

and religion. These divisions, constructed by modern researchers, reveal more

ground, and not just in North Otago. Two letters of support, for instance, appeared in the paper of a neighboring province, Canterbury.²⁰ A North Otago correspondent, T. M. Whither, urged that “no time should be lost in again repeating these experiments” while other letter-writers pledged support and money.²¹ Drought clearly generated a great deal of environmental anxiety in North Otago. Not all farmers, though, willingly championed rainmaking. Observing that his neighbor had contributed to the rainmaking fund, one canny

result in 1907.²⁸ Many also drew confidence from overseas rainmaking efforts, since Oamaru's aborted plans in 1891 had been modeled on Wyoming and Texas rainmnd

Rainmaking Prayers

“It is impossible to consider” the matter of rainmaking, explained one correspondent to the *Oamaru Mail* in July 1907, “entirely apart from the religious belief of so many in our district.” This letter-writer held that rainmaking was not impious: “I solemnly believe that man, in the act of endeavoring [sic] to bring water down from the clouds above, can do so with just as much reverence towards Him as in the act of endeavoring to obtain water by digging and boring in the earth beneath.” Some people may object to the experiment, conjectured the writer, because they believe “the Creator is in the region of the clouds above” but, in fact, God is everywhere you look. The writer finished by enclosing a £1 donation with the hope that “others, [from] both farmers and citizens, will promptly follow.”³⁶ Another correspondent agreed. According to Scripture, rainmaking prayers and rainmaking experiments went hand-in-hand: “Let them ask for much-needed rain, and ‘Prove me now, herewith, said the Lord of Hosts, if I will not open you the windows of Heaven and pour you out a blessing that there shall not be room enough to receive it’ (Psalm XCV, from Malachi iii., 9 and 10),” wrote the correspondent.³⁷

At the second meeting of the Rain-Making Committee in August 1907, rainmakers acknowledged their “dependence upon the Almighty for the success of our efforts” by requesting “the co-operation of the various religious bodies in the district, and desir[ing] that the clergy and leaders of denominations offer up special prayers in relation to the matter.”³⁸ The next day, churches in Oamaru held special prayers for rain.³⁹ While Oamaru’s Presbyterian churches held indoor services, a group of Salvation Army faithful held a two-hour outdoor service in North Otago’s dry, droughty interior punctuated by music and quiet reflection. With the Salvation Army in Oamaru holding a similar service, it was popularly said at the time that the fall of rain in each area would indicate the faithfulness of the respective branches.⁴⁰

³⁶ *OM*, July 23, 1907, p. 4.

³⁷ *OM*, July 25, 1907, p. 3.

³⁸ *OM*, August 10, 1907, p. e. *Oking pra*”orD0.0221 Tw[(up speci)-6.9(al pray)-6.2(ers in relation to the)-6.3(m)12.1(a)0.9(tt)-6.9(er.”)]TJ6 0 29

The Experiments

Meanwhile, on the afternoon of the third meeting of the Rain-Making Committee on August 13, a train conveyed Corporal Meikle and four men of the submarine miners to Oamaru.⁴¹ Rainmakers, perhaps buoyed by the impending arrival of the Defense Force members, were full of optimism. Rain following battles may be “coincidences,” wrote a reporter at the meeting, “but as coincidences they are remarkable.”⁴²

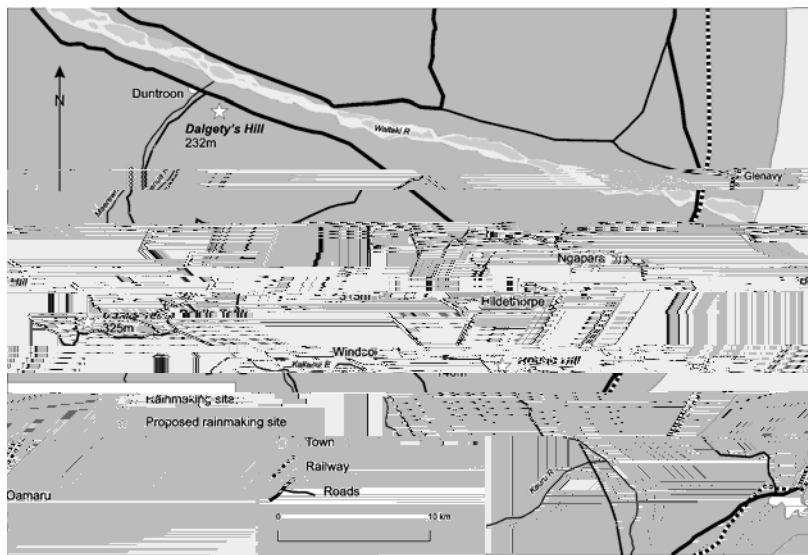
The first rainmaking experiment took place on 16 August atop Raki’s Table, a “flat-topped hill” almost 323 meters above sea level, 22 kilometers NNW from Oamaru.⁴³ At 5 p.m., with the “cool of the evening” approaching, Reverend Bates and the rainmakers, along with two journalists, made their way up to Raki’s Table. To Bates, an ordained Church of England clergyman, and future

sives. By far the most spectacular explosion took place on Raki's Table which, according to *The Mail*, with over 90 kilograms of explosives lent "to the spectacle [of rainmaking] an element of grandeur" with detonations reverberating and re-echoing "amongst the hills like thunder."⁵⁶ Observers certainly felt this blast since its concussion threw them backwards.⁵⁷

Assessing the Rainmaking Experiments

What did observers make of the experiment? After the last blast, the *Oamaru Mail* was enthusiastic, but three days later its tone had dampened. "It has been demonstrated," observed its correspondent, "that rain cannot be induced to fall by air concussion created through the medium of high explosion," although it still gave the rainmakers hope. "Whether [rain fell] as a result of the committee's enterprise, or was the natural sequence of the incomprehensible working of the mightier forces in Nature, the district was experiencing such a downfall as had not been its lot for considerable over [sic] a year, and that the hearts of the farmers and business people would be materially gladdened thereby."⁵⁸

Map of the area where the rainmaking experiments took place.



⁵⁶ *OM*, August 23, 1907, p. 4.

⁵⁷ *OM*, August 20, 1907, p. 4.

⁵⁸ *OM*, August 23, 1907, p. 4.

In contrast, right from the beginning of rainmaking discussions the *Mail's* rival, the country-focused *North Otago Times*, had poured cold water on the experiments.⁵⁹ At their conclusion, the *Times* wrote that the rainmakers went ahead “in spite of [what] all the newspapers have written, in spite of scientific reasonings [sic] on the subject, and in spite of the failure of all the experiments made by the various governments of the world.”⁶⁰ Other newspapers such as the *Auckland Weekly News* and *The Press* reported on the failure of the experiments.⁶¹ “ANTIFAKE,” a correspondent, even likened their effectiveness to “shooting boiled peas at Gibraltar.”⁶² Meteorologists also criticized the experiments. Measured criticism followed in Reverend Bates’ report on the rainmaking.⁶³ “Until it can be shown,” he wrote, “that the temperature of the air can be controlled by gigantic cooling operations we may look in vain for any alteration in the natural order of events by way of the production of artificial rain.”⁶⁴ Another meteorologist, probably Cleveland Abbe of the United States Weather Bureau, who edited the journal in which Bates published his report on the experiments, regarded the North Otago rainmaking “as misguided and vain by all scientific meteorologists.”⁶⁵ Bates, unlike Abbe, at least found room to praise the worthy efforts of Oamaru’s “progressive, enlightened, and experienced farmers and business people” who had “the best interests of the community at heart” in promoting the experiments.⁶⁶

In contrast, many people in North Otago poured their money and enthusiasm into the experiments, sincerely believing that these had ended the drought. Since rain had fallen almost immediately after the first explosion, many Ngāpara residents, for instance, attributed it to the experiment.⁶⁷ Indeed, one George White of Hilderthorpe felt sure that the experiment had caused rain in his area.⁶⁸

gratitude to Our Heavenly Father who has so abundantly supplied our need.”
Davey ended by imploring the Committee “in conjunction with the various

among Anglicans and Presbyterians alike.⁸⁰ Special prayers addressed many important national issues, from drought and cattle plagues, and cholera outbreaks to the health of the Prince of Wales.⁸¹ Increasingly from the mid-nineteenth century, however, rainmaking prayers in England and Australia were generating a great deal of criticism from among the liberal Protestant intellectual elite and other social groups. In England, growing understandings of the natural world – the discovery of what would be termed “natural laws” – were helping change notions of Providence, and in turn were leading some liberal Protestant elite and agnostics to question the efficacy of special prayers. To them, “solutions to human problems lay with human effort rather than through the protection of the Church.”⁸² Another important reason behind the increasing criticism of special prayers is to be found in social changes taking place in England. Liberal-minded clerics, scientists and professionals challenged the wealth and influence of other clergy by criticizing special prayers and the like. Where often some professionals attempted to undermine the church’s status and authority, and thus create a niche for themselves, some liberal clergy wanted to broaden the appeal of the church.⁸³ One consequence of these changes came in 1853, when Lord Palmerston, the British Home Secretary, limited the use of prayers to cure cholera because he believed poor sanitary conditions, not divine displeasure, explained its spread.⁸⁴ Controversy raged over the next decades on the efficacy of special prayers, and not just in England.

In Australia in 1882, the Anglican Bishop of Melbourne, Dr Moorhouse, became embroiled in scandal when he refused to endorse prayers for rain. Moorhouse argued that “God indicated by His providential arrangements that it was His will that we should conserve the water sent to us in winter.” *The Australasian’s* editor drew comparisons between Moorhouse’s reply and that of Lord Palmerston.⁸⁵ Later the editor praised Moorhouse for his “logic,” “eloquence” and “freedom of thought” in supporting science against theology. The editor presented Moorhouse as expressing views that formed “a well-defined milestone on the road to intellectual progress.” The editor implied that Moorhouse’s action would abolish “that large part of church ritual which is directed to enlist

⁸⁰ Turner, *Contesting Cultural Authority*, pp. 151-170 [chapter originally published as “Rain-fall, Plagues, and the Prince of Wales,” *Journal of British Studies* 13 (1974), pp. 46-65]. Quote from p. 154.

⁸¹ Turner, *Contesting Cultural Authority*, p. 153.

⁸² John Hedley Brooke, “Science and Secularization,” Linda Woodhead (ed.), *Reinventing Christianity: Nineteenth-Century Contexts* (Aldershot (Hampshire), 2001), pp. 229-238, quote from p. 155. See, for instance, Gilbert White, *The Natural History of Selbourne* (Oxford, reprint 1993).

⁸³ Turner, *Contesting Cultural Authority*, p. 158.

⁸⁴ *Ibid.*, pp. 154-155.

⁸⁵ *TA*, March 4, 1882, p. 273.

this body for power and prestige. New Zealand professionals, in contrast, did not have to challenge an established church to gain power. New Zealand's greater social opportunities enabled Catholics in nineteenth-century New Zealand to enjoy greater educational and economic opportunities than in Australia, and probably Ireland, thus minimizing the potential for religious grievances in the colony.⁹² A measure of its greater religious tolerance is that in the 1880s the Stout-Vogel Government was led by a freethinker, Sir Robert Stout, and a non-observing Jew, Sir Julius Vogel. Later, in 1889, John Ballance, an energetic and likeable Irish freethinker, became New Zealand's Prime Minister.⁹³ Rain-

God had created clouds so as “to give pleasure to man.” According to Bates, they “spoke of the Divine mercy and faithfulness ... [and] were also types of sorrow, sin, and forgiveness.” Just as clouds rose “from various places ... in glory and purity: so might humanity be glorified in the resurrection, and, though poor and weak and sinful now, be numbered amongst those who stand around the throne of God.”⁹⁷ A theistic sermon about clouds preached by the future head of the country’s meteorology branch, indeed, does indicate that historians have underplayed the role of religion in early twentieth century New Zealand science. Equally, the assumption that rationalism automatically precludes religious sensibility must be questioned.

Environmental Learning and Agricultural Change

The North Otago drought of 1906-7 brought changes to farming practices. Dairy farming, which suffered severely during the drought, virtually disappeared from the region and only recently has re-emerged.⁹⁸ Irrigation networks and fertilizer use also increased.⁹⁹ Other suggested changes, including tree planting to encourage rainfall and the adoption of dry farming techniques failed to gain popularity and indicate the popular limitations of environmental learning. Earlier extreme climatic events in New Zealand also had caused land use changes. The 1895 snowstorm, which swept through the South Island, for instance, highlighted the problem of overstocking.¹⁰⁰ Extensive periods of drought, likewise, often heightened fears of human-induced climate change caused by deforestation.¹⁰¹

Bates believed that deforestation had caused climate change in North Otago, and thus “may be combatted [sic] on scientific lines” through tree planting.¹⁰²

Bates drew attention to archaeological evidence from the region that indicated 2 412(i2.2(in)o-5.2ate)-ni2.6.8(o)-(t thro

belts intercepting the northwest and southwest winds,” to “act as shelters and windbreaks,” and to “conserve the rainfall which now runs off in floods or evaporates in hot, dry weather.” Although Bates avoided the question of “whether forest trees increase the rainfall or are themselves the result of an abundant precipitation,” he nevertheless upheld their influence on climate. Deep-rooted trees, he explained, “prevent surface evaporation by the winds, but also, as they transpire freely in the summer, create a beneficial humidity in their neighborhood [sic]. The excessive heat of a bare, sun-baked soil drives away the rain from a drought-stricken district and thus diminishes the ‘probability of rain.’”¹⁰³ Bates’ confidence that tree planting brought rainfall appears curious, given his strong view that farming techniques should be adjusted to the climate of a region. However, as he indicated in a public lecture on meteorology given in Oamaru, he felt that tree planting could only bring about local climatic changes rather than significant changes in a region’s climate.¹⁰⁴

The forests-rainfall link enjoyed a great deal of popularity among foresters and the public alike and led to the establishment of climatic reserves and forestry departments throughout the world.¹⁰⁵ By the early twentieth century, however, increasing doubt was being thrown on this theory both overseas and in New Zealand.¹⁰⁶

“climatic variations are of the greatest concern to the colony.”¹¹⁰ “We are only a young country,” he had declared to the *Mail*, “and have perhaps tried to follow the Old Country too closely with regard to our productions. We have many things to learn with regard to plants most suitable to the soil and the climate.”

expecting a productive and well-watered landscape, the drought of 1906-7 seemed an aberration, but it was one that they later would realize actually formed a regular part of this region's climate.

Conclusion

Reactions to drought offer the environmental historian an opportunity to investigate contemporary environmental ideas. In the nineteenth and twentieth centuries, drought gnawed away at the confidence of some farmers and public alike and none more so than in parts of the South Island provinces of Canterbury and Otago. These provinces, the powerhouses of the nineteenth century New Zealand economy, relied on abundant rainfall for the production of grain, meat and milk. When, in 1906-7, drought struck North Otago, severely curtailing agricultural production, residents turned to rainmaking prayers and rainmaking experiments. Special prayers thanking the Almighty for the end of the drought show that, for many North Otago Presbyterians, God remained directly involved in the natural world. Residents of North Otago viewed prayer and experiment, religion and science, as complementary activities designed to meet the same ends. D.C. Bates, meteorologist and clergyman, neatly illustrates that, to many in early twentieth-century New Zealand society, there was no distinctive, hermetically sealed division between the secular and the profane, or between science and religion. Science and religion were not mutually exclusive fields, locked in battle for the minds of modern Westerners.¹¹⁶ This evidence of the continuing strength of religion and science questions two dominant paradigms about New Zealand society: first, that scientific rationalism was automatically antipathetic to religion and, second, that by the early twentieth century scientific ideas were secularizing New Zealand society. Certainly, for some agnostics and a smaller number of atheists, scientific ideas allowed them to question religious belief, but for the vast majority, Christianity remained important and relevant to their lives. Rainmaking also reveals divisions within society over the meaning of science. Local residents enthusiastically embraced the bombarding. In contrast, meteorologists decried them as unscientific and amateurish, thereby attempting to increase the legitimacy of their own profession by criticizing the amateurism of non-professionals. Aside from revealing such tensions in New Zealand society, rainmaking has wider relevance. As this

World (New Haven and London, 2000); John Delumeau, *History of Paradise: the Garden of Eden in Myth and Tradition* (translated by Matthew O'Connell, New York, 1995).

¹¹⁶ For a history of the development of ideas of a conflict between science and religion see John Hedley Brooke, *Science and Religion*, pp. 33-42; David C. Lindberg, Ronald L. Numbers, "Introduction", David C. Lindberg, Ronald L. Numbers (eds.), *God and Nature: Historical Essays on the Encounter between Christianity and Science* (Los Angeles and Berkeley, 1986), pp. 1-18.

article shows, other people, such as those in England and Australia, undertook similar prayers and experiments, yet responded to them in very different ways. Investigating these differences reveals the importance of the special social and cultural characteristics of each country which, in New Zealand's case, was its greater religious tolerance and social opportunities.

Drought also encouraged changes to existing farming techniques, including the use of dry farming methods, tree planting, fertilizers and irrigation. In suggesting dry farming methods, some settlers rejected the dominant image of New Zealand as a fecund and well-watered land ideally suited to European agricultural practices, an important step in environmental learning that was thwarted because improved fertilizers allowed agricultural techniques to remain unchanged. Tree planting offered another alternative to improving the droughty North Otago interior by encouraging rainfall to the region. Ultimately, however, expectations of a productive, well-watered land outweighed considerations that North Otago's environment might be anything different.

Investigating reactions to individual weather phenomena thus can reveal much about the societies affected by these events: about their organization, the solutions they sought to combat the problem and, in turn, the prevailing environmental beliefs underpinning these. Religious writings and documents stand out as a rich, and so far underused, source of enquiry into New Zealand's environmental history. Sermons offer fascinating perspectives on clerical views on the relationship between humans, the natural environment and God. Settlers'