

Reviews

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Richard Kingsford (ed.): *Ecology of Desert Rivers*. Cambridge University Press: Cambridge, 2006. 354 pp., B/W illus., ISBN: 13 978 0 521 81825 4 (HB), \$199.

I stepped hesitantly onto the dry riverbed that lies between the worlds of science and of politics for the first time in my scientific career one day in September of 1995. As the senior author of a consultancy report just submitted to the Australian Government's Department of the Environment, Sport and Territories, entitled *Natural Heritage Values of the Lake Eyre Basin in South Australia: World Heritage Assessment* (CSIRO Wildlife and Ecology, Canberra, ACT, 1995), I had been summonsed to appear at a meeting of the Lake Eyre Basin Reference Group. The Chairperson of the Reference Group was Professor Deirdre Jordan, then Chancellor of Flinders University. As we walked into the meeting room in Adelaide, Professor Jordan took one look at my strained features before commenting quietly to me 'It'll be over soon enough!' She suspected that I was in for a bucketing—and she was right.

Recollections of those intense debates in the 1990s about the future of the Lake Eyre Basin kept coming into my mind as I read through Richard Kingsford's excellent *Ecology of Desert Rivers*. They did so because this book is not simply about ecology; for me it comprises a further building-block in the history of natural resource management in Australia, a story that will eventually contain a couple of

fascinating sections on our desert rivers. The story partly concerns the interrelationship between science and matters of public controversy, by which scientific insight both stimulates and is deeply affected by the debate. When fully told, another segment of the story will describe the struggles experienced by ecological science in influencing decision-making, and the associated challenges faced by scientists doing their best to be objective in their studies while holding passionate views on the 'best' use of their data in the inevitably political processes by which natural resources are allocated.

But I risk getting ahead of Kingsford's book too quickly. It is important to listen to the ecology first, before exploring its consequences. *Ecology of Desert Rivers* considers rivers of the world while foregrounding the Australian story. It argues that although drylands make up nearly 50% of the world's land surface, their rivers 'are often out of sight and out of mind'. Furthermore, rivers in drylands are 'the poor cousins in the knowledge base of river and wetland ecology' because scientific understanding is often biased towards humid regions. Each of the contributing authors incorporates information from South Africa (particularly), the Middle East, North America, and so on. Sometimes these extra-Australian references really make you sit up and take notice, as in just one blunt example from a tabular summary of impacts of river management

by Kingsford, Dennis Lemly and Julian Thompson:

Azraq Oasis, Wadi Rajil, Jordan: Originally covered 12 000 ha, providing habitat to a million waterbirds during migration and 28 breeding species. A 98% reduction in flows almost completely dried habitat. Most of the dependent aquatic vegetation has died. Reduced flows stopped springs. (p. 211)

It seems to me that the book canvasses the international literature effectively; as noted above, there is not such a huge body of data available on ecological functioning. Equally, however, there is no doubt that the spirit of the book is Australian. Its editor is an outstanding scientist whose studies of Australian waterbirds have helped uncover the vast geographic scale of their movements and the decades-long patterns of their punctuated breeding, one of the most extraordinary examples of the unique nature of our continent to emerge in recent years. Among the twenty-five other authors, eighteen are Australian; and fully 50% of the Tables and Figures consider Australian material solely. This observation is not one of criticism, for the Australian material benefits substantially from presentation in this international manner, and there is nothing amiss in important Australian insights being shared worldwide.

Ecology of Desert Rivers informs us that these systems do not have unique landforms, but that their hydrology is much more variable than that of rivers of moister regions. Bill Young and Kingsford tease out various components of flow variability with ecological consequences, emphasizing that this feature both distinguishes desert rivers from their humid counterparts and provides the template on which a fascinating biota is built. These ecological peculiarities include high rates of aquatic primary production following flooding, stemming almost entirely from algal growth. Stuart Bunn and his co-authors note that, as a consequence, such rivers

contribute a net flux of energy and nutrients from the stream to the riparian zone and floodplains. They write that 'desert rivers truly represent the ecological arteries of dryland landscapes'.

The aquatic invertebrates of desert rivers experience the booms and busts of unpredictable flooding and drying more as a 'system resetting' than as a 'disturbance'. Andrew Boulton, Fran Sheldon and Kim Jenkins present a hymn of praise to biological diversity:

In the Lake Eyre Basin rivers, connection and disconnection of waterbodies...influences the aquatic community in a sequential fashion...As water levels fall and the river becomes increasingly fragmented into disconnected waterbodies, the community composition of aquatic invertebrates in each site diverges according to those species present at the time of disconnection and the prevailing biotic and abiotic selective forces at work...In this way, each site behaves like a unique, natural mesocosm and differs from other sites in ways that are not explained readily by measured physical or water chemical variables. (p. 146)

Kingsford, Arthur Georges and Peter Unmack take up this theme in describing reactions to flooding and drying by vertebrate animals. They spell out nicely the notion that hydrological variation creates a range of inundation patterns from extensive flooding to the bottlenecks of the bust periods, but that these extremes should not distract us from the ecological importance of 'everything in between'—the minor floods and the distinctive drying patterns. Both vertebrate and invertebrate animals capitalize on big floods with extraordinary breeding events, and have found evolutionary means of waiting out dry phases. Indeed, the fundamental ecological message comes out over and over again: hydrological variability produces complex patterns of spatial and temporal connectivity, which in turn create diverse arrays of food webs and habitats supporting many fascinating specialized organisms.

So it is that we return to the challenge of connecting ecology to natural resource management, for it becomes abundantly clear that human disturbance, primarily in the form of river regulation, imposes simplicity on complexity by removing or damping these formative dynamic processes. Diversion of waters for human use removes many of the ecological opportunities presented by hydrological variability by reducing habitat value for native species, and sometimes allowing exotic invasive species to spread. At its worst, damming and diversion can severely compromise a river system, even to the extent of producing not just ecological, but also economic damage. *Ecology of Desert Rivers* has more than one motivation. It is not simply a volume explaining the interesting forces that produce the ecological arteries of our inland landscapes. It very definitely has another aim in mind, which Kingsford's introduction spells out: 'This book attempts to provide some of the necessary knowledge to understand, appreciate and sustainably manage these magnificent ecosystems...There is no greater challenge for our generation and those to follow them than the management of our rivers'. The Australian emphasis plays out here too, because the rivers of the Lake Eyre Basin are among the precious few worldwide that continue to flow without regulation or diversion.

Each of the chapters points out the effects of human disturbance, and each articulates a desire to avoid the sorts of 'ecological disasters' that are becoming all too prevalent as the water resources of the world's drylands continue to come under pressure from burgeoning human demands for water. In the second half of *Ecology of Desert Rivers* this matter becomes the entire focus. Kingsford, Lemly and Thompson discuss the impacts of water diversions globally, Keith Walker the cumulative effects of regulation of the lower River Murray, Paul Bailey and his

colleagues the impacts of secondary salinization (a phenomenon not present in rivers of humid regions), and M. J. Wishart the challenges of integrating politics, populations and ecology as dryland societies struggle to move towards sustainability. Parallels to ecology begin to emerge in this domain of human decision-making, with its complex patterns of connectivity to diverse economies supporting many fascinating specialized human organisms! Two threads among these complex human patterns interested me as I read the book, one of which I think is broadly positive and the other about which I am more ambivalent.

On the positive side, science both contributes to and benefits from public controversy. This interaction is particularly true of ecological research that uncovers looming problems such that, if public discussion of the emerging issue reaches a sufficient crescendo, governments have cause to commission further work to seek resolution among claim and counter-claim. Of course there is also the possibility that governments may decide to invest in further scientific investigation in order to give the impression of action, to buy themselves time to work out politically acceptable solutions; however, the effect on scientific investigation is the same. To some extent the very existence of *Ecology of Desert Rivers* constitutes an example of these effects.

My apprehensive entry into a meeting of the Lake Eyre Basin Reference Group twelve years ago was just one tiny part of a process by which the politically-charged consideration of the Basin's future was worked through. In March 1993, Prime Minister Paul Keating announced that the Australian and South Australian Governments had agreed to assess the environmental values of the Lake Eyre region with a view to nominating it for World Heritage listing. This statement was, ultimately, the result of growing scientific understanding of the extraordinary nature

of the wetlands of the Basin. Wayne Braithwaite of CSIRO and Sue Briggs of the New South Wales National Parks and Wildlife Service had pioneered the use of aerial surveys to study the distribution and abundance of inland waterbirds, and Richard Kingsford had developed such techniques to the point where he established that the arid zone was in fact the engine-room for the population dynamics of many species of Australian waterbirds. Jim Puckridge from the University of Adelaide had begun studying the marvellous complexity of flows and biota in Cooper Creek and the Coongie Lakes, assisted by Julian Reid and Jake Gillen. Working quietly in the background were several biologists interested in the isolated biota of the artesian mound springs of the Basin, prominent among them being Winston Ponder of the Australian Museum.

As scientific data on the unique attributes of the region welled up, conservation groups were encouraged to raise again the issue of protection and, in the late 1980s, of World Heritage listing. As Julian Reid has described (*Rangeland Journal* 16: 273–97, 1994), the notion of listing was vehemently opposed by the major landholders, the pastoralists, backed by companies with major mining interests, who banded together in the Lake Eyre Catchment Protection Group. It is difficult from this remove to recall the level of anxiety evoked at that time by discussions of World Heritage, but the experiences in at least two other locations (the Willandra Lakes region, New South Wales and the Tasmanian Wilderness) had caused massive problems for the Australian Government. Despite this, Prime Minister Keating persevered and, in July 1994, I was briefed by Departmental staff and a Ministerial advisor on the Terms of Reference for a World Heritage assessment, to be confined to the South Australian section of the Basin. I remem-

ber having to be cajoled into this task, knowing that it would prove a minefield. Nevertheless, my 200-page report with Michael Doherty and Robin Barker was submitted a year later and then subjected to scrutiny by a representative body, the Lake Eyre Basin Reference Group, appointed by the Department of the Environment, Sport and Territories.

The report concluded that the surface aquatic systems—the rivers and lakes—of the South Australian section of the Basin met three of the four criteria for World Heritage listing. Some members of the Lake Eyre Catchment Protection Group were also participants in the Lake Eyre Basin Reference Group and, not surprisingly, they did not agree with this finding. At the meeting in September 1995, I was grilled by them for about three hours. My principal interlocutor was Greg Campbell from S. Kidman & Co Ltd; as Julian Reid noted in his article in the *Rangeland Journal*, pastoralists led the opposition to the notion of listing. Campbell identified what he believed to be error after error in our report, naturally enough aiming to build up such a litany of problems that it would be discredited. My inexperience in situations such as this meant that I found it intensely hard work, but I have come to value the encounter because it was excellent real-life training for many other tough interactions in my subsequent career. Nor do I attach the slightest criticism to Greg Campbell. We had been good colleagues in Alice Springs in earlier years and, as he said to me when the meeting broke up (at last!), ‘No hard feelings—just doing my job’.

I cannot pretend to write the full history of deliberations on World Heritage listing, or of subsequent events, because correctly I distanced myself from the politics. However, the two Governments concluded that local community opposition was so strong that plans for listing were shelved (and there have been only three

listings on the Australian mainland since 1995). Our report faded into obscurity. The controversy gradually died away as the Australian, South Australian and Queensland Governments instituted much more effective community consultation processes than had been undertaken during the World Heritage fracas. In particular, as Jane Carruthers has mentioned in her neat outline of this environmental conflict (in C. Mauch, N. Stoltzfus and D. R. Weiner (eds) *Shades of Green: Environmental Activism around the Globe*, Rowman & Littlefield, 2006, pp. 69–99), local people began to respond proactively. Carruthers describes a key meeting organized by the Barcoo Shire Council at Windorah in 1995, at which the major interest groups—pastoralists, Aboriginal people, mining representatives, environmentalists, scientists, government officials—began for the first time to listen carefully to each other. A common language began to develop, one informed deeply by science. Carruthers reports a wonderful neologism from a local pastoralist—the ‘anastomazing’ channels of the Cooper—that encapsulates the growing strength of the interaction between science and the local community.

As a direct result of the Windorah meeting, a more inclusive yet locally dominated Lake Eyre Basin Coordinating Group emerged, which by the end of 1997 was formalized with links to several constituent Catchment Committees. Eventually, all these bodies were brought under the umbrella of a Lake Eyre Basin Agreement, incorporating a Ministerial Forum of the three Governments (joined subsequently also by the Northern Territory Government). Peter Cullen from the University of Canberra became Chair of the Scientific Advisory Panel that had been formed to assist decision-making, and generously invited me to participate.

When controversy reared up again from a new quarter, the people of the Basin were

better prepared to deal with it. During the mid-1990s, proposals were put forward to develop a large cotton-growing operation at Currareva on the Cooper, based upon removal and storage of up to 400,000 ML of water during flood peaks. The idea was formalized in April 1998 when the Queensland Government released a *Flow Management Plan for Cooper Creek*. Pastoralists and Aboriginal people downstream of the proposed diversion were outraged. The subtle shift that had been taking place in alliances across the Basin was accelerated, as the pastoral and Aboriginal communities found common cause with those scientists concerned about the future of the unregulated Cooper and Diamantina. Although the Currareva proposal was abandoned, it resulted in a further spate of scientific investigation, supported by funds flowing through the Lake Eyre Basin Coordinating Group from the Australian Government’s Natural Heritage Trust.

It is high time to summarize the significance of science in these controversial events. The interaction between science and the debate on the use of natural resources in the Lake Eyre Basin got off to a rocky start, with scientists seen by the local community as completely aligned with ‘lock it up’ style conservationists. As time has gone on it seems that the revelations of science have been welcomed as important contributions to the debate, to the extent that the institutional arrangements were eventually designed to allow for continuing scientific input. In the context of this review, though, the most interesting result has been the flowering of ecological knowledge. The controversies were stimulated by science, and in turn those debates provided the public and political attention necessary to cause funding to flow in the direction of further scientific investigation. Later elements of the conflict over Currareva also attracted some fine fresh scientists into the arena,

such as Stuart Bunn, Fran Sheldon, Andrew Boulton and their colleagues. In this way, science beget further science, an outcome that I believe to be distinctly positive. Most of the people prominent in this upsurge of knowledge have contributed to *Ecology of Desert Rivers*, and we owe them a debt of gratitude not just for this effort, but also for seizing the dual responsibility and opportunity generated for science by environmental conflict.

Let me now turn to the second of the two threads I mentioned earlier, which concerns the degree to which science might translate in the longer term into sustainable management of the unusual resources of desert rivers. The rivers of the Lake Eyre Basin have avoided diversion and regulation, and science has been influential by informing the decisions that have maintained that situation so far. The waters from most other desert rivers worldwide have been heavily used and, given population pressures elsewhere, it is difficult to envisage alternative outcomes. As I noted above, *Ecology of Desert Rivers* is laden with warnings about the ecological impacts of diversion, and hints at the eventual negative effects on human economies and societies when the process goes way too far. But will appeals to ecological understanding, or to reason, or to the aesthetics of the untrammelled desert rivers, necessarily bring about a socially supported political decision not to utilize the 'resource'? In its wider perspective of sustainability, this matter is the biggest question of our time, of course, and so I do not expect to lay at Richard Kingsford's feet a demand to solve it once and for all. Nevertheless, I did not find the book fully satisfying in this domain.

The degree to which we see ecological science finding its way directly into policy is a matter of constant debate among ecologists. At its sharpest, the question here is the extent to which effective natural resource management is constrained by

lack of knowledge of the resource, or by problems with the design and implementation of policy. I believe that most scientists have come to the realization that frequently it is more of the latter than the former, which of course is a major frustration to them (and to me). One tactic to correct this problem is to ensure that the results of science are communicated broadly in relatively simple language for everyone to see. This tactic rests upon the assumption that when people know more about the ecology of the system that they are managing then they will act accordingly: they will be more cautious about allocation of natural resources, think adaptively, plan more for the long-term, and attempt more strenuously to consider the needs both of the environment and of future generations. Broadly speaking, this approach is the basis for *Ecology of Desert Rivers*. I hasten to add that there is absolutely nothing wrong with this tactic—it is fundamentally necessary—but in my view it is insufficient. What I am looking for is a more comprehensive suite of tactics to grapple with the need for open analysis of trade-offs among different interests, for market mechanisms that might value the resource more comprehensively, for mechanisms that take community-level opinion into account: in short, for policy translation.

Take one example prominent in *Ecology of Desert Rivers*, and particularly significant for discussion of the future of the Cooper and the Diamantina: the issue of water abstraction and river regulation for human purposes. The book's warnings are loud and clear on this topic, and rightly so given the risks still faced not only by the rivers of the Basin, but also by those of Australia's northern tropics as demands for water continue to grow under conditions of climate change. But what has science got to say in policy terms about whether abstracting water is a 'good' or a 'bad' thing? Any diversion will cause some

degree of ecological change: what is an acceptable or a sustainable level? Because ecologists tend to be big fans aesthetically of biological diversity, and because they experience too frequently the sense of arriving like paramedics at the scene of a severe ecological accident, they tend to be sceptical of those resource-users who argue 'Don't worry, we'll only take a little bit'. As a result, ecologists often show a habit of arguing for tight, governmentally led protection. Although they also point out correctly that, without such intervention, resource use almost always spirals out of control and circles back with severe negative consequences for future generations, such outcomes just keep occurring. *Ecology of Desert Rivers* is replete with examples. I conclude, along with many other commentators, that ecological science needs to do considerably more than just communicate about potential consequences if these dreadful effects are not to go on being repeated. (It is vitally important to point out that Richard Kingsford himself comprehensively apprehends such needs, as indicated in his writings elsewhere (for example, see his article on science and river management in C. Dickman, D. Lunney and S. Bergin (eds.) *Animals of Arid Australia: Out on their Own?*, Mosman, NSW, Royal Zoological Society of New South Wales: 2007, pp. 172–87).

What might comprise this extra enchanted element? Having posed questions of sustainability, and having suggested that *Ecology of Desert Rivers* does not fully provide the answers as to how it might be achieved in the particular arena of the world's drylands, I would not be so bold as to claim with certainty where the full array of solutions will be found. However, within my own organization we are putting ecologists together with experts from many other disciplines—sociology, resource economics, institutional design, governance, systems science, policy

design, and so on—in an attempt to see whether the translation of ecological understanding into effective natural resource management can thereby be improved. This attempt is an experiment, with no guarantee of success. Many thoughtful people around the world are wrestling with the matter, searching for that magic amalgam. Nor should aesthetics and the humanities be ignored in this search (see Mandy Martin, Jane Carruthers, Guy Fitzhardinge, Tom Griffiths and Peter Haynes, *Inflows: the Channel Country*, Mandurama, NSW, Mandy Martin, 2001). Although troubled by the urgency of the need, I also remain excited about the opportunities for breakthroughs.

While all such endeavour proceeds, for the time being the rivers of the Lake Eyre Basin continue to flow unabated. Although science by itself may not fully justify this stance, I share strongly the sense of moral value that imbues *Ecology of Desert Rivers* and which argues for strict maintenance of these extraordinary ecosystems. So far this posture has been supported politically in the Lake Eyre Basin, but much water is yet to flow across the causeway at Birdsville before the story could be considered complete. While I was reading the book in preparation for this review, I spent a couple of happy days camped in the magnificent sandy bed of the Hugh River, in the heart of the MacDonnell Ranges and at the north-western edge of the Basin. Truly these rivers are the ecological arteries of our arid landscapes. Truly, too, their aesthetic qualities as well as their scientific interest demand a place in the decision-making, and although Richard Kingsford's book may not provide all the answers, it is a major statement that reminds us of this important fact.

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CSIRO Sustainable Ecosystems
Alice Springs

Tom Griffiths: *Slicing the Silence: Voyaging in Antarctica*. University of New South Wales Press: Sydney, 2007. 399 pp., 1 map, ISBN 978 0 86840 972 6 (PB), \$34.95.

Tom Griffiths voyaged to Antarctica in the summer of 2002–2003 as a fellow with the excellent Antarctic Humanities Program run by the Federal Government through the Australian Antarctic Division. Before the early 1980s, when larger ice-strengthened ships became available to supply Australia's four Antarctic stations, it was simply not possible to take any personnel south other than the summer scientists and wintering staff essential to the running of the stations.

Then ships like *Icebird* and Australia's first ice-breaking research and re-supply vessel *Aurora Australis* became available with berths for more than 100 passengers. The Humanities Program enabled artists, writers, composers, politicians, journalists and camera crews to experience a round-trip to the Australian Antarctic Territory, lasting from four to five weeks. This reviewer was a beneficiary of this program in 1989 and the author and historian Stephen Murray-Smith sailed on a similar voyage two years earlier. All of us wrote books following this experience, and Griffiths took Murray-Smith's *Sitting on Penguins* as part of his on-board reading. Coincidentally we all travelled on the same ship. *Icebird* was later re-named *Polar Bird* and Tom Griffiths happened to go south on her last voyage.

While Murray-Smith and I wrote books centred largely on our voyages, Griffiths has surveyed the entire galaxy of Antarctic history in a series of essays each prefaced with a short entry from his own travel journal. This has resulted in the most engaging and insightful book on Antarctica I have ever read.

Science began as a poor cousin in the history of Antarctic exploration, not only

in the rush to be first at the South Pole, but during an undignified scramble of flag-planting in the first half of the twentieth century as nations attempted to stake their claims on the vast, unoccupied frozen continent. Australia, with the backing of the British Government, used the expeditions of Douglas Mawson in 1911–1914 and 1929 and 1931 to claim an ambitious 42 per cent of Greater Antarctica.

Yet Mawson always regarded himself as a scientist first and explorer second. On his voyage south on *Aurora* in 1911, he spent many days trawling the sea bed, initiating the first experiments in Antarctic marine biology—much to the irritation of his acerbic skipper, J. K. Davis. Even the five starving men on Scott's doomed South Pole expedition would not jettison the 30 pounds [13.6 kilos] of important geological samples they had gathered from the Transantarctic Mountains.

As Tom Griffiths points out in *Slicing the Silence*, science triumphed over politics when Antarctica was declared the priority for the International Geophysical Year of 1957–1958. During what is still the single biggest cooperative scientific enterprise ever undertaken on earth, nearly 30,000 scientists from 66 nations took part in simultaneous observations of scientific phenomena over the entire globe—including from outer space, which had just become available through the launching of satellites by the Soviet Union and the United States. In Antarctica, the number of stations rose from 20 to 48. As Griffiths puts it: '[The] IGY cut through the increasing cacophony of post-war territorial rivalries down south' (p. 136). Shortly afterwards, all national claims were appropriately 'frozen' when the Antarctic Treaty was signed in 1959.

The Antarctic Division's founding Director, Phillip Law, once told me that no one goes to Antarctica without being profoundly changed by the experience: 'I think most who go to the Antarctic for

any length of time go through some sort of personal reassessment. A sense of feeling infinitesimally small in the face of the magnitude of nature.'

During a recent broadcast on the ABC's Radio National of a session at the 2007 Sydney Writers' Festival, Tom Griffiths spoke of 'unleashing the power of polar stories'. This he has surely done with a heady mix of scholarly research, great quotes and his own historical conclusions, boosted by the exhilaration of his own Antarctic experiences.

Stories of the 'Heroic' era of Antarctic exploration give context to more recent times. 'Polar madness has always interested me', wrote Raymond Priestley, who had good reason to know (p. 172). As a member of Scott's northern party during his 1910–1913 expedition, he spent a winter at Cape Adare, and then a second winter at Terra Nova Bay when their ship failed to pick them up. He and his five companions survived there in their summer clothing by digging a snow cave 3 metres by 3.5 metres and living on seal and penguin meat. He knew men who had gone over the top in Antarctica, and others who had committed suicide after returning home.

During 1913, when Mawson spent an extra year at Commonwealth Bay following the deaths of his sledging companions Ninnis and Mertz, he was marooned with a madman, his radio operator Sidney Jeffryes. Mawson wrote to his fiancée Paquita Delprat: 'Most of my time this winter was occupied in keeping myself and others sane' (p. 174).

Making good use of his all-too-brief opportunities to study the station logs held in the libraries of the Australian stations, Griffiths noted that in 1967, at Mawson Station, the doctor disintegrated and refused to work, secretly drinking the methylated spirits kept in the paint store. The Officer-In-Charge reported to the Antarctic Division that the doctor 'had occasional violent outbursts' (p. 174), was

threatening to cut people's heads off or to break their necks, which probably discouraged them from seeking his medical assistance. However with the coming of summer, his behaviour became unremarkable again.

Surely there can be no more bleak description of enduring the polar night than in the journal of Frederick Cook, beset in the sailing ship *Belgica* and by necessity part of the first group to winter in Antarctica in 1897–1898. 'The curtain of blackness which has fallen over the outer world of icy desolation has also descended upon the inner world of our souls' (p.1639). A lighter moment occurred when the crew thought a posse of penguins on the winter horizon was a visiting mission (presumably in dinner jackets) and dressed hurriedly to investigate.

I have not been able, in the space available, to do justice to the sweep of historic and scientific themes encompassed in this remarkable book. As well as his forensic scholarship, Tom Griffiths also writes superbly. 'Time lapse photography from satellites now reveals to us that Antarctica is like a giant, breathing organism clamped to the base of the globe' (p. 43).

And this:

This book is about the enduring power of these [Antarctic] stories. At first I thought I might navigate around the heroic era of Antarctica in order to privilege later personal and institutional experience. But Mawson, Scott, Shackleton and Byrd established the metaphors of language and experience on the ice. One must voyage with them and through the to new territory, not around them. When [biologist] Bill Green was camped in the McMurdo dry valleys at the end of the twentieth century, he dreamt of Edwardian figures sledging and the wind that he heard was 'the wind of Scott's death'. Michael Parfit, visiting Antarctica in the 1970s, observed that 'As a rare form of life here – human beings in Antarctica – we seemed haunted by our own history. The voices of people long gone were part of the present wind'. (p. 255)

Slicing the Silence is a book to be savoured and treasured.

Tim Bowden
Pacific Palms

Note: *Slicing the Silence* won the Queensland Premier's Literary Award for Non-Fiction in 2007. It was also shortlisted for the *Age* Book of the Year.

Danielle Clode: *Voyages to the South Seas: In Search of Terres Australes*. Miegunyah Press: Melbourne, 2006. 315 pp, illus., ISBN 0-522-85264-5 (HB), \$32.95.

'I am a voyager and a seaman;' wrote Louis-Antoine de Bougainville in the introduction to his *Voyage autour du Monde* (1771), 'that is a liar and a stupid fellow, in the eyes of that class of indolent haughty writers, who in their closets reason in *infinitum* on the world and its inhabitants, and with an air of superiority, confine nature within the limits of their own invention'

Bougainville, captain of the first French voyage of circumnavigation (1766–1769) succinctly—caustically—summarizes the challenge of writing in a genre of great antiquity but often questionable veracity at a time when each voyage of discovery revealed new species, societies, artefacts and practices that raised rather than answered questions about 'the world and its inhabitants'. The major question raised by Bougainville's brief encounter with Tahitian society; whether sexual shame was inherent—a product of Mankind's fall from grace—or learned—the bi-product of a decadent society—would inflame argument and imagination in Europe for decades and bring him a considerable measure of notoriety. But at least his account was in his own words, and his translator into English, Johann Reinhold Forster, was sympathetic.

James Cook, who closely followed Bougainville into the Pacific in 1768, would not be so fortunate. The editing of

the *Endeavour* voyage was placed in the hands of Dr John Hawkesworth who, in the interests of a good story, combined the contents of several journals into one first person narrative, which he placed in Cook's mouth, having added a few philosophical musings of his own for greater effect. Banks was one of the major victims of this act of ventriloquism, all his best lines given to Cook and his own role reduced to that of Pacific playboy.

The audience for both these accounts, in England and across the Channel, was huge and Cook wisely determined to retain control over the accounts of his two subsequent voyages. His three voyages, in the space of twelve years, would replace centuries of speculation with accurate charts, allowing Britain to claim territories and pursue trade. Pragmatic ambition aside, however, there was still much that remained unknown and with the long standing rivalry between France and Britain now extending into the South Seas, the first French State-sponsored scientific voyage of exploration, superbly equipped and under the command of Lapérouse, sailed in 1785. Lapérouse would not return, his ships lost after sailing out of Botany Bay in 1788, but his expedition set in train a remarkable series of French voyages into Australian waters that deserve to be better known in Australia than they currently are.

Danielle Clode has taken on the task of presenting these voyages to the English-reading public in her delightful book *Voyages to the South Seas: In Search of Terres Australes*, published earlier this year and recently awarded the Nettie Palmer prize for Non-fiction. Covering a period of fifty years in which scientific discoveries transformed the way the world was understood, Clode focuses on the voyages of d'Entrecasteaux (1791–1794), who sailed in search of Lapérouse, Baudin (1800–1804), Freycinet (1817–1820), Duperry (1822–1824), Bougainville

(1824–1825) and Dumont d'Urville (1826–1829 and 1837–1840).

Clode is well qualified to do justice to the voyages she examines, being both a zoologist and a talented science communicator. Her experiences sailing around Australia are also called on, making the descriptions of life onboard particularly vivid and compelling. She deftly articulates the complexities of motivation, ambition, rivalry, disappointment, danger and elation involved in securing funding, sailing in fragile ships, negotiating the perils of sea and personality, and making sense of discoveries made and the collections formed.

Each of these voyages is revealed through the viewpoints of the commanders and scientists onboard and enriched by the views of other significant figures such as Louis XVI, Joséphine Bonaparte, Sir Joseph Banks, Jean-Baptiste Lamarck, Georges Cuvier and Charles Darwin. Using the active voice to represent their thoughts and actions, Clode lets the reader share their sense of 'infinite possibility' and wonder. While the modern reader may know the world as subject to natural selection and bring an understanding of the mechanisms of evolution to the puzzles presented by the discoveries made during these voyages, the discoverers themselves are not hampered by our hindsight.

In addition to the information about her characters and their voyages gleaned from published and manuscript voyage accounts, letters, articles, books and memoirs, Clode has provided each with a short biography and portrait. The book is further enriched with black and white views and colour reproductions of the illustrations of the peoples, flora and fauna encountered in the South Seas and created as a result of these voyages. The book is attractively designed, with the pages clear and uncluttered. The usual academic apparatus and notes are placed at the back of the book so as not to interfere with the fas-

cinating story being told, allowing Clode greater space to amplify the points she wishes to make. The result is a powerful and compelling narrative, which should bring pleasure to the specialist as well as popular reader.

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National Museum of Australia
Canberra

Note: Danielle Clode won the Nettie Palmer Prize for Non-Fiction, one of the Victorian Premier's Literary Awards in 2007.

Jamie Kirkpatrick and Kerry Bridle

(eds). *People, Sheep and Nature Conservation. The Tasmanian Experience.* CSIRO Publishing: Collingwood, Victoria, 2007. 263 pp., illus., ISBN 9780643093720 (PB), \$39.95.

At the outset I have to admit that I know Tasmania and its landscape largely through books. However, as a historian of landscape change in New Zealand's South Island high country and a former Merino breeder in that region, I do have an appreciation of the issues that this book sets out to address. I must also say that I applaud what Kirkpatrick and Bridle have achieved here. God knows, we could do with such a balanced and insightful approach to the problems of managing production and conservation values in New Zealand's run country.

To understand the interaction between graziers, the sheep and the natural environment in Tasmania's run country Kirkpatrick and Bridle have set out three explicit questions: What is the relationship between production and conservation in natural landscapes grazed by sheep? Can nature conservation be integrated with wool production? How can the many conservation values that rely on private land be perpetuated? To answer these questions the authors have used data from a wide range of sources, including field trials, landscape surveys, and enclosure and exclosure

studies, but some of the most interesting and important information is from discussions with the managers of 48 wool-growing properties.

The first chapter provides the historical context, explaining how sheep farming developed in Tasmania. In many ways the story is very similar to the New Zealand experience: the rapid build up of sheep numbers; the use of fire as a management tool; problems of sheep scab and footrot; and the devastating impact of rabbits on the environment and the profitability of runs. The decline in wool prices since the end of World War 2 (collapse might be a better description) has made wool-growing a marginal enterprise and forced graziers to look at alternative uses for their land. This chapter also takes account of the technological developments adopted by farmers in trying to maintain their profitability and how these have reduced the native vegetation and had significant impact on native animal populations.

The following chapters explore contemporary management of run country for production, the graziers' attitude towards conservation on run country and their management to promote it, the problems of tree dieback and spread of woody plants, the relationship between sheep and native plants and animal species on the runs, and land clearance and remnant management. The penultimate chapter has some thought-provoking ideas on the future of run country, before the book finishes with a brief concluding chapter.

The major theme to emerge from this study is one of complexity. There is marked variation across the runs in terms of altitude, rainfall, land type and fertility. Individual runs differ in size and within each run there are different environmental niches. Overlaid on this are the different ways in which graziers manage their runs; even within the same environment different wool-growers might adopt different

grazing strategies. As a result of this complexity, sheep grazing results in varied outcomes for different plant species. Indeed, the authors point out that many plant species show contradictory responses between sites. They go on to warn that the 'admirable search for general principles of conservation management can be detrimental for some species' and that when trying to establish 'quick rules of thumb' the conservation extension community needs to be mindful that there are always exceptions to every rule (p. 148). They note that in some environments sheep grazing is necessary to maintain native biodiversity whereas in other environments sheep have no value in this role. Similarly, fire-grazing interaction varies. On poor soils, they found that an increase in fire frequency depletes the ecosystem of its nutrients. Whereas, in other environments, patch burning of unpalatable vegetation concentrates grazing and increases palatability.

Kirkpatrick and Bridle conclude that there is no right way to manage sheep grazing to promote the interests of 'nature', as different strategies benefit some species and disadvantage others. The key to maintain native biodiversity is spatial heterogeneity in management at the landscape scale, which leads to habitat complexity that allows species with different requirements to survive and even thrive. In contrast, temporal heterogeneity in management causes the decline of species that were adapted to the old management system, but not the new one.

The authors' chapter on the future of run country puts forward solutions that are bound to raise eyebrows, if not hackles, in both the wool-growing community and conservation groups. They propose that biodiversity plans should be integrated with property plans to help with nature conservation. In the current economic climate where wool-growing is an increasingly marginal business, they

argue that a 'stewardship payment' agreement would advance conservation. The idea being that current land use is not a threat to biodiversity, but changes in management are. They go on to argue that wool-growers in Tasmanian run country should go through an accreditation process so that their wool could be marketed for its environmental-friendly and biodiversity-friendly qualities.

This book is a breath of fresh air in a debate that has been bogged down by entrenched positions on both sides. Kirkpatrick's and Bridle's emphasis on the complexity of the issues is eminently sensible: there are different problems in different types of country; marked environmental differences occur between runs and within single runs; and different management strategies have different outcomes. These observations all seem obvious, yet in New Zealand the approach has been one size fits all. Across our ecologically complex high country we are arbitrarily splitting off 'production' country, which is being sold (or given) to the existing leaseholders, from 'conservation' land, which is being closed up and handed to the Department of Conservation. It is a system that takes no account of differences in environments between runs or differences in management. It is going to result in profound long-term landscape change, most of it bad. In contrast, Kirkpatrick's and Bridle's proposition that runs can be managed to promote both production and conservation values is far more sensible. This book should be compulsory reading for conservationists, wool-growers and decision makers not only in Tasmania, but on the Australian mainland and in New Zealand.

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Erica Nathan: *Lost Waters: A History of a Troubled Catchment*. Melbourne University Press: Carlton, 2007. xiv + 258 pp., illus., maps, 21 cm. ISBN 9780522853513 (PB), ISBN: 9780522853520 (Web), \$49.95 (PB).

Erica Nathan's *Lost Waters* is an important and timely counterpoint to dominant Australian water narratives. It is a history of the West Moorabool Catchment, a small area of confined forested valleys near Ballarat in Victoria's central highlands. In the book's introduction, Nathan acknowledges the recent intensification of high profile debates centred on water systems considered to be of national significance, but modestly states her study instead 'concerns those many finer blue lines that cartographers use to represent inland water across rural land' (p. 2). It is on this more intimate scale that the author can carry out the challenging task of rediscovering forgotten waterscapes and the history of shifting community connections to them.

Lost Waters explores the tensions between water as resource and waterscape as cultural place, between rural and local connection versus the interests of a more populous city outside of the catchment community, and the uncertain position of public versus private rights to the natural world. The two central arguments of the book are that scientific representations of water and their use for determining water policy are devoid of historical context, and that waterscapes disconnected from local communities are more likely to suffer environmental degradation.

Early chapters establish the conditions for conflict and uncertainty in relation to water that carry through to the present. The narrative begins in the mid 1800s, when local Aboriginal people had already been violently dispossessed of their land, and gold mining was disrupting the pastoral future of the area around the West Moorabool River. Alluvial mining and its

consumption of water and timber were placing strain on local resources. Nathan argues, in contrast to the contemporary economic view that water has finally reached a point where demand has outstripped supply and its economic value has been realized, water had regularly been regarded as limited and was often a contested resource.

Following this, Nathan documents the protracted and often painful loss of rural waterways from community access and knowledge. Mining activities drew attention to the need for a reliable and good quality supply of water, so the officious and abrasive engineer Christian Herman Ohlfsen Bagge was brought in to advise on the construction of Beales Reservoir. Bagge reassessed earlier work on the reservoir with reference to European data despite debates at the time stressing the importance of Australian data. The engineer was adamant that undesirable people whose activities could pollute the water must be excluded from the reserve. Locals taunted the self-important Bagge but by 1871 the last of the forest and swamp people were removed from the Beales Swamp area. In a decision that highlights the unfairness in early attempts at resource allocation and administrative arrangements, fourteen years later Beales Reservoir reserve was opened again and leased for agriculture after the Ballarat Water Board realized and then exploited the revenue potential of its land holdings.

Nathan's extensive archival sources and comparisons of changing cadastral maps reveal further administrative bungling and policy playing catch-up to the activities of local landholders in the history of 'closed roads', or 'paper roads'. An 1878 Royal Commission described 13,000 miles of closed roads in Victoria. These were roads that had been surveyed but not necessarily proclaimed. Most were used but not properly marked out or fenced. Gradually, adjoining landholders incorporated many

of these roads into their paddocks, sometimes with leases to graze, but often illegally. The fencing-in and ploughing of roads restricted local people's access to waterscapes. By default, crown lands once understood as public lands and resources became virtual private properties, with unclear formal standing. Nathan's historical work suggests that if landholders can claim that they are the ones who 'know' the land and nature, then in part this is because they have prevented anyone else from knowing it.

The later chapters, from 'Hydrology and history, part one' to the conclusion, expand from the concentration on loss and displacement, and examine the processes and politics of water allocation. Early determinations of compensation volumes in relation to the construction of Moorabool Reservoir were reported on and carried out by Stuart Murray, Elwood Mead and Thomas Murray, but in this history it is the less well-known municipal shire administrations and water committees that played the greatest role in shaping local water access and policy. Through the case studies of Moorabool and Lal Lal Reservoirs, from proposals to present, Nathan shows that current water arrangements and perceptions of natural resources did not emerge from progressive, rationally evolving policy and stable social development. Instead they are the result of haphazard, muddled and inequitable bureaucratic functioning, of policy oversights, and forgotten and shifting priorities.

The case studies support Nathan's argument that the loss of community and social connections to waterscapes results in environmental degradation, even if only on a small scale—the recent 'rediscovery' of Lal Lal Reservoir and surrounding reserve by locals has resulted in the removal of willow trees, whereas Moorabool remains 'shrouded in blackberries and anonymity' (p. 228). After reading the comprehensive history of lost community connections to

water, unfair deals, displacement, community anger and bitterness, the 'water wheel'—a pie chart used by the current water authority for representing megalitres divided among stakeholders—does indeed seem a trite abstraction. It may be accurate, but it is inadequate because it ignores the historical context for current assumptions about who 'stakeholders' are and how much should be allocated.

An extensive range of primary sources make Nathan's central arguments persuasive. Alternation between sections of reportage and interpretation of sources is evenly paced, although greater integration of interpretation and reportage in some sections may have made for an easier read. Worthy of specific mention is the author's use of maps. They do more than simply provide a quick visual guide to boundaries, size of areas and number of leases. The maps are integrated into the narrative with literary adeptness in phases such as 'in the parish map...you can hear the noisy bustle of Bungaree district farmers and bush workers pushing in on the cavernous quiet of the new Beales Reservoir reserve' (p. 46). The evolution of these maps throughout the book gives us a concrete sense of the changes that have taken place over time in the West Moorabool Catchment.

Central to the book's investigation and arguments is the concept of 'social flow' that Nathan has created in a tactical response to the more scientific and context-free notion of 'environmental flow'. It is not a critique of saving some water from extraction for human industry and town water supply, but of treating the environment as a stakeholder in a quantitative and instrumental water allocation process. Social flow means the 'fluctuating cultural ties that community has with local water places' (p. 69), and it is the social flow that Nathan says is missing from contemporary water decisions based on scientific determinations. It is a compelling idea and neat catchword; however, I would have

liked to have seen it developed more. We see a history of 'social flow' and the importance of integrating it into contemporary water decision-making, but the term itself only appears a few times in the book. Nathan states in her introduction and conclusion that she hopes the book extends to water debates further afield and I wonder how much more likely it would be for this to occur if the idea of 'social flow' was extended more broadly.

Anyone who wants to understand water rights, why there is so much conflict, why many plans are continually subject to abandonment, and perhaps most importantly, the social and cultural cost of inequitable and context-free water processes, would enjoy this history. *Lost Waters* rescues the obscure history of forest and swamp dwellers that has been overshadowed by the national story of agriculture and pastoralism, emphasizes the importance of acknowledging that water plays a central social and cultural role beyond its resource function, and highlights the importance of including historical context in decisions about water allocation. If one catchment can have such a troubled history then one has to wonder what gets lost in the large-scale national water initiatives.

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Judith A. Ajani: *The Forest Wars*.
Melbourne University Press: Melbourne,
2007. 362 pp. + index, ISBN:
9780522854190 (PB), \$34.95.

The Forest Wars uses the export woodchip trade as an entry point for a wider analysis of Australian forestry policy since 1990. Forests in Australia as elsewhere have been at the heart of some elemental conflicts between environmentalists and industry. These conflicts have been ongoing and, in the Australian context, are embedded in a

complex interplay between State and Federal politics. Judith Ajani writes as someone who has had insider and outsider roles in forestry over the last two decades. This enables her to navigate comfortably through the complex set of policy positions, industry bodies, government agencies and political actors constituting the changing Australian forestry scene. Her argument is multifaceted, but one theme she returns to is the extent to which much conflict could have been avoided if the maturing softwood and subsequently hardwood plantation resources had been deployed in a different manner.

The book is organized into four parts entitled, 'soft wood plantations – the only solution', 'Log jammed alliances', 'Multiple abuse' and 'Hardwood plantations – the next solution', which allows for a thematic treatment that is broadly chronological in execution. Ajani draws on Parliamentary statements and a multitude of policy documents, some retrieved from the obscurity of the archives, and augments these with interviews of some key actors. The resulting book is one that defies easy categorization; it is not a history of the Australian forestry conflicts, nor is it a tract that advocates and defends the positions of environmentalists or industry. Indeed, it spends some time unpacking the range of groups and interests represented by soft wood plantation growers and millers, and native forest millers gathered under the forest industry umbrella. Neither is it an analysis of past and future policy options, though it contains elements of all of these. This mix is the deliberate intention of the author who places forest controversies in a wider political, economic and environmental context. It also means that there is the possibility that, in the short term, Ajani's book will not completely satisfy those who want to read it solely as an environmental history, as an account of the political and economic backdrop to forest policy formulation and implementa-

tion, or as suggestive of future forest policy.

As a history, it touches on the work of the 1920s crop of foresters in Australia, but spends more time examining the work of prominent foresters such as Max Jacobs, and their role in shaping the long-term future of Australian forestry in the 1950s; in particular, it regards the softwood plantation versus native hardwood relationship. Ajani's primary concern is with understanding the events of the last fifteen years so that those who seek a more rounded account of the 1950s and 1960s forestry scene may feel that they wish to look elsewhere.

As an account of the political manoeuvring that followed then Prime Minister Paul Keating's attempt to achieve a breakthrough with environmentalists and the forest industry over the export of wood chips, the discussion is detailed and, not unreasonably, more attuned to the needs of Australian readers than to outsiders. In contrast, the interplay between states and the federal government, an element missing from New Zealand's unitary system, makes for compelling reading. The brokering of state 'solutions' in Queensland and Western Australia provides interesting examples of the way in which negotiation and compromise can be reached at the state level while it remains elusive at the federal level. If I have one lingering concern, it is that Ajani expects politicians, industry representatives and environmentalists to make good (rational?) decisions based on good information and to make better decisions when confronted by better information (for instance, the various recalculations about harvest levels).

Much of Ajani's book is about policy and policy reformulation. She has grounded this in the broader context of the forestry sector and the ongoing conflicts with the environmental movement. One unintended consequence for would-be

policy formulators who might read the book searching for ‘answers’ is that her insights are integrated within the narrative rather than standing out clearly from it, so that they may too readily be set aside. There is an important caveat to these remarks and that is Chapter 15: ‘What should we do’, which, in five pages, sets out the ingredients of a new forest policy for Australia anchored around three objectives (ecological integrity, economically and environmentally viable forest industries, and rural development) with two associated strategies (shifting commodity wood production from native to plantation forests and domestic processing).

Ajani has also had to deal with the question of how to present her own involvement in the narrative, for she appears in various guises as a forest industry analyst, critic of government policy and university researcher writing reflectively of earlier episodes in which she was at times a participant. Her approach has been to provide a minimalist events-based account, to note outcomes and to avoid the re-litigation of old battles.

Inevitably, I read *The Forest Wars* with an eye to similarities and differences in the Australian and New Zealand experiences over environmentalist versus industry clashes over forests. While this is not the place to recount the New Zealand experience at length, Ajani’s account of the Australian situation drew my attention to the comparatively earlier creation in New Zealand of an exotic plantation base with exotic production exceeding indigenous in the late 1950s and to the importance of having some relatively easy to plant lands that were unprofitable for agriculture so that corporate afforestation in particular was not oriented towards the replanting of lands only recently harvested of indigenous forests.

Those who read Ajani from a position within a rigidly defined industry or environmentalist perspective will probably find

much to debate in *The Forest Wars*. What will be interesting, however, is the extent to which *The Forest Wars* itself becomes something of a source book for those studying the late twentieth and early twenty-first century forest history of Australia in its broadest sense, a generation hence.

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Ted Henzell: *Australian Agriculture: Its history and challenges*. CSIRO Publishing: Melbourne, 2007. 336 pp., ISBN 9780643993426, \$79.95.

‘Dr Henzell has taken a ‘commodity approach’ to his history...’, according to Dr Bob Clements, Executive Director of the Crawford Fund, who supplied the Foreword for this book. And this is certainly true: *Australian Agriculture* is rich in facts and references.

Ted Henzell came from a farming background and had a distinguished career in research and scientific administration with CSIRO. He writes from the point of view of someone who has had a lifelong association with agriculture and its scientific research, and the wealth of data and substantial reference sources contained in this study reflect his long career. It is therefore curious to find that the author says he has written a book that tries to eschew science. ‘It is not history of agricultural science’, he says, but rather, it focuses on ‘the technologies that the farmers and graziers actually used’ (p. ix). At times, this almost seems perverse. He frequently mentions new technologies, from superphosphate to cutter bars on headers but the only people to appear, and then only by name, not by action, seem largely to be farmers. This is not to deny the huge role that farmers actually did play, but the extraordinary contribution of Henzell’s predecessors and successors in institutions like Departments

of Agriculture, CSIR(O) and Universities is largely neglected. Perhaps this is why the book feels 'soulless' as individuals are rarely mentioned or developed as actors in history.

In the play and recent film adaptation, *The History Boys*, one of the most endearing characters responds to a question from his teacher about what history is by plagiarizing an old quotable quote: 'History Miss? What is it? Just one...thing after another'. Funny, sure, as a definition, but such history does not make good reading. Good history needs a narrative and works best with a strong individual narrator. There have been many such books that have either directly or significantly told historical stories about Australian agriculture this way from Manning Clark and Geoffrey Blainey to J. M. Powell and Geoffrey Bolton. Even while taking a commodity or economic focus authors like A. G. L. Shaw, Alan Barnard, Bruce Davidson and Fred Gruen and more recently, Geoff Raby and Neil Barr and John Cary (see below) have provided narrative threads through their commodity stories, and carried the reader to wider understandings of the subject of Australian agriculture. Henzell's book alas lacks a narrative and in the end, reads as just 'one...thing after another'.

Taking the eight principal commodity groups of Australian agriculture, Henzell documents meticulously their production and economic journey since their introduction to Australia. The book reads like a well-researched gloss on the facts and figures generated by the Australian Bureau of Agricultural and Resource Economics. Each of the eight commodity groups is reviewed from a statistical production point of view and the dominant technologies listed over time. There is coverage of the reasons why various commodities rose and fell in production.

But this is where a book with a title promising *Australian Agriculture: Its History and Challenges* runs into prob-

lems. Its putative audience of 'history, social science and agriculture' students and professionals will be disappointed because the book fails to engage with the environmental outcomes of agriculture in this country in any way. Henzell begins by citing Jared Diamond, but that is as far as his environmental assessment goes. And he only quotes Diamond's older much more benign *Guns, Germs and Steel* (1998) rather than the later, more vitriolic *Collapse* (2005), which made specific reference to Australian agriculture.

Neil Barr and John Cary in *Greening a Brown Land* (Macmillan, 1992) present a vastly different, though better written, narrative of the Australian agricultural experience. They clearly, and just as 'scientifically' as Henzell, approach the settlement of the land from an agricultural perspective, but make it a narrative of experience rather than a series of separate episodic events in a 'fact book'. They also explicitly engage with the environmental outcomes of agricultural technologies in this land. But if you prefer to read an economic perspective that relates the experience of farming in Australia to its antecedents in Europe, as Henzell does extensively, then the work by Geoff Raby did this admirably some years ago in *Making Rural Australia* (OUP, 1996). Raby set out to examine the early Australian agricultural experience after white settlement. His work documented the ubiquity of experimentation, innovation and adaptation of technical know-how in Australian agriculture and he concluded by linking agriculture back to its role in society: 'Rapid economic growth and structural change would scarcely have been possible if early Australia was not a society on the make, on the go, bubbling with creativity and energy.' (Raby, p. 153). Perhaps the difference is whether your history is based on lives lived (individually or collectively) or filtered through the lens of tables of output or production.

Henzell's book is therefore disappointing as a narrative history and perhaps if it was promoted as a 'statistical review of agricultural commodities', this would have lessened expectations. It is curious to note that this book received subsidy from the Crawford Fund of the Australian Academy of Technological Sciences and Engineering, which normally supports agricultural research in developing countries. The justification given by Bob Clements was that '200 years ago Australia was a developing country'. But is it now a 'developed country'? If this history does not show how agricultural development in Australia has been made ecologically sustainable, then Australia is only 'developed' in a limited sense—and hardly an example to agriculture in so-called developing countries.

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Libby Robin: *How a Continent Created a Nation*. University of New South Wales Press: Sydney, 2007, pp. viii + 259, ISBN 9780868408910 (PB), \$39.95.

First Prime Minister Edmund Barton's oft-quoted statement at federation, 'A Nation for a Continent, and a Continent for a Nation', provides the departure point for Libby Robin's important new work. While Australia has become a nation, she argues, its identity is uncertain because the nation has not embraced the continent. The Australian people have not yet come to terms with the radically distinctive environment in which they live. Of course, early settlers and visitors as well as scientists have often been impressed by evidence for exceptionalism including trees that shed bark instead of leaves, and animals that defied conventional demarcations between mammals and reptiles. But Robin goes beyond well-known clichés to document the multi-layered experience of science with Australian nature.

Robin's aim is to chart how practical science and natural history in Australia viewed the flora and, particularly, the fauna of Australia, and abetted efforts to force the land into categories appropriate to European economic systems. These systems required the export of agricultural staples, and encouraged inappropriate land management practices in an ancient land that possessed, among other deficiencies from a European viewpoint, the poorest soils and unpredictable water supplies. She analyzes distinctive aspects of Australian science, such as the strong government–science nexus, but these are, she argues, symptoms of the problem, with science drawn into a nation-making that was all too European. Nevertheless, she finds adaptation in the views of practical scientists as they confronted the land. Robin sees hopeful signs in this history, as when conservation biology develops in partnership with vernacular and especially Aboriginal understandings to promote what she calls 'sustaining the exceptional'.

The result is highly original. It is grounded in wide interdisciplinary knowledge, and a system of thought reminiscent of American conservationist Aldo Leopold's, in that Robin seeks to develop a 'land ethic'. This is not environmental history as the history of wilderness apart from human contact. She has been influenced by ideas of sustainable land management derived from experience of those who have managed the continent for longest, the Aboriginal people.

How a Continent Created a Nation is impassioned, often impressionistic and sometimes allusive both between chapters and within them. It touches on how Australia's ecological systems shaped the larger sphere of material life, but this is not a theme systematically pursued. Still less does Robin provide a comprehensive survey of how Euro-Australian social and cultural ideas reflected or shaped aware-

ness of the continent's unique natural systems. This is not to say that these topics are absent. Interesting material illustrates how land, flora and fauna found representations in popular culture. Thus, the Ethel Pedley children's story, *Dot and the Kangaroo* (1899) reveals concern over species extinction in early twentieth-century Australia, and debates over the emblematic wattle are used to probe environmental sensibilities surrounding national symbols. But this attention to popular culture and nationalist imagination is most obvious in the introductory and concluding sections. The book mostly deals with scientific ideas and practices that are in dialogue with Australia's ecological peculiarities and economic pressures. Within this choice, Robin offers a kaleidoscope of thematic sketches, but the results are consistently interesting. Thus, an account of museum development leads up the National Museum of Australia, and illustrates the changing fortunes of science and history in that story. Another chapter contains a sharp but accurate attack on the 'unnatural economy' of wool that so long dominated Australia.

Robin shifts the emphasis from the areas of most intensive Australian settlement in the south-east's 'restless fringe' to what she regards as the two major ecological alternatives: the arid inlands and deserts on the one hand, and the more fertile tropical North on the other. Though there is a welcome attention to these regions as presenting distinctive challenges, a number of topics are omitted. Missing is North Queensland, where the sugar economy and its scientific accoutrements are illustrative of profound impositions of European agriculture on tropical ecosystems. Rather, Robin dwells upon projects less 'successful' from a Euro-Australian viewpoint. The Daly River settlement, where scheme after scheme to fill the 'empty north' ignored the significance of

Aboriginal habitation, fell far short of promise. There is no discussion of the Barrier Reef marine environment and, except for reference to Ruth Balint's idea of *mare nullius*, marine scapes do not figure. Animal life is central to this work, but fish are discussed only in so far as the case of the scientific peculiarity of the lungfish is concerned, even while Australians have yet to come fully to terms with the continent's seascapes and fisheries. Their particular ecological configurations, with their mix of richness and barrenness, might have been compared with arid landscapes.

Though the book has no single chronology, the chapters considered together illustrate a general drift towards greater awareness of the continent's constraints in the late nineteenth and early twentieth century periods, but most of the appreciation from an ecological viewpoint has come recently. Robin does not always systematically weigh up forces making for greater scientific involvement, for example, government, economy and international trends, but those who want to know what she thinks about these things will find illuminating chapter 8, where key themes are set out.

As a thoroughly interdisciplinary scholar, Robin wants science to contribute to history, and history to science. Quite rightly she stakes out an important role for history, including the story telling of the original inhabitants and the work of professional historians. She is critical of the way pre-eminent historian Sir Keith Hancock and others allowed the Australian National University's Wool Seminar project of the 1950s effectively to marginalize history, race and class. Yet she recognizes increasing interest in historical perspectives from within the scientific community—as explanations of human induced change and as benchmarks for environmental transformation.

Can the ecological sensibility Robin calls for be reconciled with an emerging national identity? The latter should be grounded ecologically through a land ethic in Robin's view, and she stresses that this knowledge must be local. Detail, she argues, is the new 'big picture'. (This surely applies even more neatly than indicated to fire regimes, where she argues that our troubles with epic conflagrations have flowed from the lack of 'little fires' that Aboriginal use developed.) The problem is that the nation is an artificial construction from an ecological viewpoint grounded in mythical nature. In contrast, the needs of regions are local and diverse. All nations are, no doubt, agglomerations of small eco-regions (p. 192), but reconciling nation and ecology, continent and people has been far from easy in the Australian case through sheer scale, and the path forward is not entirely clear. Much may be resolved by the water crisis, which presents an overarching theme as the fertile southeast becomes less so. But the experience revealed here of science's role within the nation's political economy suggests a pattern of uneven and hesitant cultural accommodation to the continent's complexities.

All in all, this is a lively book brimming with stimulating ideas, and difficult to summarize. Students and specialists in the environmental sciences should read this work to help historicize their own endeavours. Historians, too, could learn much from Robin's attempts to bridge the chasm between the imagined community of nation and ecological thinking.

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Note: *How a Continent Created a Nation* won the Australian History Prize at the New South Wales Premier's History Awards, 2007.

John Long: *Swimming in Stone: The Amazing Gogo Fossils of the Kimberley*. Fremantle Arts Centre Press: Perth, 2006. 320 pp., illus., ISBN 1 92 1064 331 (PB), \$29.95.

John Long, palaeontologist and Head of Science at Museum Victoria, takes us on two journeys in this entertaining book about his work on a large Devonian reef in north-western Australia. The first half of the book is devoted to tracing the history of the discovery of the Gogo fish fossils, from the work of Curt Teichert in the 1940s, through the explorations of the British Museum of Natural History and the Western Australian Museum in the 1960s and the scientific events that led to John Long's own explorations from 1986–2001. The second journey, or Part 2 of the book, examines the scientific significance of the fossils; this is a journey through the history of ideas that follows the twists and turns of evolutionary theories over the years. Thus, the book is framed in two parts around the fossils and around the ideas.

But perhaps there is a third journey in here as well. John Long's personal odyssey in science is threaded through both parts. His passion for fish since he was a seven-year-old and his ongoing excitement with the science of ichthyology is infectious. He assumes nothing and explains his ideas in lively prose. The margins of the book carry little 'text box' definitions of key concepts throughout, and the contents section reminds me rather of a novel in the Dickens period (or perhaps Darwin's *Origin of Species*), with a two or three line plot summary for each chapter. I read the book from cover to cover, but it would be possible to approach the sections of primary interest through this device, without reading the whole book. Long's field work expeditions are a particular feature, and we see the daily trials of doing palaeontology in remote and inaccessible places (and the back rooms of museums),

and how these studies inform and shape the development of scientific ideas.

Our first trip in the book is back in time 375 million years to the Devonian, the Age of Fishes, where we are swimming around a huge reef. It may have been 1400 kilometres long, in a long U-shape, starting near Kununurra, moving off shore and sweeping down the just off the present north-western coast of Australia then re-entering the land between Broome and Derby and moving inland beyond Fitzroy Crossing towards Go Go station from which the reef takes its name. We are visiting a time just at the cusp of possibility, before the big extinctions (known as the Kellwasser Events) that killed many of the life forms of this reef and elsewhere on earth, and the reef itself. Gogo fish fossils are important: they are brilliantly preserved and they date this important transition, a key story of 'life on Earth'. So Long takes us swimming in the warm sea, like the fish of the era, but he also considers finding colder, fresh water and walking on land nearby, finding new places to survive this dark time that pushed so many of Earth's life forms over the edge. We (the subjects of this imaginative exercise) are just beginning to have the possibility of moving out of the water and on to the land; lungs to breathe air are evolving for the first time, and the lungfish of this reef are of particular interest throughout.

It is one of the paradoxes of Australian history that this north-western corner, the seat of the oldest geology in the country and the probable route of the first Aboriginal discoverers of the country, has been the last 'discovered' by European settlers and western science. Highway 1, the route of (mostly coastal) circumnavigation of the country, was progressively sealed, but the very last bit, between the West and East Kimberley, was not completed until late in the twentieth century. So it is not surprising that this fossil-rich reef remained unacknowledged by science until the twentieth

century. It was the explorations of German palaeontologist, Curt Teichert, who brought the reef to the attention of science. Rod Home and others have written much about the impact of Germans in nineteenth century Australian science, but Teichert's story is another example of this important influence, much later than Leichhardt, Mueller, Krefft and the others.

Despite his official nationality, Teichert was born and educated in the Baltic port of Russia, Königsberg (Kalinigrad). He had worked extensively on the Silurian brachiopods of Estonia and had been part of the team that undertook the first geological mapping of Greenland. With the help of the Rockefeller foundation, in 1936, Teichert and his German-Jewish wife Trude (née Kaufmann) fled Nazi persecution in Europe and finished up in Perth, working in a research position with Professor Edward de Courcy Clarke in the geology Department at the University of Western Australia from 1937 to 1944. He was not allowed to travel overseas at this time because of the war, so he focused his efforts on the huge under-explored geological strata of Western Australia. Teichert went first to the north-west because the nascent petroleum industry was keen for a full geological mapping of the area; Go Go station had been the site of an oil find in 1919, and further drilling in the area had continued in the 1920s.

Teichert struck a different sort of reef in his trips in 1939, 1940 and 1941—a reef rich with interesting fossil specimens. He knew in 1940 that he had found a fish fossil, but there was no way at the time to extract the 'coccostean remains' from the surrounding rock. John Long's own work has developed techniques using acetic acid to prepare such specimens, and he has now prepared many of the fossils collected by Teichert in the 1940s.

Western Australia was blessed with several other internationally distinguished palaeontologists, including Harry Toombs

from the British Museum of Natural History and Oxford-educated Australian David Ride, who directed the Western Australian Museum in the 1960s. George Kenrick and other staff of the Western Australian museum were active in developing the ideas about the Gogo reef fossils in the 1960s.

I have concentrated on this 'history of science material in detail, but that is not all that *Swimming in Stone* offers. Long also explains carefully his technical skills, honed on the Gogo fossils, which allowed him to extract them from the surrounding rock and how he has used them to examine the anatomical and the physiological evolution of an astonishing range of fish.

Nowhere else in the world is it possible to get such intact fish specimens from this period. They really still 'swim in stone', uncrushed by later sediments. The excitement of these remarkable survivors feeds Long's writing, which is generally racy,

almost breathless. In the strongest passages of the book, he curbs his scientific excitement a little and interweaves some extraordinary 'human interest' stories that have, from time to time, bumped into the fieldwork. I encourage you to read for yourself about the missing murderer wandering the Kimberley in the 1980s!

Long's approach, which captures science and its ideas, but also situates them firmly in real life and places, gives a general reader a way into an intriguing form of scientific biography. In a sense, this is a new genre and a good one, something recognized by the judges of the Victorian Premier's Literary Award for Science Writing, who shortlisted this book in 2007.

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