

Climate and Culture Connections in Australia

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Abstract

Climate and culture in Australia connect in many varied ways. Such connections are most obvious in years of extreme climate fluctuations such as 2002. However, few historians or sociologists appear to recognise the breadth of ways in which climate and culture have interacted over many years. Many meteorologists, also, seem unaware of many of the connections between climate and Australian culture. This paper documents a wide cross-section of these connections, and provides a simple categorisation of them.

Introduction

“It is interesting to note that the larger inhabited part of Australia is in those latitudes in the Southern hemisphere which in the Northern produced the great civilisations..., the latitudes between tropical luxuriance and the austerity of the north. As Ford Maddox Ford has pointed out, this belt of culture extends to the far east, along the great trade route, the belt of climate identical with that of the southern half of Australia. It is the climate in which the eye is stimulated and the body is free. When one realises that in the short time of her settlement Australia has produced such a high proportion of painters and musicians, and that she has such a fresh and enthusiastic feeling for the arts, it seems almost certain that she has before her a cultural future of amazing brilliance.” (Boyd, 1953, p 246).

Climate variations, the search for climate understanding, and the desire to dominate climate, have been the catalysts for changes in technology, engineering, and economics. Not surprisingly, therefore, climate has also been a major influence on other aspects of Australian culture, and its influence has been recognised by Martin Boyd (see the quote above) and many others. Partridge (1953) even asserted that “the different climate” had been a factor in the development of “the Australian language”, noting that “Climate and physical surroundings have gradually shaped Australian pronunciation into something decidedly *sui generis*, quite distinct even from South African”. The different climate has also led to a different approach to climate terms. Baker (1945) lists several indigenous Australian climate words, including “The Dry” and “The Wet” to describe the dry and monsoon seasons. During the 1997/98 El Niño event, the term “El Niño” became equated to “drought” in the media (Kestin, 2000), so commentators often used “El Niño” when they meant drought. This appears to have been a uniquely Australian twist. More generally, climate terminology is often used metaphorically in Australia, especially in politics. Thus the following headlines were all used, in political articles, on a single page of The Australian newspaper of 17 October, 2001:

“Weathering an unseasonal damp”
“The drought of ideas”
“Wets freeze up in Howard's way”

In this paper the various ways climate has connected with culture in Australia are discussed. Many of these connections have been documented elsewhere, but these discussions are spread across many fields. It seems useful to collate descriptions of these connections, to provide an overview of the way in which culture and climate interact (or have interacted) in Australia. The interactions have not been, of course, all one way. As the science historian Richard Olsen has pointed out “Scientific theory itself arises only

out of and under the influence of its social and intellectual milieu; that is, it is a product as well as a determinant of culture” (Olsen, 1991, p 3). Similarly, certain aspects of climate theory need to be considered within the contemporary cultural milieu. Although this review of connections covers a wide range of fields, the selection included does tend to reflect the author's interests and biases, in the interests of restricting the manuscript to a reasonable length. The connections are presented in an approximately chronological order. A very broad definition of “culture” is used here, namely “the total range of activities and ideas of a group of people” (from the Collins English Dictionary, 1979).

Climate and culture connections

The most ancient connection between climate variability and culture in Australia relates the El Niño - Southern Oscillation, the irregular nonannual “cycle” of floods and droughts that dominates much of the country, to the ancient culture of the indigenous population. The unpredictable and long-lived droughts and wet periods make agriculture difficult, even today. Without modern technology to support the risky agriculture, adoption of a hunter-gatherer culture seems to have been a sensible choice (Nicholls, 1989; Diamond, 1997). As Diamond notes:

“Nomadism, the hunter-gatherer lifestyle, and minimal investment in shelter and possessions were sensible adaptations to Australia's E NSO-driven resource unpredictability.”

Indigenous accounts of major droughts and floods, now adapted into what seem like mythological stories, can be found. For instance, in a story now adapted for modern children, Tiddalick the frog drank all the water from all the rivers and billabongs, causing a major drought. Finally an eel made the frog laugh and all the waters poured out of his mouth in a great flood (Roennfeldt, 1980). The concept of widespread, devastating droughts, followed by widespread flooding, is a realistic depiction of climate variability in a country dominated by the El Niño - Southern Oscillation phenomenon (Nicholls, 1991).

The annual cycle was certainly well understood by Aborigines, with numerous examples of detailed calendars available. In the north, the monsoon wind reversals affected the language of the Australian inhabitants. Some of the names for the monsoonal winds were derived from Macassan-Malay words (Jones and Meehan, 1997). These words were imported by Macassan sailors on seasonal visits to Arnhem Land to collect sea cucumber, prior to the British colonisation. Some Aboriginal men accompanied the sailors back to Macassar, returning the following season, thereby demonstrating their understanding of the seasonal monsoonal reversal. The Indigenous Weather Knowledge web site (www.bom.gov.au/iwk) documents much other indigenous knowledge of climate in Australia, and how it relates to human activity and culture.

Those who decided to transport convicts to Australia and to establish a European agrarian-based culture were also interested in the climate. The 1770 House of Commons Committee in its consideration of several possible sites for transportation emphasised that a “healthy climate” was needed. Botany Bay was selected partly because of its supposedly near-tropical and healthy climate. Little clothing was provided on the First Fleet because of the expectation of a warm climate. The early settlers certainly believed the climate was healthy, and that this affected the culture in many ways. Watkin Tench, stepping ashore at Botany Bay in 1788, and others believed (Nicholls, 1997) that the healthy climate was the reason for:

“The great number of births which happened, considering the age, and other circumstances, of many of the mothers. Women, who certainly would never have bred in any other circumstances, here produced as fine children as ever were born.”

For many decades after colonisation there were intense discussions about the nature of the Australian climate. In the 1840s, it was still unclear whether inland Australia was arid. Ludwig Leichardt, in a letter to the German Professor Heinrich Dove, asserted that the remarkable hot and dry northwesterly winds affecting Sydney were a “decisive indication of a desert in the interior of the country” (Moyal, 1986). In this Leichardt was at odds with The Rev. W. B. Clarke who concluded that the winds indicated the existence of a salt lake or extensive vegetation in the inland. Leichardt, in his letter to Dove, asserted that Clarke's “head is full of vortices and wind-classification, as you may well suppose from his

extraordinary deductions”.

The mid-19th century saw a succession of arguments about whether the Australian climate was “healthy” (Nicholls, 1997). Just one of these debates concerned tuberculosis (then known as consumption or phthisis). As early as 1850 Australia was being promoted as having a climate beneficial to consumptives, leading to a “rush” of consumptives to the colonies. One medical critic of this promotion was expelled from the Medical Society of Victoria for his “heretical” views. The debate then raged between the medical profession and the Victorian Government Statist, Henry Heylyn Hayter, who used his Victorian Government Year Books to attack the belief that the climate was favourable for the cure of consumption. *The Age* newspaper took Hayter's side, but the debate continued until the end of the century. Writers encouraged emigration to the colonies by stressing the quality of the climate: “What do our struggling thousands gain by emigration to such lands as Australia and New Zealand, and what do they lose? For the foggy uncertain climate of Great Britain they will find one equally healthful and invigorating” (Heatherington, 1883).

The more general debate, about whether the Australian climate was healthy, continued until the end of the 19th century. Michael Davitt, quoted in White (1981) believed that the sunnier climate and the outdoor life helped “explain the vigorous frame, manliness of bearing, and stamp of independence of the average Australia”. On the other hand, Dr Alexander Buttner (also quoted in White, 1981) noted that “in cases where both the parents are Australian born, the weakening effect of the climate shows itself more and more strikingly with each succeeding generation”.

Thus even before the Australian climate was documented and understood, it was considered a major player in determining the culture. By this time, the Australian annual cycle was well understood, as the anonymous poem “The land of contrarities” indicates:

“The sun, when you to face him turn ye,
From right to left performs his journey.
The North winds scorch; but when the breeze is
Full from the South, why then it freezes.
Now of what place can such strange tales
Be told with truth, but New South Wales?”
(cited in Clarke, 1977).

Surprisingly, the Australian climate was not seen as a reason to change diet or clothing from what was suitable in England. At the end of the 19th century, Philip Muskett, Senior Resident Medical Officer at Sydney Hospital suggested (obviously in frustration at the inappropriate diet of the times) that: “Because we had a climate far closer to that of southern Europe, notably Provence in France, we had no business stuffing ourselves with a diet that had been designed for a wet and cold England. We had no need for huge amounts of meat, enormous quantities of fats, as taken in sweet puddings and other heavy desserts. Instead we should switch to a grain and vegetable diet with large quantities of fish and sparing amounts of meat.” (Beckett, 1984)

Doctors convinced the population of the necessity to continue the English practice of wearing flannel underwear, to prevent the wearer from catching a chill (Hagger, 1970). This practice continued into the 20th century, despite the discomfort from working in the heat in thick flannels.

Climate was, however, going to have a revolutionary effect on economics. William Stanley Jevons, later to be famous as the founder of modern, mathematical economics, spent five formative years in Australia in the 1850s and prepared the first comprehensive, scientific description of the Australian climate (Nicholls, 1998). He was obsessed with meteorology, and continued this interest when he returned to England. Stigler (1982) points out that Jevons's first empirical work in economics, the preparation of a time series plotting commercial events, was inspired by his interest in meteorology. Jevons even referred to his charts as being for the study of “commercial storms”. Jevons was fascinated by the 11-year sunspot cycle, and tried, unconvincingly, to relate this cycle, through variations in the Indian monsoon, to business cycles in Europe. Stigler suggests that Jevon's background in meteorology made him susceptible to the apparent associations between sunspots and commerce. This background also made him want to apply quantitative methods to economics: “It seems necessary, then, that all commercial

fluctuations should be investigated according to the same scientific methods with which we are familiar in other complicated sciences such as meteorology” (Jevons , 1862). Keynes (1936) says that Jevons “approached the complex economic facts of the real world, both literally and metaphorically, as a meteorologist”.

About the same time, on the other side of the world, a development in climatology which would have a profound impact on the Australian economy was under way. After an injury forced him from active service, Lieutenant Matthew Maury of the US Navy in 1842 took charge of the Navy's Depot of Charts and Instruments in Washington. While in this office he compiled oceanographic data from old and current ship logs, to prepare charts of winds and currents, “for the improvement of commerce and navigation” (Maury, 1857). His published charts and books were in immediate demand from sailors, and led to a sudden reduction in the duration of voyages. Maury notes that the charts reduced the England-Australia round trip from 250 days to 160 days, saving British commerce an estimated ten million (U.S.) dollars annually (Maury, 1857, viii). The commercial importance of this increased understanding of the climate of the globe must have had marked impacts on the Australian colonies.

Other aspects of social structure have been blamed on the climate. The first game of Aussie Rules football took place in 1858. Blainey (1990) suggests that climate explains why Sydney, with its wetter climate at the start of the football season (and thus softer parks) coped better with the “more physical Rugby game” (p 84-85) than did Melbourne, where the grounds at the start of the football season are often very hard. Blainey also notes that “Australian football in its opening year was also influenced by a very dry winter. The hard playing surface of 1858 probably helped to accelerate a trend away from the severe physical contact of Rugby” (p 94). Recent work (Orchard et al., 1999) has demonstrated that cruciate ligament injuries in Australian football are more likely in dry conditions. Thus there was a five-fold increase in non-contact anterior cruciate ligament injuries in Melbourne during the El Niño year of 1997.

In the mid-19th century *The Argus* (21 April 1856) used the climate as an argument for the introduction of an eight-hour working day: “We think eight hours in a climate like this is sufficient for any ordinary man” (cited in Clark, 1977, p 736). *The Bulletin* (8 January 1881) was even willing to blame Larrikinism on the climate: “Under the mild skies of Australia little is needed in the way of house-shelter”. That is, the mildness of the climate did not encourage people to work consistently to pay for quality shelter (cited in Clark, 1977, p 687).

A major advance in communications between Australia and the rest of the world occurred when Charles Todd, the Superintendent of Telegraphs of South Australia, supervised the building of the overland telegraph from Port Augusta to Darwin. The line was completed on 22nd August 1872, and the honour fell to Todd to send the first telegraphic message over the line. He tapped out the message: “We have this day, within two years, completed a line of communications two thousand miles long through the very centre of Australia, until a few years ago a terra incognita believed to be a desert.” Apart from the “desert” reference, there were other connections with the climate. Todd was also South Australian Government Meteorologist, and used his position as Superintendent of Telegraphs to “place weather stations in the hands of country postmasters and outlying telegraphists” (Moyal, 1986). By 1874, all Overland Telegraph repeater stations provided meteorological observations which were coordinated with observations from the astronomers in other colonies. Todd (1875, quoted in Moyal, 1976) noted that “stations on the Overland Telegraph are especially serviceable in determining the southerly march of the north-west monsoon, and the rainfall in the interior, which, it is believed, largely influence the seasons in South Australia and Victoria”. In 1877 a severe drought and famine afflicted India, and Henry Blanford, the Imperial Meteorological Reporter to the Government of India, noting that atmospheric pressures had been unusually high over India during the drought, asked his colleagues throughout the Empire for information about pressures in their regions. Todd realised pressures had been high over Australia, and that Australia had suffered a drought in 1877. He also recognised that previous Australian and Indian droughts had coincided. This relationship, now known as a “teleconnection”, forms part of what we now call the El Niño - Southern Oscillation. The telegraph played an important role in communicating climate data across the globe, increasing the ability of scientists to search for

such teleconnections. Todd (1893, quoted in Home and Livingston, 1994) noted that the telegraph was “to the meteorologist what the telescope is to the astronomer, in extending his field of view over large areas of the earth's surface”.

Todd reported this relationship between Indian and Australian droughts in an article in the *Australasian* on 29 December 1888, in the middle of a severe, El Niño related drought. Henry Lawson visited the drought-stricken parts of New South Wales that year, and the experience left a lasting impression on him. In the *Bulletin* of the same date as Todd's article, Lawson published a new poem “Beaten Back”:

“Beaten back in sad dejection,
After years of weary toil
On that burning hot selection
Where the drought has gorged his spoil.”

The severe El Niño related droughts of the late 19th century prompted a flood of similarly depressing poems. The highly variable climate has prompted a greater emphasis in Australian literature on “droughts and flooding rains”, in comparison with mid-latitude Northern Hemisphere countries. Japan, for instance, has a poetry form, haiku, focussed on the seasons. A major determinant of whether a poem is a haiku is the use of a season word (*kigo*). In Australia, especially since Lawson, the focus has been on the hard times associated with drought (ie., deviations from the expected annual cycle), rather than the well-defined seasonal cycle evident in haiku:

“An' half our bullocks perished when the drought was on the land,
An' the burnin' heat that dazzles as it dances on the sand;
When the sun-baked clay an' gravel paves for miles the burnin' creeks,
An' at ev'ry step yer travel there a rottin' carcass reeks...”
(from *The Song of Old Joe Swallow*, Henry Lawson).

The nature of climate in inland Australia was a major point of contention in the literary debate between Banjo Paterson and Henry Lawson carried out in *The Bulletin* in 1892 (Horgan and Sharkey, 1996). Lawson's “In answer to Banjo and otherwise” was published in *The Bulletin* of 6 August 1892, and illustrates his challenge to bush writers to maintain artistic integrity:

“And the “rise and fall of seasons” suits the rise and fall of rhyme,
But we know that western seasons do not run on “schedule time”,
For the drought will go on drying while there's anything to dry,
Then it rains until you'd fancy it would bleach the “sunny sky”
Then it pelts out of reason, for the downpour day and night
Nearly sweeps the population to the Great Australian Bight.
It is up in Northern Queensland that the “seasons” do their best,
But it's doubtful if you ever saw a season in the west,
There are years without an autumn or a winter or a spring,
There are broiling Junes and summers when it rains like anything.”

The severe droughts of the late 1890s and early 20th century probably supported Lawson's bleak view, rather than Paterson's rosier picture. The droughts peaked in 1902. Nellie Melba was, at the time, making a triumphal tour, and she was horrified by the impact of the drought:

“While travelling through Australia by rail,” she said, “I have seen heartrending proofs of the misery caused by the drought. I have seen with my own eyes the brown, burnt paddocks extending for hundreds of miles, with no vestige of grass left upon them. I have seen starving sheep leaning against the fences too weak to move...I have seen the skeletons of cattle and sheep dotting the paddocks, and the signs of desolation and starvation everywhere. It is simply appalling.” (quoted in *The Argus*, 3 November, 1902). Melba launched a drought appeal amongst her rich friends in England, but withdrew when she faced bitter criticism at home. The idea that civilised Australia might, like more primitive countries, need to rely on overseas charity, was repugnant to the locals (Keating, 1992).

Many of the poems of the 1890s and early 20th century depict settlers struggling with the variable climate. The well-known story of Goyder's Line in the Flinders Ranges illustrates how settlement, the variable climate and politics interacted through Australian history. Goyder had, in 1857, surveyed parts

of the Flinders Ranges and estimated the carrying capacities of pastoral runs. He saw the land at a favourable time, and made optimistic estimates. The fees incurred by pastoralists were levied on the basis of the estimated stock-carrying capacity, so when the runs could not support the number of sheep Goyder had estimated, the pastoralists faced ruin, and attacked Goyder. In 1865, in the middle of a devastating drought, Goyder again was sent north to “lay down as nearly as practicable, the line of demarcation between the portion of the state where rainfall has extended and where the drought prevails”. Goyder used the state of the vegetation to decide where useful rainfall had fallen through the drought. By now he recognised the variability and unreliability of the climate but again he was abused by politicians and settlers, this time for being unduly pessimistic, in the good seasons that followed the 1860s drought. Within a decade, wheat farmers had advanced far north of Goyder's Line, sustained by the belief in “the rain-making qualities of the plough” (Mincham, 1983), only to leave the land as droughts returned in 1888 and through the 1890s.

The “rain follows the plough” theory was wide-spread in the late 19th and early 20th century, especially in Australia and the USA. It was not until the dust-bowl 1930s that the theory was put to rest in the USA. In Australia a particular concern was whether forests could ameliorate the climate of the inland. Comments on this topic were included in Australian Year Books right up until 1963, with little change in the text from the early 20th century editions. The advice provided in these articles was that it was a “debatable question”.

One person whose career was initiated by the frequent droughts of inland Australia was the polar explorer Sir Hubert Wilkins whose achievements are summarised in Swan (1990). He was a lad on his family farm in northern South Australia during the severe droughts around the start of the 20th century, and noted that this experience was one reason why he went on to explore difficult environments. The following description and quote from Wilkins come from a web site devoted to his early life and accomplishments (users.chariot.net.au/~lenshome/ghw/ghw_map_mtbryanmap.htm). This land and its hardships shaped Sir Hubert from his very earliest days. *Several times while I was a boy my father was broken by droughts. It seemed that no sooner did we recover from one dry year, pay our debts and begin to prosper, than another merciless drought seared the land once more.* Grierson's biography is equally emphatic - "During his childhood, a deep impression was made on the young Wilkins by the terrible effects of ... drought. This was an unprecedented catastrophe.... Ruin faced the farmers - (his father lost) 90,000 sheep.... He reasoned the only possible form of protection against similar occurrences could be given by accurate long-term weather forecasting." One of Wilkins many explorations was the first attempt to reach the North Pole in a submarine. In this 1931 expedition he took Harald Sverdrup, the noted oceanographer, as his Chief Scientist.

A recurring theme in Australian climate theories is the idea that flooding the inland, by establishing large inland lakes, would lead to a widespread increase in rainfall, and lessen the effect of droughts such as those that affected Wilkins. The best developed of the many schemes of this type was devised by J. J. C. Bradfield in the late 1930s, a time of widespread drought. A review committee was established by the Director of Meteorological Services and reported that there “appears no clear prospect of the enormous benefits to rainfall and climate envisaged by Dr. Bradfield” (Warren, 1945). However, there was a minority, dissenting report from one member of the Committee, E. T. Quayle. Quayle, a government meteorologist, had earlier published papers supporting the contention that rainfall is increased to the lee of inland water surfaces, thus providing the scientific underpinning for the Bradfield Scheme. Similar schemes continue to appear at times, despite repeated scientific opinions that such schemes would affect climate only in the immediate surrounds of the water storages. But flooding the inland is less surprising, and worrying, than some other ideas that have been advanced to overcome Australian droughts. Shortly after the first atomic bombs were dropped on Japan the *Sun* newspaper reported that British meteorologists were discussing “whether atomic energy may be used for breaking up drought in Australia... They say that atomic bombs fired into the lower layers of the troposphere would affect the weather and cause showers over limited areas.” (The *Sun*, 18 August, 1945, quoted in Keating, 1992).

A similar fate to Goyder's befell Griffith Taylor, the head of the Department of Physical Geography at

Sydney University in the 1920s. Taylor wrote books, scientific papers, and newspaper articles on the climate of Australia pointing out, *inter alia*, that much of central and northwest Australia was arid desert unsuitable for settlement. This was unpopular, especially with politicians, and he was attacked in the press and parliaments (Powell, 1979). Sydney newspapers ran a steady campaign against him “arguing that, since Professor Taylor did not seem to like Australia, they wondered why he stayed” (Sanderson, 1988). By the end of the 1920s he had left Australia, taking an appointment at the University of Chicago where he continued his illustrious career.

Politicians and bureaucrats were eager to deny the image of Australia as drought-prone, lest this deter immigrants. H. S. Gullett, the Commonwealth Superintendent of Immigration, was quoted as saying: “Many thousands of Australians go abroad every year on business or pleasure. The Commonwealth Immigration Office appeals to every one of them to embark with the resolve that he will on all possible occasions speak well of Australia. Let none of them speak evil. Such words as 'drought'...should be thrown overboard as the vessels put out to sea.” (*Sydney Morning Herald*, 6 June 1921, cited in Keating, 1992).

At the time, however, many scientists were raising doubts about transplanting European culture into the Australian climate. Francis Ratcliffe, a young English biologist employed in the 1930s to report on the problem of Australian erosion and sand drift, was convinced that the culture imported from Europe was inappropriate to the Australian climate:

“The essential features of white pastoral settlement a stable home, a circumscribed area of land, and a flock or herd maintained on this land year-in and year-out are a heritage of life in the reliable kindly climate of Europe. In the drought-risky semi-desert Australian inland they tend to make settlement self-destructive.” (Ratcliffe, 1947, p 323).

Ratcliffe's first impression of Australia was: “Why misguided humans have attempted to make their homes in it is more than I can comprehend” (quoted by Powell, 2001). Griffith Taylor was convinced that tropical Australia was unsuitable for “close” settlement, at least by whites:

“Referring to U.S.A. it is seen that the line 68°F passes just north of New Orleans and Florida. It will be admitted that these districts are not well suited for *continuous* out-of-door white labour, or at any rate British labour; and the white Australia policy at present does not favour 'dago' immigration from Southern Europe. In Australia this isotherm of 68° passes south of the Tropic of Capricorn, so that one may safely take the latter as the northern limit of the most favourable areas for closer settlement in Australia.” (Taylor, 1915, 245-246).

Taylor supported the immigration of Chinese into Australia, believing that they were the one race that seemed able to thrive in both temperate and tropical regions (Oldroyd, 1994), and advocated inter-racial marriage. *Smith's Weekly*, and many other newspapers and politicians, attacked Taylor as a victim of what it derided as the “recent fad of climatology” (Walker, 1998), in an article entitled “Counsel for the Yellow Streak: Australia's Taylor-made future” (14 July 1923).

It is not surprising, given his interest in climate-culture linkages, that Taylor was drawn into supporting “climate determinism”, a field dominated by Ellsworth Huntington in the early decades of the 20th century. Huntington, in *Civilization and Climate*, asserted (Huntington, 1915) that:

“The climate of many countries seems to be one of the great reasons why idleness, dishonesty, immorality, stupidity, and weakness of will prevail. If we can conquer climate, the whole world will become stronger and nobler.”

Huntington again, from the same source:

“...when the great countries of antiquity rose to eminence they enjoyed a climatic stimulus comparable with that existing today where the leading nations now dwell. In other words, wherever civilization has risen to a high level, the climate appears to have possessed the qualities which today are most stimulating.”

Huntington visited Australia in 1923 and concluded that although the general level of civilisation was higher than could be expected on the basis of climate alone (Walker, 1998):

“...there is no denying that in North Queensland, more than in other parts of Australia, one meets a certain number of people who are either listless, inattentive, and unwilling to do a stroke more work than is necessary, or else are irritable and quick-tempered”.

But this was probably understandable given that (Huntington, 1925, p 309):

“In no other equal area is the white man trying to adjust himself to a climate so extreme in three important aspects; namely, its tropical or semitropical quality, its dryness, and its great variability from year to year.”

Women had even more trouble, apparently, coping with the climate, although Huntington (1925, p 346) “understood” the reasons for their difficulties:

“Perhaps one reason why women in general dislike the [tropical Australian] climate, and why women of the upper classes are especially strong in this dislike, is that women as a rule have less to occupy their minds than have men.”

The argument about whether tropical Australia was suitable for settlement by whites was, in fact, already under way before Taylor got involved. Matthew Macfie, in a paper read to the Australasian Association for the Advancement of Science, in Adelaide in January 1907, asserted that there was little hope of successful European settlement in the tropics (Harloe, 1987). These arguments provided the background to the establishment of the Australian Institute of Tropical Medicine, in Townsville. Anton Breinl, its first Director, surveyed wharf labourers in Townsville and found little appreciable difference to indicate that the tropical environment was producing “measurable changes in the white race” (Harloe, 1987). The Institute used a large cabinet to conduct tests of men reacting to hot, moist environments, and reported to Parliament (Breinl, 1920) and the medical profession that whites could work and live in the tropics, without physiological damage. This argument was important to avoid arguments against the “White Australia Policy”. If whites could not live and work in the tropics of Australia, then non-European immigration would need to be allowed, to provide a workforce for developing the north (Kennedy, 1990). The conclusion that whites could work in the tropics meant that the racially-based immigration policy could be supported.

By the middle of the 20th century the warmth of tropical and subtropical climates had become an attraction. “Follow the Sun. Australian travel posters 1930s-1950s”, a National Library of Australia touring exhibition on display through 2001, exhibited many examples of posters using warmth as a lure for tourists to travel north. A 1938 example by Percy Trompf, “Off to the North for Warmth”, had two penguins (with packed suitcases) standing on a map of Queensland. This emphasis on warmth as an attraction for vacations was a major change from the 19th century, when cool places such as the hills, or even Tasmania, were seen as attractive places to avoid the summer heat (Nicholls, 1997). Most settlers thought Melbourne or Adelaide too hot at the height of summer, and fear of heat stroke was widespread (probably reasonably so).

More recently, there have been suggestions that a warmer, tropical climate may predispose people to authoritarianism and conservatism. Ray (1982) found that Brisbane residents were more conservative than were Sydney residents, apparently associated with a lower rate of tertiary education, and speculated “that the enervating effect of a warmer climate makes the motivation and dedication needed for undertaking higher levels of education harder to sustain”.

It is intriguing that though they thought the tropics were uninhabitable by “whites”, race theorists also contended that because the necessities of life were provided in abundance in tropics, this led to the “ingrained languor and a child-like inability to plan for the future” of “tropical races” (Walker, 1998). Among the criticisms of the tropics was the inevitable “surexcitation of the sexual organs”. The racist nature of climate determinism, and its link with racial cleansing, led to the role of climate in society or history being played down. Most Australian history texts published since the early 20th century do not even mention the short-term influences of droughts, even on the economy, let alone consider climate as a force that could shape society. It is difficult to find a modern history text with “drought” or “climate” even in the index, let alone a discussion of the connection between history and climate events (Blainey and Clark are the notable exceptions). This is a situation not unique to Australia. As Felipe Fernandez-Armesto (2001) said, most accounts of history include “too much hot air and not enough wind”, ie play down the role of climate on society and history.

Yet climate's influence has been clear to many people through this period. In November 1944 Russell

Drysdale accompanied a special reporter for the *Sydney Morning Herald* to cover the drought that was devastating much of New South Wales. Drysdale's drawings of the drought were published along with the reporter's descriptions. Later Drysdale painted a series of canvases based on these drawings. These paintings match the reporter's descriptions:

“To drive into this country in a dust storm...is like driving into a lost world. The dust-laden air plays eerie tricks with light. The sky appears leaden, like a snow sky in Europe, or is crossed by great bands of black, red and grey... The sun is entirely obscured, or shows like a wan full moon. Dead trees, a tragic number, loom through the hot murk in a variety of fantastic shapes as though they died in agony beneath the axe or tortured by thirst as the wind blew the soil from their roots... Worse than the skeletons of animals and trees are the skeletons of homes.”

(Keith Newman, An artist's journey into Australia's “lost world”, *Sydney Morning Herald*, 16 December 1944, p. 5)

Drysdale's “The Crucifixion” (1945), and the others in his drought series, caused a political storm (Bonyhady, 1997). According to Hal Missingham, the Director of the Art gallery of New South Wales of the time, the painting represented “the soil of Australia crucified on the cross of erosion”. Australia's Minister for Conservation, W. F. Dunn, argued that exhibition of the painting overseas would create a false impression of the State. There is a consistent theme through Australian history of politicians choosing to ignore (and even to mock) the realities of the climate as diagnosed by scientists or portrayed by artists, whether it be the work of Hayter, Goyder, Taylor, Drysdale.

There had been severe widespread drought in the 1930s and 1940s, and overstocking through these droughts led to considerable degradation and erosion. But the rabbit also contributed, until the heavy and widespread rains and flooding of 1950 led to the successful establishment of myxomatosis (Ratcliffe et al., 1952). Earlier test releases of the disease in semiarid areas had not led to widespread establishment, presumably because these releases had been made during dry conditions. The wet condition of the 1950 La Niña episode provided ideal breeding conditions for the insects spreading the disease (Nicholls, 1991). Thus the climate contributed to the destruction of rabbits, and the rabbit as a way of life. Another of Drysdale's famous paintings, “The Rabbiters”, painted in 1947, shows this way of life, before myxomatosis.

The stark Drysdale paintings contrast with the far rosier depiction of the Australian climate in the “Golden Summer” paintings of the Heidelberg School late in the 19th century. These, however, were painted in the more benign climate on the outskirts of Melbourne, rather than in western New South Wales where Drysdale had toured (as had Lawson in the late 19th century).

Although climate has been a major theme in literature, and a substantial influence in visual art, it seems to have had less obvious influence on Australian music, although Percy Grainger thought that he had been influenced by the climate: “I come from a warm climate. Physically I'm drawn to the Italian tune colours” (quoted in Covell, 1967, p. 95). Grainger also thought that the sentimentality of some Australian music, and his own *Colonial Song* in particular, was climate-influenced:

“Perhaps it is not unnatural that people living more or less lonely in vast virgin countries and struggling against natural and climatic hardships...should run largely to that patiently yearning, inactive sentimental wistfulness that we find so touchingly expressed in much American art” (quoted in Covell, 1967, p 95).

Perhaps the work most obviously climate-related is Sculthorpe's *Sun Music I* which

“...proclaims in its title an inescapable factor of the Australian environment; and its concentration on these aspects of sunlight represented by glaring desert and menacing power could hardly have been matched by a composer living in a country where the sun is less in evidence.” (Covell, 1967, p 202).

Covell (1967, p 208) notes that “This is music which suggests the irresistible tidal swell of heat and the numbing glare of space and distance”. It is ironic then that the first performance was on a wet night in the Royal Festival Hall, London (Sculthorpe, 1999, p 76).

Artistic and media representations of Australian drought, through at least the past century, have exhibited considerable consistency. Droughts “are consistently defined as unexpectedly severe in their

intensity or duration” (West and Smith, 1996). This allows each drought to be represented as a 'supernatural' threat to society, rather than as an aspect of routine climate. Paul Keating was roundly condemned in the early 1990s for saying that drought is a natural recurring phenomenon. Representations of drought often link it to a “litany of indicators of wider moral anomie and structural collapse: the end of the rural 'Australian way of life', farm bankruptcy, rural suicide, domestic violence, massive stock depletion, rural juvenile crime etc.” (West and Smith, 1996). Drought then, is portrayed as an alien force against which society must unite. The concept of 'drought' operates “much like crime to sharpen the collective conscience and remind 'upright citizens' of their sociality”, highlighting the “need to reaffirm social morality and solidarity in the face of an unexpected and unprecedented challenge from nature” (West and Smith, 1996). Drought, more than other natural disasters, works in this way because droughts are typically long-lived (thereby providing plenty of opportunity to be converted into a “symbolic enemy”) and cover large areas (increasing the likelihood of the disaster being considered as affecting the entire nation).

Drought has been a topic of interest to the community and to scientists, for a long time. A more recent concern has been climate change and the possibility that this is being caused by an enhanced atmospheric concentration of greenhouse gases. This has brought climate scientists back into the public arena, for the first time since the attacks on Taylor and the various proposals in the mid-20th century (eg the Bradfield Scheme) to create large lakes in the inland to ameliorate the climate. Some commentators (Funtowicz and Ravetz, 1993; Bray and von Storch, 1999; Saloranta, 2001) have observed that greenhouse science has become an example of “postnormal science”. In such situations, the facts are uncertain, values in dispute, stakes high and decisions urgent. This is a reasonable characterisation of the climate change issue, where “far-reaching societal policies will be decided on the basis of scientific information that is inherently uncertain to an extreme degree” (Funtowicz and Ravetz, 1993). As Bray and von Storch (1999) note, “...incompatibility between the state of knowledge and the calls for action suggests that, to some degree at least, scientific advice is a product of both scientific knowledge and normative judgement, suggesting a socioeconomic construction of the climate change issue”. Certainly, the politics of the enhanced greenhouse effect has been as important as the science in recent years (Hamilton, 2001). An examination of the history of climate-culture interactions in Australia makes clear, however, that the greenhouse effect issue is just the most recent example of climatology as “postnormal science”. Public arguments about the influence of climate on health, the “rain follows the plough” controversy, the Paterson-Lawson debate, and the ameliorating influence of inland lakes all fit the definition of “postnormal science” although in eras other than our own.

Conclusions

Indicate that although the connections between climate and culture are pervasive, they are not simply a case of climate determining culture. The variety of interactions suggests that there are four distinct ways in which climate connects with culture:

1. Climate affects culture (eg, drought leads to poems entitled “Drought”; climate variability favours hunter-gathering culture)
2. Climate theories affect culture (eg, climate “determinism” can lead to racism; belief that hot climates are unhealthy leads to vacations in the hills; using wind charts to reduce sailing times encourages commerce)
3. Culture affects climate (eg, urbanisation and enhanced greenhouse effect lead to local or global warming)
4. Culture affects climate theories (eg, telegraph allows exchange of climate data, leading to better understanding of climate; existence of computers allows modelling of climate).

The wide variety of these various interactions listed above demonstrates the pervasive nature of the influence of climate on Australian society and culture. It is intriguing, to a climatologist, that despite these clear links between Australian culture most standard descriptions of Australian climate ignore the possible links between climate and the Australian “way of life”. Perusal of a standard Australian history text, or any sociological text considering the Australian “character” or society, is unlikely to reveal any

entries under “climate”, “drought”, or similar meteorological terms. There are exceptions to this. Geoffrey Blainey is the obvious stand out (eg., Blainey (2003) devotes eight pages to the interactions between the Australian climate and society). The general lack of recognition of the part the climate has played, and continues to play, in Australian society and history is especially difficult to comprehend in a severe drought year such as 2002, when the media was dominated by articles about all aspects of the climate and its influence on individuals, the economy, politics, and society. This lack of recognition is perhaps understandable given the undue influence that environmental determinism gained during the first half of the 20th century. But to deny any influence of climate on Australian culture and history seems an extreme reaction. Perhaps in the future a more moderate role of climate on Australian society and culture and history, and likewise the role of these on our understanding of the Australian climate, might be more widely recognised. Again, reflecting on this during a severe drought, one wonders if the 2002 drought will produce another Hubert Wilkins, or a new Russell Drysdale, or a second Henry Lawson?

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