned the problem of drinking water. At Shaquan (沙泉, i.e. Shajingzi 沙井子), 90 li to the north-west of Xingxingxia, Lin found the water was salty. He bought 'a container of bottle-gourd to store water to come here'. Xie said the spring water at Shaquan was quite flourishing. Upon arriving at Kushui-I (苦水驛), 80 li to the north-west of Shaquan, Xie said the spring there had a depth of eight chi (尺, 2.4 metres), but the water was very bitter, so drinking water was brought from Shaquan. Further on at Geziyandun (格子煙墩), 140 li from Kushui-I, Lin said that the water was drinkable. Upon arriving at Changliushui (長流水), 70 li from Geziyandun, Xie noted that there was a spring on the north-west slope, and the water was abundant and clear, tasting very sweet and cool.

Both Lin and Xie paid much attention to trees along the road. At Huanglugang (黃蘆崗), 70 li to the south-east of Hami, Xie noticed that there were dozens of aspens (Baiyang 白楊, *Salicaceae*). Upon arriving at Xinzhuangzi (新庄子), 30 li to the east of Hami, Xie described forests of willows (Yang 楊, *Populus*) and elms (Yu 榆, *Ulmus pumila*). At Hami, Lin saw much farm land with dense forests. At Santaixün (三臺汛), 70 li to the west of Jimusa (濟木薩), Lin saw numerous elm and willow trees. At Erbao (二堡) 60 li from Hami, Xie noticed that the trees in the village were shady; at Liushuquan (柳樹泉), 50 li from Erbao, Xie also

90 For detailed records of Lin and Xie, see Appendix in the Chinese version of this paper.

noticed that trees lined the village roads. Between Chezhaluquan (車轎轡泉), 275 li from Liushuquan, and Qijiaojing (七角井), 58 li from Chezhaluquan, Xie saw many poon trees (Hutong 胡桐, *Calophyllum*) with a height less than one zhang (c. 3 metres), having been cut down for several years, with only dry wood left on the ground. From Shanshan (i.e. Pizhan 辟展) to Ergong (二工), a distance of 53 li, Xie saw trees along both sides of the village road. From Turfan to Yarya (雅爾崖), 20 li from Turfan, Xie noted that along the road there were officially planted willows, and in the villages, springs and trees could be seen continuously. At Baojiadian (鮑家店), 15 li to the east of Suilai xian (綏來縣), Lin noticed that trees were quite numerous. From Wusu xian (烏蘇縣) to Ganhezi (乾河子), 30 li to the south-west of Wusu xian, Lin said there were no residents along the road, but there were numerous trees; Xie said that there were abundant red willow trees about. Between Heyanzi (河沿子, 130 li from Ganhezi), and Guertu (固爾圖, 30 li from Ganhezi), Lin said there was a section of level road with numerous trees. En route from Shaquan-I (沙泉驛) to Jinghe (精河), a distance of 60 li, Xie saw no tree along the road, and even small bushes such as camel thorn, red willow, or white vine were rarely seen. From Songshutou (松樹頭 190 li to the east of Yili) to Ertai (二臺 20 li to the west of Songshutou), Lin noted that there were thousands of pine trees (Song 松, *Pinaceae*) on the mountain slopes. Two shops at Ertai were built entirely with blocks of pine, which indicated that they were rather cheap. Xie said the Yili Wood Company had an examining station and a team to guard the roads, which revealed that this was a place for logging.

It should be noted that Wen Huanran has pointed out that there were great changes in the forest history of Xinjiang as a result of several natural and human factors. In general, these factors interacted and restrained each other, except that in the Qing Dynasty when the effect of wars was greater, human economic activity was usually the leading factor.⁹¹ The collection of firewood, building of houses with pine blocks, and tree felling mentioned by Lin and Xie show that human economic activities had an effect on the forest in Xinjiang.

Besides the above observations, Lin and Xie also made statements relating to the natural landscapes of deserts, rivers, rapids, lakes, salt lakes, and mountain gorges. Xie's descriptions are especially detailed, which need not be repeated here.

91 Lin Zexu, *Nanjiang kanken rijii*, 6–36.

Concluding Remark

This paper has used GIS maps to illustrate the spatial and temporal distribution of the Tuntian system in Xinjiang. The viewpoint of property rights confirms a tendency for this system to change from public to private land. Moreover, this paper also discussed the landscape shaped by humans through the practice of the Tuntian system. Finally, a comparison of observations by Lin in 1842 and Xie in 1917 reveals that in the course of 75 years, some environmental changes in Xinjiang were related to the colonists' land cultivation and some to wars.

Appendix: Conversion of measurements

1 mou 畝 = 666.5 square metres

1 li 里 = 0.5 kilometre

1 shi 石 = 120 catties

1 chi 尺 = 0.303 metre

1 zhang 丈 = 3.03 metres

EPIZOOTICS AND THE COLONIAL LEGACIES OF THE UNITED STATES IN PHILIPPINE VETERINARY SCIENCE

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Abstract

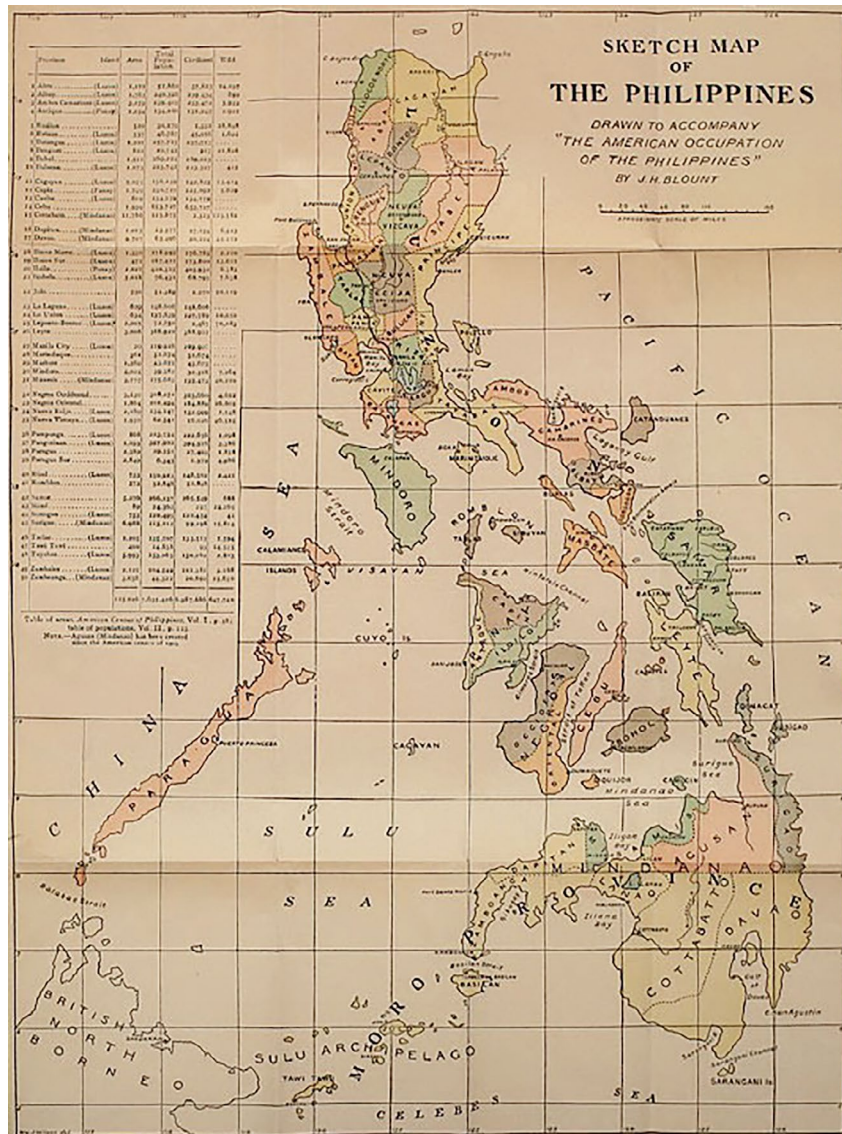
The Philippines is an agricultural country highly dependent on water buffalos/carabaos and beef cattle, which are bred and used as work animals and forms of transport. In 1898, American colonial officials, observing the poor health conditions of these animals, noted that many were stricken with infectious contagions. Their death due to communicable animal contagions or epizootics alarmed these officials. Because of this agricultural problem, officials made the control of animal diseases a major focus of colonial policy in the Philippines. Solutions to this problem included the creation of the Bureau of Agriculture and the Bureau of Animal Industry, the establishment of the University of the Philippines College of Veterinary Science, and the implementation of anti-rinderpest serum inoculation, animal quarantine, and anti-rinderpest vaccination. This article analyses the historical development of these government and academic institutions, and examines their important contributions to the development of Philippine environmental and veterinary history. As well, it investigates the significance of other colonial policies implemented by the Americans and how they affected the campaign against animal contagions. Using David Arnold's concept of tropicality, I will also examine how the Americans successfully conquered a particular aspect of the tropical environment—the animal disease problem in the Philippines.

Keywords: epizootics, rinderpest, Bureau of Agriculture, College of Veterinary Science, carabao, tropicality

Introduction

In 1968, American jurist Charles Burke Elliott wrote in *The Philippines to the End of the Commission Government* that 'a most serious problem has been the saving of the lives of the draft and other domestic animals from death by diseases'. While in that country, Justice Elliott, Supreme Court Justice in the Philippines from 1909 to 1912, witnessed the death of domestic carabaos,

beef cattle, and horses due to the spread of infectious animal contagions.¹ Elliott suggests that it was 'increasingly important to restock the islands with the draft animals with which the Filipinos are accustomed'.²



Map 1: Map of the Philippines.

Source: James H. Blount, *The American Occupation of the Philippines, 1898–1912* (New York and London: The Knickerbocker Press, 1912).

1 Charles Burke Elliott, *The Philippines to the End of the Commission Government: A Study in Tropical Democracy* (New York: Greenwood, 1968), 345–6.

2 Charles Burke Elliott, *The Philippines to the End of the Commission Government*, 345–6.

The problem of animal disease haunted the American colonial government following its annexation of the islands in 1898. The agricultural sector of the former Spanish colony was paralysed with the death of thousands of domestic carabaos and cattle throughout the islands due to rinderpest. Considered as an agricultural crisis, the death of domestic animals caused by rinderpest left much farmland and many rice fields untilled.

As the new colonial master of the Philippine archipelago from 1898 to 1946 (Map 1), the United States acted swiftly and urgently to address the crisis in order to save the thousands of domestic animals affected by infectious contagions. Just like their Spanish colonial predecessors, the American colonial government implemented various policies directed towards the protection of carabaos and cattle against epizootics through the application of modern veterinary medical practices. These actions uphold what Greg Bankoff considers to be Western colonisers' 'growing conviction as to the efficacy of their own ability to control the natural world'.³ According to David Arnold, Westerners regarded colonies like the Philippines as having 'a hostile and deleterious environment'.⁴ The sense of otherness of the West towards the tropical environment and its 'adverse representations of nature' in the colonies not only included the tropical climate and flora but also encompassed its animal life.⁵

This paper examines how the introduction and development of veterinary science in the Philippines during the American colonial period discloses 'the role of the colonial state as an instigator and active participant in the dissemination and application of scientific knowledge to the imperial venture'.⁶ Colonial belief in the power of 'modern science', particularly the scientific control of animal diseases through modern veterinary practices, offered a way of re-examining the tropical environment during the nineteenth and even in the early twentieth century as both physical and conceptual spaces.⁷ The development of Philippine veterinary science under the Americans proved how the new colonisers, just like their Spanish predecessors, could demonstrate their supremacy over nature and at the same time reduce the country's tropical environment to a new conceptual and physical territory 'over which they could gain mastery and exercise dominion'.⁸ The legacy of the changes and scientific developments in veterinary science introduced by the USA into the Philippines remain.

3 Greg Bankoff, 'A Question of Breeding: Zootechny and colonial attitudes toward the Tropical Environment in the Late Nineteenth-Century Philippines', *Journal of Asian Studies* 60, no. 2 (May 2001): 413.

4 Bankoff, 'A Question of Breeding', 414.

5 Bankoff, 'A Question of Breeding', 430.

6 Bankoff, 'A Question of Breeding', 424.

7 Bankoff, 'A Question of Breeding', 424.

8 Bankoff, 'A Question of Breeding', 424.

The *tropicality* discourse and the development of Philippine veterinary science during the American period

For David Arnold, the tropics are ‘a Western way of defining something culturally and politically alien, as well as environmentally distinctive, from Europe and other parts of the temperate zone’.⁹ He argues that Westerners attached a sense of ‘otherness’ to ‘warm countries and tropical places’ like the Philippines. These differences were not only evident in colonial descriptions of indigenous societies and cultures, but were also ‘reflected in accounts of plants, animals, climate and topography ... particularized through discussion of disease’.¹⁰ In the Philippines, American doctors and veterinary experts viewed the domestic bovine and equine animals, just like their human counterparts, as environmentally alien and so both human and animal contagions were viewed as tropical diseases that were considered distinct compared to those in the ‘milder and more temperate lands’.¹¹

Tropical diseases, whether human or animal, were ‘in many respects ... widely different from the diseases of temperate climates’.¹² Arnold notes that because of this condition, ‘special knowledge was needed for their diagnosis and successful treatment’.¹³ He believes that tropical diseases led to ‘scientific developments, especially the creation of medical specialization in the diseases of “warm climates”’.¹⁴ In this regard, I seek to explain how the study of animal contagions in the Philippines led to the development of a specialised medical field in the colony—Philippine veterinary science.

In the process of developing scientific solutions to control the spread of animal contagions in the colony, the Philippines was converted into a tropical laboratory intended ‘for experiments in disease eradication’.¹⁵ This new trend of disease eradication focused on investigation of the symptoms of a disease and the performance of laboratory experiments in order to control and eventually eradicate the contagion. The Americans converted the Philippines into what might be described as a tropical laboratory to control and eradicate the spread of various infectious animal contagions that struck the country in the nineteenth

9 David Arnold, ‘Tropical Medicine before Manson’, in *Warm Climate and Western Medicine: The Emergence of Tropical Medicine, 1500–1930*, ed. David Arnold (Amsterdam: Rodopi, 1996), 6.

10 Arnold, ‘Tropical Medicine before Manson’, 6.

11 Arnold, ‘Tropical Medicine before Manson’, 10.

12 Arnold, ‘Tropical Medicine before Manson’, 3.

13 Arnold, ‘Tropical Medicine before Manson’, 3.

14 Bankoff, ‘A Question of Breeding’, 424.

15 David N. Livingstone, ‘Tropical Climate and Moral Hygiene: The Anatomy of a Victorian Debate’, *British Journal for the History of Science* 32, no. 1 (March 1999): 107.

and twentieth centuries. As a tropical laboratory for the control and cure of contagions, the Philippines became an important site for American surgeons, doctors, and veterinary experts to conduct medical research and numerous experiments so that they could determine and understand the etiology of the different animal contagions that infected both the Filipinos and their domestic animals. They also used both the Filipinos and their work animals as laboratory subjects to test various vaccines and sera against the contagions and eventually develop an effective form of cure and treatment against the diseases.¹⁶

Carabaos and beef cattle in the Philippines

The Philippine archipelago has fertile lands, rich mineral deposits, and lush vegetation that supports diverse animal life. Part of the diverse animal life in this tropical island country are the domestic carabaos and cattle that serve as draft animals, and which are the backbone of the Philippine agricultural economy because of their important role in rice farming.¹⁷ In the past and until the present time, Filipino farmers utilised them as beasts of burden in lowland rice-farming provinces, including Pangasinan, Pampanga, Bulacan, Nueva Ecija, Albay, Morong (now Rizal Province), Laguna, Masbate, Mindoro, and Zambales in Luzon; Cebu, Iloilo, and Negros in the Visayas region; and Misamis and Cotabato in Mindanao.

The carabao (*Bubalus Bubalis Carabanesis*) or water buffalo ('kalabaw' in the Tagalog language) has been described as 'an ungainly quadruped domestic animal, with well-formed, evenly set, and symmetrical spreading horns, black or brown with very scarce body hair ... a large, arched and rough set of horns and a comparatively small head'.¹⁸ In Hugo Miller's *Principle of Economics Applied to the Philippines*, he asserts that the carabao is the most important animal for farmers because 'it performs nearly ninety percent of agricultural and transportation work'. Carabaos are utilised 'in preparing the land for planting, in cultivating and in transporting crops to the market'.¹⁹ No wonder the farmer considered them to be so precious that they were housed 'in a comfortable area under his nipa hut and cared for like it was a member of the family'.²⁰

16 See Felino S. Garcia Jr, 'The Pathogenic Body in Colonial Science, 1901–1913', *Philippine Social Science Review* 65, no. 1 (2013): 46–9.

17 Gregorio San Agustin, 'Moral Responsibilities of a Veterinarian', in *Philippinensian*, by Students of the University of the Philippines (Manila: University of the Philippines, 1916), 179.

18 United States Bureau of Census, *Census of the Philippine Islands Taken Under the Direction of the Philippine Commission in the Year 1903* (Washington, DC: Government Printing Office, 1905), 4: 30.

19 Hugo H. Miller, *Principles of Economics Applied to the Philippines* (Boston, MA: Ginn and Company, 1932), 428.

20 Victor Buencamino, *Memoirs of Victor Buencamino* (Mandaluyong: Jorge B. Vargas Filipiniana Foundation, 1977), 107.

Compared with other draft animals, the carabao, notes D. F. Doeppers, is 'the animal best suited for work in muddy swampy environments and which thrives on poor quality browse'.²¹ The horse, on the other hand, was not utilised as a farm animal in the same way as the carabao because its 'physique and kinetics rendered it unsuitable for employment in the mud of rice paddies'.²²

The importance of the carabao is reflected in its value. According to the 1903 Census, the value of 640,871 head of carabaos in the Philippines was PhP 49,319,755, or PhP 76.96 per head.²³ Fifteen years later in 1918 the value of the carabao had increased to PhP 117 per head, an increase of PhP 40.04.²⁴ The value of the carabao increased by 52 per cent from 1903 to 1918 because of the epizootics problem that ravaged the domestic supply of carabaos in the Philippines. It was an important problem during the American period because of the carabao's central importance to rice farming.

Just like the value of carabaos, the price of cattle also increased from 1903 to 1918 because of epizootics that killed domestic bovine animals in the Philippines. According to the 1903 census, the total value of 127,559 head of cattle in the Philippines was PhP 6,192,815, with a price per head of PhP 48.55.²⁵ This included native cattle (or 'baka' in the Tagalog language), which were utilised mainly as transport animals, and secondarily, for their meat, hide, and horns. This domestic animal thrives in many provinces in the country, namely in Northern Luzon, Mindoro, Masbate, Bataan, Marinduque, Benguet, Negros, Leyte, Cebu, Iloilo, Misamis, and Cotabato.²⁶ There are also a number of other species of cattle in the Philippines that came from Mexico or China. For example, the red cattle of Mindoro came from China. They are thin but rangy and upright. The Spanish type of cattle that arrived through Mexico has a black or black-and-white coat. This type of cattle thrived in northern Luzon and some parts of the Visayas.²⁷

21 D. F. Doeppers, 'Beef consumption and regional cattle husbandry systems in the Philippines, 1850–1940', in *Smallholders and Stockbreeders: History of foodcrop and livestock farming in Southeast Asia*, ed. Peter Boomgaard and David Henley (Leiden: KITLV Press, 2004), 314.

22 Bankoff, 'A Question of Breeding', 417.

23 *Census of the Philippine Islands Taken Under the Direction of the Philippine Commission in the Year 1903*, 4: 225.

24 Government of the Philippine Islands, Department of Commerce and Communications, Bureau of Commerce and Industry, *Statistical Bulletin of the Philippine Islands, 1928* (Manila: Bureau of Printing, 1929), 51.

25 *Census of the Philippine Islands Taken Under the Direction of the Philippine Commission in the Year 1903*, 4: 225.

26 United States Bureau of Insular Affairs, War Department, *Report of the Philippine Commission to the President* (Washington, DC: Government Printing Office, 1901), 4: 14.

27 Dean C. Worcester, *The Philippine Islands and Their People* (New York and London: Macmillan, 1899), 512; United States Bureau of Insular Affairs, War Department, *Report of the Philippine Commission to the President*, 4: 14.

Epizootics in the colonial Philippines

The spread of infectious animal contagions or epizootics was a problem that had been noted by colonial officials in Southeast and South Asia since at least the 1600s, and which later affected other colonies in Africa and India.²⁸ The Dutch East India Company (VOC) reported cases of epizootic attack among the buffaloes in Sri Lanka as far back as 1647, 1661, 1665, and 1669. In Thailand, VOC writers also mentioned in their reports the decimation of cattle and horses due to epizootics in 1729 and 1732 respectively. Peter Boomgaard concludes that ‘throughout the period 1600–1850 epizootics among buffalo were more frequent than cattle epidemics’ in Indonesia.²⁹ In Java, for example, Thomas Stamford Raffles witnessed how ‘Buffaloes ... are subject to an epidemic disease’ that ‘prevails throughout the whole Island, and generally re-appears after an interval of three, four, or five years: it makes great ravages in the stock of the peasantry’.³⁰ Raffles was referring to the devastating attacks of cattle plague or rinderpest that were also later recorded in the island of Java from 1878 to 1881.

The animal disease problem experienced by the indigenous population in Indonesia, Thailand, Sri Lanka, and South Africa was also present in the Philippines. The attack of infectious animal contagions, or epizootics, among livestock was a problem for the American colonial government because the Philippines was an agricultural country that was highly dependent on the use of carabaos and cattle as draft animals and food. Colonial reports recorded how the contagions killed thousands of domestic carabaos and beef cattle throughout the country. Primary sources and records from the Bureau of Agriculture mention the prevalence of bovine anthrax, foot-and-mouth disease, and even *haemorrhagic septicaemia* as examples of the epizootics that attacked domestic bovine livestock in the country.³¹ But it must be noted that special attention was given by both the Spanish and the American colonial governments to

28 See, for example, Karen Brown, ‘Tropical Medicine and Animal Diseases: Onderstepoort and the Development of Veterinary Science in South Africa 1908–1950’, *Journal of Southern African Studies* 31, no. 3 (September 2005): 513–29; ‘From Ubombo to Mkhuzi: Disease, Colonial Science, and the Control of *Nagana* (livestock trypanosomosis) in Zululand, South Africa, c.1894–1953’, *Journal of the History of Medicine and Allied Sciences* 63, no. 3 (July 2008): 285–322.

29 Peter Boomgaard, ‘The Age of the Buffalo and the Dawn of the Cattle Era in Indonesia, 1500–1850’, in *Smallholders and Stockbreeders*, ed. Boomgaard and Henley, 262–3.

30 Boomgaard, ‘The Age of the Buffalo’, 262.

31 See Katherine Mayo, *The Isles of Fear: The Truth about the Philippines* (New York: Harcourt, Brace and Company, 1925); Bureau of Agriculture, ‘An Order Regulating the Handling of Dangerous and Communicable Animal Diseases’, *Philippine Agricultural Review* 19 (1926): 377–86.

rinderpest, a highly communicable and fatal animal contagion, because of its degree of infectiousness and impact on the country's carabao and beef cattle population.³²

Rinderpest infects both carabaos and beef cattle and is caused by the rinderpest virus (*Paramyxoviridae*, genus *Morbillivirus*), which is found in the blood, faeces, urine, saliva, tears, milk, and various organs of an animal suffering from the disease.³³ Rinderpest can be transmitted directly from an infected animal to healthy stock through close contact. It can also be transmitted to a healthy animal through direct contact with an infected animal's urine, faeces, saliva, blood, tears, and mucus. An animal that suffers from the contagion initially shows dejection, loss of appetite, and signs of fatigue. After these symptoms, its belly swells and the animal develops a cough, dry muzzle, diarrhoea, and agitated respiration. In the disease's final stages, 'the animal [becomes] emaciated, walks with difficulty and constantly [lies] down'. Those that die of rinderpest have 'truly black blood, sticky, [which] refus[es] to coagulate ... and the intestines are dark reddish-black color and marked with lacerations'.³⁴

The contagion was introduced into the Philippines in the 1880s when the Spanish Government imported carabaos and cattle from Indo-China, intended for breeding purposes.³⁵ When rinderpest was introduced into the country, the Spanish Government was unaware of the pathology of the disease. As a result, isolation measures on imported cattle and carabaos infected with rinderpest from Hong Kong, Hoihau (China), and Indo-China were never implemented. It is estimated that thousands of imported cattle and carabaos infected with the disease were sold and shipped monthly to different provinces in the country. As a consequence, the disease spread rapidly and infected the native stock of bovine animals.³⁶

In 1888, rinderpest killed thousands of bovine animals in Bulacan. Carcasses of dead carabaos and cattle were left abandoned in fields and rivers. The vast number of dead animals floating in the water impeded the course of steamships passing by Manila and Bulacan. Even small boats in Bulacan found it difficult

32 Dean C. Worcester, *The Philippines: Past and Present* (New York: Macmillan, 1930), 413; Greg Bankoff, 'Horsing around: The life and times of the horse in the Philippines at the turn of the twentieth century', in *Smallholders and Stockbreeders*, ed. Boomgaard and Henley, 249.

33 In the Philippines and other Spanish colonies, the disease is called epizootia; in England and other English colonies it is known as cattle plague; while in Continental Europe and other European countries, the disease is called rinderpest.

34 Greg Bankoff, 'Bestia Incognita: The horse and its history in the Philippines 1880–1930', *Anthrozoos* 17, no. 1 (2004): 5.

35 Angel K. Gomez, 'Intensity and Distribution of Infectious Diseases of Animals in the Philippines', *Philippine Agriculturist* 14, no. 9 (1926): 523.

36 David G. Moberly, 'Common Dangerous Communicable Diseases of Domestic Animals in the Philippine Islands', *Philippine Agricultural Review* 1 (February 1908): 110.

to navigate the province's rivers.³⁷ Experts estimate that the mortality rate was as high as 90 per cent of the total number of bovine animals in the Philippines. Researcher Ken De Bevoise explains that the impact of rinderpest in the Philippines was great because the native carabao had a very weak resistance to the disease. Since the native stock was never infected by the disease prior to the 1880s, the first rinderpest attack had a high mortality rate.³⁸

During the early 1900s, rinderpest continued to spread and create fear among Filipino farmers and American colonial officials alike. In 1900–01, American military authorities estimated that many provinces lost between 50 and 60 per cent of their carabaos and cattle due to this highly infectious animal contagion.³⁹ For example, the 1903 census shows that 629,176 carabaos and cattle succumbed to rinderpest. Most deaths were recorded in the Visayas and Mindanao provinces because the plague had already killed thousands of draft animals in Luzon during a previous outbreak of the contagion.⁴⁰

Spanish and then American colonial officials established government agencies to lead the campaign against animal contagions. The Spanish Government tried to control the contagion by professionalising veterinary practice in the Philippines during the latter part of the nineteenth century. The American colonial government created a government agency, namely, the Bureau of Agriculture (later, the Bureau of Animal Industry), to lead and supervise the campaign against epizootics. The Americans also opened an academic institution that became the first veterinary college in Southeast Asia, and implemented a number of policies to control and eradicate the contagions.

Colonial imperatives for the introduction of veterinary science in the Philippines

The desire to improve the health of domestic animals in the Philippines during the nineteenth century led to the application of the Lamarckian principle of acclimatisation that colonial administrators used as a means to establish 'human mastery not only over inanimate but also over animate nature'.⁴¹ Bankoff writes that 'animals, especially domesticated animals, were represented as *locomotoras*

37 Ken De Bevoise, *Agents of Apocalypse: Epidemic Disease in the Colonial Philippines* (Quezon City: New Day Publisher, 2002), 19.

38 De Bevoise, *Agents of Apocalypse*, 158.

39 Stanton Youngberg, 'A Brief History of Rinderpest in the Philippine Islands', *Philippine Agricultural Review* 15 (1922): 205.

40 *Census of the Philippine Islands Taken Under the Direction of the Philippine Commission in the Year 1903*, 4: 225.

41 Bankoff, 'A Question of Breeding', 424.

vivientes—living machines or engines susceptible to improvement through breeding'.⁴² Aside from animal breeding, improving these 'living machines' was also achieved through the application of modern veterinary science. Later American colonial officials, particularly colonial scientists, believed that through the proper application of colonial science and scientific knowledge, 'humanity could manipulate nature to compensate for any defect of function or pernicious effect of environment'. The pernicious effects of the hot and humid tropical environment of the Philippines on domestic animals became apparent when carabaos and beef cattle became susceptible to bacterial or viral contagions brought about by conditions in the tropics.⁴³

The Spanish coloniser's scientific endeavours and achievements have been criticised as 'backward, irrational, and decadent, akin to the Medieval'.⁴⁴ As Bankoff argues, this 'black myth' or *leyenda negra* was propagated by American colonial officials to differentiate their scientific advances from those of their Spanish predecessors. However, records reveal, according to Bankoff, that the 'Spanish colonial official, foreign naturalist, and the missionary father were as well versed in the science of their day as geographical location and international communications permitted'.⁴⁵ But despite their significant scientific contributions to the domains of meteorology, forestry, and botany, not much had been done by the Spaniards to significantly address the animal disease problem in the Philippines.

Veterinary work in the Spanish colonial Philippines started only in the latter part of the nineteenth century. In 1828, a royal decree ordered the appointment of a veterinarian for the Philippines.⁴⁶ This position was created in response to the raising of a regiment of the Spanish cavalry, called the 'dragoons of Luzon'. Initially, the decree called for the appointment of only one veterinarian. However, in 1843 another veterinary position was opened, also through a royal decree. The position of *mariscales* or government veterinarian, though, was not taken by a graduate of a veterinary course. Any Spaniard who passed the regular veterinary examination board was eligible to be appointed as *mariscales*. The rules of appointment became stricter after the Royal Decree of 19 August 1847 revised the veterinary course in Spain. Henceforth, only graduates in veterinary medicine were eligible for appointment as veterinarians. Those who already practised the profession prior to 1847 were given three years to finish

42 Bankoff, 'A Question of Breeding', 424.

43 Bankoff, 'A Question of Breeding', 424.

44 Garcia, 'The Pathogenic Body', 36.

45 See Greg Bankoff, 'The Science of Nature and the Nature of Science in the Spanish and American Philippines', in *Cultivating the Colonies: Colonial States and their Environmental Legacies*, ed. Christina Folke Ax et al. (Athens, OH: Ohio University Press, 2011), 78–108.

46 Gregorio San Agustín, 'Meat Inspection in the Philippines', *Philippine Journal of Animal Industry* 3, no. 6 (November–December 1936): 519.

their veterinary medicine degrees. Because of the new rules, veterinarians in the Spanish army were from 1855 called *profesores de veterinaria* or *veterenarios*. Veterinarians in the Spanish army were given military ranks. They also became part of the Spanish Veterinary Corps. The employment of *veterenarios* in the Spanish Army continued until the end of the Spanish regime in 1898.⁴⁷

The Spanish Veterinary Corps was the principal agency tasked with controlling animal diseases in the Philippines. It was mandated to preserve the health of animals in the Spanish army. It was also duty-bound to treat animal contagions, conduct meat inspection in the *matadero* or slaughterhouse of Manila, and serve as sanitary police. In addition, it was tasked with training cavalry animals.⁴⁸ The army veterinarians' knowledge of animal science was put to the test when the great rinderpest epidemic killed 90 per cent of the carabao and cattle population in the Philippines during the late 1880s.⁴⁹ The high mortality of bovine animals due to the plague alarmed the Spanish Government. As a response to the problem, Spanish veterinary officials informed people about the necessary treatment against the disease. Announcements made by the government recommended the use of purgatives as a cure and the cleaning of premises where an animal died as a preventive measure.⁵⁰

Bankoff argues that even though the Spaniards professionalised scientific knowledge and elevated veterinary science to a specialised discipline in the Philippines during the nineteenth century, veterinary medicine and care of domestic animals 'came a poor second to questions of interhuman competition despite the establishment of a *policia sanitaria*', which was responsible for the maintenance of animal health conditions.⁵¹ Bankoff concludes that the decline of Spanish scientific knowledge and expertise, including veterinary science, can be attributed to the Spanish Government's failure 'to survive the transition to modernity as well, neither as a model nor in knowledge production'.⁵² 'As Spanish power waned', Bankoff writes, 'it fell increasingly under foreign influence and failed to develop a firm scientific, technological, or industrial base of its own.'⁵³

47 Vicente Ferriols, 'Early History of Veterinary Science in the Philippine Islands', in *Encyclopedia of the Philippines*, ed. Zoilo Galang (Manila: Exequiel Floro, 1957), 332–4, 338.

48 Ferriols, 'Early History of Veterinary Science', 333–4.

49 Bankoff, 'Bestia Incognita', 5.

50 Philippines Bureau of Agriculture, 'Rinderpest under the Spanish Regime', *Philippine Agricultural Review* 3 (1910): 368; United States Bureau of Insular Affairs, War Department, *Report of the Philippine Commission to the President* (Washington, DC: Government Printing Office, 1903), 365.

51 Bankoff, 'Horsing around', 248–9.

52 See Bankoff, 'The Science of Nature', 89.

53 Bankoff, 'The Science of Nature', 89.

A new and different story unfolds with the occupation of the Philippines by the United States in 1898. In a 1911 *Manila Times* article, W. E. Musgrave, an American doctor and former dean of the Philippine General Hospital, proudly announced to the world that 'the history of scientific progress in the Philippines begins with our occupation of the islands'.⁵⁴ Musgrave's announcement summarises the boastful scientific achievements of the Americans in their newly acquired colony, a tradition of scientific advancement that followed British scientific traditions.⁵⁵

Dean Worcester, the first American Secretary of the Interior of the American civil government in the Philippines (1901–13), was one of the first American colonial officials in the islands to witness the poor health conditions of domestic animals there. In his book, *The Philippines: Past and Present*, Worcester writes:

Rinderpest, a highly contagious and very destructive disease of horned cattle, was introduced in 1888 and spread like fire in prairie grass. No real effort was made to check it prior to the American occupation, and it caused enormous losses, both directly by killing large numbers of beef cattle and indirectly by depriving farmers of draft animals.⁵⁶

Worcester's observations of the epidemic diseases that struck domestic animals in the Philippines crystallised America's responsibility to control the tropical environment of the Philippines, through the control and eradication of the animal contagions that were killing off carabaos and cattle.

The development of Philippine veterinary science under the star-spangled banner

As the United States started its campaign against animal contagions, its primary concern was to establish 'a more comprehensive institutional and legal structure with which to tackle animal diseases'.⁵⁷ To make this goal concrete, American military, health, and veterinary officials established government institutions to implement programmes to control epizootics.

At the start of American rule in the Philippines in 1898, there was no single government agency tasked with supervising the campaign against animal diseases. Because of this, the American military government (1898–1901), through the Office of the Provost-Marshal-General, implemented a number of ordinances to ensure the safety and protection of domestic animals from

54 Garcia, 'The Pathogenic Body', 36.

55 See Bankoff, 'The Science of Nature', 89–90.

56 Worcester, *The Philippines*, 413.

57 Bankoff, 'Horsing around', 249.

epizootics. For example, the Provost-Marshal-General was authorised to craft policies and health regulations in the form of municipal ordinances for the city of Manila.⁵⁸ He also established a veterinary department under the supervision of the Board of Health tasked with ensuring that diseases among domestic animals were properly checked and monitored. In practical terms, the veterinary department inspected all cattle entering Manila and all animals butchered in the slaughterhouse; took care of domestic animals; and checked the sanitary conditions of public and private stables. The veterinary department comprised one veterinarian and three Filipino animal inspectors.⁵⁹

This structure changed when the civil government in the Philippines was established on 4 July 1901. As far as animal disease control was concerned, this function was placed under the Insular Board of Health, the Serum Laboratory, and the Bureau of Agriculture. The Insular Board of Health was established to supervise public health and the health of domestic animals in the Philippines,⁶⁰ and comprised a Commissioner of Public Health, a Sanitary Engineer, a Chief Health Inspector, a Superintendent of Government Laboratories, and a Secretary.⁶¹ The Americans also recognised laboratory science as being key to the control and eradication of animal diseases. Accordingly, in July 1901 they set up the Serum Laboratory,⁶² which was later incorporated into the Vaccine Institute to improve the production of vaccines.⁶³

The civil government also created a Veterinary Corps in 1901 under the direct supervision of the Director of the Serum Laboratory. Its task was to inoculate all animals infected with dangerous and communicable diseases. In 1904, the Veterinary Corps became a Veterinary Division under the Board of Health.⁶⁴ It consisted of 'nine veterinarians and 20 inoculators charged among other duties with inspecting animals entering the country'.⁶⁵

58 United States Bureau of Insular Affairs, War Department, *Report of the Philippine Commission to the President*, 1901 (Washington, DC: Government Printing Office, 1902), 2: 1162.

59 Philippines Bureau of Agriculture, 'The Animal-Disease Control Problem', *Philippine Agricultural Review* 1, no. 5 (1908): 186–93; United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1904 (Washington, DC: Government Printing Office, 1905), 2: 204–5.

60 George R. Harvey, 'Certain Legal Phases of the Work of the Government Veterinary Surgeons', *Philippine Agricultural Review* 1 (1908): 416.

61 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1902 (Washington, DC: Government Printing Office, 1903), 1: 381.

62 United States, Philippine Commission, *Public Laws passed by the Philippine Commission during the Period from September 1, 1902 to August 31, 1903* (Manila: Bureau of Public Printing, 1904), 263–4; United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1902 (Washington, DC: Government Printing Office, 1903), 1: 549.

63 United States, Philippine Commission, *Public Laws passed by the Philippine Commission during the Period from September 1, 1902 to August 31, 1903*, 263–4; United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1902 (Washington, DC: Government Printing Office, 1903), 1: 549.

64 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1904 (Washington, DC: Government Printing Office, 1905), 2: 48, 416, 449.

65 Bankoff, 'Horsing around', 249.

An additional agency involved in disease control was the Insular Bureau of Agriculture (established in October 1901). This comprised a bureau chief, an expert in animal industry, a botanist, an assistant agrostologist, a soil expert, a tropical agriculturist, an expert in plant culture and breeding, and an expert in farm machinery and farm management.⁶⁶ It was tasked with investigating and disseminating important information about livestock, dairy, and other animal industries. The introduction of new, and the improvement of existing, breeds of domestic animals formed another function of the Bureau. A third was ensuring the safety of imported animals used for serum production, breeding, and food consumption.⁶⁷

Further restructuring occurred. In 1905, the Philippine Commission, in accordance with the Reorganization Act (No. 1407), integrated the animal disease control functions of the Board of Health and Bureau of Agriculture into a single agency.⁶⁸ Section 5(d) of this Act transferred the supervision of the Veterinary Division, which was previously under the Board of Health, to the Animal Industry Division of the Bureau of Agriculture.⁶⁹ In 1919, the Bureau of Agriculture underwent further reorganisation when the Animal Industry Division was abolished and its functions were delegated to the Veterinary Division of the Bureau of Agriculture. During this period, the Veterinary Division directly supervised government veterinary research, animal disease control and quarantine, and meat inspection.⁷⁰

The Veterinary Research Laboratory was a facility established to study the pathology and causes of animal diseases, together with their prevention and possible cure. It also manufactured vaccines, sera, and other biological products not produced by private companies.⁷¹ The Animal Disease Control Division was responsible for the control and eradication of infectious animal diseases, including preventing their entry into the country. It was also in charge of the

66 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1902 (Washington, DC: Government Printing Office, 1903), 1: 298–9, 587.

67 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1902 (Washington, DC: Government Printing Office, 1903), 1: 588; Commonwealth of the Philippines Department of Agriculture and Commerce, *The Livestock Industry in the Philippines* (Manila: Bureau of Printing, 1939), 7.

68 United States, Philippine Commission, *Public Laws Passed by the Philippine Commission during the Period from September 1, 1905 to August 31, 1906* (Manila: Bureau of Public Printing, 1907), 79–83.

69 United States House of Representatives, *Annual Report of the War Department for the Fiscal Year Ended June 30, 1905: Acts of the Philippine Commission and Public Resolutions from September 1, 1904 to October 31, 1905* (Washington, DC: Government Printing Office, 1905), 242–4.

70 United States Congress, Senate, *Report of the Governor General of the Philippine Islands to the Secretary of War, 1921* (Washington, DC: Government Printing Office, 1921), 180.

71 Philippines Department of Agriculture and Commerce, Bureau of Animal Industry, *Animal Industry Administrative Order No. 1* (15 August 1933), 79–80.

operation of 'a system of inspection of meat, dairy farms, ports, railway stations and shipping centers' and the control and regulation of animal movements within towns, provinces, and islands throughout the country.⁷²

The Animal Quarantine Division controlled the strict enforcement of quarantine rules, animal movement regulations, and vaccination policies. The Meat Inspection Section was responsible for the maintenance and establishment of municipal slaughterhouses and the inspection of dairy farms. It was tasked with ensuring that all animals sold and slaughtered were safe to be eaten, and enforced rules for the regulation and maintenance of dairy farms.⁷³

In the 1930s, the government bureaucracy was further reorganised to maximise the greatest efficiency pursuant to the needs of the time. In 1929, the functions of the Bureau of Agriculture were transferred to the Bureau of Animal Industry and the Bureau of Plant Industry. This completely stripped the Bureau of Agriculture of all duties and functions involving animal disease control. Henceforth, the Bureau of Animal Industry became the sole agency tasked with all matters pertaining to animal disease control. In 1930, the Bureau of Animal Industry was established to investigate, study, and report on the conditions of domestic animals in the Philippines. The practical functions of the Bureau included finding ways to improve methods of animal reproduction, inquiring and reporting on the causes of dangerous communicable animal diseases in the Philippines, and lastly, controlling and eradicating the spread of infectious animal diseases in the country.⁷⁴

The Bureau of Animal Industry had four divisions: the Administrative Division, the Animal Disease Control Division, the Veterinary Research Division, and the Animal Husbandry Division.⁷⁵ The Veterinary Research Division had four sections: Immunology, Bacterial Diseases, Biochemical Diseases, and Parasitic Diseases.⁷⁶ The Bacterial Diseases Section studied the epizootology, diagnosis, prevention, and treatment of various bacterial diseases of animals. The Parasitic Diseases Section examined the nature of various parasitic diseases of animals in the Philippines and researched the treatment of different unknown parasites.⁷⁷

72 Sergio Osmeña, 'Address by the Guest of Honor', *Philippine Journal of Animal Industry* 3, no. 2 (1936): 80.

73 Osmeña, 'Address by the Guest of Honor', 80. See also Commonwealth of the Philippines Department of Agriculture and Commerce, Bureau of Animal Industry, *Annual Report of the Bureau of Animal Industry for the Fiscal Year Ending December 31, 1938* (Manila: Bureau of Printing, 1939).

74 Philippine Legislature, *Public Laws Enacted by the Philippine Legislature during the Period August 9, 1929 to February 7, 1930* (Manila: Bureau of Printing, 1930), 352–5.

75 Commonwealth of the Philippines Department of Agriculture and Commerce, *The Livestock Industry in the Philippines* (Manila: Bureau of Printing, 1939), 10–11.

76 Commonwealth of the Philippines Department of Agriculture and Commerce, *Administrative Order No. 1* (15 August 1933), 79–80.

77 Commonwealth of the Philippines Department of Agriculture and Commerce, *Administrative Order No. 1*, 79–80; Commonwealth of the Philippines, *Annual Report of the Bureau of Animal Industry for the Fiscal Year Ending December 31, 1938*.

While these institutions and legislation were impressive on paper, their ability to successfully carry out these tasks was another matter. As the following paragraphs show, quarantine faced resistance from local people, while personnel shortages dogged the veterinary service, which was unable to successfully develop a serum against rinderpest until the 1930s.

Serum inoculation

The Bureau of Agriculture introduced in the latter part of 1902 the immediate inoculation of susceptible animals with the anti-rinderpest serum. The serum was extracted from the blood of an animal that had been infected with the rinderpest virus but had fully recovered. Experiments showed that the serum of an animal that recovered from rinderpest was able to provide immunity to susceptible animals. The potency of the serum depended on the animal's reaction when it was still suffering from the disease. For example, animals that suffered a mild form and suffered only low fever produced a less potent serum. Injection of a highly potent serum in healthy animals gave temporary immunity from rinderpest for one to two months. In some cases, it was an effective curative agent against rinderpest, especially if it was given early.⁷⁸

Veterinary surgeons and inoculators used two methods of inoculation. These were the simultaneous inoculation and the serum-alone methods. The simultaneous or mixed method was conducted by injecting under the skin of a healthy animal 30 ml of anti-rinderpest serum and 1 ml of virulent blood or blood from a sick animal. This method gave healthy animals the disease and the remedy at the same time. Experiments showed this method gave a longer period of immunity, resulting in only a very slight attack of the disease.⁷⁹ On the other hand, the serum-alone method was conducted by injecting only the anti-rinderpest serum under the skin of a healthy animal. This method was adopted in the country because British veterinarians had used it effectively for several years in India.⁸⁰

In 1903, veterinary surgeons and inoculators used both inoculation methods in different provinces in the country. It was during these trials that the Bureau of Agriculture observed the weakness of both inoculation methods. After four years of use, the simultaneous method produced heavy losses. Its failure

78 H. F. Kern, 'The Use of Anti-Rinderpest Serum in the Field', *Philippine Agricultural Review* 15 (1922): 241; Teodulo Topacio, 'The Manufacture of Anti-Rinderpest Serum in the Philippine Islands', *Philippine Agricultural Review* 15 (1922): 230–1.

79 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1903 (Washington, DC: Government Printing Office, 1904), 2: 378; United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1905 (Washington, DC: Government Printing Office, 1906), 2: 47 and 117; Manuel M. Robles, 'Experiments on the Virulence of Rinderpest Blood', *Philippine Journal of Animal Industry* 2, no. 4 (1931): 307.

80 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1903 (Washington, DC: Government Printing Office, 1904), 2: 378.

was undoubtedly due to the lack of adequate field trials.⁸¹ For one thing, the Bureau did not conduct experiments to test the effectiveness of the method. They did find out that virulent blood obtained in a haphazard manner did not ensure uniformity of virulence. Moreover, many bovine animals died because veterinarians and inoculators did not consider the condition of the animals when they were being inoculated. Because of the ineffectiveness of the simultaneous method, veterinary officials stopped its field application in 1907.⁸²

The failure of the simultaneous method led the Bureau of Agriculture to shift to the serum-alone method. Colonial officials thought that its application was effective. Unfortunately, just like the simultaneous method, the serum-alone method was also a failure. It provided only temporary immunity that lasted from seven to 14 days. The immunity that it provided lasted only so long as it was still circulating in the animal's system. After it had been eliminated from the body, the animal was again susceptible to the disease. So when this method was employed in the field, many native cattle and carabaos died because they again became highly susceptible to the disease. The method was also discontinued because it was very expensive. Results of field trials showed that an animal needed to be injected with 20 to 30 ml of serum for 10 to 15 times but despite this it acquired only temporary immunity. For these reasons, the use of the serum-alone method was discontinued in 1911.⁸³

Aside from the ineffectiveness of treatment, many Filipino farmers did not cooperate with inoculation. They expected the American veterinarians and inoculators to give medicine to their sick carabaos or cattle, but they were astounded when they saw veterinarians injecting into their beloved carabao blood from a sick animal. Many Filipino farmers became angry with American veterinarians because they thought that the injection of virulent blood did not cure but only aggravated the condition of their animals. Moreover, the inoculation method became very unpopular among farmers because of the high mortality rate. In the official reports of the inoculators, the death rate incurred following the inoculation of bovine animals in some areas was as high as 50 per cent.⁸⁴ This high level of mortality made many farmers resent the programme and act violently whenever American inoculators came to vaccinate their work animals. In the memoirs of Dr Victor Buencamino, the first

81 Rodney Sullivan, *Exemplar of Americanism: The Philippine Career of Dean C. Worcester* (Quezon City: New Day Publishers, 1992), 102–3.

82 Angel Gomez, 'Eradication and Control of Rinderpest in the Philippine Islands,' *Journal of the American Veterinary Medical Association* 113, no. 857 (August 1948): 112; Moberly, 'Common Dangerous Communicable Diseases', 117–18.

83 Kern, 'The Use of Anti-Rinderpest Serum in the Field', 243; Youngberg, 'A Brief History of Rinderpest in the Philippine Islands', 207–9, 215.

84 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1904 (Washington, DC: Government Printing Office, 1905), 2: 21; and Sullivan, *Exemplar of Americanism*, 102–3.

Filipino veterinarian, he mentions 'many cases of violence, of farmers chasing government veterinarians away with bolos' to prevent their animals from being inoculated. Because of the antagonistic response of Filipinos to the inoculation policy of the colonial government, his 'team had to be accompanied by platoons of Philippine Scouts'.⁸⁵ Proof of the intense opposition of many Filipino farmers to the veterinary forces of the colonial government was the term 'precursors of evil', which they gave to the American veterinarians. The term was coined because everywhere the American veterinarians went to conduct inoculations, many of the animals died. In some areas, farmers even hid their animals in the mountains to escape the inoculators.⁸⁶

Quarantine programme

American policies to control animal contagions were patterned after British veterinary practices. American veterinary officials subscribed to the contagionist perspective in veterinary science and the importation theory of animal diseases theorised by British scientists. John Gamgee, the English principal of the New Veterinary College in Edinburgh in the late 1850s, developed this perspective on veterinary science. Its proposition was that infectious animal contagions 'could be passed on via an intermediate agency or host as well as by direct contact'.⁸⁷ Contagionists believed that animal diseases were caused by 'foreign or external agents that invaded an otherwise healthy system, eventually disrupting or destroying its normal functioning'.⁸⁸ This theory was postulated in the nineteenth century when the British Government faced threats of animal contagions. Under this theory, the infective agents of animal disease were diseased cattle; the system infected was the livestock economy; and the infection was introduced through importation. As a result of this theory, the British Government implemented administrative control measures that 'sought to keep out and stamp out any and every animal contagion that threatened the livestock industry'.⁸⁹ These policies were implemented through the passage of legislative orders that allowed the exclusion of affected beasts through quarantines and port inspections.

In the Philippines, the Bureau of Agriculture adopted the strict implementation of the animal quarantine policy because it realised that any method aimed at the eradication of animal diseases was ineffective so long as the movement of infected

85 Buencamino, *Memoirs*, 107–8.

86 Buencamino, *Memoirs*, 107–8.

87 Michael Worboys, *Spreading Germs: Disease Theories and Medical Practices in Britain, 1865–1900* (Cambridge: Cambridge University Press, 2000), 48, 57.

88 Worboys, *Spreading Germs*, 71.

89 Worboys, *Spreading Germs*, 71.

animals between barrios, towns, and provinces was not controlled. With this in mind, the Bureau implemented a more serious and stricter campaign to control the spread of epizootics in the country.

On 10 October 1907, the Philippine Commission passed Act No. 1760, which prohibited 'any person, firm or corporation from shipping or bringing into the country any domestic animal that was suffering from, infected with or [had] died of dangerous communicable diseases'. The Act also prohibited 'the transfer, shipping or transport from one island, province, municipality, township or settlement to another domestic animals infected with any infectious animal disease or to expose such animal, either dead or alive, on any public road, street or highway where it may come in contact with other domestic animals'. The Act appointed the Director of Agriculture head of the animal disease control campaign, empowering him to provide permits, quarantine, cremate, and dispose of all imported and domestic animals from ports or places infected with contagious diseases. The same Director of Agriculture was also authorised to inspect all domestic animals arriving by boat, rail, or otherwise in cities, ports, or other places to prevent the entry and spread of infectious communicable diseases within the Philippines.⁹⁰ With the enactment of Act No. 2172 in 1912, the Director of Agriculture was given powers to strictly impose the quarantine policy. He was empowered to place under quarantine any province, island, municipality, barrio, township, settlement, parcel of land, or district of whatever size if the area was determined to have been infected by an infectious animal disease. The Act authorised the Director of Agriculture to isolate infected animals and to place them in quarantine stations. The Act also prohibited all persons, railroad company employees, and owners or masters of any steam or sailing vessel or boat in any place declared under quarantine to receive or to deliver for transport or transportation from and to any quarantined province, island, municipality, barrio, parcel of land, or district any domestic animal without the written permission of the Director of Agriculture.⁹¹ In order to ensure compliance with the quarantine policy, the Bureau of Agriculture established permanent quarantine stations in key areas throughout the country. Quarantine stations were built in Manila, Pandacan, Iloilo, and Cebu to ensure that susceptible imported animals did not spread animal contagions in the country.⁹²

90 United States War Department, *Annual Report, 1907: Acts of the Philippine Commission and Public Resolutions from September 16, 1906 to October 31, 1907* (Washington, DC: Government Printing Office, 1907), 445–7.

91 United States, Philippine Commission, *Public Laws Enacted by the Philippine Legislature during the Period January 1, 1910 to October 15, 1912* (Manila: Bureau of Printing, 1912), 343.

92 Bankoff, 'Horsing around', 249.

Like inoculation, animal quarantine was severely opposed by many Filipino farmers and its laws usually violated by Filipino animal owners because it went against their regular routine. Farmers pastured their animals during the day and allowed them to move and mingle freely after work in the river or in muddy swamps. Unfortunately, when the quarantine measures were implemented in 1912, sick carabaos and cattle were isolated and placed in roofless corrals constructed by the government. Many Filipino farmers considered the quarantine measures worse than the disease itself because they separated them from their farming partner, the carabao.

Farmers defied quarantine regulations by removing their animals from quarantine corrals and hiding them in the mountains where the government's search teams would be unable to find them. In other districts, farmers submitted their animals for quarantine but asked for work passes during the night in order to pasture their animals. Others did not even apply for passes. They just took their animals out of the isolation corrals and pastured them.⁹³ Quarantine detached the farmer from his sick animal and this was seen by farmers as a severe policy that failed to consider the significance of the carabao to the Filipino farmer.⁹⁴ Historian John Larkin cites an instance in Pampanga, a province in Luzon, where Filipino farmers frequently violated the quarantine policy implemented by the government:

By late 1912 and early 1913 the situation became critical. Farmers evaded the quarantine and brought infected animals to clean areas ... Farmers and veterinarians countered each other's move with evasion and strict controls. Tensions sprang up. At one point a farmer from Arayat, Andriano Panlilio, with a group of armed men chased the vets off his property.⁹⁵

The implementation of the quarantine programme did not produce positive results. Data reveal that the number of deaths due to rinderpest increased four years after the policy was implemented. When the programme was implemented in 1912, only 2,847 deaths were recorded. Four years after the policy was implemented, the number of deaths recorded increased to 18,251. In 1917, the number of deaths ballooned to 26,951. Table 1 shows the number of deaths due to rinderpest in 1912–17.

93 C. H. Decker, 'Rinderpest in the Amburayan River Valley', *Philippine Agricultural Review* 6 (1913): 392–3; Pablo Ocampo Y Tecson, 'The Relations Existing Between the Bureau of Agriculture and the Provincial and Municipal Governments in the Suppression of Infective Animal Diseases', *Philippine Agricultural Review* 1, no. 10 (1908): 422; Stanton Youngberg, 'Resume of the Work of the Veterinary Division for the Year 1916', *Philippine Agricultural Review* 10 (1917): 177.

94 This behaviour was common among Filipino farmers. See John Larkin, *The Pampangans: Colonial Society in a Philippine Province* (Berkeley, CA: University of California Press, 1972).

95 Larkin, *The Pampangans*, 259.

Table 1: Number of deaths due to rinderpest, 1912–17.

Year	Deaths
1912	2,847
1913	2,787
1914	2,715
1915	2,305
1916	18,251
1917	26,951

Source: Commonwealth of the Philippines. *Annual Report of the Bureau of Animal Industry for the Fiscal Year Ending December 31, 1938* (Manila: Bureau of Printing, 1939), 72.

Dr Victor Buencamino, the first Filipino veterinarian to serve as an official in the Bureau of Agriculture, sympathised with the Filipino farmer's plight and condition. Buencamino believed that the quarantine policy was contrary to the Filipino's culture. In his memoir, he writes:

government men were taking his carabao away and confining it in a roofless corral with strange animals of other farmers and [giving it] strange medicine that was known to have killed more than cured. And on top of it all, the poor farmer had to lug his carabao feed over his own shoulders all the way to the quarantine site. Naturally the farmer rebelled against this.⁹⁶

Filipino local officials also did not support the colonial government's quarantine policy. They were supposed to help the Bureau of Agriculture implement the quarantine policies in their respective areas but they did not implement the policy because of fears that they would not win the local elections. Instead of strictly implementing the quarantine regulations, many local officials allowed farmers to evade quarantine policies.

The American colonial government attributed the popular prejudice and 'indifference, amounting at times to active opposition of people and officials to the work'⁹⁷ to the 'ignorance or superstition' of the Filipinos.⁹⁸ Filipinos simply did not understand the scientifically tested programmes against infectious animal diseases.

⁹⁶ Buencamino, *Memoirs*, 107.

⁹⁷ United States Bureau of Insular Affairs, *Report of the Philippine Commission* (Washington, DC: Government Printing Office, 1911), 183–4.

⁹⁸ United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1908 (Washington, DC: Government Printing Office, 1909), 2: 53.

The University of the Philippines College of Veterinary Science: America's veterinary college in the tropical island colony

In addition to the ineffectiveness of both inoculation and quarantine, there was a third problem related to the colonial government's inability to hire a sufficient number of American veterinarians to implement the animal disease control campaign in the provinces. Most of the American veterinary experts who were hired to work in the colony immediately returned home after their contracts expired.⁹⁹ Many American veterinarians could not be enticed to work in the Philippines because the colonial government could not offer high enough salaries. Well-qualified veterinarians commanded high salaries in the United States that the American colonial government found difficult to match. The continuous recruitment and appointment of veterinarians from the United States drained the country's Insular Treasury.¹⁰⁰

The scarcity of American veterinarians made it extremely difficult to respond immediately to the needs of provinces affected by colonial epizootics. Due to the lack of veterinary personnel, the Bureau of Agriculture had no choice but to respond only to calls where serious outbreaks of animal contagions were prevalent or appeared to be widespread. Officials of the Bureau confessed that their pool of veterinary experts and personnel was much too small to handle the gargantuan task of controlling and later eradicating the widespread incidence of infectious animal diseases in the Philippines.¹⁰¹ In 1908, the Bureau admitted this problem in its annual report:

Due to lack of sufficient veterinarians, it is impossible to respond to the calls of provinces affected by epizootics. The Bureau has necessitated [*sic*] responding to calls only where the outbreaks of disease appeared to be serious and has resulted in some small outbreaks assuming a serious aspect before attention could be given to them. Owing to [the] widespread prevalence of rinderpest, [and] foot-and-mouth disease ... our veterinary force is still too small to satisfactorily handle the work.¹⁰²

99 Philippine Veterinary Medical Association, 'Opening Address of Dr. Vicente Ferriols, President of the Philippine Veterinary Medical Association, February 20, 1940', *Philippine Journal of Animal Industry* 8, no. 3 (1941): 196–7; A. K. Gomez, 'Development of Veterinary Medicine in the Philippines', *Bulletin of National Research Council of the Philippine Islands* (1935): 341.

100 United States Bureau of Insular Affairs, *Report of the Philippine Commission to the Secretary of War*, 1911 (Washington, DC: Government Printing Office, 1912), 181.

101 Philippine Bureau of Agriculture, 'Report of the Bureau of Agriculture for the Fiscal Year Ending June 30, 1908', *Philippine Agricultural Review* 2 (1909): 6.

102 Philippine Bureau of Agriculture, 'Report of the Bureau of Agriculture for the Fiscal Year Ending June 30, 1908', 6.

The scarcity of well-trained veterinarians in the Philippines was a lingering problem for many years.¹⁰³ Aware of the need to address the problem of securing competent American veterinarians, Dean C. Worcester, Secretary of the Interior, made a brilliant suggestion in 1907. He recommended 'that early consideration should be given [to] the question of the advisability of establishing here [in the Philippines] a veterinary school'.¹⁰⁴ In this regard, Worcester reported that 'the first college of the proposed new University to be established should be a College of Veterinary Medicine and Surgery'.¹⁰⁵ The efforts of Secretary Worcester and Dr Archibald Ward, chief veterinarian of the Bureau of Agriculture, bore fruit with the establishment of the College of Veterinary Science together with six other colleges of the University of the Philippines.¹⁰⁶ Act No. 1870 or *An Act for the Purpose of Founding a University for the Philippine Islands* was enacted in a special session of the Philippine legislature on 18 June 1908 and it provided for the creation of the University of the Philippines. One of the first colleges that opened in 1908 was the College of Veterinary Science.¹⁰⁷

The College of Veterinary Science was established to train and develop a body of competent veterinarians 'whom the country will depend on for the control and eradication of animal epidemics that constantly threaten her animal population'¹⁰⁸ and who could 'give advice to the owner[s] of livestock ... [on] various diseases and ailments'¹⁰⁹ that were decimating the domestic animal population in the Philippines. University of the Philippines President Murray Simpson Bartlett noted the significance of establishing a veterinary college when he observed that 'the service of expert veterinarians is an absolute necessity in furthering the development of the immense agricultural resources of the Philippine Islands'.¹¹⁰

The first campus of the College of Veterinary Science was located in Pandacan, Manila, adjoining the quarantine yards of the Bureau of Agriculture and near the Pandacan Animal Quarantine Station.¹¹¹ When classes formally started in

103 Worcester, *The Philippines*, 419.

104 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1907 (Washington, DC: Government Printing Office, 1908), 2: 46.

105 Manuel D. Sumulong, 'The Establishment and Growth of the College of Veterinary Science', *Philippine Journal of Animal Industry* 3, no. 2 (1936): 80.

106 Vicente Ferriols, 'A Brief Resume of Rinderpest Control Work in the Philippines', *Philippine Journal of Agriculture* (1929): 396.

107 Aside from the College of Veterinary Science, other colleges that opened in 1908 included the College of Philosophy, Science, and Letters; the College of Law, Social, and Political Science; the College of Medicine and Surgery; the College of Engineering; the College of Mines; the College of Agriculture; and the School of Fine Arts. See Mauro F. Manuel, Mario S. Tongson, Teodulo M. Topacio Jr. and Grace D. De Ocampo, *A Century of Veterinary Medicine in the Philippines, 1898–1998* (Quezon City: University of the Philippines Press, 2002), 448–9.

108 Gregorio San Agustin, 'Address by Gregorio San Agustin', *Philippine Journal of Animal Industry* 3 (March–April 1936): 54.

109 W. H. Boynton, foreword to *Philippinensian*, 167.

110 Manuel D. Sumulong, 'The Outlook of a Filipino Veterinarian', in *Philippinensian*, 295.

111 Sumulong, 'The Outlook of a Filipino Veterinarian', 26.

June 1910, construction of the buildings of the veterinary college was not yet complete. Hence, classes were temporarily conducted at the Philippine Medical School compound in Calle Herran, Manila.¹¹² Only in 1912 were the veterinary college buildings finally finished.¹¹³ The College of Veterinary Science also maintained an animal clinic located between Rizal Avenue and Calle Tayuman in Manila. Its clinic occupied an area adjoining the grounds of the San Lazaro Hospital used in earlier times as an immunisation station of the Bureau of Agriculture.

On 17 May 1911, the college transferred to San Lazaro district at the corner of Tayuman Street and Rizal Avenue, adjoining the San Lazaro Hospital, because many students complained of the difficulty of attending their classes in two widely separated campuses.¹¹⁴ The new site was perfect for the college because clinical materials needed by veterinary science students were available at the San Lazaro racetrack.¹¹⁵

On 9 February 1933, Victor Buencamino, the Director of the Bureau of Animal Industry, proposed to the Secretary of the Department of Agriculture and Commerce the return of the College of Veterinary Science to Pandacan, Manila. A joint committee made up of representatives from the College of Agriculture, the College of Veterinary Science, and the School of Forestry studied the proposal. In March 1933, the committee members agreed to transfer the College of Veterinary Science back to Pandacan.¹¹⁶

112 The Philippine Medical School was formally opened on 10 June 1907. When it started, the school occupied the old building of the School for the Deaf and Blind located on Malecon Drive, Manila (a seaside boulevard leading to Luneta, which is now called Bonifacio Drive). On 1 June 1910, the school was transferred to Calle Herran (today Pedro Gil, Manila). The Philippine Medical School became the College of Medicine and Surgery with the enactment of Act No. 1870. See Alvin Broerman, 'The College of Veterinary Science, University of the Philippines', *Philippine Agricultural Review* 4 (June 1911): 289.

113 Fernando A. Bernardo, *Pictorial History of UPLB* (Los Baños: University of the Philippines Los Baños Alumni Association, 2007), 36.

114 L. M. Yutuc, 'The College of Veterinary Medicine', in *The College of Veterinary Medicine: Golden Jubilee Commemorative Volume 1960* (Quezon City: University of the Philippines, 1960), 2.

115 Yutuc, 'The College of Veterinary Medicine', 2.

116 Buencamino suggested the great advantage of this move for the Bureau of Animal Industry, which was then located in Pandacan, Manila. Faculty members and students of the college unanimously endorsed the move to return it to Manila. The faculty of the college adopted a resolution petitioning the Board of Regents to approve the above-mentioned proposal. In their petition, the faculty affirmed that the proposal of the bureau would be for the betterment of the institution and would provide benefits to the country's veterinary profession. See Sumulong, 'The Establishment and Growth of the College of Veterinary Science', 118–19.

Development of a vaccine against rinderpest, 1920s–30s

The Bureau of Agriculture, and its successor, the Bureau of Animal Industry, supported all endeavours to develop a vaccine against animal contagions. Prior to the development of a vaccine against rinderpest, veterinary experts used the anti-rinderpest serum to inoculate susceptible animals. From 1903 to 1911, veterinary surgeons implemented the anti-rinderpest serum inoculation campaign. In this programme, healthy and susceptible carabaos were inoculated with 30 ml of anti-rinderpest serum and 1 ml of virulent blood or blood from a sick animal. This method gave healthy animals the disease and the remedy at the same time.¹¹⁷ As noted, field trial results showed that an animal needed to be injected with 20 to 30 ml of serum 10 to 15 times for it to receive immunity, but unfortunately trials also proved that the inoculated animal acquired only temporary immunity. For these reasons, the use of the anti-rinderpest serum was discontinued in 1911.¹¹⁸ Aside from its failure to provide immunity, the programme was also discontinued because, as noted, many Filipino animal owners did not cooperate with the American veterinarians because they expected veterinarians and inoculators to give medicine to their sick carabaos.

In the 1920s, Filipino and American veterinarians made a significant breakthrough in Philippine veterinary science when they finally developed the long-awaited cure for rinderpest. Once considered as the scourge of the livestock population, rinderpest was finally eradicated in the Philippines with the discovery of the anti-rinderpest vaccine. The development of the vaccine against rinderpest took place in two countries. In 1902, Dr C. Kakizaki published in Japan the results of his experimentation on the use of spleen virus in glycerine as an immunising agent. The vaccine was made from glycerinated organ pulp.¹¹⁹ In the Philippines, Dr William H. Boynton, research pathologist of the Bureau of Agriculture and professor of Veterinary Science at the University of the Philippines College of Veterinary Science, studied different body organs to be used in the development of the rinderpest vaccine.¹²⁰ After years of studies and experimentation, Dr Boynton successfully developed a more effective rinderpest vaccine in 1923. The vaccine contained blood and finely ground tissues taken from a highly

117 United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1904 (Washington, DC: Government Printing Office, 1905), 2: 378; United States Bureau of Insular Affairs, *Report of the Philippine Commission*, 1906 (Washington, DC: Government Printing Office, 1907), 47, 117; Robles, 'Experiments on the Virulence of Rinderpest Blood', 307.

118 Kern, 'The Use of Anti-Rinderpest Serum in the Field', 243; Youngberg, 'A Brief History of Rinderpest in the Philippine Islands', 207–9, 215.

119 See C. A. Spinage, *Cattle Plague: A History* (New York: Springer Science+Business Media, 2003), 425–6.

120 Robles, 'Notes on Vaccines and Sera Prepared by the Bureau of Animal Industry', 266; Juan Generoso, 'Rinderpest in the Philippines', in Bureau of Plant Industry, Bureau of Animal Industry and the Fiber Inspection Service, *A Half Century of Philippine Agriculture* (Manila: Liwayway Publications, 1952), 345.

susceptible animal that had been artificially injected with virulent rinderpest-infected blood. It also contained phenol, glycerin, and salt solution. When the Boynton vaccine was used in the field, deaths due to rinderpest were drastically reduced: in 1927, to 2,123.¹²¹

Despite its effective application in the field, the Boynton vaccine was far from perfect. In February 1926, the United States Army Medical Department Research Board, at the request of Governor-General Leonard Wood and the Bureau of Agriculture, conducted a study to improve the vaccine. Major Raymond Kelser led the group that conducted the study. The other members of the group were Dr Stanton Youngberg, Dr Teodulo Topacio, and Dr Ildefonso Patdu from the University of the Philippines College of Veterinary Science. The Rockefeller Foundation funded Kelser's research team.¹²² After months of experimentation, the research team concluded that chloroform in proper proportion to a mixture of blood and finely ground tissues from an animal killed in the acute stages of rinderpest was able to kill the rinderpest virus. It led to a rapid decrease in the number of deaths due to rinderpest. The Bureau of Animal Industry used this same vaccine for six years. In that period, there were fewer than 200 deaths due to rinderpest.¹²³

Despite its initial success, the Kelser chloroform-treated wet tissue vaccine was not without problems. The Bureau of Animal Industry found that if the vaccine was not properly refrigerated, it perished within 48 hours. This made the vaccine difficult to use in certain parts of the Philippines where transportation facilities were poor and the supply of ice was not assured. In 1931, Manuel Robles and Juan Generoso, two Filipino veterinarians from the Veterinary Research Division, modified the dry rinderpest vaccine to extend its shelf life. Since the vaccine did not need refrigeration, it was extensively used even in the remotest parts of the country. Its application successfully controlled the spread of rinderpest in the Philippines. By 1934, rinderpest infection was confined to the provinces of Isabela, Negros Oriental, and Negros Occidental, with only 79 deaths recorded.¹²⁴

By 1935, rinderpest was no longer a threat to the cattle and carabao population. According to the Bureau of Animal Industry, it was confined to isolated areas in the provinces of Negros Occidental and Negros Oriental in the Visayas. Two years later, in 1937, the combined use of Kelser's wet tissue vaccine and the

121 Gomez, 'Eradication and Control of Rinderpest in the Philippine Islands', 110.

122 Buencamino, *Memoirs*, 108–9.

123 Buencamino, *Memoirs*, 108–9, 378–80.

124 For an extensive discussion of the work of Drs Robles and Generoso on the modified dry rinderpest vaccine, see Manuel M. Robles and Juan D. Generoso, 'Progress Report on Dried Rinderpest Vaccine', *Philippine Journal of Agriculture* 2 (1931): 341–5; and Teodulo Topacio, 'Preservation and Purification of Dry Rinderpest Vaccine', *Philippine Journal of Animal Industry* 4 (1937), 379–88.

dried powdered vaccine proved very effective: no case of death due to rinderpest was recorded. While several cases were discovered in the following year, the infection was isolated and easily checked by the Bureau of Animal Industry. In 1939, the Bureau did not receive notice of a single case of rinderpest. For this reason, the Bureau of Animal Industry officially declared the Philippines rinderpest-free.¹²⁵

Table 2 shows the number of cases and deaths due to rinderpest and the type of vaccination given to animals in 1923–39.

Table 2: Prophylactic treatment used against rinderpest, 1923–39.

Year	Cases	Deaths	Doses of Rinderpest Vaccine Used	Type of Vaccination Used
1923	27,505	23,220	44,345	Phenolized, 3 injections
1924	19,599	15,350	385,098	Phenolized, 3 injections
1925	14,143	10,747	286,141	Phenolized, 3 injections
1926	9,824	7,470	397,128	Phenolized, 3 injections
1927	3,013	2,123	497,743	Phenolized, 3 injections; and chloroform-treated, single injection
1928	3,650	2,695	249,893	Chloroform-treated, single injection
1929	4,069	3,105	442,533	Chloroform-treated, single injection
1930	1,659	1,420	400,333	Chloroform-treated, single injection
1931	1,325	951	112,928	Chloroform-treated, single injection
1932	196	139	390,500	Chloroform-treated, single injection
1933	529	297	224,373	Chloroform-treated, single injection
1934	134	79	53,846	Dried, single injection
1935	79	39	7,000	Dried, single injection
1936	101	46	38,840	Dried, single injection
1937	0	0	21,200	Dried, single injection
1938	35	26	18,480	Dried, single injection
1939	0	0	11,358	Dried, single injection

Source: Angel K. Gomez, 'Eradication and Control of Rinderpest in the Philippine Islands', *Journal of the American Veterinary Medical Association* 113, no. 857 (August 1948): 110.

125 Commonwealth of the Philippines, *Annual Report of the Bureau of Animal Industry for the Period January 1 to December 31, 1935*, 9–10, 143; *Annual Report of the Bureau of Animal Industry for the Fiscal Year Ending December 31, 1937*, 16–17; *Semi-Annual Report of the Bureau of Animal Industry from January 1 to June 30, 1939*, 14.

Conclusion

The American colonial government's assertion of its role as an 'instigator and active participant in the dissemination of scientific knowledge'¹²⁶ in the Philippines was clearly manifested in its attempt to control and eradicate the spread of rinderpest in the Philippines. The application of scientific knowledge through the implementation of modern veterinary policies in the colonial Philippines provided a new way of understanding the Western constructs of the tropics as both physical and conceptual spaces.¹²⁷ The necessity to control the spread of animal contagions in the Philippines shows the American colonial government's desire to conquer the Philippines not just in terms of physical space or colonial territory, but also as a conceptual territory. Yet the American colonial government failed to master nature in the tropics by simply implementing policies that many Filipinos considered culturally insensitive.

In this study, the dominance of the American colonial state over its colony was particularised in the study of animal contagions or epizootics and the coloniser's successful application of modern scientific knowledge. As the new colonial elite who actively participated in the study of the health problems of domestic animals in the tropics, they in the process created 'scientific developments' and produced medical specialisation in the diseases of 'warm climates'.¹²⁸ In this research, the emphasis given by American colonial officials to the control of the spread of animal contagions in the Philippines led to the advancement of a specialised medical field in the colony—the development of Philippine veterinary science.

In their attempt to control nature and assert their dominion over the Philippines' tropical environment, American colonisers instituted an extensive campaign against rinderpest, the most infectious animal contagion or epizootic recorded in the country. The earliest solution implemented by the Americans to address the rinderpest problem was the establishment of agencies, both government and academic institutions, to lead the campaign against the spread of animal contagions and to produce a new breed of Filipino veterinarian in the colony. They established the Bureau of Agriculture and its successor, the Bureau of Animal Industry, as principal agencies tasked with controlling animal contagions. The colonial government also opened the first veterinary college anywhere in Southeast Asia, the University of the Philippines College of Veterinary Science, to train Filipino veterinarians.

126 Bankoff, 'A Question of Breeding', 424.

127 Bankoff, 'A Question of Breeding', 424.

128 Bankoff, 'A Question of Breeding', 424.

Apart from establishing institutions, American colonial officials also enacted policies to control the extent of infection of the contagions in the Philippines. In 1902, American veterinarians implemented the serum inoculation programme, but it was considered a failure because of the high mortality rate incurred. Five years later, agricultural officials imposed a strict animal quarantine policy to control animal movement and thereby the spread of contagions. The quarantine programme was implemented by American veterinary officials against rinderpest in a similar manner to that by which they addressed the cholera epidemic in the Philippines during the early 1900s.¹²⁹ Like the cholera-infected Filipinos, the sick carabaos and cattle were viewed by the colonisers as 'degenerate types' that, according to Anderson, required 'constant surveillance, instruction, and sometimes isolation'.¹³⁰ Because of such views, the Americans' policy required the application of isolation or quarantine measures to all sick animals.

Many Filipinos considered the serum inoculation programme and the animal quarantine policy as both evil and heartless because they separated Filipino livestock owners from their animals and failed to consider the economic value of the carabao to the farmer. Detaching the carabao from the farmer was tantamount to paralysing the farmer's only source of income since the carabao was the farmer's life and his main source of livelihood. Without his beast of burden, he could not cultivate his rice fields.

An anti-rinderpest vaccine was developed by Dr William Boynton in 1923 and improved later by Filipino veterinarians to ensure its effectiveness. With the vaccine's application in the field, total eradication of the contagion was achieved in the Philippines by 1939. However, the road travelled towards the long-awaited cure for rinderpest was very difficult. Many farmers had lost their work animals during the campaign because many carabaos and cattle died due to the ineffective serum introduced by the American veterinarians. During the entire campaign of the Americans against rinderpest, the colonisers transformed the Philippines into a tropical laboratory where the farmer and his work animal were made into laboratory subjects. As the American veterinary experts worked on the cure to the disease on a trial-and-error basis, the Filipino's sentimentality, his emotional attachment to his beast of burden, and his culture were ignored. And worse, their negative reactions towards the policies were criticised by American colonial officials who stated that the Filipinos were simply ignorant of Western science. Success may have been achieved in the control and eradication of epizootics in the Philippines. America may have achieved its goal to end the spread

129 See Reynaldo Ileto, 'Cholera and the Origins of the American Sanitary Order in the Philippines', in *Discrepant Histories: Translocal Essays on Filipino Cultures*, ed. Vicente L. Rafael (Manila: Anvil Publishing, 1995), 51–81.

130 Warwick Anderson, "'Where Every Prospect Pleases and Only Man is Vile": Laboratory Medicine as Colonial Discourse', in *Discrepant Histories: Translocal Essays on Filipino Cultures*, ed. Rafael, 100.

of rinderpest in the Philippines and considered it as an important legacy in Philippine veterinary science, but the programme to combat the disease was a brutal and heartless one to Filipino farmers. Even as the instigator and active participant in the dissemination of scientific knowledge, the American colonial state failed to win the support of the Filipino farmers to help them solve the epizootics problem because they did not consider the cultural dimension of their scientific policies.