

Biological Diversity as a Political Force in Australia

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Biodiversity and crisis management

The 1980s were marked by a sense of crisis in species loss on a planetary scale. Michael Soulé described conservation biology as ‘a science of crisis’.¹ The task of conservation biologists, in Soulé’s words, was to study ‘the dynamics and problems of perturbed species, communities, and ecosystems’.² Soulé wanted to situate conservation biology as a science useful to policy makers at a time when he saw the world’s accelerating extinctions demanding both action and good science. He and many other ecologists were concerned that while not everything could be ‘saved’, there was a rational basis for making decisions among options. Conservation biology focused on the long-term viability of whole systems. Its key tool for measurement and comparison was biological diversity. ‘BioDiversity’ emerged in this era as a media-friendly variant of this concept at a well-publicized Smithsonian Institution teleconference in 1986, featuring prominent North American ecologists Thomas Lovejoy, E. O. Wilson and Paul Ehrlich.

Historian Timothy Farnham, in his book *Saving Nature’s Legacy*, argued that biodiversity became ‘a new name for nature’ following this meeting.³ Farnham documented the rise of the terms ‘biological diversity’ and ‘biodiversity’, using the North American Institute for Scientific Information database, where there were zero references to biodiversity in 1980 and 1981 and just seven in 1982, but by the twenty-first century there were thousands—over 4,000 references in 2004.⁴ His analysis charts the rapid



Border between South Australia (right) and Victoria (left) – 1969
(Photographer: Peter Attiwill, courtesy)

rise in international currency of the term, via North American scientific publications. There is no doubt that biodiversity became a tool and a *raison d'être* for green groups, such as Conservation International, which was established in 1987, on the heels of the Smithsonian conference. It offered a comparative way to measure responses by governments and others responsible for the conservation of species. It was also adopted at this time by more established conservation authorities, like the International Union for the Conservation of Nature (IUCN) (founded in 1948), as the world's first 'global environmental organization'.⁵ The earlier history in different conservation movements and the role of the science of ecology itself may be lost in this globalizing discourse.

Farnham and others promulgate an 'origins' story rather than a nuanced sense of what drives the global concept of biodiversity, and its uses today.⁶ While there is no doubt that a 'global environmentalist story' accelerates from the 1980s, it is useful to document its roots in actual places, in case histories. Local stories lay the ground for the later widespread uptake of global phenomena. The environmental movement of the Earth Day (1970) era fanned anxiety about species loss in the 1980s, but it built on earlier conservation movements that had been supported by nature lovers, hunters, hikers and national parks activists for more than a century.⁷ This chapter documents an explicitly political use of the idea of biological diversity in 1969 by nature conservationists, significantly before the emergence of green political parties. Australia was not the only place where local stories and individual histories of the idea of biological diversity feature different sorts of actors from the later 1980s movement. America itself has its 'gospel of efficiency' conservationists predating the environmentalists.⁸ The shift from 'conservation' to 'environmentalism' is striking, yet has been little studied.⁹ The Australian case of the Little Desert controversy straddled that shift, and thus it offers a local historical window on changing global ideas, a way to 'slice' through earlier and later stories. Environmentalism changed the world views of some, and alienated others. But none denied that 'something had happened'.

Natural history for conservation

Natural history was the chief motivation for conservation, in Australia and in many other places in the 1960s.¹⁰ Jenny Beckman has traced the power of field naturalists to arouse political support to 'save species' in Sweden, for example.¹¹ In Australia, like Sweden, 'activists' for national parks in the same period tended to be middle-class retirees who were interested in birds or plants, and loved walking and the bush. These serious, older people valued biological expertise. When they needed to fight against developers for their special patches of nature, they asked ecologists to evaluate their case.

Naturalists and bushwalkers joined forces with unlikely allies, including agricultural economists and ecologists, to oppose an agricultural development in an area known as the Little Desert, on the south-eastern edge of the arid centre of Australia. They wanted to save 'their' bushland from becoming wheat and sheep farms, a project dear to the heart of the Minister for Lands, Sir William McDonald. His idea of beauty was 'grass as far as the eye can see'—and this was his electorate, where the economy was struggling and the local high school was about to close down because of low numbers. He was astonished to find opposition in people who thought this 'wasteland' aesthetically pleasing and important for animals and plants. Perhaps he was even more surprised that so many of them drove from Melbourne, a big city seven hours drive away from the region, to appreciate the bush there.

The Little Desert dispute was, in a sense, one of the last of an era in conservation lobbying before Australia (and the rest of the world) turned 'green'. The Little Desert was disputed in an atmosphere where the political preferences of the activists were outside the campaign. There was little shared political ground between them. Little Desert campaigners ranged from 'card-carrying communists' to members of the Melbourne Club, the city's most conservative and exclusive gentlemen's club.

The 'environmentalists' of the 1970s could be characterized as young, left-voting and politically articulate. By contrast, there were very few young activists in the 1960s Save Our Bushlands Action Committee, the activist group concerned about the Little Desert.¹² The protagonists did not vote alike. What they shared was a love of nature. Many of these earlier activists became very uncomfortable with the overt left-leaning politics of the greens, and bemused that the environment had fostered an 'ism', or social movement.

Green political movements

The first green party in the world was the United Tasmania Group in 1972. In May of the same year, New Zealand's Values Party became the first national political party with a 'green' remit and a manifesto 'Blueprint for New Zealand—An Alternative Future'. The name 'Green' was originally fostered by the Builders Labourers Federation in Australia, who, in partnership with the local residents (mostly women, conservative and older), instigated 'Green Bans' protesting to work on sites of cultural and environmental significance in Kellys Bush, an exclusive, leafy suburb of Sydney.¹³ The Green movement expanded internationally later in 1972 with the Popular Movement for the Environment in Neuchâtel, Switzerland. In 1980, *Die Grünen* made 'Green' a major political force in Germany, with a brief to oppose pollution and nuclear power. Increasing partnerships between socialist and environmentalist principles (e.g. Germany's 'red-green' alliance) emerged in these years.¹⁴ The Finnish Green Party became the first European Green

party to be part of a national Cabinet in 1995. In 2012, there were Green political groups in about 90 countries.¹⁵

When I came to write about the Little Desert dispute in the 1990s, just as the green movement was on the rise, many of the former activists opposed the new green politics. They felt underappreciated as pioneering activists for biodiversity, and for national parks and reserves. This conservation work created the niche for policy structures that enabled environmentalists of the 1970s to talk to politicians, but they themselves felt excluded from the 1990s environmentalist discourse. Most of all they regretted that although the Little Desert dispute had established structures for people with environmental concerns to speak directly to governments, governments 'only listen to the greens'.¹⁶ Many of them, including some ecologists, were concerned that the science was by 1990s distanced from campaigning. Over the years in between, ecologists had inspired and supported other environmentalist campaigns. Canadian Neil Evernden commented wryly that the public interest in the environment:

engendered, in bureaucratic circles, a craving for experts.... It was to the universities, citadels of expertise and scientific management, that the bureaucrats turned. And there, as if waiting for discovery, was an obscure biological specialty called 'ecology', which was to become a household word.¹⁷

Ecology was an important expertise for bureaucrats, but it did not always support the moral positions of the environmental movement, and this was a source of discomfort for some conservationists whose actions were grounded in natural history and science.

Experts for the environment

On 14 October 1969, The Honourable J. W. Galbally moved in the Legislative Council (the Upper House of the Victorian Parliament) that a Select Committee be appointed to inquire into and report upon the proposal to open the Little Desert to agricultural settlement. The Committee was required to have special regard for the suitability of the land, the economics of the proposed farm units and 'the value of the area as a sanctuary for native flora and fauna'.¹⁸

The Little Desert Settlement Committee (LDSC) was a political exercise, instigated by left-leaning, opposition politicians who held a useful majority in the Legislative Council (upper house), but not enough seats in the lower house to win government. Although Jack Galbally (the Chair) was a barrister, and its style was legalistic, the LDSC was never intended to be a 'balanced' inquiry. Conservative members of parliament, including Sir William McDonald, the Minister for Lands, declined to be witnesses for

the development scheme. This left the unenviable task of explaining the Minister's development scheme to a hostile inquiry to Alan Judge Holt, the Secretary of Lands, his most senior public servant.¹⁹

Galbally, who was not himself a nature enthusiast, used the drama of the inquiry to discredit on the government and its development scheme. The inquiry also set new standards of public accountability and transparency for agricultural development in the state. Galbally suggested that the public craved 'solid evidence'. Even in 1969, there was growing 'trust in numbers', to use Theodore Porter's phrase, so ecological descriptions of the place and measures of changes that would be wrought by the farming scheme were crucial.²⁰ Ecologists were enthusiastic about applying their science to 'public' purposes, although they were not particularly looking for the political outcomes that drove Galbally. In addition, two senior agricultural economists were prepared to testify that the scheme was not viable economically. An earlier proposal had been abandoned by a commercial developer, and since this time (1963) commodity prices of wheat and wool had fallen sharply, and there had been a major drought in all of south-eastern Australia in 1967–1968, one of the worst in the century. Thus the 'numbers' came not just from ecology, but also economics, and together they lent extraordinary support to the nature-lovers' cause.

Two ecologists gave formal evidence: Peter Attiwill, a forest ecologist, and Malcolm Calder, a pollination ecologist and reproductive biologist. Both came from the University of Melbourne's Botany School. This Botany School participated significantly in public intellectual life and natural resource management under the leadership of Professor John S. Turner, who was head from 1939 until 1973. If he had not been in England on sabbatical at the time of the Galbally inquiry, he would probably have given evidence himself. The younger scientists were confident that their appearance at the inquiry would be endorsed by the 'Prof.'

Botanists taught and controlled aspects of the curriculum for foresters and agricultural scientists and had cooperative research ventures with a number of government departments. John Turner arrived in Melbourne from Cambridge England in January 1939, just as Victoria was devastated by the massive Black Friday bushfires.²¹ Turner later said that he regretted that he had not had sufficient background to seize that opportunity to study 'forest fire ecology'.²² The fires caused massive soil erosion, and made soil conservation a vital concern for the state authorities managing water and electricity. Detailed research into the ecology of the high country was undertaken by Maisie Fawcett from the Melbourne Botany School, with support from the Soil Conservation Board.²³ In the years from 1941 until 1948, Maisie Fawcett worked in various alpine catchment areas. Early in 1945, at Fawcett's request, the State Electricity Commission fenced a 7.7 ha area at Rocky Valley to begin an ecological survey of the Kiewa catchment. Fawcett compared grazed areas with the closed area by pegging out various plots of matching size and similar vegetation. She was thus

If science were indeed 'an essential humanity', then it became natural for this new generation to express its humanity in scientific terms.

Crosbie Morrison's *Argus* articles of the 1930s, his magazine *Wild Life* (1938–1954) and his radio broadcasts of the same name were part of this genre.³⁵ Writers from the nineteenth and early twentieth century, such as Donald Macdonald and Charles Barrett, had established very successful nature study columns in newspapers and magazines.³⁶ Morrison, with his MSc in Zoology, however, introduced a new, consciously scientific note into nature study writings and broadcasts. By the 1950s, the science of ecology was regarded, for example, by Edna Walling, a well-known Melbourne landscape gardener, as an 'essential adjunct' to conservation and landscape design.³⁷

In the 1960s, science writers began to move away from selling the virtues of scientific progress towards writing material that was critical of technology and development. The most internationally significant work in this new genre of popular scientific literature was Rachel Carson's *Silent Spring*, published in 1962.³⁸ In Australia, A. J. Marshall's popularly written *The Great Extermination* marked the beginning of scientists as 'whistle-blowers'. Marshall, a fine writer, was foundation professor of zoology at Melbourne's new Monash University. While technology supported development, increasingly sciences like ecology came to oppose it.

Ecology was increasingly used in field naturalists' circles in arguments for the conservation of the 'the web of life' and, a little later, the preservation of habitat. Ecology was the science that justified nature conservation, but the moral purpose grew out of natural history and nature study.

In the early 1960s, the International Council of Scientific Unions launched an International Biological Program (IBP) to promote the science of ecology, and to put it on a more quantitative basis. Turner was one of the two representatives sent by Australia to the IBP's preliminary meeting in Paris in mid-1964, the other being (Sir) Otto Frankel, world-renowned genetic conservationist. Always alert to public applications, they suggested that the Australian contribution to IBP should support urgent conservation objectives. Ecologists were frequently hampered in responding to conservation concerns, as they all felt the need for 'a big general survey' that it seemed no one had time to do. Turner nominated R. L. Specht, a member of his own department (and then President of the Victorian National Parks Association), as the Australian coordinator for the IBP programme at the Paris meeting. IBP gave Australia a new reason to undertake detailed surveys of its plant communities, and they set about mapping each state's vegetation in a format that conformed with international standards.³⁹

The interconnectedness, yet separateness, of ecology and conservation was a difficulty that each scientist resolved differently. Ecologist David Ashton put it thus:

Ecology is the study of why plants and animals are where they are... Conservation is an appreciation of what we have and want... You can't conserve scientifically unless you know something of the 'why'.⁴⁰

He saw conservation as overlapping with science, but involving something else, captured in the words 'appreciation' and 'want'. Conservation was a matter of negotiation rather than an absolute science. There was, however, unanimity among conservationists, scientists and natural resource managers that science, especially ecological science, was and should be a guiding principle in its negotiation. By 1969, even politicians had noticed ecology. There was no question of the relevance of ecological testimony to the Galbally inquiry into the Little Desert.

The evidence

Jack Galbally was a barrister, experienced at presenting evidence before a court. His opening question to each scientist was about formal qualifications. He carefully orchestrated it so that each testimony began with a statement revealing academic qualifications including a PhD and distinguished international research experience.⁴¹ This served to suggest to the LDSC that ecologists Peter Attiwill and Malcolm Calder both represented 'pure science', despite the fact that Calder was officially nominated as representative of the activist group Save Our Bushlands Action Committee at the inquiry.

Attiwill's testimony centred on a scientific argument for the preservation of the *biological diversity* of the region. 'Biodiversity' is such a familiar term now that this seems unsurprising, but in 1969 it was a new concept. Attiwill explained it carefully. He described a technical definition of 'diversity' as the probability of finding particular species in ten plots placed randomly throughout a plant community. The plots were evaluated using the technique of 'minimal area quadrats'. Quadrats (plots) were of increasing size: 1, 2, 4, 8, 16 and 64 sq. m. The principle of the method is that when the number of species in each quadrat is counted, vegetational diversity can be evaluated by graphing the number of species versus size of plot. If there is great diversity, the graphs show increasing numbers of species. In a vegetationally uniform area, the species per plot graph flattens out.⁴² Attiwill reported that he had established that many species were found at only one or two of the ten plots examined. This indicated that the Little Desert was not just biologically rich but also *diverse*.

Although the plots were random in an area, the areas themselves were spread throughout the whole area under consideration for development. This diversity meant that whatever the area chosen, some species would, statistically speaking, almost certainly be lost, even if a development was undertaken in only part of the area, and a substantial part of the Little

Desert was retained as bushland. On the evidence of the agricultural botany students' 1968 survey, Attiwill could state that species did not occur throughout the region. Rather, they were found only in certain parts of the Little Desert area. Because the survey had been so brief, he was not able to state categorically which species would be lost in any particular place, only that it was statistically likely that some would be lost. This was a clever argument, for it carried the implication that time-consuming and detailed research would be needed before any alienations (land developments) could 'safely' occur. In summing up, Attiwill called for the preservation of all remaining unalienated areas in the Little Desert. The basis for his summary argument moved away from his specific expertise to what he called 'a new morality':

[The] recognition of the need for conservation is part of a world-wide movement which, in essence, appears to be related to the problem of over-population and greatly increased mobility. We now recognise that a finite world can support a finite population. The goal of 'the greatest good for the greatest number' is simply not possible—we cannot maximise two variables at the same time. I believe we must maximise 'goodness', or the quality of life. It is the desire to maximise the quality of life—to make the world a fit place in which to live—that has brought to our attention problems of pollution, of contamination, and of conservation. The need to control the quality of our environment is, I consider, part of a new morality which is now man's urgent responsibility.⁴³

Malcolm Calder (although he had also supervised the Botany School field trip) focused on the aims of the Save Our Bushlands Action Committee, who wanted to 'express their concern over the failure of the government to recognise the social, scientific and even moral responsibility they have to conserve large areas of our natural environment'.⁴⁴ Calder emphasized the growing awareness that 'land is a finite resource', and that it therefore needed 'a far-sighted policy on land use, taking into consideration the needs of the rural industries and primary producers as well as the needs of society for national parks and wildlife reserves, housing, roads and communications, recreation areas and industry'. He urged that 'the Little Desert can only be considered in relation to other areas and within such a comprehensive policy of land use'.⁴⁵ Calder boldly proposed an 'alternative development scheme'. The Little Desert was ideally suited to 'the establishment of a National Park in association with a field study centre along the lines of the Field Study Centres operating so successfully in Britain'. Calder argued that field studies like those he and Attiwill had recently undertaken with the agricultural botany students to develop the practical skills used by ecologists were of value to the whole population. Such skills provided 'a cultural and aesthetic discipline, ... bringing an increasingly urbanised population into closer touch with natural phenomena and rural life'.⁴⁶ Such

a centre could be financed by the government redirecting priorities away from a 'high level of investment in doubtful primary production' towards a field centre which would offer the general public greater knowledge and respect for the environment and would 'assist to a similar level the policy of decentralization'.⁴⁷ Galbally commented that this was 'a most interesting and arresting suggestion'.⁴⁸

The ecologists showed themselves in 1969 to be so confident of the credibility of their science that they felt free to speak beyond their disciplinary expertise. Their arguments for a national park in the Little Desert appealed to all the conservationist and resource management traditions of their time, in addition to their ecological recommendations. Attiwill's 'quality control' had utilitarian overtones, whilst Calder appealed to a more populist and romantic sense of loss of wild nature felt by the urban population, a sentiment more often expressed by heritage groups. Both ecologists were conscious that non-scientific arguments would appeal to parliamentarians and the media.

It was, perhaps, easier for ecologists to accept social responsibility for their actions than it was for other scientists at the time—for instance, nuclear physicists. But they were conscious of the professional risk, not so much for their reputations as for the time spent away from their scientific work doing advocacy. American sociologist Dorothy Nelkin argued from a study of the professional association of American ecologists, a largely academic group at the time, that by the early 1970s American ecologists preferred to return to the isolation of their laboratories, rather than to try to keep up with the mountain of socially responsible work that was accumulating for the few trained specialists in the field.⁴⁹ This was certainly the view of Australian ecologists that I interviewed. The level of demand placed on qualified scientists to speak about environmental issues increased so sharply by the end of the 1960s that they just could not cope with the workload. In 1971, Turner wrote to a citizen seeking support for a campaign against development in the south-eastern growth corridor of Melbourne:

I am now getting several letters a week requesting the assistance of my department on some conservation matter or another... [T]he time has come when I simply cannot take any more work of this kind. I fully sympathise with the case you propose to present, and I know that you will have difficulty in finding people with sufficient ecological knowledge to speak in that field. However, everything is progressing so quickly that the burden on the few ecologists in the State is becoming almost intolerable.⁵⁰

The social responsibility of ecologists was something each worked out according to his or her own lights. Australian ecologists never had the vast resources for basic research that university ecologists did in the United

States, but they perhaps felt less the burden of defending a discipline. The lower degree of professionalization, and the nature of opportunities to study ecology in Australia, meant the notion of ecology as 'management tool' was more readily accepted in Australia than in North America.⁵¹

Conclusions: Biodiversity as nature?

The invention of 'the environment' as a holistic concept in the 1940s and 1950s led to the naming of a new interdisciplinary field of study: 'environmental science' in 1962.⁵² Collaboration across sciences such as soil science (pedology), pasture science (agrostology), forestry, agricultural economics and ecology (including rangelands science) increased from the 1960s onwards. The Little Desert case study provided a political moment when the collaboration between environmental sciences and public policy was on show. The deliberations of the Galbally inquiry directly influenced public outcomes for managing land, natural resources and public open space in Australia.

The new integrated science and politics of environmental understanding successfully used 'biological diversity' as a tool to change the policies of government. The incoming government of 1970 saw that it had a new obligation to nature: voters had dumped Sir William McDonald, the architect of the Little Desert development scheme, from his long-held seat in parliament. This was not quite a 'mandate': the dispute did not change the governing political party.⁵³ But it was a wake-up call. (Sir) Rupert Hamer, Victoria's new premier in 1970, recognized the need for a change in policies with respect to managing land that people valued as nature. While the previous premier, Henry Bolte, had regarded the Little Desert as wasteland that would have been better developed, he listened to the activists, some of whom were personal friends, and was persuaded by them. He decided to retire, and to make way for a new, younger premier, with a different, more transparent method for land management. Hamer was personally sympathetic to nature conservation, and when in 1970, he created the Land Conservation Council as an independent authority, he included representatives of conservation interests in its membership. The dispute also changed the way that conservation groups themselves made claims. The Conservation Council of Victoria (CCV) was established as a 'peak body' that had a seat on the Land Conservation Council.⁵⁴ The CCV represented the interests of a wide range of self-identifying conservation societies. The concept of 'biological diversity' contributed importantly to achieving conservation aims by turning nature ('bushland') into a measured space, measured for 'diversity', rather than area. This changed the framework of the political inquiry in 1969, and the pattern of policy making and national parks management thereafter.

Biological diversity did not create a green movement. Nor was it associated with a particular political party. It was used by scientists and activists to change policy, not to change governments. The later BioDiversity movement of 1986 was not directly responsible for a political party in the United States either, but increasingly became part of the global conservation effort. Biodiversity has now become part of the discourse of powerful international environmental lobby groups, such as Conservation International and Greenpeace. It is commonly used in green political arguments at the national and sub-national level around national parks and land and sea management, perhaps particularly by green parties where these parties are influential.

The fact that biodiversity can be measured is more important to its scientific and policy credibility than to its influence in green politics or environmentalism. Policy makers and science alike trust *numbers*: they rely on them for making 'objective' decisions between competing claims.⁵⁵ Thus, biodiversity has become a major tool of scientifically credible global organizations, such as IUCN, that seek out forms of discourse that work across languages and cultures. Biodiversity thereby frames much of global governance of nature. It certainly did not mean 'nature' in the 1960s. However, through its history of use in governance, and in political moments like the Little Desert dispute and many others, it has emerged as the measure of nature in the twenty-first century.

Notes

- 1 Michael E. Soulé, 'What is conservation biology?' *Bioscience* 35:11 (1985), 727–734. Libby Robin, 'The rise of the idea of biodiversity: Crises, responses and expertise', *Quaderni* (Journal of l'Institut des Sciences Humaines et Sociales du CNRS); Special Issue: *Les promesses de la biodiversité* 76:1 (2011), 25–38.
- 2 Soulé, 'What is conservation biology?' 727.
- 3 Timothy Farnham, *Saving Nature's Legacy: The Origins of the Idea of Biodiversity* (New Haven, CT: Yale University Press, 2007), 2.
- 4 Farnham, *Saving Nature's Legacy*, 1–3.
- 5 IUCN website 2012: <http://www.iucn.org/about/>. See also: CI 2012—website: <http://www.conservation.org/about/pages/history.aspx>.
- 6 Farnham's work is not alone on this point. E. O. Wilson himself writes of his role in the biodiversity moment as 'pioneering' (e.g. E. O. Wilson, *The Diversity of Life*, New York: Springer, 1992). Radkau also follows the American story as a counterpoint to the German one, without recognizing the non-political, more general scientific trajectory found elsewhere. Joachim Radkau, *Nature and Power: A Global History of the Environment* [original German 2002] (Cambridge, MA: Cambridge University Press, 2008).

- 7 Samuel P. Hays, *Conservation and the Gospel of Efficiency* (Cambridge, MA: Harvard University Press, 1959); Samuel P. Hays, *Beauty, Health and Permanence: Environmental Politics in the United States 1955–1985* (New York: Cambridge University Press, 1987); Roderick Nash, *Wilderness and the American Mind* (New Haven, CT: Yale University Press, 1987 [1967]). Beyond the United States: Melissa Harper, *The Ways of the Bushwalker* (Sydney: University of New South Wales Press, 2007); Kirstie Ross, *Going Bush* (Auckland: Auckland University Press, 2008); John Sheail, *Nature in Trust: The History of Nature Conservation in Britain* (Glasgow: Blackie, 1976); Jane Carruthers, *The Kruger National Park* (Pietermaritzburg: University of Natal Press, 1996); Claes Grundsten, *National Parks in Sweden: Europe's Last Wilderness* (Stockholm: National Environmental Protection Board, Information Division, 1987).
- 8 Hays, *Conservation and the Gospel of Efficiency and Beauty, Health and Permanence*.
- 9 George Sessions, 'Shallow and deep ecology: A review of the philosophical literature', in Robert C. Schultz and J. Donald Hughes (eds), *Ecological Consciousness* (Washington, DC: University Press of America, 1981), 422.
- 10 Tom Griffiths, '“The Natural History of Melbourne”': The culture of nature writing in Victoria, 1880–1945', *Australian Historical Studies* 93 (1989), 339–365.
- 11 Jenny Beckman, 'Biodiversity as species protection: ArtDatabanken and its histories', in Steven Hartman, Anna Storm and Sverker Sörlin (eds), *The Environmental Humanities* (The Sigtuna Symposium). Routledge Environmental Humanities Series. (London: Routledge 2015, forthcoming).
- 12 The Little Desert dispute also became linked with another campaign against a dairying development at Kentbruck Heath, near Portland, at the same time. The two development proposals, both in western Victoria, initiated by the same Minister for Lands, were natural companion-causes. Young activists did join later environmental campaigns, but not this one. At this time, they were fighting conscription or the Vietnam War itself. Conscription was abolished in Australia in 1972, and this freed the Vietnam generation to join (and shape) 'environmentalism'.
- 13 Tim Bonyhady, *Places Worth Keeping: Conservationists, Politics and Law* (St Leonards: Allen & Unwin, 1993).
- 14 In the twenty-first century, there is now another sort of environmentalism allied with far right groups, see Madeleine Hurd 2012. 'The nation, the Volk and the Heimat: Understanding ecofascist iconographies of space and nature'. Paper read at Nordic Network for Interdisciplinary Environmental Studies (NIES) Annual Symposium, Oslo, 28 September 2012. 10 pp.
- 15 Cassandra Pybus and Richard Flanagan (eds), *The Rest of the World is Watching* (Sydney: Sun, 1990). Elim Papadakis, *The Green Movement in West Germany* (London: St Martin's Press, 1984). Radkau, *Nature and Power*. See also http://en.wikipedia.org/wiki/Green_party for a useful summary.
- 16 Interview with Bill Middleton, forester and Little Desert campaigner, 9 February 1990. On the outcomes, see Libby Robin, *Defending the Little*

- Desert: The Rise of Environmental Consciousness in Australia* (Carlton: Melbourne University Press, 1998).
- 17 Neil Evernden, *The Natural Alien* (Toronto: University of Toronto Press, 1985), 5.
- 18 Little Desert Settlement Committee (LDSC), *Report upon the Proposal to Open the Little Desert to Settlement (Together with Appendices)*, Legislative Council, Melbourne, 17 March 1970 (includes relevant extracts from the Minutes of the Proceedings of the Legislative Council), 2.
- 19 Transcript of evidence given before the Little Desert Settlement Committee (LDSC Transcript, hereafter), 23 December 1969, records the invitation issued to McDonald on 22 October, and his reply, on 15 December, declining to appear. Alan Holt recalled that Galbally had apologized for placing him in an invidious position [Interview with Libby Robin, 18 November 1991].
- 20 Theodore M. Porter, *Trust in Numbers: The Pursuit of Objectivity in Science and Public Life* (Princeton, NJ: Princeton University Press, 1995).
- 21 The 1939 Black Friday fires were the greatest in Victoria's history until the Black Saturday fires of 2009. The devastation of Black Friday fires shaped forestry, soil conservation and land management practices throughout the postwar years.
- 22 Turner, transcript of interview with Libby Robin, 28 January 1991, p. 3. 'Fire ecology' is possibly a term used with the hindsight of the 1990s. The interview was held at the height of the fire season. Turner strongly encouraged his staff (including David Ashton and Peter Attiwill) to undertake ecological studies of *Eucalyptus regnans* (Mountain ash) affected by the 1939 fires from the 1940s. See Tom Griffiths, *Forests of Ash: An Environmental History* (Port Melbourne: Cambridge University Press, 2001).
- 23 Linden Gillbank, *The Biological Heritage of Victoria's Alps: An Historical Exploration*. Report prepared for the Historic Places Section (Melbourne: Department of Conservation and Environment, 1991), 26–38.
- 24 Stella G. M. Carr (née Fawcett) and J. S. Turner 'The ecology of the Bogong high plains', (Parts I and II) *Journal of Australian Botany* 7:1 (1959), 12–63.
- 25 A. S. Watt, 'On the ecology of British beechwoods with special reference to their regeneration', Part II Sections II and III, *Journal of Ecology* 13:1 (1925), 27–73.
- 26 David Ashton, *Personal Communication*, 12 March 1993.
- 27 Gillbank, *The Biological Heritage of Victoria's Alps*, 30.
- 28 Peter Attiwill, interview with Libby Robin, 21 October 1991.
- 29 It was also supported by good advice from local Kaniva contacts, particularly P. L. Williams, Alex Hicks and Avelyn Coutts. Attiwill and Calder both returned to the Little Desert later in the year to add to the student work, and to recheck details for the report to the Galbally Committee. [Calder, LDSC Transcript, p. 193].
- 30 For the history of 'metre plots' (quadrats) and 'enclosures' in the United States, see Ronald C. Tobey, *Saving the Prairies* (Berkeley: University of California Press, 1981), 204–207.
- 31 Donald Worster, *Nature's Economy: The Roots of Ecology* (Cambridge: Cambridge University Press, 1991 [first published 1977]).

- 32 'Ped' (F. G. Elford), 'Ecology in general science', *Wild Life*, 7 November 1945, 351.
- 33 Roderick Alan Fawns, 'The maintenance and transformation of school science', PhD diss., Monash University, Clayton, 1987, 2.
- 34 Turner's 'Preface' for the 1954 edition of James and Rowney's *New General Science*, as quoted by Fawns, 'The maintenance and transformation of school science', 20.
- 35 Libby Robin, 'The professor and the journalist: Scientists in popular conservation campaigns', *Victorian Historical Journal* October (1994), 154–168.
- 36 Griffiths, *The Natural History of Melbourne*.
- 37 Edna Walling, *The Australian Roadside* (1952), republished as *Country Roads: The Australian Roadside* (Lilydale, Pioneer Design Studio, 1985), 16–18.
- 38 Rachel Carson, *Silent Spring* (New York: Ballantyne, 1962).
- 39 R. L. Specht, author's interview, 29 May 1991. IBP occupied Specht's time for two decades, long after he had moved to take the Chair of Botany at the University of Queensland in 1966. On IBP, see also Libby Robin, 'Nature conservation as a national concern: The role of the Australian Academy of Science', *Historical Records of Australian Science* 10:1 (1994), 1–24.
- 40 David Ashton, *Personal Communication*, 24 March 1993.
- 41 LDSC Transcript, p. 71 (Attwill) and p. 188 (Calder).
- 42 Peter Attwill, *Personal Communication*, 18 September 1991.
- 43 Peter Attwill, LDSC Transcript, 75.
- 44 Calder, LDSC Transcript, 190.
- 45 Calder, LDSC Transcript, 190A.
- 46 Calder, LDSC Transcript, 190B.
- 47 Calder, LDSC Transcript, 192.
- 48 The suggestion was not taken up by governments, but by a private entrepreneur, Whimpy Reichheldt, whose successful Little Desert Lodge business continues in the twenty-first century (see Robin, *Defending the Little Desert*).
- 49 Dorothy Nelkin, 'Scientists and professional responsibility: The experience of American ecologists', *Social Studies of Science* 7 (1977), 75–95.
- 50 Turner to W. J. (Bill) Kilpatrick of Hawthorn, 17 June 1971. Turner Collection Box 20 (Conservation), University of Melbourne Archives.
- 51 Libby Robin, 'Radical ecology and conservation science: An Australian perspective', *Environment and History* 4:2 (1998), 191–208.
- 52 Libby Robin, Sverker Sörlin and Paul Warde (eds), *The Future of Nature: Documents of Global Change* (New Haven, CT: Yale University Press, 2013).
- 53 'Mandate' became a key word in the language of Australian politics from December 1972, in the rhetoric of reformist Prime Minister, Gough Whitlam, who was appointed after his left-wing party had been in opposition for 23 years.
- 54 The deliberations of this body continued for two decades. The Little Desert was not formally declared a national park until 1988, but was protected from development while the discussions continued.
- 55 Porter, *Trust in Numbers*, 1995.

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