

Environment and History

Special Virtual Edition:

**Natures in
Between**



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Cover: Goethe facing a grave monument, cut paper, 1780 (de.wikipedia.org).
Background photo: Sarah Johnson

Environment and History

Special Virtual Edition: 'Natures in Between'

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A Scholarly Slice of ‘Natures in Between’: Samples from the Vault of Environment and History

This ‘virtual issue’ represents an inaugural foray for *Environment and History* and a somewhat unnerving one for an environmental historian used to tackling the material world at some part of the editorial process. Our theme here – rather appropriately – is ‘Natures in Between’, a salient tagline that pays heed to the cybernetic stylings of a ‘virtual’ issue and also invokes various forms of borderland terrain: political, ecological, cultural and technological. Significantly, this foray into the ‘electronic frontier’ of *Environment and History* provides us with a opportunity to delve into an archival record 22 years in the making, locating old favourites and digging out forgotten papers in a process of historiographical metal-detecting.

The theme of this issue – of course – reflects the organising banner of the forthcoming ESEH conference (Zagreb, June–July 2017) and its intention to think about how humans have modified the planet in various ways to create ‘contact or conflict zones’ that involve cultural communications, the exchange of materials and practices, ideological collisions or military clashes, along with a complex array of human–environmental relationships. In scanning the archives to find suitable papers to include here, the main editorial difficulty I faced was one of selection. As it turns out, the idea of ‘Natures in Between’ has been a rich and sustained vein of scholarship throughout our print run, from the earliest issue to the most recent volume. Here, then, are assembled fifteen papers that collectively speak to the ‘multiple uses’ of environmental spaces by *homo sapiens* as well as a multitude of approaches, contexts and conclusions that inform the central concept of ‘Natures in Between’.

Our first paper, ‘In Our Own Image: The Environment and Society as Global Discourse’ by Michael Redclift, dates back to 1995 and the first issue of *Environment and History*. Here Redclift convincingly demonstrates how the environment is a mental as well as material fixture. By uncovering the ways in which Science (in particular) has manufactured the environment as ‘intellectual capital’, the paper argues for the importance of recognising multiple understandings of global environmental change. Read in the terms of the thematic wrapper of this virtual issue, Planet Earth is perhaps the ultimate ‘contact zone’. Our second entry, from Donald Worster, entitled ‘The Two Cultures Revisited: Environmental History and the Environmental Sciences,’ dates back to Volume 2. Notable for its investigations of the ‘new’ field of environmental history, Worster’s paper points to the importance of a subject that provides a space for scientists and humanities scholars to congregate. The third paper, from Melissa Leach and Cathy Green, places focus firmly on the ways in which gender analysis can usefully inform studies of power, property and labour relations. As such, ‘Gender and Environmental History: From Representation of Women and Nature to Gender Analysis of Ecology

and Politics,' elaborates on a developing scholarly discourse that seeks to explore processes of disenfranchisement and marginalisation, in other words, the 'voices in between'. 'Environmental History and the Challenges of Interdisciplinarity: An Antipodean Perspective', a paper from Volume 9, completes the first section of our offerings by pointing to the challenges as well as the boons of a scholarship 'in between'. Fortunately, authors Eric Pawson and Stephen Dovers present a working solution based around 'intersections' (they identify four themes – mutual understanding; spatial scale and locale; time and change; and the environment and agency – and our readers will no doubt come up with more) that offer useful points of cross-subject convergence.

The next group of papers ranges widely over matter and space to highlight both the gaps and the translations between environmental and cultural worlds. In 'Weeds, People and Contested Places', by Neil Clayton (also in Volume 9) the (literally) thorny categorisation of 'good' and 'bad' plants is explored with a view to illuminating how particular horticultural wrangles created New Zealand as a place of biotic contest. Kim McQuaid, meanwhile, looks at the way environmental issues were framed (and forgotten) in the age of the space race. 'Selling the Space Age: NASA and Earth's Environment, 1958–1990', which first appeared in Volume 12, demonstrates how an elite cadre of NASA scientists effectively ignored 'earthly concerns' in their unyielding desire to create a 'human spaceflight culture'. Cross-fertilisation is the subject of the next paper – 'Out of the Woods and into the Lab: Exploring the Strange Marriage of American Woodcraft and Soviet Ecology in Czech Environmentalism' – from Petr Jehlicka and Joe Smith. Published in Volume 13, this piece explores the variegated roots of environmental awareness in the Czech Republic, finding grassroots and romantic concerns for nature conservation sitting alongside official scientific discourses and coded references to the frontier mythology of the trans-Mississippi United States. From Volume 14, Heather Goodall's 'Riding the Tide: Indigenous Knowledge, History and Water in a Changing Australia' points to further complexities in the assembling of environmental knowledge by highlighting the value of indigenous perspectives (or Traditional Environmental Knowledge [TEK] as it is labelled in modern environmental analysis) as well as the problematic consequences of reading that knowledge in an ahistorical way. Evidence from the upper Darling River region in Australia, she argues, suggests the value in charting an evolving indigenous viewpoint, especially as to how traditional strategies for conservation might alleviate modern hydrological crises.

Our next group of papers conjure with 'Natures in Between' in terms of hybridity, causality and conservation doctrine, finding new possibilities for understanding such issues as urban-rural networks, disaster resilience and biodiversity management in exploring the eco-cultural entanglements of the past. 'Landscape and Ambience on the Urban Fringe: From Agricultural to Imagined Countryside' by Joseph Goddard (Volume 15) elaborates on the

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idea of ‘penurbia’, a space somewhere between city and country that sports a degree of rural aesthetic but ‘thinks’ in urban terms. For Uwe Luebken and Christof Mauch, editors of a Special Issue on Risk and Disasters (Volume 17), the subject of natural catastrophe presents a useful way of exploring how social, scientific, economic and cultural processes impact on the vulnerability of human systems (see their ‘Uncertain Environments: Natural Hazards, Risk and Insurance in Historical Perspective’). For Drew A. Swanson, meanwhile, the pressing issue is one of wildlands management and the problems of conflating ‘biodiversity’ with endangered species and habitat protection. Published in Volume 18, ‘Endangered Species and Threatened Landscapes in Appalachia: Managing the Wild and the Human in the American Mountain South’ reveals how, in one ecological community, campaigns to preserve particular species worked to the detriment of other animals (and humans) within a complex ecological system.

The last four papers included here are from our most recent volumes, and ponder questions of historical memory, landscape change and unintended consequences: all important thematic motifs in the study of ‘Natures in Between’. Karen Middleton argues for the importance of the historical record (and, in particular, for the importance of reminiscence, fuzzy narrative and memory) in understanding environmental worlds. ‘Renarrating a Biological Invasion: Historical Memory, Local Communities and Ecologists’ documents how a biological control programme against ‘Malagasy cactus’ in 1920s Madagascar was powerfully remembered and recast during in the 1980s and 1990s as part of a controversy surrounding another exotic and extremely invasive species of prickly pear. In ‘The Aesthetics of the Volga and National Narratives in Russia’, Dorothy Zeisler-Vralsted examines the historical development of an iconic river to show how visions of romanticism, nationalism and modernity played out along its course. The penultimate paper here, ‘Borderland, No-Man’s Land, Nature’s Wonderland: Troubled Humanity and Untroubled Earth’ finds ‘other-than-human nature’ in unusual places. As author Peter Coates argues, whereas humanity has often been seen as the source of environmental malaise (our second article from Donald Worster concludes thus), at various sites of military-industrial strife – his ‘borderlands, militarised landscapes, shatter zones, forbidden zones and other sites of upheaval and trauma’ – other species have flourished in the absence of *homo sapiens*: civilian, leaving a complicated eco-cultural footprint alongside unresolved separatist narratives of ‘history’ and ‘nature’. The last paper here is a most recent offering from Volume 23: ‘Engineering Edens on this “Rivered Earth”? A Review Article on Water Management and Hydro-resilience in the British Empire, 1860s–1940s’. Here, James Beattie and Ruth Morgan explore various regimes of fresh water management in the British Empire, finding diverse ecologies, a disconnect between colonial aspirations and abilities in ‘controlling’ water, and an overarching theme of ‘hydro-resilience’.

The forthcoming ESEH conference promises further (and lively) debate on the topic of borderlands spaces, contact/conflict zones and the ‘multiple uses’ of environments in historical, contemporary and future contexts. This brief review of the papers in our vaults presents *Environment and History* as a special sort of ‘contact environment’, one whose nature has the study of ‘Natures in Between’ firmly at its core.

KAREN R. JONES

Confessions of an Enthusiastic Chair

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It is a privilege to serve as the chair of the programme committee for a major international conference. This is a job which can give a proper sense of the directions the discipline is embracing. With some conceit, one might even think that it can offer the opportunity not just to understand but to contribute to shaping the field.

With more than 400 submissions, the 2017 European Society for Environmental History Conference in Zagreb is already a success. The number of submissions illuminates the good health of our field in Europe and worldwide. Hence, where is environmental history going? An obvious answer is that we are going to Zagreb and, I would argue, this is not only a geographical destination. For a long time environmental history has been an Anglo-Saxon business. Indeed, despite the precocious intuitions of the French historiography, as a self-conscious field environmental history found its home especially in the Anglo-Saxon world both at global level – its considerable success in the United States – and at continental level. However, the diffusion of a discipline does not occur only as a spontaneous spread of seeds or spores; the European Society for Environmental History has deliberately fostered an inclusive policy aiming to see all continental regions involved in its activities. The Zagreb conference goes precisely in that direction. What does it imply to expand the environmental history field beyond the Anglo-Saxon world, or, we could also say, beyond the centre-north European barycentre? The first and perhaps most obvious consideration is that Eastern Europe brings a different story of post-war continental development. An environmental history of Europe has to deal with a continent split in two by the Iron Curtain, with two different economic and political systems but also with two divergent narratives embedded in landscapes and bodies. Too often Europe has been reduced to a narrow portion of itself, erasing the multiple socioecologies which make the variegated puzzle of our common history. Indeed, this diversity will traverse the ESEH conference in Zagreb, with a significant presence of papers on Eastern Europe. Since its inception, the community of European environmental historians has had to deal with the twofold challenge of a plurality of languages – something which did not affect our North American counterpart even in its transnational effort between the US and Canada – and of national contexts, with their legacies of laws, institutions and cultures. I believe this is still a relevant issue; obviously

it forces most of us to express ourselves in a foreign, imperial language which sometimes seems to be dictating not only rhetorical constructs and mysterious sounds but also conceptual tools and scholarly hierarchies. The inclusion of a more complex geography is a remarkable result, but it can still lead to a compartmentalised pluralism; staying in the metaphor of the puzzle, the pieces do show a unified image but each of them might still be almost independent. Including panels on regions that have been long neglected is a remarkable achievement; overcoming geographical compartmentalisation is – I believe – the next step. Just as one example, rather than hosting a panel on urban environmental history in a specific region, I would like to see panels in which histories from different contexts can meet, looking for connections as well as divergences. Although with no intention to diminish the relevance of presenting a paper and discussing with peers, I would also argue that a conference does not exhaust its functions in the few days of the event. Building a panel, connecting with scholars working on similar themes, and hopefully thinking on how to collectively develop the results of that interaction are all parts of what I would call the conference infrastructure, which – I believe – expands far beyond the venue, rooms and the PowerPoint projectors. ‘Natures in Between’ means also this: exploring relationships, connections and disjunctions which can transform a potentially infinite collection of case studies into a meaningful puzzle.

In terms of themes, it is a gigantic task doomed to almost certain failure to attempt an exhaustive summary of the topics of the 2017 ESEH conference. Most likely I will simplify, omitting something and misreading some proposals – after all, I am making my assumptions on the basis of short abstracts and titles. Thereby, better to dismiss immediately any claim of exhaustiveness and declare openly that what follows are only the very personal impressions and some unsolved dreams of the chair of a programme committee.

Building upon a quick reading of our programme, I would argue that there are a few themes which more clearly stick in our minds. It is interesting to notice that in several instances those themes are actually the same as those addressed in this special issue. This is the case with the ‘war and the environment’ theme, which is at the core of Peter Coates’ article as well as being one of the main threads of the 2017 conference, with at least six panels explicitly dedicated to this topic. I would not say that this is a new path for our field; from mid-1990s that Ed Russell started pointing in that direction,¹ while Richard Tucker’s untiring organisational effort has been instrumental in

1. Edmund P. Russell, “‘Speaking of Annihilation’: Mobilizing for War Against Human and Insect Enemies, 1914-1945”. *The Journal of American History* 82 (4) (1996): 1505-1529. A few years later Russell published his volume *War and Nature: Fighting Humans and Insects with Chemicals from World War I to Silent Spring* (Cambridge: Cambridge University Press, 2001).

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bridging between military and environmental history.² I wish to believe that the relevance of war in our scholarship is also the result of an engaged attitude that pushes all of us to address the challenges of these worrying times. Environmental history was born with the ambition to be part of a broader societal mobilisation; since its very beginning it was haunted by the classic critique which opposes advocacy and scientific work, and, I would dare to say, political engagement and rigorous scholarship.³ Personally, I have always believed that a good scholar is not a neutral one, but someone who interrogates – though not manipulates – the sources with a point of view, a thesis to test, a research question coming from her standpoint. Its finally attained academic recognition – although not everywhere, I must add – should not drive environmental history into a quiet and irrelevant academic corner.⁴ In that same direction goes our decision as programme committee to reserve a special place in the conference for a discussion on the environment and migration nexus, dedicating the plenary roundtable to that theme. Although definitely connected with the invasive species topic as well as with the histories of colonial settlements, both present in this virtual special issue, I do believe that the environmental history of migrations is still quite absent in our field. In this respect, the 2017 conference is accomplishing a twofold aim: on one hand, we are suggesting an expansion of our research agenda towards a neglected theme; on the other, we are fostering the public – can I say political? – commitment of our discipline with the big challenges of the present. In a time when fences are erected again and the freedom of movement is insured only for goods and capitals, but not for women and men, we could not hold our conference in the Balkans without pointing at the so-called migration crisis (actually, I would argue that there is a poverty and war crisis, maybe a xenophobic and racist crisis, but no migration crisis). The plenary roundtable is dedicated to *Trespassing. Environmental History and the Challenges of Migrations*. Trespassing is proposed here as a metaphor for the liberating practices of going beyond the usual borders – disciplinary, national and even species-like – and challenging any authority. After all, every revolution, every radical change, must pass across the borders of what was not allowed to happen, or even to exist. Apart from the plenary roundtable, organised by the programme committee, migration is still a marginal topic in our conference – and the present virtual issue mirrors this situation. A simple search in the programme can confirm that impression: one can test how many

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2. Richard Tucker has been instrumental in building the Environment and War Network (<http://environmentandwar.com/>), as well as in organising events and collective publications on this theme.
 3. This issue is present in almost all the interviews with the founding figures of the field published by *Environmental History*. See <http://environmentalhistory.net/interviews/>.
 4. I have already elaborated on this matter in ‘Environmental History between Institutionalization and Revolution: A Short Commentary with Two Sites and One Experiment’, in *Environmental Humanities. Voices from the Anthropocene* eds Serenella Iovino and Serpil Oppermann (London: Rowman and Littlefield, 2017).

times the words ‘forest’ or ‘city’ appear in comparison with ‘migration’. One might wish that things will change in the near future, not in the sense of inverting the proportions – what is wrong in having engaging panels on forests and cities? – but actually adding more and new research themes, including migrations and many other relevant topics which still deserve more attention.

Together with wars, forests and cities, animals are another recurring theme in the Zagreb conference. Looking at the programmes of the previous ESEH conferences, it is clear that animals have not always been so present in our research. I would argue that the relevance of animals in the Zagreb conference might be related to the growing debate on agency in environmental history and in what I would define as a post-human turn in the humanities. However, while our discussion on agency has been more developed, it seems to me that the post-human/more than human turn is still rather under-addressed in environmental history – we have only one experimental panel contemplating multispecies ethnography. This might be somehow related to a surprisingly weak connection between environmental history and environmental humanities; of course, one can claim that there is no connection because there is identity, but I would not be convinced by such an argument. Environmental history is a founding pillar of the environmental humanities but the two do not coincide. In order to be relevant in shaping this growing field, environmental historians should engage with the challenges of an interdisciplinary arena, navigating the same kind of problems raised in this special issue by Pawson and Dovers. By only analysing the programme, it is difficult to rate the level of interdisciplinarity that will materialise in Zagreb. It is a fact that the conference has been organised by our colleagues in a geography department, signalling clearly that environmental history is not the private property of historians. I would have wished to have more contributions explicitly from non-historians, or, even better, panels, roundtables and papers reflecting on the possibilities to work across disciplinary fields. I realise there is a tension between different visions for the discipline. For some, flexibility and inclusiveness have transformed environmental history into a nomadic tent, so large and permeable that everything and everybody can claim to be part of it. As Mark Hersey has suggested, this can weaken the heuristic power of the discipline, leaving us without any specific methodological and theoretical tool which can constitute our contribution to history in general.⁵ Although I do find this argument valuable and agree that it is extremely important to reflect on the methodological contributions of our field, I still believe that the tent metaphor is actually wonderful. It gives the impression of a mobile community, it

5. I thank Mark Hersey for having shared with me his concerns. I also refer here to his intervention at the panel ‘State of the Field: Environmental History’ organised by Lisa Brady for the 2015 Organization of the American Historians in St. Louis. See Lisa Brady, ‘Has Environmental history lost its way’, published online at <http://www.processhistory.org/has-environmental-history-lost-its-way/>

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evokes the tradition of hospitality – something so much needed in the desert of current academic specialization; it is, obviously, weaker than a mansion or a fortress, but it is more adaptable and manageable. Perhaps, my point is that we no longer need the kind of disciplines we have been trained into and using for so long. Facing the current multifaceted crises, or we might say the Capitalocene,⁶ which are the knowledges we need? Is the inter/multi/transdisciplinary approach still a doable option? It is not by a chance that since 2015 a collective of political ecologists, of which I am part, has started proposing the idea of undisciplining disciplines.⁷ The bottom line is the rather modest result of multi/trans/inter disciplinarity – something that everybody who has been on the job market should know very well – and consequently the need to address the inherent limitations of our disciplinary way of organising not only university life, but our understanding of the world. Undisciplining means breaking free from the usual frames, experimenting while openly challenging the ‘rules’ of what has been formalized as the disciplined canon. Our political ecology collective held an international conference in Stockholm in 2015 entitled *Undisciplined Environments*, which gathered five hundred participants from all over the world and from any kind of background.⁸ We had an artistic stream in the conference, with people performing, reading poems or exhibiting their visual works; an activist forum; and we invited an indigenous leader as one of our keynote speakers.

As chair of the ESEH conference I have tried to bring in some of these undisciplining options. I am happy to see that we will have a few experimental sessions in Zagreb and I truly hope we will develop more of this in the future. We will also host a two-day movie session, which might stimulate a debate not only on the themes of the films but also on the challenges and opportunities to think of engaging with peers and public beyond the text.

The truth is that I love trespassing, challenging the ordering of borders and people, exploring new paths and pushing the rules. I would not be content with a well-established discipline, safe behind impenetrable fortifications. Just to stay in the military metaphor, I prefer a guerrilla approach; I would like to see environmental historians not entrenched in a fortress but so blended into the landscape that it would be difficult to distinguish us from the rest. To paraphrase a famous image, we can strive to become a bigger and more fearsome fish in the ocean, or, instead, towards becoming the ocean, entering everywhere and continuously changing to the shapes of land and the light of the sun.

6. I am employing here Jason Moore’s counter-definition of the Anthropocene.

7. I am referring here to the European network of political ecology – Entitle (<http://www.political ecology.eu/>).

8. The website of the conference is <http://www.ces.uc.pt/undisciplined-environments/>

With and Without Borders

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The continent of Europe is filled with borders. There are 48 countries (even more if you divide the UK into constituent nations) that attempt to co-exist on the little over ten million square kilometres of territory. Historically we know that these borders have been contested over and over again: from the great expansion of the Roman Empire 1,000 years ago to the creation of the USSR and its eventual dissolution, from the Norman Conquest of England to the two World Wars.

Croatia, the location of the European Society for Environmental History 2017 biennial meeting, has been perpetually caught up in border struggles – at different points in its history Croatia has been part of the Rome Empire, Ottoman Empire, Hungary, Austria-Hungary, Yugoslavia, as well as an independent kingdom and modern country. No place in Croatia is located more than seventy kilometres from an international border. It is no wonder, then, that when a group from Croatia offered to host the ESEH 2017 meeting, they chose a theme to highlight that history: ‘Natures in between. Environments in areas of contact among states, economic systems, cultures and religions’. The organisers wanted to push environmental historians to think about the consequences of borders and other areas of contact.

As President of ESEH, I was pleased that *Environment and History* decided to make a special virtual issue to highlight papers on this theme. Nature has often been caught in between – captured as a bystander in social, religious, ethnic, and ideological conflict and contact. Species like the prickly pear in Madagascar from Middleton’s study in this collection and the wildflowers-turned-weeds in Clayton’s work stress that zones of contact involve more than the human, even if unintentional. Nature has also been intentionally harnessed at meeting points to fulfill human needs, whether those needs were physical (as in the colonial reshaping of rivers discussed by Beattie and Morgan in this collection) or ideological (as shown by Zeisler-Vralsted’s analysis of the Volga River in this collection). The historical legacies of contact and conflict leave us at times with a Nature pressed in between.

At the same time, Nature in those in-between places is not helpless. Nature may in fact have a heyday with the disturbed spaces created by humans for entirely other purposes, as evidenced in Coates’ investigation of militarised landscapes. Nature should not be portrayed as only a victim in the exchanges zones built for humans.

In envisioning what happens at points of contact, the program for ESEH 2017 in some senses turns the theme ‘Nature in between’ on its head, emphasising instead how humans may be the ones caught in between. From the keynote lecture by Rob Nixon, who has stressed the slow environmental consequences of modernity, to a plenary panel on ‘Trespassing. Environmental history and the challenges of migrations’, these histories have immediate relevance for ongoing social and environmental dilemmas. At the conference we will be challenged to think about exchanges of resources, ideas, people, and species over the long history of Europe and beyond and how that places both us and Nature in tough spots.

I will close by challenging the theme to claim that Nature is not in between, but rather all-encompassing. Nature may be squeezed by humans in some ways, but that chokehold inevitably affects us. This is why attempts to downplay the risks of climate change to humans and other existing species is dangerous. Nature as an abstract entity will survive everything, but the specific Nature that makes our lives possible may not. Nature may be stuck in between political and ideological struggles in the twenty-first century, as it has for millennia before that, but in the end, Nature is the one without borders.

In Our Own Image: the Environment and Society as Global Discourse

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SUMMARY

The environment is clearly shaped by human hands, but it is also shaped by the human mind. The paper examines the way in which the environment is produced, as intellectual capital. It asks about the extent to which the environment can be understood by science and through science. It explores the way in which science, as a cultural form, enables us to construct an environment which is 'manageable', but prevents us from coming to terms with increased uncertainty.

Drawing on research about the Canadian frontier in the 1840s and current critiques of environmental economics, the paper concludes by suggesting that research on the global environment should recognise the existence of different, and divergent, understandings of what the global environment is, and how the problems associated with global environmental change can be addressed.

This paper is about how the environment is *produced*. It is about the physical landscape that results from human activities and ingenuity, and the mental landscape that shapes these activities and is shaped *by them*.

It asks whether our environment, any environment, can be understood by science or through science. It explores the way in which our science, as a cultural form, gives rise to our construction of the environment.

When I say that the environment is a social *construction*, what do I mean? Here are some examples: these are the discourses.

CASE ONE : BIOSPHERE RESERVES IN SCOTLAND

On 23 May 1990 I attended a meeting in Edinburgh organised by UK Man and the Biosphere (MAB) to discuss a Working Party Report on the designation of new Biosphere Reserves. Between 1977 and 1984 (when the UK left UNESCO) thirteen Biosphere Reserves were designated in the United Kingdom, and the meeting was convened to consider whether there should be new ones added.

This raised a series of issues for the UK Committee. Some members declared that we *did not have* Biosphere Reserves in Britain, only National Parks. Others argued that the term ‘Biosphere Reserve’ was not British anyway. It was foreign. ‘They’ had Biosphere Reserves, not us! Some participants decided, unilaterally, that if we *did* have ‘Biosphere Reserves’ we could dispense with ‘buffer zones’. We did not need them! Finally, there was strong support for the proposition that we should tell UNESCO to use *our* designations – National Parks, ESAs, SSSIs, AONBs etc.

The meeting in Edinburgh had problems with competing definitions of the environment. ‘Our’ designation was not ‘theirs’. And it mattered. It was as important to those attending the meeting as cricket or real beer or Maastricht. The objection was that ‘our’ protected areas were *not* ‘Biosphere Reserves’ and never would be.

CASE TWO : PUBLIC INQUIRY DISCOURSE

The second case is taken from the Inspector’s report of a public inquiry into a new road scheme (this is quoted from Burningham and O’Brien 1992). First, the Inspector presents the argument that an area of woodland is environmentally valuable, and should not be used as a site for lay-bys.

It is reluctantly accepted that the new road will have to pass through Devil’s Cope but not that lay-bys should be located in this attractive, natural, untouched woodland which is worth preserving. It would be a deplorable and needless extravagance to destroy a small proportion of a small cope used, with permission, by the British Trust for Ornithology and by members of the public, and believed to be rich in wildlife and flowers, simply to provide lay-bys which could be placed elsewhere on the A27 ...

The Department of Transport’s view was rather different:

Devil’s cope is an overgrown and neglected piece of woodland ... Most of the trees are not of a great age being up to around 80 years old and no coppicing has taken place for some 20 years. There is no public footpath running through the wood and footpath 251 passes along its south-western boundary. A survey of the cope concluded that its flora and fauna were unlikely to be rich and varied ... (Burningham and O’Brien 1992: 7)

Was the woodland bordering the A27 ‘... attractive, natural and untouched’ or ‘... overgrown and neglected’? The point is that assessments of ‘the environment’ are informed by a variety of social commitments, and these assessments are used to pursue specific social goals. We are not *simply* talking about a piece of woodland, we are talking about it in a social context. That context is provided by us.

CASE THREE : CANADA WEST IN THE 1840S

My third case concerns an early migrant to Canada, whose letters to his family in the 1840s formed part of a private research project (Redclift 1988, 1989). In this case the environment served to help create personal identity. By examining the way that nineteenth-century settlers forged new social relations, and created a civil society, we can explain current preoccupations, in Canada, with the environment.

Francis Codd qualified at the College of Surgeons in Lincoln's Inn Fields in 1844, when he was twenty-one years old. He must have had difficulty in finding a medical post in England, for his letters imply that he needed a patron before he could establish himself properly. This sounds plausible. Cowan, writing about British emigration to British North America, notes that:

Frequently the applicants were professional men who had been property holders. [After 1825] two new reasons for removal are evident : the desire to get away before all is lost, and the necessity for taking educated young people from a land in which professions and occupations are already crowded to a colony where openings for them may be found. (Cowan 1961: 187)

In Canada opportunities were very much better. He chose to settle in what was then virtually uncharted country, in the hamlet of Pembroke, to the north of what was then termed Canada West. Southern Ontario to the south had already been settled, it represented the 'civilised Canada' of small farms and flourishing towns such as Hamilton (Katz 1975). The Algonquins, where Francis tried to establish himself, was another country. Apparently it took his fancy 'because it was such a long way off'. Few settlers had penetrated the region, and the road to Pembroke was still used principally as a winter route by lumbermen. Not until 1860 was a road opened from Renfrew county to the north-west (Macdonald 1966: 18). On the night of 12 February 1847, Francis Codd arrived in Bytown (later Ottawa) from Montreal, in a covered sleigh drawn by two horses. He was swathed in buffalo skins to keep out the sub-zero temperatures. The journey from Montreal had taken a whole day and a night. Today it takes forty minutes by plane.

According to Francis, Bytown was already 'one of the best planned and most flourishing towns in Canada', with about seven thousand inhabitants, but in the late 1840s it was a very rough town indeed. It was 'the scene of frequent riots and head-breakings between rival Irish and *Canadian* lumbermen' (Careless 1967: 30). In the early 1840s the Irish had attempted to drive the French in Upper Canada out by force and had met reprisals in turn. The 'Irish', before the 1850s, were usually Ulstermen and the battles they fought with French Catholic settlers were looked upon as 'Holy Wars'. Francis Codd had become a Catholic and this fact was to influence his judgement of many things, notably the choice of a marriage partner. He observed wryly that 'Catholic Englishmen are regarded as

nondescript in Canada, where being English confers prestige on anyone, for an Englishman is regarded to be a man of honour till he proves himself to the contrary’.

First impressions of the area to the north of Bytown were mixed. He notes that the countryside was ‘not gloomy like the winter scenery in England, but quite entrancing’. This aesthetic delight was to continue unabated during the subsequent four years. The people were less attractive than the countryside, however: ‘there is no other part of Canada peopled by such savages ... and no law or civil power within a hundred miles to control them’. He soon found that his patients rarely paid their bills, were regularly drunk and expected him to save their lives or risk losing his own! By April 1847 he had found ‘great favour with all the people ... but the cares and duties of a doctor’s life are greater even than I expected’.

As Careless points out ‘Canada West ... was so full of recent immigrants and so much in the stage of extensive rather than intensive growth, that its social structure was naturally ill-defined’ (Careless 1967: 28). On the frontier a distinctive lumber community had developed, which combined logging in the winter with farming in the summer. During the 1840s more hired labour was used in the lumber industry, the shantymen whom Careless refers to as a ‘forest proletariat’ (Careless 1967: 30).

Francis Codd was to find many of his patients within this unruly fraternity. He was expected to distance himself from them: ‘I cannot farm and practice medicine, patients would not like it and I would not have the time’. Indeed, he is told by an admirer that he is ‘not half roughian enough for this place’. Nevertheless those who do succeed earn his admiration. Soon after arriving he meets a woman from Norfolk who tells him ‘Lawk, Sir, if the poor creatures at home only knew what a place Canada is, it would be good for ’em’. Eight months later he is writing that if he had the £200 with which he landed in Canada he would ‘go into the bush and become a farmer’ rather than a doctor. Typical of the ‘success stories’ he encounters is a man named Pinhey who lived near Bytown. Francis notes that although he was not a poor man when he migrated ... ‘now he is probably in ten times the living and independence he did in England ... had he stayed in England he would still have been a nobody ... now he is a member of Legislative Council ... is the founder perhaps of a noble Canadian family and owns the greater part of the township of March’.

The frontier seems to have been distinguished by property-owning anarchy as much as a ‘forest proletariat’. Land was cheap and easily available, especially since the land grant system had been abandoned. Cowan notes that ‘the government [in England] began to appeal to man’s purely selfish instincts by making his reward depend solely upon his own efforts’ (Cowan 1961: 113). The land market developed in competition with that of the United States: ‘... between 1844 and 1848 purchases of land to the amount of almost one million dollars were made [through scrip] ... the greater part of it for speculative purposes’

(Macdonald 1966: 13). However, it was the revenue to be derived from lumbering which attracted government interest in the region and necessitated a road-building programme. For the colonising population cheap land was an important accompaniment to lumbering. Francis notes that 'all farming produce meets with a ready market here from the timber merchants and yet a hundred acre lot, half cleared, sells for about £50'. Farther from the settlements one could buy 'a farm of 500 acres for £40, but only thirty acres of it cleared'.

The essence of succeeding on the frontier was efficient self-provisioning. The people made maple sugar and molasses, and picked strawberries and blueberries in the summer. The 'main art of living in Canada is to do with as little *cash* as possible and if a man has a farm he can raise his own flour, pork, butter and cheese'. Fish and venison were bought from the Indians. In other words, it was as important to save money as to make it. The life of a frontier farmer was rewarding but it was also hard.

Farming 'does very well for a man who has a family and who is willing to lead a *stationary*, moneyless life and be considered as an equal by all his clodhopping neighbours and labourers'.

In 1850, after his return to Canada, following a brief visit to England, Francis builds a house and employs a housekeeper, which proves more economical than renting rooms. He is still constantly in debt – with the compensation that it means his credit is always good – but his income has improved. It is still difficult for him to make social comparisons with England. His friend, Mr Donnell, 'a civilised lumberman ... lives as a man would in England worth £400 or £500 a year, though in fact he is a very quiet man in this part of Canada'. In December 1849 he writes: 'I begin to think that £100 *in* England is worth £200 *out of it* as far as comfort is concerned'.

Creditworthiness came to assume more importance the longer he lived in Canada. Since few people arrived with much capital and the flow of cash was so irregular, what mattered most was personal credit. In January 1852 he calculates that he has earned £130 from his practice in the previous year. Of this sum £92 is still due to him and he has accumulated debts of £77. He asks his father rhetorically whether '... if I had been in the same situation in England I should have met with as much help in the shape of credit as I have had in Canada? I love old England very much but I should not like to try it I must confess'.

What did it mean to be a professional man in a speculative economy marked by transient labour and the complete absence of social bench-marks? The letters provide many clues. Not surprisingly few frontierspeople were concerned with social etiquette. Francis notes innumerable instances where social habits were made to serve utilitarian ends. In December 1849 he records meeting 'an uncivilised Scotsman who took the soup ladle for a spoon and held it above his head while he drank from it saying 'Eh, mon, but this is the awful spun?' On another occasion an old woman who kept a tavern 'could not find the carving fork so she took hold of one end of the joint of beef with her hand and the other with

her teeth and carved from it with the carving knife, talking all the while'. His companion, a Mr Harper, 'was nearly killed with laughing', but the unabashed tavernkeeper only thought he was laughing at her jokes!

Professional status had to be earned in a society where nobody's family counted for so much. Francis Codd earned respect for shooting the rapids in a bark canoe that he bought off an Indian, and after shooting a deer, writes 'I consider myself a great hunter now and am the envy of the other sporting white men in the village – don't laugh!' This was in December 1850. His earlier attempts at hunting game had proved disastrous, culminating in a confrontation with a grizzly bear.

Colonising the frontier was fraught with problems, many of them of human invention. The drinking could reach epidemic proportions. Francis records one wedding which he attended where 'twenty men drank seven or eight gallons of rum and whisky ... I dare say there is as much grog drunk in this township as in the city of Toronto, although the population is not a tenth of it.' On another occasion he attended a ball where 'an Indian came in and danced in the style of a great bear, yelling every now and then like a banshee. In the end he got drunk and tore Mr Lyle's shirt off his back and was kicked out, he was a savage old fellow and is said to have murdered a white man'. Without a system of JPs, district courts or lawyers, it was hardly surprising that violent reputations served to deter potential aggressors more effectively than anything else.

However, by December 1849 a Division Court had been established in Renfrew for small debts. Francis came to take a very positive view of the efforts that were made to build a network of local magistrates with a high degree of legitimacy. He was attracted to the makeshift democracy of frontier Canada. By January 1852 he was writing :

A magistrate in this country is, however, a very different animal from the same in England – he need not spend a dollar a year the more for being a magistrate – many of our magistrates are plain farmers who can just read and write decently but their authority seems to be just as much respected as in England. One of the two magistrates in this village is an old pensioner-sergeant who was quartered in Holt [Norfolk] in the Artillery in 1806.

Civil disturbances were still common, of course, but there were signs that support existed for genuine community-based efforts at law enforcement. In the same letter, in 1852, Francis refers to a concert performed by a local music club – '... mostly young ladies taught and led by Mr Thompson, the blacksmith' – which succeeded, despite barracking from the audience, in raising money for a Renfrew Mechanics' Institute Library. He notes that 'if the township can raise £25 the government is bound to give £50'.

Between 1847 and 1852 Francis Codd's view of Canada changed dramatically. At the beginning he sought to survive, and to establish himself professionally. He was in no doubt as to the drawbacks of living on the frontier. 'There are

no emigrants up here', he complains in June 1847, 'they stay in the more popular parts of Canada where land is more expensive and everything else cheaper'. He toys with the thought of returning to Montreal, where he could earn a regular salary as a doctor in the Government employ.

The longer Francis stays in Canada the more he likes the frontier. He assures his parents that although he was returning to see them he intends 'leaving old England perhaps for ever'. His complaints are directed at individual misconduct rather than at Canada.

Before returning to England, briefly, in 1848, he writes to urge his brother Henry to come to Canada to qualify as a lawyer. Half the members of the Canadian Parliament are 'lawyers or doctors, chiefly lawyers'. He says he 'prefers Canada to England under any circumstances', and fears that already he would feel more like a stranger in England than in Canada.

The second phase of Francis Codd's correspondence after his return to Canada in 1849 is punctuated with repeated pleas for his family to join him there. Although he returned to the same part of the country, he regrets that he had not settled further west 'for the farmers can always get cash there for their wheat and here [in Renfrew] the markets are very uncertain because everything depends on the lumber trade'. In 1849 he was twenty-six years old: '... where shall I be next birthday? *Here* I hope, although of course I should like to see you all'.

His attachment to the frontier grows with familiarity. Local 'society' begins to develop. In nearby Pakenham village there are 'two doctors, four clergymen, a lawyer, several storekeepers and lots of civilised girls'. This was in January 1850. Soon he is established in his own house with a housekeeper who 'is clean and honest but apt to get drunk occasionally'. He reviews the prospect of his parents emigrating to Canada, and decides that they are too old to uproot themselves. Anybody intending to emigrate should spend between two months and a year having a look at the country first.

But an extraordinary coincidence occurs: as his own fortunes improve so, apparently, do those of his adopted country! Increasingly Francis refers to the advantages that Canada has over England. He is critical of Lord John Russell's proposals on Catholic emancipation (this is in March 1851). In Canada the government does not try to interfere with the Catholic Church: '... Canada is freer'. When his brother Henry complains about the Canadian winter Francis retorts that 'there can be no worse climate than that of England'. Canadian wheat is so good 'it was even sold in New York last year!' Canada 'is flourishing and all parties feel that it is getting strong enough to defy any attempt at tyrannising either by Great Britain or United States'. His first obligation, as a Canadian, is to learn French. Three years earlier he had bemoaned his inability to talk to the French women in a shanty on the Madawasha river. Now he has 'commenced learning French again and means to stick to it until I can talk fluently'.

He begins to take delight in the company of others during his frequent trips into the bush. In January 1852 Francis accompanies the new Presbyterian

Minister – ‘none of the evangelical humbug about him that most of the Scotch have’ – ‘to an Indian camp, seven miles up the ice’. They feast on venison and he notes how delighted Mr Thomson, the Minister, is : ‘he likes Canada very much, he says, and his wife and eight children are coming out next Spring’.

The last letters are full of advice on how to manage to survive with limited financial resources in an alien environment. He notes that : ‘it takes a man several years to open his eyes to what may be done with a little capital in Canada, and by that time an emigrant has generally fooled away all he brought . . .’ His expenses increase as his practice begins to flourish, but he is evidently in demand not only as a doctor. He is asked to give a lecture in aid of the Mechanics’ Institute Library fund, and is called as a key witness in a murder case held in Perth.

Francis Codd’s experiences illustrate my point about the way *we construct the environment out of human ingenuity and then go on to impart normative value to it*. Francis invested Canada with his own aspirations, and constructed a view of the environment that could be defended solidly, that was part of himself.

The people were rough – but they were often courageous. They had no money – but they were worth a lot more than they had been in England. ‘Civilisation’ was spreading – but not at the expense of the wilderness, which left him awestruck and admiring. This, of course, is the stuff of movies and novels, of Canadian consciousness. Perhaps it helps explain why Canada, despite failing to resolve its ethnic differences internally, has taken the ‘environment’ so much to its heart? The Canadian Green Plan is supposed to inform research in the universities and in the sciences. It is the inspiration behind the Canadian Global Change Programme. The representations of nature and the environment contained in letters like those of Francis Codd tell us much about the societies from which they sprang – and about the societies they produced.

ECOLOGICAL IMPERATIVES : GLOBAL NEMESIS

We have seen how the environment is constructed intellectually and morally in the treatment it receives from our culture : the ‘discourses’ that we employ. My final example comes to the heart of the issue : is ‘science’ adequate to the task before us, to equip human societies to manage the environment more sustainably? By the same token, does the acknowledgement that our view of the environment is socially constructed weaken our capacity to get on top of ‘real’ problems in the ‘real’ world?

At the leading edge of these issues is the ‘new’ discipline of environmental economics, particularly the work of David Pearce (1989). The difficulty in fully incorporating social goals within the analysis of environmental economics is, paradoxically, demonstrated by the principle which is used to defend it. Pearce declares that *we know natural capital is valuable because people are willing to pay to preserve it*. It is clear that environmental economists like Pearce have

proved able to push back the boundaries of the neo-classical paradigm, and to accommodate environmental concerns in their analysis. However, this accommodation has come at a price. Essentially, the analysis has widened the bounds of consumer choice, enabling the individual's preferences to be expressed; but basically it leaves the neo-classical paradigm intact. Market values, or imputed market values, can be used to provide a fuller account of natural capital, and the benefits of sustainability. In seeking sustainable development, Pearce notes that '*... what constitutes development, and the time horizon to be adopted, are both ethically and practically determined*' (Pearce 1989 : 3). This observation should lead us to consider not only the political context in which decisions are taken about the environment, but also the circumstances under which environmental economics is used to help facilitate decisions. If 'development' is subject to value judgements, and lies outside the compass of objective science, why is environmental economics not subject to the same value judgements?

The first problem with the neo-classical paradigm is that it fails to recognise that monetary values are *always* exchange values, not use values. When Pearce refers to 'use benefits' and 'use values' he is referring to exploitation values. Use values do not attract monetary values because they exist outside the framework of market pricing. As Francis Codd noted, they were the currency of the Canadian frontier. Environmental economists will argue that this is no impediment to using monetary values for them, and that the way that we arrive at these prices is a matter of methodological refinement, but this is to miss the point. *Economists cannot value what the environment is worth; merely its value in monetary terms.* Monetary valuations do not capture the worth of the environment to different groups of people.

Let us use women's labour in the forest communities of the developing world as an example. Many of the environmental goods that women collect, and that poor rural households use, are 'free goods' in nature but vitally important for survival. Elson and Redclift (1992) note that one tribal community in Andhra Pradesh could identify one hundred and sixty nine different items of consumption, drawn from forest and bush land. Environmental accounting is ill-equipped to measure the real value of the environment to women, when these use values are part of direct household provisioning.

The second problem with the paradigm is that it claims 'value neutrality', when environmental economics itself expresses the preferences and biases of the society in which it was developed. The values we place on nature, not surprisingly, reflect our priorities, *not the value of nature itself.* Nature is a mirror to our system of values, and in seeking monetary values for environmental goods and services we are attempting to 'naturalise' the environment. The point would not have been lost on Francis Codd.

Environmental economics provides a good illustration of the way we seek to construct the environment socially, through the mechanism of monetary valuation. Progress within the discipline aims to extend the paradigm, rather than to

place it within its political and social context. Development projects, for example, such as large dams or irrigation schemes, are said to have 'environmental consequences', which environmental economics is well-placed to address. This is to ignore the fact that development projects are socially created and socially implemented. They already internalise a view of nature, in their methodology and practices. They also seek to acquire legitimacy for the idea of projects - another instance of the way they are socially constructed.

There is a third area in which the neo-classical model can be faulted. It is that this model fails to recognise that *conventional economic analysis rests on a particular view of human nature and social relations*. It sees social interaction as instrumental. That is, it is designed to maximise the individual's utility. As Hodgson writes '... the tastes and preferences of individuals are considered a given' (Hodgson 1992 : 54). Related to this, environmental economics does not see social interaction as constituting value in its own right. It is this failure to recognise human behaviour as culturally determined, and capable of a very wide range of variability, which cannot be easily married with the reductionism of economics.

Concepts like that of 'willingness to pay', used by environmental economists, presuppose a set of cultural and ideological assumptions. Although economists might look upon the North Sea as a 'waste sink resource', fishing communities in the area would view it otherwise, as would holidaymakers, or artists, or any individual or group of individuals. Similar observations could be made today about the Algonquins, which Francis Codd helped to 'civilise'. Is this beautiful area a resource for tourists, a wilderness, a historical 'heritage' or a potential area for development?

The problem for modern environmental economics is compounded by a fourth set of issues, which concern the degree to which the 'individual, rational calculator' is fully apprised of the situation in which he is being asked to make choices. As Gleick puts it:

Modern economics relies heavily on the efficient market theory. Knowledge is assumed to flow freely from place to place. The people making important decisions are supposed to have access to more or less the same body of information ... (Gleick 1987: 181)

These objections to the paradigm on which environmental economics is founded suggest that environmental economics has real technical competence, in attaching monetary values to environmental benefits and losses, but that this competence does not constitute an adequate basis for environmental valuation. Indeed, we need to look at environmental economics within a wider context, in which we consider it as a product of society itself. Before considering where this leaves our discussion of the environment and society, we should examine the wider policy context from another perspective, which builds on the points above.

THE ENVIRONMENT AND THE SOCIAL CONSTRUCTION OF SCIENCE

It is clear that the view we take of the environment is closely bound up with the view we take of science. Increasingly environmental problems are looked upon as scientific problems, amenable to scientific 'answers'. An example is the current policy prescriptions surrounding global environmental changes, particularly global warming. Since global warming is a 'scientific' problem, it is assumed that it must have a scientific solution. The 'greenhouse effect' is viewed as carrying social and economic implications, but scarcely as an 'effect', in that the human behaviour which underlies global warming is rarely considered. More attention is paid to ways of mitigating the effects of global warming, than to its causes in human behaviour and choices, the underlying social commitments which make up our daily lives.

Part of the problem with this approach is that the modes of inquiry in the natural sciences are themselves *social processes. into which crucial assumptions, choices, conventions and risks, are necessarily built*. Once we regard science as outside ourselves it becomes impossible to take responsibility for its consequences. And so it is with global warming: when it is relegated to the sphere of 'consequences' we are able to avoid the environmental implications of our own behaviour, and that of our societies.

At the same time environmental policy is nothing more than the formulation of one set of social and political choices, governing environmental uses, over another set of choices. It is hardly surprising that the discussion and practice of sustainable development is intimately linked to the social authority of our science and technology. In the North this authority is increasingly contested, especially by environmental groups and interested citizens. In the South it is frequently ignored, notably by development institutions whose model of 'development' often acknowledges no social authority but that of science, of 'progress'. As I have argued, that is why development in the South is, ultimately, not socially and politically sustainable.

Where does this leave our discussion of the environment and development? It soon becomes clear that we cannot achieve more ecologically sustainable development without ensuring that it is also socially sustainable. We need to recognise, in fact, that our definition of what is *ecologically* sustainable answers to *human purposes* and needs as well as ecological parameters.

By the same token, we cannot achieve more socially sustainable development in a way that effectively excludes ecological factors from consideration. If the model for better environmental policy merely 'adds on' environmental considerations to existing models it is not equipped to provide a long-term view. The strong sense of 'sustainable development' emphasises the sustainability of the interrelationship between biological, economic and social systems, rather

than that of the component parts. Each system involves elements – social ‘needs’, levels of production, biodiversity – which are subject to modification. It follows that social science is ill-equipped to address environmental problems if it does not rethink the ‘development’ agenda.

I have argued that much of the writing on the environment and development takes its message from the natural sciences. A more critical perspective regards science as part of the problem, as well as the solution. It suggests that environmental management, as a strategy to cope with the externalities of the development model, is found wanting. Modern economics has played a major role in the ‘success’ of economic growth together with the *unsustainable* development that characterises North and South. For the pursuit of growth, and neglect of its ecological consequences, has its roots in the classical paradigm which informed both market economies and state socialist ones. As the discussion of the Canadian frontier makes clear, environmental management is a *cultural* process through which not only ‘nature’ is transformed, but our understanding of it.

If we are to meet the problems presented by unsustainable development on a global scale, we need of course to go beyond the assertion that such problems are themselves socially-constructed. We need to embrace a stance for which we are ill-prepared in many ways, and one at odds with the way we formulated economic and social problems in the past. We can only assume full responsibility for our actions towards the environment by examining the underlying social commitments which govern our lives : the way we use energy and scarce natural resources, the way we value goods and services. Environmental economics at least represents one attempt to grapple with these problems, but it was created ‘in our own image’, to reflect human concerns and the preoccupations we have inherited from a world economic system that is in disarray.

The problem with our discourse about the environment and development is that it meets the criteria of yesterday. The Earth Summit in Brazil in 1992 demonstrated, as few events have, that the ‘global’ discourse about the fate of the planet was initiated in the North and, ultimately, dependent on northern goodwill. It is a ‘one-sided’ global discourse from which we are trying to wrench benefits without examining the processes which require global agreement. Sustainable development is a ‘global’ project, but our ability to find solutions is influenced, critically, by our inability to admit mistakes. The global project is being developed through parsimonious negotiations, in ignorance of the intellectual history which contributed to global problems in the first place, and makes us poorly equipped to deal with them.

The universe that Francis Codd was entering, the Canadian frontier of the 1840s, was one of confidence, inspired by the promethean spirit. As Roland Barthes has reminded us ‘myth has the task of giving a historical intention a natural justification, and making contingency appear external ... A conjuring trick has taken place; it has turned reality inside out, it has emptied it of history and filled it with nature’ (Barthes 1973 : 142-143).

IN OUR OWN IMAGE

In dealing with the environment we are dealing with myth. The burden of my argument is that acting responsibly towards nature means reclaiming that history. Latter-day Canadians view the environment through their construction of the 'frontier' and 'wilderness'; environmental economists through the lens of neo-classical economics; conservationists and developers through their own interests and social commitments. Before we can really address the problems of the environment we need to look in the mirror, to discover *why* we created nature – in our own image – in the first place.

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The Two Cultures Revisited: Environmental History and the Environmental Sciences

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SUMMARY

The gap between the sciences and the humanities persists in our intellectual life, with significant consequences. The new field of environmental history represents an opportunity to bridge that gap, since it requires historians to become more conversant with the environmental sciences and apply their insights to the study of the past. I give examples of where that conversation has been helpful in rewriting history. However, the scientists are in need of the historians and humanists more than they commonly acknowledge. Environmental problems have their source in human culture, and to solve those problems we need the insights of the humanities.

In 1959 the English physicist and novelist, C. P. Snow, described modern academic life as divided into 'two cultures', the literary intellectuals and the scientists. 'Between the two', he wrote, lies 'a gulf of mutual incomprehension.... They have a curious distorted image of each other. Their attitudes are so different that, even on the level of emotion, they can't find much common ground.'¹ The literary intellectuals appeared to him as pessimists about the human condition, turning their back on their times and seeking refuge in the individual self or in the distant past. The scientists, on the other hand, appeared to be shallow optimists, indifferent to books and tradition yet cosseted by those in power. We might not describe the two cultures in precisely those same terms today – there are, for example, a lot of pessimistic scientists around these days – but the cultural split that Snow perceived more than thirty years ago seems still to be a fact of intellectual life in many parts of the world. And standing on the humanities side of the gulf are not only the literary intellectuals but also historians like myself, warily eyeing the scientists and envying their money.

Snow believed that the two cultures needed to find a common ground, and he proposed one: understanding and developing the world's poor nations, who

already in 1959 were falling farther and farther behind the rich nations. I believe that something like that solution has in fact become reality, as scientists, both theoretical and applied, natural and social, have discovered global poverty – have paid a lot more attention to the disparities of wealth, the stimulation of technical innovation, and the need for modern training and education among the poorer nations; and as historians and humanists have expanded their view to take in people of colour, have tried to address the ethical challenges of racism, classism, and sexism, and have come to see the value of cultural traditions that lie outside the northern hemisphere. Obviously, we have not eliminated the gap between the rich and poor, have not even succeeded in narrowing it in many parts of the world – a very discouraging result. But in a more positive light, we have made progress in understanding the world's social problems and have done so together, just as Snow hoped we would.

Now in this last decade of the century, which some have begun to call the environmental decade, we have an opportunity to discover new common ground between the two cultures. The opportunity comes from the world's environmental crisis, which stretches from the polluted waters of the industrial countries to the banks of the Amazon, the Nile, and the Mekong. The crisis consists of two parts, the first and more serious of which is the impending death of millions of species of plants and animals and of thousands of ecosystems, reversing the achievements of aeons of evolution. Part two is the growing threat to the security of human cultures, as virtually every society is now facing the question of how long it can sustain itself in a degraded and depleted environment. I rank their importance thus because it is easier to invent new technologies, new social organisations and institutions, or new values than new species or ecosystems; nonetheless, I acknowledge that the demise of old ways of life may be very hard on people who cannot adapt.

Scientists, historians, indeed scholars from all the academic disciplines, are beginning to come together in response to this crisis and open doorways through the walls of specialisation that divide us. We are doing this not merely for our intellectual enlightenment, or for the advancement of careers, but also for a moral reason – the good of the earth and all its inhabitants.

This concern, however, has a long, long way to go before it becomes general and before we have truly brought the two cultures together. Many of my fellow historians, for example, continue to throw up walls around their work and try to live undisturbed by world events. Despite thirty or forty years of public discussion of global environmental issues, only a few American history textbooks try to remind students of the environmental context of our national development: of the thick green pineries, for example, that once stretched from Maine to Minnesota, where Americans cut the lumber to build millions of balloon-frame houses in Boston, Detroit, Chicago, St. Louis, and Kansas City. Generally, the textbooks fail to convey even a hint of the lively, vital interaction with the land – with all its organisms and microorganisms, with such natural

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resources as soil and water – that has gone on through time. Thus, the account of American history that students usually encounter remains a lot like deodorised, fluorescent-lit, saran-wrapped supermarkets, where one can push a cart up and down the aisles every week and never be stimulated to think about the ultimate source of the milk or bread on which our politics, our heroes and villains, our social order, even (perhaps most particularly) our economic life, has fed. We commonly tell a story of the past that encourages irresponsibility in the present.

This continuing indifference, this irresponsibility, can be blamed in part on the urbanisation of modern life, which has put so much distance between people and the land. But another important source, I believe, lies in the way we organise our academic life. Historians have not been *expected* to deal with nature or even with the imaginations of roving outdoor painters, the politics of environmentalism, or the changing models of natural science. Somewhere, it seems, a great lawgiver has enscribed on a tablet of stone that water cycles, deforestation, animal populations, soil nutrient gains and losses are reserved for Science, while History must confine itself to tariffs, diplomatic negotiation, union-management conflict, race and gender. Science is supposed to deal with Nature; the scientists even have a journal proclaiming that fact in its title. History, on the other hand, must deal with People, Society, and Culture.

Nobody is quite sure which great lawgiver decreed this division of the world, though one leading suspect is René Descartes, who in the mid-seventeenth century announced that the world is divided into two opposing forces, mind versus matter, the consequence of the announcement being that scientists took up the study of matter, leaving mind to the humanists. Others have pointed to the much older argument between Democritus and Lucretius, on the one hand, and Plato on the other, over the primacy of mind or matter in the order of things. And some would argue we must go back even before the rise of dualistic western civilisation to some deeper human tendency to divide the world into binary oppositions.² Whatever the origins of the split, we still suffer today from a rigid set of categories that set us apart from one another in the academy. Nature is set apart from culture. The material order is set apart from the spiritual. The realm of objective data is strictly demarcated from the realm of subjectivity, feeling, and value. This division has worked to balkanise our various university departments and academic professions, our intellectual loyalties, and even our scholarly languages. I cannot adequately express the enormous damage that this balkanisation has done not only to our intellectual and moral life but also to the natural world.

But we can open a small doorway through the wall, the doorway of environmental history, whose essential purpose is to put nature back into historical studies, or, defined more elaborately, to explore the ways in which the biophysical world has influenced the course of human history and the ways in which people have thought about their natural surroundings. Students of environmental history include both scientists and historians, all looking for some

common ground in this new field but probably all aware of how much will always divide us in our research.

In the United States environmental history has been, over the past two decades, essentially a study of the conservation of nature, both as idea and practice, or of the failure of conservation, and of the relationship of conservation to other ideas like development, laissez-faire economics, and private property. More recently, the field has broadened to include the reorganisation of nature that has been going on for a long time and is now accelerating everywhere. The first line of inquiry has not required environmental historians to create any new methodology; for the study of conservation historians have been able to use their traditional skills in interpreting documents, analysing the history of ideas, politics, and economics in the same old, familiar ways though with new questions in mind. But when we begin to move into that second area, the history of the reorganisation of nature, we find ourselves needing help from scientists. They become essential allies, an intellectual circle we must penetrate and understand. So environmental historians have begun reading books and papers written by scientists in ecology, physical geography, soil chemistry, climatology, plant genetics, parasitology, reproductive biology, and groundwater hydrology. In one recent work by a historian I found references to the following scientific journals: *Annual Review of Ecology and Systematics*, *Science*, *BioScience*, *Canadian Journal of Fisheries and Aquatic Science*, and the *Proceedings of the California Academy of Science*.³ Apparently, to do environmental history really well, one must have some familiarity with, if not advanced training in, more scientific fields than many scientists would venture to acquire. That requirement may be daunting to an historian who once thought he had a rather simple art to master, except for those foreign language exams, but now discovers he needs to know how to analyze, for instance, the record of atmospheric methane concentration based on measurements of air trapped in an ice core from Antarctica.⁴

A new door has begun to open, but where does it lead? It leads, I think, to a picture of the human past that is unlike anything you will find in the standard history books. It leads to a past wider in scope than any of our national territories, taking in whole continents, even the earth itself, to a past older than the American constitution, or the Magna Carta, or even the Pyramids, as old as the species itself, and yet as new as the automobile or aerosol sprays or the greenhouse effect.

Before sketching some of that new picture I want to acknowledge another, more basic kind of help that scientists have given the field of environmental history. In the most fundamental sense the field would not exist were it not for the moral leadership of many scientists, who have been in the forefront of discovering that we are in a state of crisis with the natural world, a discovery that began, at least in the United States, with the publication of Rachel Carson's *Silent Spring* in 1962, followed by the warnings of scientists like Paul Ehrlich, Barry Commoner, and others.

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In the new picture of history we are beginning to reconceive the past as a series of ecological interchanges that have gone on between human communities and their surroundings – the material, real world of objects that we have not invented but that constantly impinge on our cultural life. As Lewis Mumford once wrote, ‘all thinking worthy of the name must now be ecological, in the sense of appreciating and utilising organic complexity, and in adapting every kind of change to the requirements not of man alone, or of any single generation, but of all his organic partners and every part of his habitat’.⁵ I like to think that that is precisely the point of the new environmental history, ‘thinking that is worthy of the name’, thinking that places people in their full organic complexity and teaches responsibility toward all our partners on the earth.

Besides learning a broad ecological point of view, environment historians, with the aid of scientists, have begun to see the past as deeply influenced by the history of climate change. Only in the last few years have we assembled reasonably complete data on historic temperatures and rainfall for many parts of the world, so that we now know, for example, that, between 1550 and 1700, temperatures in western Europe were unusually cold and the climate was very unstable, bringing on a crisis of subsistence, the long-term social and economic effects of which we still do not fully understand.⁶ Historians have begun to look at new data on China also and to ask what may have been the relationship of rainfall and drought cycles to the rise and expansion of the Central Asian steppe peoples.⁷ Other recent evidence suggests the hand of climate in the declining fortunes of the Mayan civilisation of Central America. And going much farther back in time, we have new reason to think that agriculture, which involves turning wild annual grasses into domesticated cereals, may have begun in the southern Levant 12,000 years ago under the simultaneous pressure of drought, high temperatures, overpopulation, and overexploitation of natural resources.⁸ This study of past climates depends on scientific methods, but it is no longer exclusively a scientist’s concern.

Environmental historians have also learned the importance of the scarcity or abundance of natural resources, especially energy resources, in the making and unmaking of societies. It has been scientists and engineers who can take credit for reminding us of those resources and of the profound social consequences that may follow when they begin to run low. The first great energy crisis in history was not the one caused by the 1973 oil embargo but rather the much earlier one caused by the depletion of forests, and it occurred not once but many times and in many places. There was an energy crisis forming in England by the 16th century, forcing the English to turn to dirty, smelly coal to keep from freezing through the winter; any sensible Englishman would have preferred an oak log on the grate to a shovelful of coal, but most had little choice in a landscape severely overcut and turned into sheep pasture.⁹ The Chinese likewise depleted their forest reserves and went through an energy squeeze long before OPEC, lasting from 1400 to 1800 AD, during which time they were forced to burn straw and

build with bamboo.¹⁰ The consequences of the transition from wood to the fossil fuels have been more far-reaching than we once realised; they include changes in technology, the organisation of labour, political institutions, and, of course, the quality of the atmosphere and human health. On the positive side, the mining of coal helped realise an affluence that was unprecedented in human experience. By the early 19th century, writes R. P. Sieferle, 'the whole area of England should have been planted with wood for energy purposes, had there been no coal'. Instead, after opening up their coal mines, the English could devote the rest of their lands to elegant country estates, important food crops, and row upon row of workingmen's cottages.¹¹

Those cottages for the working class should remind us that with the new affluence came a new kind of environmental degradation, one especially borne by the rising numbers of poor people. Part of that degradation we now call pollution, but it has been around since the advent of modern fossil fuel energy use and mining processes. Nowhere has pollution's impact been more deadly than in Europe of the last century; for example, in the German city of Freiberg industrial emissions became so bad by the 1840s that 'not a blade of greening grass' could be found in the area, and 'the rooftops were covered with sediment from the poisonous smoke'. Even relatively non-industrial cities like York, England, suffered from the smokestack soot that came streaming in the open windows, ruining furniture and clothing, driving the wealthy to sell their houses at cut-rate prices and to move toward the cleaner air of the countryside.¹² The work of scientists – chemists and others – on contemporary air and water pollution is helping environmental historians understand the social and ecological effects of that past pollution, though it may require the full collaboration of the two cultures to tell us whether the air has gotten better or worse since the beginning of the industrial era.

The impact of technology on the natural environment, we can now see, goes back much farther than Rachel Carson's target of chlorinated hydrocarbons and other pesticides, even farther back than the industrial cities of Victorian England. Technology has been around as long as humans and has been reorganising nature during that entire span of social evolution. No matter how far back in time we go, it is difficult to determine just where technology began and where it left off in the landscape. For example, thanks to the work of a group of fire ecologists who have been studying the role of fire in ecosystems, we now understand that many of our so-called pristine landscapes, like the tallgrass prairie of North America, were in fact the product of fires burning across the land from time immemorial.

The unresolved, and probably unresolvable, question raised by that discovery is how many of those fires were really set by human beings, either deliberately to manipulate the environment or accidentally, and how many were the work of nature. This is a reorganisation of nature on which hard evidence is often lacking, and interpretations vary from those who see the fiery hand of aboriginal tribes in every landscape and those who are sure that lightning caused

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most fires. In any case, historians have joined scientists in asking questions such as, why is Australia the land of the eucalypts, a plant genus hardened to fire? What role, if any, did the Aborigines, who entered the continent from southeast Asia some 40,000 to 55,000 years ago, play in that ecological dominance? Did the English convicts arriving at Botany Bay in 1788 come into a land, 'not as God made it', but 'as the Aborigines made it'?¹³

I could go on to review the work done by environmental historians on disease and the spread of microorganisms, on demography and human fertility, and on the overseas ecological impact of the European conquest; and I could review their work on the changing landscape of the Finnish forest, the Gangetic plain, the Mediterranean basin, and so on. But the point is simply this: the natural sciences, particularly environmentally-oriented sciences like ecology and climatology, have opened to historians a vast new agenda of research, with enormous relevance to our current global predicament. There are new methodologies to be understood if not always directly employed by historians. Most importantly, science can help historians see beyond the realm of culture and appreciate the significance of those autonomous material forces, processes, and beings that we call nature. Having learned to transcend the realm of human culture, we will see the past in a more complete, realistic light.

However, it would be a mistake to suppose that environmental historians want simply to become the pupils of environmental scientists, or their archival assistants digging up documents to supplement their scientific data. Instead, we historians want to see a convergence of long-divided modes of thought, one that brings about a genuine dialogue and a new openness in all the disciplines. Already, from our brief experience with the conversation that has occurred, historians have concluded that the scientists need to absorb a few lessons and methodological assumptions from us.

In the first place, scientists must acknowledge, as many have begun to do, that the nature they describe in their textbooks often seems unreal and contrived to the historian. Typically, it lacks any connection to human history and all its contingencies, accidents, cycles, ideas and social forces. Too often science seems oblivious to the fact that human beings have been interacting with nature over a very long period of time, at least over two million years – some would say four million years – and that what we mean by nature is, to some extent, a product of history.

That is by no means a new idea, even among scientists, who ever since the 18th century have been slowly becoming historians of a sort. For instance, Georges-Louis Leclerc, the Comte de Buffon, the leading naturalist of pre-Revolutionary France, was historical-minded enough to try to describe the seven great epochs of the earth, beginning with the moment of divine creation and coming down to the present.¹⁴ The geologist James Hutton of Edinburgh, who founded historical geology in the same century, realised that the landscape we see around us has not always looked as it does today but has gone through cycles

of decay and renewal. 'The earth', he wrote, 'like the body of an animal, is wasted at the same time that it is repaired. It has a state of growth and augmentation; it has another state, which is that of diminution and decay. This world is thus destroyed in one part, but it is renewed in another.'¹⁵ Those were important anticipations of the modern historical consciousness, but science had to wait until the next century, when the biologist Charles Darwin came on the scene, to learn to be fundamentally historical in outlook. After *The Origin of Species* appeared in 1859, science became thoroughly historicised, not only in biology but in almost every scientific field, in the sense that natural phenomena came to be studied over time and the so-called laws of nature came to be seen more as historical observations – rather like the observations the social historian makes – than laws that must be obeyed, as Isaac Newton had it. Today, scientists regularly acknowledge that they deal with observations rooted in particular moments, with indeterminate events that may not be repeated, let alone predicted, in the future. Despite all the historicising that has gone on, however, science has tended to remain, until lately, intellectually isolated from the history that people have made on the planet.

Ecosystems, for instance, have been commonly described in the textbooks as self-contained assemblages of plants and animals, evolving over time but in the absence of any people, ignoring the fact that many of the world's ecosystems have long been the home of people too. Some of those ecosystems have been profoundly, visibly altered by the human presence, while in other places that presence has been far more subtle and hard to discern. If wind has shaped the soil profile of my home landscape of the North American prairie, if bison have influenced its vegetation, if prairie dogs have dug holes all over the place, then humans have long been active there too. Historians want scientists to take more seriously the fact that a human impact on the rest of nature has always been a possibility and that the impact has been increasing exponentially in the modern era, for deep material and cultural reasons, until now it is as big and powerful as the atomic bomb.¹⁶

In the second place, historians expect scientists to acknowledge that their ideas of nature, even their most complex theoretical ideas, seemingly so immune to the pressures of daily life, are products to some extent of the cultures in which they appear. Ideas of nature have a history, one linked inextricably to the history of culture, whether economic, aesthetic, or political. We cannot isolate our perception of nature into one division called 'science' and into other divisions called literature, the arts, religion, or philosophy, for they all float along together in a single flow of ideas and perceptions. Moreover, I doubt that there are any truly profound methodological differences between the two cultures in apprehending nature; both profess to follow the same rules of reason, tolerance, critical thought, fairmindedness, and consensus, rules that are far more important than any special tools or methods of gathering data.

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Historians, like scientists, are acutely aware that the professional papers they read in the scientific journals have dates on them, but may react to those dates differently. For scientists the dates seem to be an index to truth: the more recent the date, the more truthful the paper. For historians, on the other hand, the dates do not necessarily appear that way. We want to make the date itself a subject of analysis. What did an ecologist, writing in, say, 1920, see in nature, and how was his or her experience different from that of an ecologist writing in 1990? Did it matter that the former ecologist may have been an American writing in the aftermath of World War One, that he may have voted for Warren G. Harding for President, that he may have lived in Nebraska rather than southern France, that he looked at the landscape through the windshield of a Model T rather than from a covered wagon? Historians are trained to look for personal biography in every idea, no matter how scientifically objective it is supposed to be, and to look for the influence of contemporary opinion on the rise and fall of scientific theories. Granted that the present generation of scientists work hard to give us a more reliable account of nature than their predecessors, historians nonetheless find the ideas of other eras intrinsically interesting, often as interesting as those of our own day, and for all we know, they are as valid in their way.

Words like ecosystem, niche, competitive exclusion, biomass, energy flow, plate tectonics, chaos are all just that – words – and must be appreciated as such. We may hope they indicate facts, but we can only be absolutely sure that they are words, and as words they are only representations of facts. That in itself is a point worth pausing over in the dialogue of the two cultures. Every science that the environmental historian approaches presents him or her with a language, and that language is filled, like all of the world's languages, with metaphors, figures of speech, hidden structures of meaning, even world views – in short, it is filled with culture. The environmental historian wants to learn that language, no matter how strange it may seem at first, and use it to improve his understanding of the human past. But as a historian, trained in the modes of thought common to the humanities, where language itself is an important object of analysis, he must insist that the words of the scientist not go unexamined. They are themselves worthy of attention as expressions of culture, as expressions of ethical beliefs. We cannot take science out of its culture, out of the realm of meaning, value, and ethics.

In the third place, environmental historians would argue that scientists need them to answer a very big question that the latter have done much to raise to public consciousness but have no special methodology or expertise to answer: Why are we in a state of crisis with the global environment? Scientists have described that crisis with impressive precision, measuring, for instance, where the carbon is generated that is causing the greenhouse effect and learning how to track its flow from one hemisphere to the other and to make somewhat better predictions of its effects on temperatures and rainfall at the regional level. They

can pinpoint with amazing detail the sources of that carbon in the tailpipes and smokestacks of the industrialised, automobilised societies. But having done all that, the scientists still cannot tell us *why* we have those societies, or where they came from, or what the moral forces are that have made them. They cannot explain why cattle ranchers are cutting down and burning the Brazilian rain forest, or why the Brazilian government has been ineffective in stopping them. They cannot explain why we humans will push tens of millions of species toward extinction over the next twenty years, nor why that prospect of ecological holocaust still seems irrelevant to most of the world's leaders. They cannot explain why the Eastern European nations have such serious pollution problems, or why some western economists believe so fervently that market incentives alone will solve every problem. All those 'why' questions are rooted in culture. I emphasise the point not to denigrate the achievements of scientists, but only to remind us that natural science cannot by itself fathom the sources of the crisis it has identified, for the sources lie not in the nature that scientists study but in the *human nature* and, especially, in the *human culture* that historians and other humanists have made their study.

We are facing a global crisis today, not because of how ecosystems function in a state of nature but rather how our ethical systems function. Getting through the crisis requires understanding our reorganisation of nature as precisely as possible, but even more, it requires understanding those ethical systems that have directed the reorganisation and using that understanding to reform them. Historians, along with literary scholars, anthropologists, and philosophers, cannot do the reforming, of course, but they can help with understanding the causes.

In the view of this historian, the most important causes lie not in any particular technology of production or health care – the advent of medical inoculations, for example, or better ploughs and crops, or the steam engine, or the coal industry, all of which were outcomes more than causes – but rather in modern culture itself, in its worldview that has swept aside much that went before it in values and perceptions. We can call this modern culture by a simple name – the world view of *materialism* – but must try to think about it as a very complex phenomenon, one made up of many parts, economic and scientific, so intertwined and interdependent that even now historians have not fully probed their intellectual linkage. The shift in world view toward materialism was as important a cultural turn as the one that occurred in what Karl Jaspers has called the 'Axial Period' of human history, the 5th and 6th centuries BC, when so many of the world's great religious and philosophical systems first appeared – Confucianism, Buddhism, the pre-Socratics in Greece, the Old Testament prophets.¹⁷ I see this new world view – 'post-Axial' we might call it – taking over western Europe in the 17th and the 18th century AD, after a long spawning period, and manifesting itself in the many so-called 'revolutions' that comprise modernity, including the Scientific, the Industrial, the Capitalist, all of which were only surface manifestations of a more fundamental change in thinking .

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Thus at the very centre of environmental history must stand the study of evolving world views, a study at least as important as investigating the reorganisation of the landscape that has occurred. For that study in the history of ideas we emphatically need the humanities and all their expertise, their methods, their traditions.

So we are opening a door in the wall that separates nature from culture, science from history, matter from mind. Where we are arriving is not at some point where all academic distinctions or boundaries disappear, where the categories of nature and culture have been completely abolished or subsumed, but one where those boundaries are more permeable than before. Nature has become less easy to isolate from culture than we once thought, and vice-versa. The two realms are linked together in an endless loop of exchanges, interactions, and meanings, so that they keep collapsing into one another. We try to make them distinct, and sometimes for good reason: we need to try to step outside of culture regularly and acknowledge, as Henry Thoreau once put it, 'our own limits transgressed'. On the other hand, we have to realise that what we mean by nature is inescapably a mirror held up by culture to its environment, a mirror reflecting itself. This is a paradox we humans cannot get out of. The door we open between the two cultures is finally a passage to that unresolvable paradox.

We live in a material world, and nature is the largest, most complex, more wonderful part of that materiality. As an environmental historian, I want to bring that material world to the attention of my colleagues, whether they are studying the rise and fall of prices, the policies of kings and prime ministers, or the causes of war. That material world of nature, I want them to see, has a rational order, a structure that is at least partially intelligible, and a history of its own. We historians of every sort need to grant the significance of that autonomous nature and to respect its discordant harmonies, its intricate evolution.

But we cannot then fall back on a simple materialism as an explanation for why societies have behaved as they have. The human communities of the past have not been merely the products of climate, or soil, or disease, or ecosystems, or of an abundance or scarcity of natural resources. They have also been the products of ideas, dreams, and ethical systems. And it is those latter, distinctly cultural forces that explain how and why we humans have so often in the past, and almost everywhere today, gotten so badly out of synch with the rest of nature.

NOTES

¹ C.P. Snow, *The Two Cultures and the Scientific Revolution* (New York: Cambridge University Press, 1963; orig. given as Rede Lectures in 1959), pp. 4-5.

² On this nature-vs-culture split I have profited from reading Neil L. Jamieson and George W. Lovelace, 'Cultural Values and Human Ecology: Some Initial Considerations', in *Cultural Values and Human Ecology in Southeast Asia*, ed. Karl L. Hutterer, A. Terry Rambo, and George Lovelace, Center for South and Southeast Asian Studies, University

of Michigan, No. 27 (Ann Arbor: University of Michigan Press, 1985), pp. 27-54; and Alice E. Ingerson, 'Some Practical Effects and Radical Uses of the Nature/Culture Dichotomy' (unpublished essay).

³ See Arthur F. McEvoy, *The Fisherman's Problem: Ecology and Law in the California Fisheries 1850-1980* (New York: Cambridge University Press, 1986).

⁴ See, for example, F.E. Graedel and P.J. Crutzen, 'Atmospheric Trace Constituents', in *The Earth As Transformed by Human Action*, ed. B.L. Turner II et al. (Cambridge: Cambridge University Press, 1990), pp. 300-301.

⁵ Lewis Mumford, *The Pentagon of Power* (New York: Harcourt, Brace, Jovanovich, 1970), p. 393.

⁶ Andrew B. Appleby, 'Epidemics and Famine in the Little Ice Age', *Climate and History: Studies in Interdisciplinary History*, ed. Robert I. Rotberg and Theodore K. Rabb (Princeton, N.J.: Princeton University Press, 1981), pp. 63-84; Jean M. Grove, *The Little Ice Age* (London: Methuen 1988). The pioneering studies in this area were H. H. Lamb, *Climate: Present Past and Future* (London: Methuen, 1972), and Emmanuel Le Roy Ladurie, *Times of Feast. Times of Famine: A History of Climate since the Year 1000*, trans. Barbara Bray (London: Allen and Unwin, 1972).

⁷ See L. N. Gumilev, *Searches for an Imaginary Kingdom: The Legend of the Kingdom of Prester John*, trans. R. E. Smith (Cambridge: Cambridge University Press, 1988).

⁸ Joy McCarrison and Frank Hole, 'The Ecology of Seasonal Stress and the Origins of Agriculture in the Near East', *American Anthropology*, 93 (March 1991): 46-69.

⁹ John U. Nef, 'An Early Energy Crisis and Its Consequences', *Scientific American*, 237 (1977): 140-151; Richard Wilkinson, *Poverty and Progress: An Ecological Perspective on Economic Development* (New York: Praeger, 1973), Chap. 4; I. G. Simmons, *Changing the Face of the Earth: Culture, Environment, History* (Oxford: Basil Blackwell, 1989), 296-306.

¹⁰ Vaclav Smil, *The Bad Earth: Environmental Degradation in China* (New York: Sharpe, 1984), section 2.

¹¹ R. P. Sieferle, 'The Energy System – A Basic Concept of Environmental History', in *The Silent Countdown: Essays in European Environmental History*, ed. P. Brimblecombe and C. Pfister (Berlin and Heidelberg: Springer-Verlag, 1990), pp. 14-15.

¹² E. Schramm, 'Experts in the Smelter Smoke Debate', in Brimblecombe and Pfister, p. 197; P. Brimblecombe and C. Bowler, 'Air Pollution in York, 1850-1900', *ibid.*, p. 183.

¹³ See, for instance, Stephen J. Pyne, *Burning Bush: A Fire History of Australia* (New York: Henry Holt, 1991). The quotation is from page 82.

¹⁴ Buffon, 'Des Epoques de la Nature' (1779), in *Oeuvres completes de Buffon* (Paris: Pourrat Freres, 1838), Vol. I, pp. 479-569.

¹⁵ James Hutton, *Theory of the Earth* (Edinburgh: Cadell, Davie, Creech, 1795), Vol. II, p. 562.

¹⁶ An ecologist who has begun to study the landscape as influenced by human history is Norman Christensen of Duke University. See his essay, 'Landscape History and Ecological Change', *Journal of Forest History*, 33 (July 1989): 116-125.

¹⁷ Karl Jaspers, *The Origin and Goal of History* (New Haven, Conn.: Yale University Press, 1959), pp. 1-21. According to Jaspers, the Axial Period was a nearly simultaneous spiritual flowering occurring in three widely separated centres – China, India, and the West – in which rationality replaced primitive mythology, speculative philosophy appeared for the first time, and religion took on an ethical content.

Gender and Environmental History: From Representation of Women and Nature to Gender Analysis of Ecology and Politics

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SUMMARY

While gender-blindness has characterised much writing on colonial environmental history, women have assumed centre-stage in the historical narratives produced by two linked contemporary policy discourses: ecofeminism, and 'women, environment and development'. Yet the latter's representations are highly problematic, both in simplifying and obscuring important relationships and processes, and in supporting potentially regressive policy agendas. The paper outlines an alternative approach to environmental history grounded in gender analysis. Drawing on well-documented case studies from Africa and India, it shows how a gender approach reveals linkages between ecological processes and relations of labour, property and power critical to understanding environmental change and assessing policy options.

INTRODUCTION¹

Writing on imperial and colonial history has been heavily criticised, initially for its complete ignorance of women as historical subjects and, more recently, for its gender-blind methodology and hence failure to envisage history as a gendered experience. A deluge of counter histories have been produced in response to these criticisms, some singularly focused on relocating women in history, and others which have examined women in relation to men in specific historical contexts and from diverse theoretical perspectives. Despite the rush to locate 'lost female worlds' (Nair 1994), however, gender issues have yet to receive serious attention in work on environmental history. Indeed the growing body of work on the causes and impacts of land use change, and their relationships with imperial and colonial policy and politics, has to date shown remarkably little interest in their gender dimensions.

Given this paucity of relevant, focused work, this paper makes no claims to provide a comprehensive review of literature on gender and environmental

history. Providing a synthesis of key relationships between gender, imperialism, ecology and politics would – even were the data to exist – be an enormous undertaking. Furthermore, writing feminist history involves more than mere description; it must acknowledge the assorted ways in which different feminist theoretical perspectives shape the production of historical knowledge, and thus capture event histories and relationships differently in their interpretations (cf. Scott 1988). In this light, our aims here are much more limited. In part I, we briefly expose problems in ‘conventional’ environmental history which, in its apparent blindness to questions of gender, can be argued to be actively anti-women, denying not only their agency but also their experience and interests. We then explore one set of responses, in contemporary ecofeminist and ‘women, environment and development’ (WED) work, which emphasises a ‘special’ relationship between women and the environment. These analyses make strong claims about colonial history, and provide a set of interpretative lenses for it. But their representations of history are, we suggest, also highly problematic. Their generalised accounts obscure rather than clarify linkages between changing gender relations, ecologies, and colonial science, ideology and policy, and they deploy history to suggest policies which could well prove detrimental to women.

Building on this critique, part II presents an alternative approach to environmental history grounded in gender analysis. It outlines elements of such an approach – emerging in a still small body of work by anthropologists and political ecologists, as well as feminist historians – and briefly illustrates their application in three cases. These gendered environmental histories provide very different interpretations of historical events from both conventional ‘masculinist’ historical accounts, and from ecofeminist/WED ‘histories’; a re-writing which not only questions the very categories and assumptions underlying these two approaches, but which also carries different implications for contemporary debates and policy-making.

I. WOMEN AND NATURE: REPRESENTATIONS OF HISTORY IN CONTEMPORARY POLICY DEBATES

Gender bias in conventional environmental history

In much writing on imperialism, ecology and politics, women hardly figure. Examples of such work are commonplace, whether focusing on the history of local use of land and vegetation in the context of economic change, or on the policies of imperial and colonial governments and local responses to them. The silences in such accounts reproduce those in the written historical sources of the colonial period, in which, for the most part, administrators described their dealings with the men they perceived as heads of households, local political authorities and leaders of struggles against their regimes.

The problem with such accounts, from a feminist viewpoint, is not simply that they are ignorant about women; ‘gender-blind’ in the sense of conflating

women's and men's experiences into a neutral whole. Instead, and as Scott (1988) emphasises in a more general context, they can be said to have distorted history and politics by assuming that the key actors were men. Their silences thus actively deny and exclude the very different activities which women may have been engaged in; the ways they valued and interacted with ecology; the ways they felt the impact of political and economic change, and their own responses and struggles. Likewise denied are the ways that women felt and interpreted men's interactions with ecology and politics, in terms of changing relations between the genders. Feminist scholars recognise that the conflation of 'history' with masculine experience and agency can actively disadvantage women, not only by projecting images of them as passive and powerless, but also by obscuring the regressive social and material effects on women of past policies and change, and hence of future policies which might draw from these experiences.

Responses from WED and ecofeminism

Among an array of possible responses to this gender bias in environmental history and policy, two linked approaches have recently acquired prominence among activists, scholars and development policy-makers: the so-called 'women, environment and development' (WED) approach, and ecofeminism. While both have been heavily criticised (for example, by Agarwal 1992, Jackson 1992, and Leach 1992a), they are worthy of consideration here both because of their continued influence, and because of the particular ways that they have dominated the representation of environmental history.

The WED approach emerged in the 1980s mainly among development analysts and policy-makers, and draws heavily on the conceptual apparatus of the 'women in development' (WID) approach first popularised a decade earlier. In general, WED emphasises that far from being insignificant, women have a 'special' relationship with the environment, derived largely from their close daily interaction with it as a result of tasks allocated within the gender division of labour. Much emphasis is laid on women's involvement with 'reproductive' activities such as fuel and water provision, and food production and gathering. In the late 1980s, the accent of this approach swung from images of women as victims of environmental degradation to a stress on women's efficiency as environmental managers. Currently, a focus on women's roles is used to suggest an extensive accumulated knowledge and experience of natural resource management and this, in turn, has led to easy assumptions of women being the obvious constituency for programmes and policies concerned with environmental conservation, rehabilitation and management (Dankelman and Davidson 1988; Rodda 1991).

In upholding this 'special' relationship, WED has allied itself conceptually with ecofeminism. Ecofeminism views women as 'close to nature'²² in a spiritual or conceptual sense, different from – yet able to be invoked in support of – WED's focus on women's material roles. Largely of Northern origin, ecofeminism

nevertheless has an increasingly vocal international presence (for example, through the work of Vandana Shiva, and discussions at UNCED in Rio, 1992), and an implicit influence on many development perceptions (cf. Braidotti *et al.* 1994). Although ecofeminism is multi-stranded, many of the elements which have tended to filter into wider debates about women and the environment can be traced back to what has been termed 'cultural ecofeminism' such that 'Much populist ecological activism by women, while perhaps not explicitly ecofeminist, implicitly draws on and is motivated by the connection between women's reproductive biology (nature) and male-designed technology (culture)' (Merchant 1992: 192). In 'patriarchal' thought, it is argued, nature is seen as inferior to culture, and hence women are seen as inferior to men. The domination and oppression of women and the domination and exploitation of nature have thus gone together. Such reasoning gives women a particular stake in ending the domination of nature. To scale up from individual to organisation, it is argued that the common objectives of feminist and environmental movements are conducive to a merging of perspectives and action.

To some ecofeminists, women's link with nature, within a nature/culture divide, is biologically inevitable (e.g. Salleh 1984; Starhawk 1990). Others see such connections as broad philosophical or ideological constructs associated with particular societies. Whether ecofeminists appeal to biology or to culture/philosophy as a response to silences about women in conventional environmental scholarship, their arguments appear to be trans-historical, even a-historical. Nevertheless, ecofeminism is commonly accompanied by 'historical' analysis.

The Scientific Revolution, spanning the sixteenth and seventeenth centuries, is taken by many ecofeminists as the time in western history when both women and nature were conceptually devalued (Merchant 1982; Plumwood 1986; Warren 1987). Organismic theory had predominated, in which the earth, viewed as a nurturing female, lay at the centre of a cosmology in which nature and society were dynamically interconnected. 'Modern science', it is claimed, replaced organismic theory with a mechanistic view of nature which upheld competition and domination as necessary to the pursuit of progress: 'The removal of animistic, organic assumptions about the cosmos constituted the death of nature... Because nature was now viewed as a system of dead, inert particles moved by external, rather than inherent forces, the mechanical framework itself could legitimate the manipulation of nature' (Merchant 1982: xvii). Ecofeminists see the 'death of nature' precipitating the subordination of nurturing female principles; ideological changes argued to have presaged an actual change in attitudes and behaviour towards nature and towards women at this point in western history (*ibid.*: 2).

Some ecofeminist discourse thus examines how western post-enlightenment images have been imposed on 'indigenous' societies in Asia and Africa through scientific and development processes. Thus Mies and Shiva (1993) reasonably characterise imperialism and colonialism as bearers of a particular western,

mechanistic science and rationality, but characterise this as patriarchal or 'masculinist', so 'doing violence' to women and nature. Such rationality undermined, it is argued, pre-existing conceptions which were very different, viewing people and 'nature' as interdependent, and male-female relations as non-hierarchical (Shiva 1989). This conceptual subordination went hand-in-hand with material subordination, as patriarchy in colonialism and capital accumulation sanctioned new relations of property and power (Mies and Shiva 1993; Mies 1986). This provides the basis for a call for rejection of dominant development models and scientific paradigms, and the recovery of a localised 'subsistence perspective' centred on women's reproductive roles which will necessarily, it is argued, be respectful of 'nature' and women.

Ecofeminist perspectives are upheld – and gain credibility in policy – through more specific narratives concerning colonial environmental history. The most elaborate example is found in Shiva's (1988) account of women and forests in the Indian hills (cf. Philipose 1989). Shiva conjures up a pre-colonial 'golden age' when feminine, conservation and ecological principles predominated, when women's subsistence livelihoods were analogous to nature 'renewing herself' (Shiva 1988: 4), when the satisfaction of basic needs was enough to ensure societal affluence, and when patriarchy was absent. The work of men and women during this period was complementary and life harmonious, and apparently casteless and classless. Shiva bolsters this imagery by drawing on ancient Hindu cosmology, claiming that 'nature is Prakriti, a living and creative process, the feminine principle from which all life arises' and – conflating symbolic representation with material reality – argues that women's interaction with nature has always taken place in the context of preserving the feminine principle (Ibid.: xviii). Moreover, she claims that:

Forests have always been central to Indian civilisation. They have been worshipped as Aranyani, the Goddess of the Forest, the primary source of life and fertility, and the forest as a community has been viewed as a model for societal and civilisational evolution (Ibid.: 55).

Reasonably again, Shiva considers the colonial period as a turning point in history where capitalism and the new, destructive, science and technology of environment, as represented by commercial and industrial forestry management principles, were transferred into Indian culture and society. She rightly points out the tendency of reductionist scientific discourse to overlook the importance of forest products in women's reproductive and subsistence roles. But the argument is forced further, to assert that the 'feminine principle' in indigenous forestry was thus suppressed, fundamentally undermining the status of linked women-and-nature. This conceptual subordination went hand in hand with new relations of property and power which allowed alienation of forest land and resources to commercial development, and this systematically undermined women's natural resource management roles and sources for 'staying alive' (Ibid.).

Shiva uses this 'history' to label contemporary environmental movements as 'feminine'. This has served, for example, to immortalise the Chipko (tree-hugging) movement as a 'feminist' environmental movement, providing a potent and widely-quoted image to justify a particular approach to women and natural resource management. The Chipko demonstrations first occurred in 1973 in Chamoli district, Uttar Pradesh, and have since been replicated in other parts of India such as Karnataka where the Appiko Movement has taken on the fight to save the forests of the Western Ghats region. Shiva argues that Chipko is a response by people, especially women, within Garhwal District to the invasion of commercial forestry. The conceptual link between this version of history and the current Chipko movement is the notion that women through their special affinity with nature, 'have *conserved* those categories of thought and action which make survival possible' (Shiva 1988, emphasis added). Women in Garhwal are thus represented as conceptually in a half-world somewhere between pre-colonial times and the present, their essential affinity with nature forcing them into a desperate fight against the vestiges of western-style progress, while glancing back at a dying golden age. Shiva builds up Chipko's image as a feminist movement since this reinforces her argument about women's agency in environmental protection: she claims that 'Chipko is a history of the visions and actions of exceptionally courageous women', and that similar movements elsewhere 'have been fuelled by the ecological insights and political and moral strengths of women' (Ibid.: 67; cf. Omvedt 1984).³ The key feature of the ecofeminist 'histories' which lend strength to such claims, then, is the way that femininity is linked *a priori* both 'with nature' and 'with the past'.

In the African context, historical narratives concerning women, agriculture and environment provide a parallel example of the use of claims about history to uphold WED and ecofeminist concerns. The arguments here turn on the image of ecologically-harmonious, female subsistence farming systems, and their rupture through colonial commercial crop development. Boserup's (1970) influential analysis of the effects of colonialism and 'capital penetration' on subsistence agriculture, while an important scholarly landmark in some respects and central in establishing the dominant framework for work on 'women in development',⁴ nevertheless produces arguments which resonate with Shiva's. These are open to invocation in ecofeminist/WED histories, whether concerning particular societies, or 'African women' more generally.

In these historical narratives, female farming is portrayed as an 'original' form: Boserup (1970: 16) argued that 'Africa is the region of female farming par excellence', where productive labour is carried out largely by women – perhaps assisted by men's tree-felling or land preparation. These female roles, it is commonly argued, were centrally valued within relatively gender-egalitarian societies. As Guyer (1991) has pointed out, women's farming roles are often portrayed as naturally arising from and attuned to their reproductive functions, especially child care. They have also been portrayed as inherently 'co-operative'

with the productivity of soil and vegetation processes, viewed as inherently female: for instance, in images of the earth as a mother (cf. Mies 1986). Pre-colonial agriculture is viewed as subsistence-focused, isolated from commercial forces, and harmoniously integrated with environmental use by ecologically-attuned women, such that 'nature' is minimally modified. In the forest zone, for instance, such images draw on Baumann's classic view that an association of forest ecology, dominance of root crops over cereals, minimal cultivation of the soil and female farming have persisted 'in the African primeval forest....from time immemorial' (1928: 294; cf. Guyer 1991).

This primordial harmony is portrayed as breaking down under the effects of male-biased colonial export crop and labour policies. As Boserup (1970) argued, men engaged in growing high-value export crops, introducing new gender inequalities associated with private property and women's unpaid 'family labour' on men's holdings. Women's food farming was relegated to an increasingly under-resourced and devalued subsistence sector, in which 'nature' was simultaneously devalued:

When commodity production as the prime economic activity is introduced as development, it destroys the potential of nature and women to produce life and goods and services for basic needs... Women are devalued, first, because their work co-operates with nature's processes, and second, because work that satisfies needs and ensures sustenance is devalued in general... Nature's economy – through which environmental regeneration takes place – and the people's subsistence economy – within which women produce the sustenance for society through 'invisible' unpaid work ... are being systematically destroyed to create growth in the market economy (Mies and Shiva 1993: 75).

'Environmental degradation', it is argued, arose both because export crops and products themselves were environmentally damaging, and because women in devalued subsistence production were forced to mine soils, fell trees and so on in order to survive. Environmental degradation and the degradation of women's status thus went hand-in-hand. But women have, it is argued, retained subsistence-focused regenerative energies which now need to be harnessed in restoring the environment; a process which, it is argued, will simultaneously restore their power and status (Monimart 1989; Maathai 1988).

Clearly, these representations of history serve a purpose, supporting a particular policy and political agenda; in essence, forging a new and positive identity for women in a 'Green' era. In common, they suggest that women have, and maintain, a closeness to nature and subsistence concern – as demonstrated in feminine environmental movements and persistent female roles – which make them the obvious agents for environmental conservation and rehabilitation, and for the local, subsistence-focused development necessary for this. And they suggest that this will simultaneously be good for women, their communities and 'nature'.

Challenging ecofeminist and WED 'histories'

Yet these representations of history and their ecofeminist tenets sit very uneasily with other areas of scholarship about gender and rural change by anthropologists, historians and others, whether or not concerned explicitly with 'environment'. The implicit criticism presented by such work converges with explicit, and vociferous, critiques of the conceptual framework of ecofeminism. It is worth summarising central elements of these critiques which, in challenging the concepts and assumptions structuring ecofeminist 'histories', suggest that they fundamentally misrepresent crucial relationships between gender, ecology and colonial politics.

First, the notion of universal links between women and 'nature' in ecofeminist accounts has been strongly criticised. Anthropological studies show up wide cross-cultural and historical variability in the meanings attributed to 'female' and 'male', and the ways they are linked with concepts relevant to environment (MacCormack and Strathern 1980; Moore 1988). A woman's procreative roles are by no means necessarily seen to place her closer to a universally-conceived nature, and to exclude men from this relationship. Thus for example, Shiva (1989) succumbs to unwarranted extension of principles she associates with Hinduism when she suggests that all pre-colonial societies 'were based on an ontology of the feminine as the living principle' (Shiva 1989: 42). Yet Agarwal (1992), for example, argues that the imagery of Prakriti varies in its connotations and relevance even among Hindu groups in India, as well as being of comparatively little importance among non-Hindu people. Furthermore, in non-western thought 'nature' may not be categorically distinguished from a separate 'society'. As a generalised category, 'nature' certainly fails to capture complex ideas about the physical and non-physical attributes of different micro-environments and ecological processes (cf. Croll and Parkin 1992, Fairhead and Leach 1996). Ecofeminist formulations fail to consider how different environmental categories are differently linked with ideas about gender. They obscure these cultural and historical particularities by, in effect, offering only a single, inverted alternative to supposed western female:male::nature:culture hierarchies, falling into the same dichotomous trap as western thought (Molyneux and Steinberg 1995). Furthermore, this raises central doubts about the political project of ecofeminism: can 're-casting as a virtue' women-nature links that people do not perceive, be an adequate basis for political action? (cf. Braidotti *et al.* 1994).

A second, related critique concerns the portrayal of women as a homogeneous category in their relation to the environment. Shiva's analysis of the women-nature link is, for example, intended to apply to all 'third world women'. But this fails to address the conceptual and material factors which distinguish individual or groups of women from each other, whether by age, class, caste, ethnic group, or local ecology (cf. Leach 1994). That some women become involved in environmental action does not mean that this represents all women's interest and agency (Jackson 1993).

Thirdly, men remain largely invisible in many of these accounts, except as the other side of a dichotomy. Indeed, that women's relationship with the environment appears 'special' in WED work can be at least partly because men's does not appear (Leach 1992a). In Shiva's analysis, for example, rural men's ecological work, knowledge and so on are subsumed under a genderless 'peasant' or 'tribal' categorisation, while the male:female, destroyer:protector dichotomy is sustained by an allusion to the dominance of women and nature by western industrial man.

Furthermore, the tendency to treat women and men as dichotomously separate obscures the relations between them. Gender analysis perspectives, focusing on gender relations and roles as socially and historically constructed, have posed the greatest critical challenge to ecofeminism and WED. In drawing attention to the ways that gender relations structure (and are structured through) environmental use and management, as mediated by divisions and relations of labour, responsibility, property, power and knowledge, they undermine common WED policy images and assumptions. They would suggest, for instance, that if certain women are 'closely involved' with natural resources, this reflects gender-divided roles and possibly a lack of other opportunities, rather than any inherent caring relationship (e.g. Agarwal 1992). They would suggest that women's labour involvement with the environment may obscure gendered relations of property and power which deny women control over and benefit from their activities. And they suggest the possibility of conflicts between environmental and women's gender interests; for example, that allocating women responsibility for 'saving the environment' could increase their workloads or reinforce regressive gender roles, rather than representing progressive change or enhanced gender equity (Jackson 1993; Leach 1992a).

Ecofeminist histories reduce the material aspects of people's changing gender and environmental relations to a dichotomy between a harmonious, timeless pre-colonial golden age and the destructive effects of capitalism and colonialism; in effect, to the endless reproduction of glorious 'tradition' until the arrival of 'capitalist modernity'. However this is to obscure the evidently important dynamics of gender, social stratification and environmental change in pre-colonial history;⁵ dynamics often influenced by trade and commerce in ways which strongly deny images of subsistence isolation. While all scholars agree that colonialism and capitalism have profoundly restructured – and continue to restructure – economies, societies and their gender relations, the accumulated evidence from a large number of historical analyses shows the complex and varied forms of this articulation (e.g. Etienne and Leacock 1980; Moore 1988). That colonial and capitalist economic relations have often serviced to encourage ecologically-destructive practices, while supported by some evidence, also cannot be generalised *a priori*; this is to obscure the specific policies and politics of colonialism, their interactions with local land-use practices, and the ecologically-specific responses of land to use in particular contexts (cf. Leach and Fairhead 1995).

Finally, the effects of colonial science and ideology on 'indigenous knowledge' and ecological concepts are treated in similarly sweeping, and misleading, terms in these ecofeminist/WED histories. There is an assumption that pre-colonial, organic, sacralised views of 'nature' went hand-in-hand with harmonious environmental practices and egalitarian gender relations. Yet this cannot be upheld. Indigenous 'organic' conceptions can evidently encompass struggle and conflict between people and certain ecological processes as well as harmony (Croll and Parkin 1992). That certain ecological processes are 'socialised' in local thought, and certain resources culturally valued, does not translate into an all-encompassing respect for nature (Persoon 1989), and often speaks to local power relations (Fairhead and Leach 1996). Indeed, as Jackson (1995) points out, there is plenty of evidence linking organic conceptions of society and ecology with oppressive social institutions: the territorial cults which managed land and fertility concerns in late nineteenth century southern Africa have, for example, been associated with the aristocratic domination and lethal taxation of commoners, as well as the subordination of women (Schoffeleers 1979; Maxwell 1994; cf. Fairhead 1992). Recent anthropological analyses of ecological knowledge and gender ideology, in contrast, locate the ways in which certain ideas are produced and debated within social and political processes, and in relation to particular groups and institutions.

Equally, the image of western thought and colonial science as monolithically wiping out other views and knowledges (leaving perhaps a shadowy residual of the old feminised order) is problematic. This obscures the complex content of colonial and modern scientific discourses, and the processes through which they articulate with rural people's own. While ecofeminism is valuable in drawing critical attention to the constituents of scientific epistemology and their operation through colonialism, and in raising questions about links between science and oppressive social relations, such a critique needs to be developed through engagement with the highly diverse and contradictory theories and practices of which science is constituted (Molyneux and Steinberg 1995: 92).

These critical perspectives would not necessarily deny the events which ecofeminism interprets – women's involvement in some environmental movements or in conserving soil or planting trees, for instance. But they would interpret these as particular to certain times, places and social relations, and interrogate the power relations which may produce them. As Guyer emphasises, in as much as 'female farming' is evident, it needs to be taken as a 'variable product of society and history', rather than a fixed starting point of agricultural evolution (Guyer 1991: 259). And women's involvement in Chipko can be represented quite differently: not as evidence of women's closeness to nature, but as a struggle for material resources in the context of gender-ascribed natural resource dependence, and women's limited opportunities as compared with men to out-migrate (Jain 1984; Peritore 1992).⁶ The movement can be alternatively

interpreted not as feminist, but as a peasant movement which emerged at a particular historical juncture (Guha 1989), and in which women's participation was actually conservative of their subordinate position (Jain 1984).⁷

II. TOWARDS GENDER ANALYSIS OF HISTORY, ECOLOGY AND POLITICS

An alternative response, both to gender bias in conventional environmental history and to the problems in ecofeminist/WED accounts, takes inspiration from gender analysis and gives more attention to the specific details of changing relationships between gender, ecology and politics. We now go on to outline and exemplify elements of this alternative historical genre, remarkably little-represented in focused work on colonial environmental history. Elements of a gender analysis of history, ecology and politics emerge from work with other emphases. These include works analysing gender and agrarian history (e.g. Berry 1975, 1988, 1993; Martin 1988), and studies of gender and rural change by social anthropologists and others which reflect on history and environment, but which do not produce environmental history as such (e.g. Guyer 1984, 1988; Leach 1994; Linares 1992; Sharma 1980). A third, emerging area of work has specifically focused on gender relations and processes of social and environmental change, albeit examining these from the present (e.g. Jackson 1983; Joekes *et al.* 1995.). Approaches within it variously categorise themselves as feminist environmentalism (e.g. Agarwal 1992), feminist political ecology (e.g. Rocheleau 1995; Thomas-Slayter 1992; Mackenzie 1991), or in a more applied sense as gender, environment and development.

From these perspectives, first, gender is interrogated as socially and historically constructed, and as grounded in relations of power. Second, rather than assume complementarity in gender roles, there is an emphasis on analysing changing relations between the genders and conflicts and processes of contestation which may characterise claims over resources, authority and status in this context. Such an approach clearly implies greater specificity in the account of intersections between gender and politics, than in the generalised narratives of ecofeminism or WED. But importantly, in the best work, specificity around gender relations is coupled with attention to ecological specificity, including attention to diversity in the resources available; to the ways that soils and vegetation respond to particular uses, and to how aspects of environment are socially valued and symbolically represented. Attention to what has been termed a 'micro-political economy of gendered resource use' (Leach 1991) in interaction with specific ecologies and politics can reveal specific gendered practices of environmental significance, which are as important in structuring the event histories of actual environments as they are in differentiating women's and

men's experiences. And as Agarwal (1992) points out, symbolic representations of gender, of aspects of ecology and of their interrelationship may be seen as (interactively) part of this structuring.

Such an approach obviously poses important methodological challenges, which this paper cannot cover. Suffice it to say that historical research in this genre is bringing insights from feminist research methodologies to a careful use of documentary, as well as oral sources (cf. Moore and Vaughan 1994). Here we simply and briefly illustrate a gender relations approach to environmental history, by focusing on three of the few cases which have been well-documented. The selected illustrations, again, relate to 'female farming' in Africa, and to women and forests in India. These brief summaries are directed towards highlighting some of the key relationships between gender, ecology and politics as they unfolded during the imperial and colonial periods, and which emerge from a gender analysis. The summaries also reveal some very different interpretations of situations treated in ecofeminist/WED histories, revealing, again, the claims of the latter to be at best partial, and at worst highly misleading.⁸

1. *Gender, ecology and agricultural change in the Northern Province of Zambia*

Moore and Vaughan's important (1994) study 'Cutting down trees' brings gender analysis to an account of *citemene*, the shifting cultivation system practised by Bemba-speaking people in Zambia's Northern Province, over the last century. They document the ways successive colonial administrators and scientists from a range of disciplines represented and attempted to intervene in *citemene*; the gendered nature of these discourses, and how colonial politics intersected with the gender politics of production, food consumption and marriage among the Province's farmers.⁹

Early attempts at establishing control over Bemba chiefly territories from the 1890s centred on the activities of the British South Africa Company and of Catholic missions. This skeletal administration's first attempts to intervene in *citemene* were in the context of tax collection and labour recruitment for portage; activities inhibited by the dispersed, seasonally-mobile settlement pattern which *citemene* was seen to encourage. The administration tried to abolish dispersed residence and seasonal farm huts. In the ensuing political struggles, chiefs suggested that *citemene* was 'traditionally' integral to a ritually-sanctioned, 'Bemba' chiefly power system on one hand, and to masculine identity on the other, the latter through an association between male warriorhood and the felling of trees. Moore and Vaughan argue that these images, which rested on a particular representation of pre-colonial history, allowed *citemene* to become an important symbol of male and ethnic autonomy. Yet they present evidence to suggest that these images also played down the probably far more contested nature of nineteenth century chief-commoner relations, and that Bemba women had probably exercised a considerable ritual authority over

productive and fertility processes in the ecology of *citemene*; forms of knowledge which subsequently became suppressed. This example brings out the extent to which links between gender identity and ecology, as well as gender differences in expressions of ecological knowledge, are far from timeless (as ecofeminist assertions about woman-nature links would suggest), but could be constructed and altered in the politics of the colonial encounter.

The image of *citemene* as centred on male tree-cutting – driven by a particular sexual division of labour – had, by the 1930s, become strongly consolidated in the discourse of the colonial administration, and in conjunction with several contemporary developments, it came to drive subsequent research and policy concerns over the ‘problem of *citemene*’. In the context of greater colonial concern about vegetation and soil degradation from the 1930s, agricultural and ecological scientists began investigating the sustainability of the ‘wasteful’ *citemene* system in the face of population growth, coming to perceive it as a system on the verge of ecological collapse. The period from the 1930s onwards saw an expansion of labour migration of men from Northern Rhodesia to the Copperbelt, adding the threat of breakdown due to the removal of male labour for tree cutting. Integration into the cash economy was, moreover, seen by anthropologists such as Audrey Richards (1939) to be engendering a breakdown in the kinship relations with which *citemene* had been so closely entwined. The Bemba food production system was thus perceived as breaking down at the same time as women were abandoned by their menfolk – a contemporary image not unlike those invoked in some WED accounts.

However, Moore and Vaughan detail a number of reasons, rooted largely in overlooked relationships between gender, ecology and economy, why this breakdown scenario did not come to pass. From farmers’ perspective, for example, the *citemene* ‘system’ was actually composed of multiple production strategies, and also encompassed a range of semi-permanent gardens, largely cultivated by women, and gathering activities linked to fallow cycles; these extended the flexibility of the practice in the face of population growth and male absenteeism. Women were also able to make adjustments to land use and cropping strategies which altered the gender and generational division of labour; for instance in the 1940s and 50s by incorporating into the *citemene* cycle more semi-permanent cultivation of cassava – a crop which suited the timing and availability of female labour, and certain local soil conditions. There was great variation between households and localities in levels of male absenteeism, linked not least to the dynamics of marriage arrangements, and these intersected with variations in micro-environment – and hence cropping possibilities – to alter the specific impacts from place to place. And rather than greater integration into the cash economy ‘breaking down’ the social economy around food and agriculture, women and men were able to incorporate money and partial market integration into the transactions which sustained altered, but nonetheless viable, kinship relations and networks; in particular, women re-worked joint-house-keeping and redistributive exchange networks to suit their changing circum-

stances. These responses thus strongly deny the dichotomy between 'subsistence' and 'commercial', and the image of subsistence-grounded women 'subordinated' by the colonial commercial relations, so often invoked in ecofeminist/WED accounts.

Between 1940 and 1960 the colonial administration became increasingly concerned about Bemba food security, and intervened both in agricultural production and marketing. It encouraged, for instance, the shift from millet towards cassava production already evident in some areas. Where this shift was not taking place, administrators tended to invoke ethnic explanations and 'the laziness of the male Bemba cultivator'. But Moore and Vaughan point out how the interaction of local soil conditions with intra-household gender politics may have been more significant. In some soils cassava evidently did not flourish, while 'an insistence on the importance of traditional *citemene* practice was also an insistence that male labour was required to keep this system running and this gave women some moral leverage over their husbands' (Moore and Vaughan 1994: 94). While women could be agricultural and ecological innovators, then, incorporating new crops and rotations, they could also resist adaptations that would let their migrant husbands 'off the hook'. In this, they appear to collude with colonial discourse about the problem of *citemene*.

In the period after World War II, the colonial government began actively to promote a new type of 'progressive', modern farming, in which individual farmers would occupy a permanent area of land and cooperate with others in using modern farming methods in 'peasant blocks'. This new conception of 'development' was also a renewed attempt at colonial land control – and in the creation of a docile, politically-loyal peasantry – and it was accompanied by a succession of attempts to establish rural cooperatives and group institutions. It also contained ideas about gender; that a progressive farmer would be male, and his wife a contributor of 'family labour' and 'domestic science' skills. For certain young men, identification as progressive farmers came to be attractive as a channel of access to State grants and subsidies and a means to demonstrate wealth and conspicuous consumption, as well as a means to resist chiefly authority and kinship obligations. Nevertheless, even such farmers did not abandon *citemene* as the colonial government intended. It persisted – sometimes in secret – as a means of diversification and risk avoidance in the context of perceived insecure benefits from the State. It thus also persisted as an activity in which women were involved and retained some autonomy, albeit with changes in the gender division of labour and cropping strategies to make it compatible with settled residence (Moore and Vaughan 1994: 139). In the 1970s, similar State strategies and responses to them were to surface, this time focused on the cash-cropping of hybrid maize and targeted at men. As in the 1950s, complex and varied gender struggles ensued over the control of gendered labour, land and products. In this process *citemene* also continued, in some cases with women gaining greater control over its products; but they also lost much control over their own labour, and over their semi-permanent *citemene* gardens which, in a

process of contestation of meanings, often came to be redefined as men's maize fields.

Evidently, as Moore and Vaughan show, transformations in 'female farming' here cannot be simply reduced to social and ecological 'marginalisation' by a male-dominated colonial cash crop economy, as ecofeminist 'histories' would suggest. Indeed a major emphasis of Moore and Vaughan's account is to deny meta-narratives about change, and instead to highlight the variability in experiences of change which emerged as different ecological possibilities, relations of land and labour use, and dynamics of marriage and household formation interplayed with regional political issues.

2. Gender, land and forests in the Jarkhand region of India

Turning to the Indian sub-continent, Kelkar and Nathan (1991) provide a detailed analysis of changing relationships between gender and forests in the Jarkhand region. Taken together with Agarwal's (1989, 1991, 1995) broader works on gender and colonial environmental policy, this provides a case of gender analysis of ecology and colonial politics which strongly qualifies some of Shiva's ecofeminist assertions about Indian women and forests.

The *adivasi* groups in Jarkhand maintained a pre-colonial economy which combined agriculture with the gathering of forest products, such as leaves, fruits and nuts used as food during the rainy season, firewood and construction materials. The labour and ecological knowledge involved in gathering 'wild' products were not female preserves, as ecofeminist analyses tend to suggest. Rather, men were involved in collecting timber for house construction, for instance, and there was considerable gender sharing of jobs; in fruit collection, men would usually shake the trees while women and children collected the produce. However, gathering was important to women in that forest produce collected or exchanged generally represented a source of income which they could use and spend without prior consultation with their husbands or male kin. This contrasted with agriculture, where men (on the basis of male land ownership) were able to claim rights over produce and income, and managed grain stores. Notably, in focusing on the intersection of gender with property relations, this analysis interprets women's involvement with wild plants and gathering very differently from ecofeminist histories, which take it to epitomise women's 'closeness to nature'.

In the pre-colonial period, villagers in Jarkhand seem to have been the acknowledged owners of the forest (Guha 1983, 1989). Among most groups, including the Munda, Ho and Oraon, land was held on behalf of the village by *khuntkattidars*, the patrilineal descendants of original settlers. These village authorities were involved in decisions about clearing forest for agriculture, retaining certain village forests for gathering purposes, and in the allotment of agricultural land to individual patrilineages. That there were such hierarchies in control over land and ecological processes, even in these *adivasi* areas where

distinctions of caste were absent, certainly refutes the ecofeminist notion of pre-colonial 'equality' regarding environment. In the nineteenth and early twentieth centuries, there were a number of State attempts to remove restrictions on land transfer, in the name of encouraging investment and enabling peasants to get the full value of their land. Individual titleholding and land markets were, for instance, included among the Survey Officer's recommendations in the 1920s Land Survey in Santhal district. In response, *adivasi* groups led a number of rebellions aimed at defending the communal, lineage-based control of land.

Pre-colonial rights to agricultural land were nevertheless strongly differentiated by gender, and in this context Kelkar and Nathan (1991) examine how land rights acquired different meanings for women through manipulation by colonial officials and male kin during the colonial period. Women's land rights reflected a gender bias in structuring, such that land passed through patrilineages, and women's access was derived indirectly through male kin. Nevertheless, they were also structured among women, refuting the image in WED analyses of women as a homogeneous group: daughters and wives tended to have indirect rights to the produce of land held by their husbands, whereas widows were entitled to claim what amounted to a life interest in land, involving its maintenance, management and control of produce. It was the latter that became most open to contest. Thus in 1906 Santhal women were recorded in the colonial land settlement records as holding life interest rights to land, but by 1922 these were increasingly being recorded as *khorphosh*, or basic maintenance rights where women were allocated specific plots of land for the fulfilment of their familial obligations. This reflected attempts to level out life interest rights to a lower order, especially by male kin reluctant to wait for a widow's death before inheriting the land. In many cases, women found it difficult to resist these claims, not least because their attempts to do so opened them to accusations of witchcraft. In other cases women have shown outright hostility to altering patrilineal inheritance rights. However, Kelkar and Nathan avoid construing images of women lacking agency, documenting for instance some Santhal, Ho and Munda women's attempts to side-step male appropriation by transferring land rights to daughters. There is also evidence to suggest that, at the turn of the century, alongside the efforts of some male kin to speed up their inheritance of widows' land, other Jharkhandi men, particularly from amongst the Santhals, were active supporters of the need to extend women's land rights (Bodding 1925, cited in Kelkar and Nathan 1991: 92). This historical analysis thus creates a variegated picture of conflict, manipulation, and trade-offs around gender and land rights.

In the context of this historical trend towards reducing women's residual rights in land, their relative autonomy through control over gathering income was particularly important. But this was also under threat of erosion, through struggles with the colonial State over rights to forests. Agarwal (1991) notes four key aspects of British policy which had the effect of increasing State control over forests and village commons, and granting selective access rights to a favoured

few. First, there were reforms to establish State monopoly over forests; the Indian Forest Act of 1876, in particular, had elaborate provisions by which blocks of forest were designated as 'reserved' for timber. Second, in such reserved forests the customary rights of local populations were severely curtailed, although forest officers usually retained significant leeway to grant rights to those they chose. Third, the State actively promoted a notion of 'Scientific' forest management, which encouraged commercially-profitable species at the expense of those locally used and managed – a discourse which Shiva is right to emphasise overlooked the importance of forest products in subsistence and reproduction, but which it seems misleading to label as 'masculine'. Fourth, forests were exploited by European and Indian private contractors, and forest land alienated, often with the permission or collusion of Forest Department officials, first for railway or ship-building in the mid-nineteenth century, then for tea plantations, and later for commercial timber extraction. Agarwal argues that these processes progressively eroded local management systems, in some areas leading to degradation of forest resources.

The early twentieth century nevertheless saw a number of protests in Jarkhand against British encroachments and takeover of forests. These protests were not 'environmental movements' in the sense that they were entwined more broadly with struggles about a way of life. Nor were they 'feminine', although women played an active part in them, at times fighting and raiding. Issues of gender oppression also surfaced in these protests; for example in the Munda uprising at the end of the nineteenth century, led by an upper section of *adivasi* society, men were asked to give up the practice of polygyny, as practiced by upper-section men. But as Agarwal (1989) emphasises, there was no organisational framework within which women's specific concerns could systematically be discussed and articulated; women's participation in these movements served less to empower them than to oppose anti-women practices in a way that would enhance the moral and social standing of the men around them.

The protests did have the effect of preserving some of the rights of *adivasi* communities. These have been greatest in the case of the Mundari *khuntkatti* system, in which complete village ownership of forests has in effect been retained. In other areas, village ownership survived only in a modified form, *rakhat*, which was officially recognised in the 1927-33 settlement, in which forest land was subject to joint State-village management with certain restrictions on local rights. In further areas, State agents exercised rights to manage and sell forest land and products, leaving inhabitants the right only to take wood for domestic purposes and sale, for which they paid a fixed amount per family to the State. Katyayan (1987) claims that such areas often became denuded, as commercial demand led to unrestricted felling, and the *adivasi* cultivator-gatherers had little incentive to do anything but mine the wood. Even where village control was maintained, however, this did not necessarily serve to safeguard the forest products that were important to women. For as Kelkar and Nathan (1991) show, the forests were managed by village-level assemblies or

panchayats within which *khuntkatti* descendants held dominant authority, and women seldom had representation. As the alienation and degradation of forests elsewhere increased pressure on these forests, so they sometimes came to be managed for products of interest to certain groups, to the exclusion of women's resource priorities. In some cases, village authorities and elites would collude with local contractors-cum-traders to allocate timber cutting rights, for example. And where sal trees were felled for timber, women lost access to leaves which they had marketed as a source of independent income. Furthermore for the village chiefs, priests, and *khunkattidars* who dominated the *panchayats*, the forest was relatively less important as a source of gathered products than as a source of land for agriculture. This particular example thus illustrates how gender relations within the institutions managing 'communal' resources have affected people's ability to access, control and maintain their resources over time.

As presented in the works of Kelkar and Nathan and of Agarwal, then, the history of gender and forests in India turns strongly on issues of resource access and control, and on the gender dimensions of institutions which influence rights over property and decision-making. These issues, missing almost entirely from ecofeminist accounts, are – from a gender analysis perspective – central to explaining the processes through which colonial forestry developments did indeed constrain many women's practices, but in varied – and sometimes resisted – ways.

3. *Gender in the politics of rice development in the Gambia*

In West Africa, Carney and Watts (1991) examined gendered responses to repeated government attempts to intensify rice production in the Gambia River Basin. In this case, State attempts to harness and modify local ecology in the interests of the colonial economy and polity ultimately 'founded on the reefs of household gender roles and property relations' (p. 653).

Struggles in the early colonial period reflected the way government schemes intersected with the then prevailing gender division of labour by crop in Mandinka society. This had every appearance of Boserup's classic female farming system, in that women were the main food producers. But Carney and Watts show that this apparent tradition was in fact a product of the growing commoditisation of production in the mid- nineteenth century. Prior to European presence, indigenous African rices had been cultivated both on rain-fed uplands, as part of dryland cropping systems also involving millet and sorghum, and in various forms of wetland. Wetland rice was primarily the domain of Mandinka women, who controlled what they produced and marketed their own surplus; an export trade which the British became interested in encouraging during the first wave of territorial expansion in the early nineteenth century. But this attempt at imperial intervention was soon cut short by the rapid development of the

groundnut industry and exports from the 1840s. While the expansion of groundnut production was achieved through heavy dependence on hired immigrant male labour, it also eroded men's contribution to upland food crops. Men increasingly devolved responsibility for food production onto the female members of extended farm-households. And while previously the division of labour in both upland and wetland rice had been task based, with men responsible for certain swamp preparation tasks, and women rotating vegetable and fonio (*Digitaria exilis*) production with household upland crops, the division of labour now became much more separated, both spatially and by crop. Rice became women's work, and unlike groundnuts, largely non-commoditised.

Carney and Watts argue that women were unable to shoulder the burden of meeting food needs, increased as they were by immigrant labour. This contributed to a growth in rice imports. By the time British colonial rule was established in 1889, the high level of rice imports was seen as a source of structural instability in the political economy, not least because food was necessary to feed the immigrant labour on which the groundnut export economy depended. The concern to reduce imports motivated the first in a series of attempts to boost domestic rice production, and in this context the colonial administration became highly interested in women's agricultural practices. Tidal swamps were seen as a potential rice bowl for The Gambia, and became the focus of technical interventions, including the introduction of Asian rices, the clearance of mangroves, and the promotion of new methods for seedbed clearance. A surge in production did indeed result, doubling the area planted to rice by the mid-1950s; but further expansion was limited by problems over the mobilisation of gendered labour. The administration recognised that women's labour was already used to the full, and thus that further expansion depended on encouraging men to take part, transforming rice production into a 'household' enterprise. But officials lacked mechanisms to compel men to participate, and men successfully resisted these attempts to intensify their labour by appealing to gender identity, claiming that rice was 'a woman's crop' (Carney and Watts 1991: 661). Meanwhile women felt the impact of government efforts in increased work burdens – Haswell (1963) noted that the period women laboured in swamps extended from 90 to 102 days between 1949 and 1962 – and long daily commuting. The expansion ultimately foundered on the limits of women's labour time.

Furthermore, these colonial attempts at harnessing wetland rice ecology precipitated gender struggles over crop rights, linked to claims over land. Mandinka society had recognised at least two types of cropland: *maruo* or household land, dedicated to food production for household consumption, and *kamanyango* – land cleared by an individual or allocated in exchange for fulfillment of household labour obligations – whose product was individually controlled and marketed. Women sought to define the newly cleared and improved swamps as *kamanyango*, over which they could claim product control. Men, however, saw the expanded output as an avenue to reduce their purchase

of imported rice, and thus save part of their groundnut revenue from expenditure on food. In seeking such a definition, they opposed women's land claims, stating that 'women cannot own land' in a manner that drew the attention of colonial officials. Men sought to define the rice fields as *maruo*, a classification that diminished female control over the products of their labour and enabled male family heads to appropriate women's surplus production. Colonial officials tended to concur with such a reinvention of tradition, sensitive to the possibly negative implications of women's rice control for household food reserves and the feeding of migrant labour- issues so central to the regime.

From the 1950s onwards, and pressured by post-war crisis, the colonial government attempted a new phase of rice development to be based on mechanised dry season irrigation. Initially in 1949, the British Treasury and Colonial Development Corporation (CDC) acquired 10,800 acres of land at Wallikunda for a large-scale irrigated rice project. The scheme foundered, partly for ecological reasons – virtually no prior hydrological or soil data had been obtained – but mainly because of the gendered resistance it provoked. The scheme's land lease rode roughshod over the fact that most of the land was already communally owned, and that a quarter was under *kamanyango* cultivation by local women (Carney and Watts 1991: 666). Women were offered wage work in rice processing in compensation, but they found this highly unsatisfactory, and they and their angry husbands were soon demanding the return of the appropriated land. When this was refused, protests became violent and men broke into the CDC rice stores. This failed project was replaced, in 1952, by a more modest 200 acre development to be based on sharecropping, which the colonial government saw as a way to redress the labour problem. But again women did not come forward, and those who did undermined government yields by appropriating more than their share of the crop. In a third phase, the CDC withdrew and the project fell into the hands of the Sapu Rice Research Station, which attempted yet another labour arrangement: leasing land to female rice growers who were provided with subsidised tractor services. But once again, women resisted the claims on their labour, responding by defaulting on the payment for tractor services, so that 'in effect, the project was captured by heavily indebted female tenants' (Carney and Watts 1991: 668).

Seeds were thus sown of continuing gender conflict in the post-independence period. When at independence lands from the collapsed rice development project were returned to farmers, they were claimed by women as *kamanyango* and men as *maruo*. And recent government attempts to promote small-scale irrigated rice have again defined land as *maruo*, and men as household heads, thus promoting resistance among women and again jeopardising project success.

This case presented by Carney and Watts (1991) bears strong echoes of several other accounts of West African rice production from a gender perspective (e.g. Linares 1992, Leach 1992b, 1994). It shows clearly that gender roles were far from static – as ecofeminist/WED accounts would suggest – but changed in interaction with the policies and politics of the colonial State. It also

shows that when State interventions initiated struggles and conflicts over customary relations in ecological and social practice, there were consequences not only for women – albeit of an ambiguous, even contradictory kind (Carney and Watts 1991: 653) – but also for the shaping of the agricultural environment.

CONCLUSIONS

The approaches exemplified above begin to allow the possibility of ‘rescuing’ gender-differentiated environmental experiences, not only from the silences of conventional environmental history, but also from the mystifying glosses which ecofeminist ‘histories’ place on them. These examples – and others like them – do suggest some commonalities in the broad historical relationships linking gender, ecology and colonial politics. The discourse and practices of colonial states did tend to marginalise the aspects of ecological relations in which women enjoyed most autonomy and status. The changes in material relations of property and power which unfolded did frequently disenfranchise women, whether of land, gathering rights or labour. But the examples also indicate much more variation, flexibility and resistance in these processes than has usually been recognised. In different situations, this may have related to important differences among women; to the effectiveness of unseen struggles and forms of resistance, or, more specifically, because women were able to find space to mobilise alternative claims or adjust practices in their favour.

Such alternative accounts of history, in turn, suggest the flawed nature of ecofeminist/WED policy implications: that women, as guardians of nature, should be targeted as allies in resource conservation projects, or that women’s and environmental interests are necessarily complementary. Instead, they point out the social and historical contexts which may indeed make some women especially concerned with resource conservation in some situations, but in others may divorce them from it. They point out the conflicts between women’s and ‘environmental’ interests in some circumstances, for instance where women’s involvement with natural resources reflects their subordinate position in gendered relations of property and power. And they underline the risk that policies premised on an assumption of a generalised affinity between women and nature, or simplistic observations of ‘what women do’ will simply instrumentalise women as a source of cheap or unrewarded labour in activities whose benefits they may not control. Gender analysis of environmental relations suggests that in policy, ‘complementarities’ between women’s and environmental interests have to be carefully sought out – not assumed – from a perspective which takes account of gender relations in the valuation, access, use and control of particular resources.

Studies from a gender analysis perspective show the importance of gender issues not only for illuminating changes in women’s status, but also for the more general project of colonial environmental history. They suggest that gender

relations shape patterns of environmental use and management with tangible ecological effects, making gender analysis indispensable for understanding environmental event histories. And gender relations mediate the effects of external economic and policy processes on people and the environment, rendering their comprehension necessary to a historical account of colonial environmental politics and interventions.

Whether the concern is in using gender analysis to produce feminist knowledge, or simply for a fuller understanding of environmental history, a number of issues emerge from these and other cases which would be important for more focused study. These include first, relationships between changes in gendered product, site and technique use, and specific ecological processes. Existing work often documents the former effectively while making sweeping assumptions about their environmental impact; yet differences in the local dynamics of soil, water, vegetation, fire, climate and animals may profoundly alter how land responds to the same use practices (cf. Leach and Fairhead 1995). Second, there is scope for much more work on changing regimes of tenure and property rights. This needs to pay attention to the particular channels of resource access and control used by different groups of women – often involving the manipulation of meanings and ambiguities in tenurial frameworks – and to examine their specific intersection with changing ecological conditions (and landscape niche availability) on one hand, and the politics of colonial environmental policies on the other. Third, and related, are gender dimensions of the institutional arrangements which surround natural resource use and management, where it would be fruitful to explore the implications for gendered authority, resource access and status of the shifting configuration of household, family, village, regional and State institutions which have claimed authority over different ecological domains and usages over time. And fourth, a deeply under-studied area concerns the historical relationship between gender and ecological knowledges, including those of colonial states.

It also begins to be evident that a gender approach means not merely ‘adding women in’ to accounts of imperialism, ecology and politics, but re-thinking and collapsing their existing categories in a more fundamental re-writing of history (cf. Scott 1988). Thus ‘politics’, from a gender perspective, must extend not only to relationships with the colonial State, formal government authorities and their discourses, but also to the more diffuse processes through which these forms of authority intersected with power relations in everyday resource-using processes, and in the negotiation of gendered domains of action and agency. In other words, gender is located within a more multiple, mobile field of power relations (Scott 1988: 26; cf. Foucault 1978) which merges any distinction between ‘public’ and ‘private’. ‘Ecology’ ceases to be treatable as separate from ‘society’, but comes to be differentiated and ‘socialised’ (Fairhead and Leach 1996) in the sense that the definition and valuation of ecological processes are integral to expressions of social identity and struggles. And a properly gendered environmental history

does not merely replace the production, commercial bias of conventional environmental history with the appeal to reproduction and subsistence in ecofeminism/WED, but replaces these oppositions with a more textured, nuanced analysis.

Nevertheless in arguing for better event histories of gendered environmental relations, and privileging their material dimensions, part II of this paper has left begging important questions about historical representation. As our treatment of Moore and Vaughan's case acknowledges, women and men have, during and since the colonial period, produced their own representations of their own histories, and the politics of this process is certainly an area which deserves further study.

There is already some work which reveals how representations of past environments – of landscape history – become part of oral histories which uphold particular social or political relations, and gendered rights and statuses linked to them. In West Africa for instance, descent group status in local politics, linked to control over women in marriage, is frequently legitimated through 'origin stories' of settlement-founders moving into uninhabited 'wilderness' areas (Dupré 1991); whether high forest (as among Sierra Leonean Mende groups; Hill 1984; Leach 1994), or barren savannas (in much of the forest-savanna transition zone; Fairhead and Leach 1996). These representational histories may have little to do with 'real' ecological events, or indeed with women's experience of social ones. Yet colonial administrations were sometimes exposed to them, and constructed their own versions of history and environmental policy in relation to them, as West African administrators sometimes did in taking accounts of forest loss literally. In this respect, and following Moore and Vaughan's lead, a major challenge for future work is to examine the production of diverse historical representations about a place, produced at different times and by different authors (local women and men, chiefs and commoners; colonial and modern anthropologists, colonial administrators), exploring how these accounts speak to and past each other, and how (as discourses) they had material effects.

This paper has also left begging important questions about the post-colonial politics of authorship and representation. Questions about who has the right to speak about whom and for whom are of course relevant when it is the event history of people's diverse, materially-grounded experiences at stake; and they become even more pressing if one attempts to represent people's representations of their history. There has not been space here to enter the diverse and extensive debates on this topic. Indeed, basic questions about the politics of voice, the power relations involved in setting feminist research agendas, and the extent to which Northern or elite Southern feminists can or should do so on behalf of others (Zeleva 1993) could be applied in critique of the arguments presented here. Of relevance, too, are debates on the construction of colonial subjectivities and their intersection with gender – whether or not phrased in the terms of colonial discourse theory and 'subaltern studies' as prevalent in Asian scholar-

ship (e.g. Spivak 1988) – which question the extent to which alternative, ‘indigenous’ discourses are recoverable from the constructions colonialism placed on them. A comprehensive review of gender and environmental history would need to address the insights and uncomfortable issues raised by these debates.

Yet a concern with the politics of representation also contextualises the argument forwarded here. To a certain extent, all historical accounts are representation as well as event, discursively constituted, and supportive of particular political or institutional outlooks. By essentialising the relationship between women and nature, ecofeminist analyses have represented history in generalised ways which entrap women in static roles. These accounts may, as Jackson (1995) points out, be better treated not as ‘real history’ but as meta-narratives which serve other purposes, whether in upholding particular policy agendas, or constructing a coherent image of female solidarity. Recognising this – interrogating ecofeminism as one sort of historical narrative – has made space to explore a gender analysis of historical events as presented in part II. Yet this, too, could be treated as another sort of representation, constructed through different feminist theoretical lenses and supporting different policy implications. Recognising this, in turn, opens up the research agenda for gender analysis of imperialism, ecology and politics to consider a plurality of other accounts, including the representations of their own environmental history which women and men have been actively forging during and since the colonial period.

NOTES

¹ An earlier version of this paper, produced as *IDS Working Paper 16*, was peer-reviewed by Barbara Harriss-White and Anna Tsing. Within the spirit of the original paper, we have endeavoured to respond to as many of their helpful comments and criticisms as possible. Our thanks are also due to James Fairhead for comments on this version; responsibility for the arguments forwarded and the ways we represent others’ work nevertheless rests with us alone.

² At this stage in the argument, we are using ‘nature’ in the same ill-defined way as most ecofeminists do; this lack of definition is one of the problems which we draw attention to below.

³ The Green Belt movement in Kenya is frequently referred to as the African equivalent of Chipko, and is similarly represented as a feminist environmental movement indicating women’s agency in environmental protection. However we know of no systematic ecofeminist ‘re-writing’ of the movement’s history and stimuli.

⁴ As we have argued elsewhere (Joekes, Green and Leach 1995), the analytic framework (and flaws) of the WED perspective can be closely related to assumptions inherited from the WID approach to gender and development more generally. While we cannot pursue this argument here, representations of history from a WED perspective clearly reflect the influence of WID policy assumptions, as well as of Northern cultural feminism.

⁵ Shiva implies that both gender inequality and class/caste stratification were external, western influences on Indian society, and thus non-existent in pre-colonial India.

However, this makes invisible the older roots of patriarchy in both Vedic and pre-Vedic culture (Dietrich 1992: 99), and the caste systems which – albeit operating in an attenuated form in the hills – are seen by Peritore (1992: 205) as crucially underlying the emergence and form of the Chipko movement.

⁶ Peritore (1992) argues that up to 60 per cent of the male population of Garwhal District have out-migrated, while Jain (1984) presents evidence that 20 per cent of the area's households are female-headed.

⁷ In this context, it has been argued that the reassertion of images of Prakriti may be harmful to women: 'Picked up by the cross currents of caste and middle class ideology, [ideas such as the feminine principle] are open to communal manipulation and can even be used to manipulate women and ecological issues from a middle class perspective. Patriarchal manipulation of women's power concepts is, anyway a sad chapter in the history of religions.... [In India] there is a class component in the difference between the Devi as an independent female power-principle and the spouse Goddess, the more domesticated, patriarchal version of the goddess...the projection of a certain middle class type of feminine principle has...turned lethal to women in the practice of and debate on *sati*' (Dietrich 1992: 104).

⁸ We apologise to the authors of this material if they feel that these selective summaries have in any way misrepresented their work or its intentions. Readers are referred to the full works for more detail of the particular cases.

⁹ As a re-study of Audrey Richards' 1939 *Land, Labour and Diet*, Moore and Vaughan's book is also intended as a methodological work addressing the problem of writing and context. As such, it treats history both as representation and event, and explores the narrative contradictions among numerous possible interpretations of *citemene* – by male and female farmers, officials, scientists, anthropologists and others. While this innovative approach is a central aspect of the work, it cannot be captured in the brief account we give here.

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Environmental History and the Challenges of Interdisciplinarity: An Antipodean Perspective

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ABSTRACT

The environment has attracted more ‘integrative’ or ‘interdisciplinary’ efforts than any other substantive focus, one of which is the diverse and evolving field of environmental history. However, the theory and practice of interdisciplinarity, in environmental history and elsewhere, is unclear and contested ground. In this paper, we explore the nature of interdisciplinary work in environmental history. Drawing on three brief project narratives from environmental history, the paper discusses issues and problems, both intellectual and practical, that face those who seek to move across disciplinary boundaries in environmental history (as most of us do, wittingly or not). We then propose and discuss four ‘intersections’ that we believe have potential as loci of interdisciplinary engagement: mutual understanding; spatial scale and locale; time and change; and the environment and agency.

KEY WORDS

Interdisciplinarity, narratives, issues, problems, intersections

1. INTRODUCTION

'In undertaking [interdisciplinary] research ... we could do worse than regard our partners as dancing partners, when we take to the floor together. How do we learn to dance with each other? That is the sixty-four-thousand-dollar question.'¹

Is environmental history a sub-discipline of history as often seems to be assumed? Is it a discipline in its own right, as some have asserted? Or is it an interdisciplinary activity, as is increasingly urged in the literature?² The answer may vary between and even within places. In North America, the leading practitioners are often but not exclusively academic historians. For a long time historical geographers and landscape historians held sway in the British version of environmental history. In South Africa historians established and have dominated the field, but the potential for a more diverse participation is becoming apparent. In Australia, by contrast, many prominent writers of environmental histories are not mainstream historians at all, but geographers, ecologists, foresters, farmer-poets and historians of science. In New Zealand, the field was tilled by geographers, but now fruitful collaborations are emerging amongst a much wider range of participants, including historians, anthropologists and archaeologists, as well as Maori scholars.³

As writers and organisers of environmental histories, neither of us has a disciplinary allegiance with academic history. One has previously described himself as 'a lapsed ecologist-turned-public policy analyst';⁴ the other is an historical geographer with some doctoral training in economic history. We both however have long experience of interdisciplinary teaching and research, and have both assumed prominent roles in environmental history projects in the last decade. These include editing or co-editing collections of essays on the environmental histories of southern hemisphere lands; drawing on environmental history in public policy analysis for sustainability and a seven year term as contributing editor to, and chair of the advisory committee of, the *New Zealand Historical Atlas*.⁵

Our experiences in such projects have led us to the view that to practice environmental history in these ways inevitably makes it an interdisciplinary activity because 'no one discipline – history or any other – can make much sense of the subject on its own'.⁶ To adopt such a position is to open oneself up to the excitement of engaging with other disciplines, whilst at the same time bringing to the table a distinct view of the insights that one's own disciplinary perspective can offer. But beyond such pleasantries, what does it actually mean to practice 'interdisciplinarity'? How can the disciplines interact and what are the points of intersection? Unless these questions are posed, there is a danger that the end result will be 'a diverse soup of very loosely related scholarship', lacking coherence or audience.⁷ On the other hand, too much theoretical and methodological convergence may stifle the insights that can emerge with disparate approaches.⁸ In other interdisciplinary initiatives concerning the environment,

such as ecological economics and environmental politics, a desire for grand syntheses of theory and methods can at times be discerned, although not often as yet in environmental history (with the possible exception of the Americans Crosby, Cronon and Worster). Diversity and fluidity are necessary, but so are some reasonably solid intersections around which that diversity can produce more than smooth platitudes.

There are therefore significant intellectual challenges and, as we shall see, not insignificant practical ones in pursuing interdisciplinarity. This article is an attempt to explore these issues and identify some intersections, driven partly by our own frustrations that they are often not brought sufficiently into the open. It is too easy to assume that interdisciplinarity will emerge when representatives of different disciplines get together. But our experience of interdisciplinary teaching, research and writing, and of institutions dedicated to these purposes, tells us that this is not so. Interdisciplinarity has to be worked at, because members of different disciplinary cultures use particular discursive practices. They adopt different languages and types of evidence, and they think about and understand the world in culturally distinct ways.⁹

We begin with three short narratives, because narratives of interdisciplinary research experience are 'rare in the literature'.¹⁰ The purpose of this section of the paper is to contextualise our questions about interdisciplinarity. We provide brief biographies of projects in, or related to, environmental history, from which we identify some of the benefits and difficulties of interdisciplinarity as a working process. In the next section of the paper, we draw from these biographies a clearer specification of the practical and intellectual challenges to be faced if interdisciplinarity is to be advanced. In the last section, we explore ways of resolving such issues by examining four potential points of intersection between practitioners from different disciplines involved in environmental histories. These are: seeking to understand each other (clearing the ground); spatial scale and locale; time and change; and environment, agency and process. The paper therefore develops as a logical sequence, in which we seek to move beyond a portrayal of the pros and cons of working in interdisciplinary projects, through a clear specification of the challenges, towards ways in which we might learn more about how 'to dance with each other'.

2. PROJECT BIOGRAPHIES

The potential for intersection of historical and environmental discourses and modes of analysis has been increasing in recent years for a number of reasons. An obvious one is the manner in which the media focuses on global climate change, so bringing anxieties about sustainability to the fore. In its turn, this has been a factor encouraging students to seek out teaching and research supervision that can provide explanations more convincing, or at least more enticing and

proactive, than those of single disciplines. At the same time, there is a demand for public policy formulation in respect of environmental change that contextualises present problems in terms of past processes. In Australia and New Zealand, there have also recently been a number of national and regional anniversaries of key dates in European settlement, for which publications have been produced that have had to face up to these new expectations. Simultaneously, the 'new museology'¹¹ has been used to remake national and regional museums, offering explanations taking account of the destabilising narratives of postmodernism, sometimes with an overt focus on the relations between peoples and their environments.

We have drawn three biographies from this overall context. The first concerns the reconstruction of national museums in New Zealand and Australia in the last decade. The second focuses on national and regional projects producing text to mark significant anniversaries. The third biography is of an institution dedicated, for nearly 30 years, to interdisciplinary environmental work.

National museums

In his critical analysis of heritage, the geographer Lowenthal identifies the traditional purpose of museums as to generate '*Pride* – tribal, local or national'.¹² Such comfortable assumptions are now being undermined by the adoption of the new museology, a central characteristic of which is 'A challenging of the standard narrative of national history, and especially of its imperialistic and racist components'.¹³ The standard narrative sees triumph over nature and native in the appropriation of the land as essentially unproblematic. As Hicks observes, 'curiously to this day [the Smithsonian Museum of Natural History] displays the native American Indian as just another species of animal to be presented in dioramas along with the great plains buffalo!'¹⁴ Environmental context, let alone the environmental transformation associated with European colonisation, disappears from the narrative thereafter, assumed merely to be the stage upon which new heroes wage successful battle.

Recent scholarship in environmental histories as well as of indigenous-coloniser relations undermines this simplistic view. Europeans in the antipodes did not enter empty lands even if their legal fictions encouraged them to think so: Aboriginal and Maori occupants had transformed their territories, imaginatively and materially. The new arrivals in turn generated further transformations, imaginative and material. It is these transformations that should be the very stuff of local, regional and national stories. The National Museum of Australia in Canberra (opened in 2001) embraces this challenge. Its stunning building, in changing hues of bush green and earthy red, wraps around the Garden of Australian Dreams in which the markers of Aboriginal and European upon the land are portrayed. Inside, the opening gallery, 'Tangled Destinies', explores

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relations between people and land using a range of disciplines and forms of representation, seeking to portray environmental attitudes and reactions as they have been understood through time, rather than in what have been described as 'apocalyptic' or 'progressive' ways.¹⁵

By contrast, Te Papa Tongarewa in Wellington, New Zealand's national museum (opened in 1998), which has done much to re-invent the idea of the national museum in other ways, has ducked this challenge. Built around a level two floor on natural environment themes and a level four floor on cultural heritage, the original idea of using the intervening level to explore the meeting of culture and nature, people and place, was abandoned. Echoing Lowenthal's characterisation above, 'There was a view at the time, openly endorsed by Te Papa, that opening day exhibitions should be celebratory of our culture and our natural environment'.¹⁶ For political reasons but also, we suspect, a failure of imagination on the part of 'concept leaders' expert in natural history and history, the means of grasping an interdisciplinary opportunity was found wanting. Only in the Mana Whenua displays can one 'learn how important the land and the natural environment are for Maori'.¹⁷

National and regional projects

The effect of the Te Papa failure is to lend credence to the view that indigenous peoples are 'of' or 'in' nature, but that any such ecological interconnectivity does not apply to colonial European settlers. This is a common enough omission amongst historians as well. A recent example is Belich's acclaimed *Making Peoples: A History of the New Zealanders*. He is detailed and illuminating on the environmental learning and adaptation of Maori colonisers but ignores the theme when the narrative moves past 1840 (the date of the signing of the Treaty of Waitangi, which in its English language version ceded sovereignty over Maori territories to the British Crown). A similar sleight of hand is evident in the three volume *Historical Atlas of Canada*, which purports to reflect a country that has worked to develop native Canadian policy in the last three decades, the period over which the Atlas was in production. Nonetheless, native Canadians are to be found mainly in volume 1, isolated from contemporary stories as mere historical figures.¹⁸

This contrasts with the *New Zealand Historical Atlas*, initiated as a 1990 project to mark 150 years of the signing of the Treaty of Waitangi. There was therefore an academic and political imperative to tell the stories of Maori relationships with land and territory, as well as with Pakeha, or Europeans. A project with such a brief required careful interdisciplinary planning. The historian editor selected two deputies, one a geographer-cartographer, the other a professional cartographer. They worked with an advisory committee chaired by a geographer, with membership drawn also from history, economic history, archaeology and ecology. An early decision was made to represent pre-contact

Maori stories using parallel discourses, those of archaeology and those of oral tradition. The 'iwi maps', visually appealing and technically sophisticated bird's-eye views of tribal territories and nets of names across the land, set a standard for portrayal of people-environment relations elsewhere in the Atlas.

Consequently it was necessary to ensure that subsequent chronological sections explored Maori and Maori-Pakeha cultural relations, inevitably often through the prism of land. From this it was a short step to representation of transfers of land to Pakeha and its subsequent transformation. Although the transformation theme was not part of the initial editorial plan, it was included following the urging of the advisory committee. Regular meetings of this committee ensured that the various disciplinary perspectives were heard; at an early stage in the development of the Atlas, some meetings of representatives of specific disciplines were also held. A Maori advisory committee met with less frequency, but had some cross membership of the main committee. Through the opportunities thereby created for interdisciplinary dialogue, a reasonably consistent coverage of environmental histories was achieved through the Atlas, with this being represented at a range of spatial scales appropriate to the stories being told.¹⁹

Regular meetings and debate can encourage interdisciplinary working, although this is perhaps more practical in smaller places such as New Zealand rather than larger ones like Canada. Regional projects offer even more opportunity for such interaction, although it is unlikely to occur without conscious effort. An example is the Christchurch 2000 project, organised by university historians to focus historical research in the years leading up to the sesquicentennial of the province of Canterbury, New Zealand. One outcome was a book of city essays, drawing on representatives from a number of humanities disciplines. Interdisciplinary interaction was aided by a lengthy lead-in time (as for the Atlas project), by monthly meetings of contributors, and by a large public forum. This was held two years before publication and provided invaluable feedback on the ways in which (for instance) a chapter on urban environmental themes by a geographer might extend the expectations of a local readership schooled in more conventional forms of history.²⁰

The Centre for Resource and Environmental Studies

In our third biography, such practical dimensions also emerge, but in an organisational rather than project context. The Centre for Resource and Environmental Studies (CRES) was established at the Australian National University in 1973 as a policy-oriented, interdisciplinary research and postgraduate training centre. While no longer unique, it remains one of the longest-standing and substantial foci for broad environmental research and training, with some eighty scholars and support staff centred around fourteen core-funded academics.²¹ In

broad terms, the CRES experience can speak to the challenges of historically informed, interdisciplinary environmental research and training elsewhere.

The establishment of CRES reflected the rise of the environment as an intellectual and political issue, and an early recognition of the need to respond from not only single disciplinary perspectives. CRES has therefore housed a wide range of disciplines, including ecology, earth sciences, sociology, anthropology, public policy, information sciences, economics, political science and mathematics. This mix, and the constellations in which they connect in research, has altered as people move in and out. In addition, individuals have also shifted focus, travelling across or bridging disciplinary divides. The construction of environmental problems has also changed since 1973, particularly with the emergence of the policy and research agenda of sustainability. This has increased the need to integrate environmental imperatives with social and economic ones.²²

The long term nature of sustainability issues demands a forward view of environmental processes, and there is the obvious corollary for a longer view back. CRES has from inception had a time depth to its work, especially in the form of 'biohistory' and integrative scholarship in human ecology as developed by Boyden and colleagues. Similarly, a focus on indigenous issues demands cognisance of human histories (and, inevitably, climatic and landscape histories) of +60,000 years. More recently, an explicit focus on environmental history has strengthened this temporal propensity. It has also led to a particular concern with the connections between environmental history and current policy questions.²³

In postgraduate research, a number of issues have been identified. Mandatory multi-member supervisory teams and regular whole-of-team contact have assisted interdisciplinary efforts, but finding suitable examiners has been a constant challenge. However, the art and craft of multiple and interdisciplinary supervision is a poorly developed area of professional practice. The increasing availability of prestige PhD scholarships from R&D agencies which place a premium on integrative research, and rising demand from prospective students, indicates a critical area of intellectual activity and hence of necessary skills development. These remarks apply not just to environmental fields, but it is often the case that doctoral researchers in sustainability – and perhaps environmental history – are not simply using new, innovative synthetic approaches, but are at the forefront of their development.

The rising demand for interdisciplinary work at CRES and other such agencies has come from outside the academy (R&D and policy agencies, the private and community sectors) at least as often as from within. Accrued experience has confirmed both the difficulties associated with it, and the validity of multiple approaches. These may be additive (essentially multi-disciplinary) or more integrated (interdisciplinary), and practised as longer-term research themes or as discrete projects, and by individuals, small collaborations and large,

multi-member teams. Experience has also emphasised the practical as well as intellectual difficulties of interdisciplinarity: leadership, funding, career development, the attrition of effort in preliminary work, and team management.

3. ISSUES AND PROBLEMS

These project biographies are neither representative nor definitive, but the issues and problems that run through them are illustrative. We identify and focus on four at this point, prior to discussing, in the next section, ways in which they might be resolved. First, as practised in these biographies, environmental history emerges not as a discipline in its own right; nor as a sub-discipline of history. Rather it is an interdisciplinary pursuit carried out within and between a wide range of disciplines, its participants seeking to identify complementary ways of thinking about questions that span shared interests. The 'new museology' draws on more than the traditional curatorial disciplines of archaeology, anthropology, history and natural history, adding art history, geography and history of science. Innovative atlases are the product of partnerships between not just historians and cartographers but also engage the spatial imaginations of geographers and owners of indigenous territorial knowledges. Institutions with broad environmental mandates, such as CRES, bring together environmental historians with environmental modellers, human ecologists, ecological economists and policy analysts.

Secondly, what drives interdisciplinarity between sometimes unlikely bedfellows? Institutionally, interdisciplinarity has become an unquestionably 'good thing', as the growth of 'interdisciplines' in the environmental field – and the journals they have spawned – confirms.²⁴ The range of disciplines, approaches and configurations involved, evidenced in our project biographies, are matched by a variety and interaction of drivers. An obvious impetus is scholarly interest, stemming from disciplines facing their limits and responding to the issues of the time. But the wisdom of scholars is not the clear driver, as it rarely would be in any new societal development. In an era of environmental concern, there is a political drive for new knowledges, and in a market-defined world, scholars follow funding. At more specific levels, resource and environmental managers are increasingly engaging with the past for quite practical reasons, whilst museums and other institutions seek historians and others who can place environment in temporal context. There is a wider public interest in environmental histories, evidenced in a stream of books that appeal well beyond the academy.²⁵

These various drivers do not operate in isolation. Scholarly interest is fed by political interest in an issue, even from the margins, as is interest in policy and management circles likewise. This in turn is reflected in the growing demand for

postgraduate training. The museum situation is illustrative. Museum professionals and the disciplines they belong to undergo change and alter their interpretations, museums as businesses chase consumers of entertainment and spectacle, and the public seek more than things in glass cases. In the process of interaction, the relation of subject and object blur and the positions of narrative and narrator shift from established museum traditions.²⁶ So, interdisciplinary activity is the product of variable patterns of engagement of many disciplines for a variety of reasons. What are the challenges of focus and coherence, both practical and intellectual, that are encountered?

The practical problems are our third issue. These are to be expected in new interdisciplinary enterprises, and the project biographies above mentioned several. Interdisciplinarity typically involves collaboration, often with unfamiliar partners (but, many of these problems also strike the rare, yet possible and entirely necessary, individual interdisciplinarian). The usual problems of team work are present and often sharpened: leadership, assigning roles and functions, establishment of research directions, publishing options and thus career opportunities, institutional support, cost allocation, and distance. Distance can be a particular issue when collaborators are sought outside familiar grounds. (Or, are propinquity and chance meetings most often the determinants of interdisciplinary partnerships?) If the building of mutual understanding of key conceptual intersections is of prime importance, as we argue in the next section, then practical difficulties that constrain sustained, real-time human interaction should not be underestimated.

Time too is an issue. Commonly preliminary collaborative moves and opening research expeditions are as crucial to later productivity as the 'substantive' research activity. Early and joint problem definition in particular lengthens the opening phase. While research funding possibilities have improved to some extent, those that are defined by disciplinary boundaries may be difficult to access for interdisciplinary projects. These considerations can be easily transferred to what is perhaps (given the price of failure or the benefits of success) the most crucial of all interdisciplinary team projects. This is the doctoral research team including student, supervisors and very often also adjunct advisers and collaborators. If doctoral research is to be an active location for the human, time and financial resources of interdisciplinary environmental history, bringing on stream the next generation of scholars, then professional development of the supervisory capacity (both practical and intellectual) represents a key forefront.²⁷

Fourthly, what of the intellectual problems of coherence? Given the lack of discussion, in usual circumstances, between members of disciplines that construct knowledge in quite different ways, and which value quite different kinds of evidence, it has been suggested that these problems constitute a 'black box'.²⁸ Part of the dilemma is to define what depth or extent of convergence constitutes

'interdisciplinarity'. How close do we need to get? We can consider two different pathways. The first admits that considerable epistemological differences exist between the disciplines that contribute to environmental history, or to any other interdisciplinary field, and seeks only a superficial measure of connection between them. This view anticipates that each disciplinary perspective will bring specific insights to a research problem, but no particular effort is made to meld these together. The narratives in other words are multiple, and the insights additive: they depend on the reader, with perhaps some assistance from an editorial voice. Many edited collections in environmental history are of this nature.

The second path puts the onus for collective insight on the researcher and writer as much as the reader and is 'driven by people who realise that they cannot answer their own questions without engaging in some deep way with another discipline and its culture'.²⁹ This 'deeper' form of interdisciplinarity presupposes an attempt to intersect constructively with other disciplinary epistemologies. This implies a willingness to see why others ask different questions, the ways in which they construct and interpret evidence, and how they represent their findings. The map for instance is not just a simple indicator of place location, but a spatial language for analysis and representation of processes and events. These issues arise particularly between humanities and science disciplines; as Worster quaintly puts it: 'undoubtedly the most outlandish language that must be learned is the natural scientist's'. In this regard, dialogue might begin 'by clearing the ground of any obstructive misconceptions or prejudices about each other'.³⁰

4. INTERSECTIONS

Such requirements may seem so forbidding as to suggest that the attempt is not worth the effort. Simpler forms of working – the first of the above means – are appropriate depending on the task at hand, and as long as the limits are recognised. But for that recognition of limits, and certainly for deeper engagement, some foci for increased understanding are needed. Otherwise, those of us who contribute to environmental history from different disciplinary bases talk past each other and miss the real gains to be made from greater co-operation. To assist the process, we propose that a good start can be made by identifying four potential points of intersection through which interdisciplinary working might occur: clearing the ground; spatial scale and locale; time and change; and environment, agency and process.

Clearing the ground

The first intersection is recognition of the diversity of evidence, analysis and representation in the research approaches of other disciplines. This involves an

honest attempt to understand their starting assumptions, or epistemological commitments, and to do this using a contemporary reading of how they construct knowledge. There is otherwise the danger that insights that come from other ways of knowing will be reinvented in bastardised form, misrepresented or simply misunderstood. Ecology and geography, two of the synthetic disciplines that have built long traditions of theorising and analysis of the integration of human and environmental processes, seem particularly prone to such misrepresentation. This most likely arises due to the lack of facility which many researchers trained in the humanities have with understanding of environmental processes *per se*. Geography for instance is frequently caricatured, or reduced to 'co-ordinates on the map', with any sense of its key research questions 'of how cultures and societies write themselves onto the earth', of how people make places and 'how both the environmental and the social are transformed in the process' being lost.³¹

A number of recent works, attempting to explain some of the bigger historical questions – why some places are rich, some poor – have rediscovered simplistic forms of environmental determinism, discredited amongst geographers for over fifty years. Examples include books by the economic historian Landes and the zoologist Diamond. Their histories annex geography as a series of variables, of climate and physical conditions, in which explanation is sought by eliding the complex stories of social relations in times and places that underlie the apparent simplicity of the patterns identified. Such environmental history can in turn amount to little more than an accumulation of pieces of information in which, ironically, both the historian's and the geographer's concern with human agency, and the skill of situating this within its historical and spatial contexts, has been lost. As Blaut says, 'it was environmental determinism that caused our science [geography] to fall on hard times. We should remind historians of that fact'.³²

Ecology is a crucial contributor to study of the environment and exemplifies the issues of understanding what another discipline says, and whether it is said in unison. Ecology is a word often misused, referring to some property of the natural or even cultural world rather than a discipline of science. It is appropriated to label intellectual and normative enterprises that might be unrecognisable or even disturbing to professional ecologists, such as political or social ecology. As a discipline, ecology is characterised by diversity and rapid theoretical and methodological development. With rising interest in environmental problems, words, concepts and even assumed laws leave the discipline and take on a new life in policy debates and in the thinking and writing of historians, and economists. The use and misuse of ecological concepts is an issue in contemporary environmental management debates and in fields such as environmental ethics, but has been little explored in environmental history.³³

What might be assumed as solid concepts from ecology may not be. A survey of more than six hundred British ecologists asked them to select ten out of fifty

listed ecological concepts and rank those ten in order of usefulness.³⁴ Only two – ‘the ecosystem’ and ‘succession’ – were selected by more than half the respondents. Concepts selected by less than a third of respondents included species diversity, carrying capacity and food webs, to name three that are freely used by other disciplines. And, while ‘succession’ was relatively popular in the survey, in the eyes of many ecologists it is dated and of questionable utility. What a discipline believes in changes rapidly and this demands that collaboration be based on an appreciation of recent developments within it rather than worn but handy slogans. So, while alluring, tractable and easily communicated concepts may or may not ring true to an ecologist.

Moreover, much depends on the ‘ecologist’ in question and the individual baggage of theory, method, data and problem definition. Population or behavioural ecologists and ecosystem theorists, for example, are quite different creatures. In interdisciplinary ventures, the choice of collaborator, book, journal or theoretical construct from another discipline is a key one to make, as the ‘sample’ of the discipline thus (probably unwittingly) selected will determine the course and fate of the venture. And not just in ecology: the differences between a black letter lawyer and a law-in-context practitioner or an evolutionary versus a neo-classical economist are significant but not often appreciated by those from outside. We acknowledge or even take for granted the richness and divisions within our own disciplines but may be blind to others, a reality confirmed by the oft-heard statement by interdisciplinary project designers that ‘we need an [insert discipline]’. That, however, is at least an improvement on ‘we need a social science perspective’, as scientists cast around for collaborators to satisfy grant application requirements. The recognition of intra-disciplinary variation is as important as that of inter-disciplinary diversity.

Spatial scale and locale

The obverse of the failure to represent other disciplines in their contemporary form is recognition of the insights to be gained from them. A second set of intersections can usefully occur around the spatial themes of scale and locale. Use of such concepts recognises that human activities and their effects are spatially constituted, affecting places large and small, and that in exploring human-environment interactions, a number of scales of analysis are important.

The common focus of academic history has been the nation-state, and Vincent has argued that little has occurred to undermine this privileging of one scale of analysis despite the proliferation of different types of history in recent decades. The point is debatable, given the absence of environmental history from Vincent’s discussion. Griffiths asserts that ‘environmental history often makes best sense on a regional and global scale, and rarely on a national one’.³⁵ But this

is also too simple. The national scale may indeed be useful, as with island states such as Australia and New Zealand, or when a theme primarily determined by jurisdiction, such as trade, policy or law, is being pursued. Also, the global and regional are only a sample of scales relevant to environmental processes: the sub-national, catchment and local matter too.

Some of the best environmental history is about very small places. Guthrie-Smith's study of the changing landscape of his own Hawke's Bay, New Zealand sheep station, *Tutira*, first published in 1921, is a classic in the tradition of earlier natural histories such as Gilbert White's parish-focused *Selborne*. *Tutira* is an account of the effects of Guthrie-Smith's own land improvement activities on local habitats, bird populations and soils over a period of 40 years. It has been credited by William Cronon as the inspiration for the development of his own interest in environmental history.³⁶ Conversely, Crosby's bold focus in *Ecological Imperialism* has prompted adoption of this scale of analysis in environmental histories of the impacts of empire.³⁷ This is to recognise that some human-environmental impacts are the product of processes and flows expressed at broad scales, which in turn affect smaller scale localities.

Different disciplines have different spatial scales deeply embedded in their epistemological commitments. If many disciplines are necessary but not alone sufficient to the environmental history enterprise, so then are many scales. Economists focus on the nation state, the firm and the individual. Lawyers are concerned with the spatial extent of the legal jurisdiction, or on the flow of custom and preference in both time and space of a given legal tradition. Hydrologists like catchments and the streamlines that snake through them. Ecologists work with a variety of spatial scales, and are increasingly interested in the processes that link them (taxa, nutrient and energy fluxes, etc.). So too are geographers, whose concern with spatial divisions of labour is based on the interactions of processes characterising and in turn shaping localities constituted at differing scales.

Some disciplines offer insights through scales of analysis that are at once spatially-defined and process-determined: the environmental history of the Australian domain defined by the plant species known as Brigalow (*Acacia harpophylla*), by ecological biogeographer Nix, evidences the potential for adoption of 'scales' that go beyond political or even cultural territories. Environmental histories shaped by natural system entities and processes – vegetation alliances, migratory species movements, nutrient cycles, soil types, and so on – rather than the more traditional scales, allow fresh excursions. The work of historical geographers on the European colonisation of South Australia is a good example of the ways in which Victorian understandings of natural systems were reproduced in political landscapes.³⁸ The simple question of 'what scale?' conceals either frightening complexity or a fascinating realm of possibilities.

Time and change

Just as disciplines have particular spatial scales and processes embedded deeply in the ways in which they explain the world, so they have temporal scales. Human-natural system interactions are characterised by variable and dynamic time frames, with different aspects of this dynamism being more or less explicable by different disciplines. Crucial to collaboration is the ability to explain change in different variables and influences over time and at particular times. For example, it is necessary to address tendencies either to assume an unchanging 'environment' as the stage on which human histories have been acted out, or to assume stasis in human aspirations, behaviour and institutions.

The pattern of vegetation at the time of European occupation of Australia and New Zealand has often been treated as a backdrop to recent history, rather than as a complex product of multiple forces such as past patterns of climate change and previous indigenous land management. To do so discounts the environmental learning and knowledge of indigenous peoples, reflected in their role as agents of extensive landscape change, as in the grasslands of eastern Australia and New Zealand. The creation of and extent of past use of particular environmental configurations also matters in current concerns, for instance land claims processes. In another specific example, the presumed extent of vegetation types in 1750 underpinned Australia's recent and substantial resource allocation process producing Regional Forest Agreements.³⁹

Environmental change also occurs independently of human intervention. Such dynamism is perhaps readily appreciated within geological frames of reference, but only in the last thirty years or so has the occurrence of climate change been explored systematically within human history.⁴⁰ Such change may be apparently cyclical, or sharply episodic. Abrupt changes may be more common than has been apparent due to the recording of past environmental conditions in historical accounts being 'notoriously light' and the preference for uniformitarian thinking over catastrophism.⁴¹ But even if new sources of evidence of environmental change, such as tree ring chronologies, are now becoming available, there are problems of causation as well as difficulties of 'reading off' historical events against environmental variations. 'We are dealing with a number of variables and hence a multitude of possible outcomes'⁴² in what is an inevitable interdisciplinary intersection.

So if one group of environmental historians can gain from awareness of natural variability, their counterparts trained in the natural sciences benefit from appreciation of the interplay of persistence and particularity in human affairs. Legal frameworks, for example, may appear to reflect contemporary circumstance, but enduring power relations and precedents often ensure that longstanding understandings of human relations with the natural world persist. Similarly, institutional histories reveal much about human-nature interactions, as suggested by Uekoetter in his 'organisational approach' for environmental history.

To give an example, in the state of Victoria, for a quarter of a century from 1972, the internationally remarkable Land Conservation Council inquired into and deeply influenced land management and conservation policy. It left a persistent signature on the tenure and land use of the state. That it was established can be taken as unexplained event: it just was. But complex forces led to the creation of the institution, in particular the heated and significant Little Desert dispute of the late 1960s, where emerging ecological knowledge and community disquiet sank an agricultural development proposal and identified the need for new institutional arrangements.⁴³

Environment, agency, and process

If we classify those involved in writing environmental histories into people whose primary interest and skill concerns human society (social sciences, the humanities) and the non-human world (natural sciences), we can construct an equally simplistic division between those who focus on social constructions of environment, and on the environment as understood using scientific evidence. It is not the case that natural scientists unswervingly accept such evidence; indeed many understand its limitations all too well. But the fascination with newly discovered information from such sources may lure those from the humanities into abandoning caution, just as natural scientists can submit unthinkingly to entertaining but misleading accounts of human societies. The point is that in the continuum of explanation between complete social construction and environmental determinism lies a core intersection for environmental history – nature as dynamic, independent of humans, or nature as constructed, physically and mentally, by humans.

Given that environmental history by definition accounts for, and moreover is created by, an interest in natural-human system interaction, there should be willingness to engage at this intersection. There is a growing literature on environmental hazards that does so. Early geographical hazards research focused on human response to environmental shocks, such as floods, as if the interaction was straightforwardly linear. But people render themselves prone to flooding by placing their assets in the way, and by modifying hydrological behaviour through intervention in catchments. Subsequent work, following the call of Hewitt, has attempted to understand not only the extent to which particular political economies are more, or less, vulnerable to environmental shocks, but also to explore human appreciation of variability in environmental systems. Much settler colonisation proceeded on the assumption of uniformitarianism, and persisted with this, despite evidence to the contrary in the form of droughts, as well as floods and earthquakes.⁴⁴

The contemporary political economy of colonisation/industrialisation/modernisation generates far more encompassing hazards. Patterns of regional or global environmental change ('acid rain'; the enhanced greenhouse effect) are

the product of wastes generated by people at particular points, the effects of which are generalised by broader scale physical processes in the atmosphere. This however is an example of an insight commonplace if not universally accepted in physical science. There is a danger that the intersection is overlooked and evidence reported without the customary interpretive cautions of such disciplines. Some influential environmental historians and histories have come in for criticism for this very reason. Van Sittert takes Worster to task for calling upon scientists to recognise the social construction of nature embedded in their science, whilst also urging them to crusade against materialism and nature's destruction which is of course similarly constructed.⁴⁵

In another context, Young lambasts Lines, whose book *Taming the Great South Land* according to its dust jacket, 'combines environmental, social and political history to record 200 years of implacable exploitation of nature', for not assessing the evidence we have for environmental change with sufficient care.⁴⁶ She gives a number of examples to show how little is known of the scale of land degradation, deforestation and salinisation in Australia, and the ways in which map representation can generalise from very limited data to give the appearance of crisis. Sampling and classification procedures in the collection and display of such data require the same cautious interpretation and contextualising as historians allow for in use of traditional archival sources. In seeking shared – or at least mutually interpretable – explanations of environmental change and change in human-natural system interactions, questions of agency and process, if brought explicitly to the fore, constitute a potent interdisciplinary intersection combining elements of the three that we outlined earlier in this section.

5. CONCLUSIONS

Disciplines are, by definition, strange and arcane to those without, and connections between them offer great possibilities along with pitfalls of misunderstanding. Carefully chosen intersections, pursued persistently, offer more potential than brief dalliances, or selective raids into foreign disciplinary literatures, or simply not keeping up. However, on occasion it may be that we will find that disciplines are more similar than we think. For instance, particular 'insights' of systems science and ecology – non-linearity, near-equilibrium dynamics, thresholds, path dependency, feedbacks – might be locations of interdisciplinary discourse if their meaning is deconstructed and it is realised that any (for example) historian or political scientist worth their salt understands such 'system properties' by other names, and in other methodological and theoretical ways. A central systems concept, feedback (positive or negative), is identified in the widest array of social and natural phenomena by Richardson,⁴⁷ but by another name – or indeed so commonly assumed and dealt with as to have no name at all – would be recognised by most environmental historians as core to understand-

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ing interdependent change in human societies and the natural world. Our intersections might offer unrealised commonalities as well as differences.

We suggest that the intersections discussed here have potential for furthering the collaborative imperative of environmental history, and moreover invite that collaboration to explicitly explore the praxis of interdisciplinarity, rather than merely assist discrete inquiries. At the very least, such exploration may prompt other suggestions for intersections between disciplines. Interdisciplinarity is an arena of scholarship in its own right as well as a means to the end of joint inquiry.⁴⁸ It is comforting that environmental history is not alone in this, even in the environmental arena. Ecological economics, environmental philosophy, political and social ecology, green social theory, institutional economics of sustainability, environmental politics, and so on – these are all to some degree interdisciplinary, some implicitly and others, like ecological economics, explicitly, at least in ambition. They overlap in focus, too, although their practitioners and theoretical and methodological developments often remain unconnected.

Of all substantive foci, past uses of environments and their future sustainability have generated greater quantity and diversity of interdisciplinary ventures than any other, and so offer a source of much needed project narratives, intersections and analyses of interdisciplinary engagement. With more elaborated engagement, environmental history, arguably the environmental ‘interdiscipline’ that attracts the greatest disciplinary variety, may not only improve its own explanations, but become the leading laboratory in the interdisciplinary experiment.

NOTES

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¹ Redclift 1999, 273.

² Examples of those who assume environmental history is a sub-discipline of history include Carruthers 2002, MacKenzie 1997 and Worster 1988. Simmons 2001 asserts that it is a discipline in its own right. Powell 1996 urges that it be considered an interdisciplinary activity.

³ The comment about environmental history in Britain is from Cioc et al. 2000, but amongst well-known practitioners there are Oliver Rackham, a botanist, and T.C. Smout and Keith Thomas, both historians. Dovers et al. 2002 is indicative of the growing diversity of environmental history in South Africa. For Australia, see Dovers 1994 and 2000; for New Zealand, Pawson and Brooking 2002.

⁴ Dovers 2001, 206.

⁵ For collective environmental histories of southern hemisphere lands, see Dovers 1994, 2000; Dovers et al. 2002; Pawson and Brooking 2002; on links to public policy analysis: Dovers 2001; on the *New Zealand Historical Atlas*: Pawson 1997.

⁶ Dovers 2001, 197.

- ⁷ Mabin, 2001.
- ⁸ Dovers 2002.
- ⁹ Schoenberger 2001.
- ¹⁰ Mobbs and Crabb 2002, 3.
- ¹¹ Poulot 1994.
- ¹² Lowenthal 1996, 160.
- ¹³ Davison 2001, 18.
- ¹⁴ Hicks 2001, 184.
- ¹⁵ MacKenzie 1997.
- ¹⁶ Hicks 2001, 188.
- ¹⁷ Te Papa, visitors' brochure, no date.
- ¹⁸ Belich 1996; Harris 1987.
- ¹⁹ McKinnon 1997; Pawson 1997.
- ²⁰ Cookson and Dunstall 2000; Pawson 2000.
- ²¹ Mobbs and Crabb 2002.
- ²² Cf. United Nations 1992.
- ²³ For CRES work on biohistory, see Boyden et al. 1981, 1990; Boyden 1987; on indigenous issues: Ross et al. 1994; Coombs et al. 1983; on environmental history, see Dovers 1994; Dargavel 1995; Robin 1998; and on its links with policy questions: Dovers 2000, 2001; Robin 2001.
- ²⁴ Becker et al. 1999.
- ²⁵ On environmental managers engaging with the past, see Wasson and Sidorchuk 2000; and Roberts 2000. McIntyre and Wehner 2001 discuss the search by museums for those who can place environment in temporal context. Examples of the public appeal of environmental histories include Flannery 1994; Diamond 1997; McNeill 2001.
- ²⁶ Lane 2000.
- ²⁷ Dovers 2002.
- ²⁸ Becker et al. 1999.
- ²⁹ Schoenberger 2001, 373.
- ³⁰ Worster 1988, 294; Redclift 1999, 269.
- ³¹ Schoenberger 2001, 377.
- ³² Landes, 1998; Diamond, 1997; Blaut, 1999, 406
- ³³ On the diversity and rapid development of ecology, see Dovers et al. 1996, Peters 1991 and Handmer et al. 2001. Schrader-Frechette 1995 and Holland 1995 discuss the use and misuse of ecological concepts in environmental management and in environmental ethics respectively.
- ³⁴ Cherrett 1988.
- ³⁵ Vincent 1995; Griffiths 1997, 47.
- ³⁶ Cronon 1999, xi–xii.
- ³⁷ Crosby 1986; Griffiths and Robin 1997.
- ³⁸ Nix 1994 on Brigalow; Meinig 1962 and Williams 1974 are the historical geographers who have worked on South Australia.
- ³⁹ On the role of indigenous peoples as agents of landscape change, see Pawson and Cant 1992; Mobbs, in press, highlights the role of the presumed extent of vegetation types in 1750 in production of Regional Forest Agreements.
- ⁴⁰ Parry 1978; Lamb 1982.
- ⁴¹ Baillie 1999, 46.
- ⁴² Slack 1999, 4.

- ⁴³ Whéen 2002 on legal frameworks; Uekoetter 1998 on the 'organisational approach'; Robin 1998 on the Little Desert dispute.
- ⁴⁴ Hewitt 1983; on droughts see Meinig 1962; on floods, Pawson 2000; and on earthquakes, Grapes 2000.
- ⁴⁵ See Dann 2002 for 'the contemporary political economy of colonisation/industrialisation/modernisation'; McNeill 2000 explores human induced patterns of environmental change; Van Sittert 2002.
- ⁴⁶ Young 2000 on Lines 1992.
- ⁴⁷ Richardson 1991.
- ⁴⁸ Gibbons et al. 1994; Sommerville and Rapport 2000.

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Weeds, People and Contested Places

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ABSTRACT

In the Western world weeds have been defined and redefined according to the cultural ideas and outlooks of peoples who have tried to compete with them for open places, over many millennia. Somewhere along the way ‘weed’ emerged as a concept, and became embedded in and expressed through language. In the first part of this synoptical essay some of the expressions of the changes in human perceptions of, and responses to, a group of plants with which people have had to contend for places, and the deeper cultural significances of the contest itself, are explored. In the second, the inter-societal relationships between weeds and humans are explored in the unique context of New Zealand’s discrete landscape and the settler society which transformed it within the comparatively short period of two centuries. Possibilities for ongoing studies of the weeds–people relationship within New Zealand and other regional contexts are offered.

KEYWORDS

Weeds, weediness, colonisation, invasion, New Zealand

‘In naming a plant a weed, man gives proof of his personal arrogance.’

Jean Rostand ¹

INTRODUCTION

In a relatively young country like New Zealand the opportunity arises to study in some detail the evolution of a new flora, induced by European settlement, and the evolving relationships between that flora and those who induced it.² The

pioneer New Zealand ecologist, Leonard Cockayne, considered that such studies would be 'of the greatest scientific and economic interest not only with regard to New Zealand botany, pure and applied, but also because they may shed much needed light upon the evolution of floras and vegetation in general'. That the plants introduced into New Zealand and into much of the New World from the Old were 'some of them the most aggressive weeds in Europe', heightened the element of conflict within the relationship.³

New Zealand presented a singular advantage for Cockayne and others who looked to ecology to gauge the effects of invasions by alien plants. The invasion of this relatively small, isolated archipelago has been documented more or less continuously, although somewhat haphazardly, from the earliest European contact period.

If the evolution of a country's flora was a proper study for the ecologist, the evolving relationships and conflicts between the weedy flora and those who induced it, is the province of environmental history. But, in order to understand a relationship that, in New Zealand, has developed over a comparatively short period of two centuries, it must first be set within the context of the several millennia during which people and their weeds have contested places.

What is attempted here is firstly a synopsis of a range of history-writings, not necessarily historiographical in content or intent, about a societal conflict between weeds and people. This might in due course inform a fuller study of the conflict as it occurred in nineteenth- and early- to mid-twentieth-century New Zealand.⁴ Constructing such a context in this essay may also serve as a point of contiguity for regional studies elsewhere of the weed–people relationship. The second part of the essay considers a selection of writings that illustrate several trends of thought (scientific, academic, legislative) on the subject, expressed both within New Zealand's settler society, and about that society by 'outside' observers. The extent to which those threads running through the New Zealand discourse either reflected or initiated similar trends elsewhere might again inform further and fuller regional studies.

From what follows, it might seem that the historical literature touching on weeds is extensive. Writing about the history of weeds has, however, generally been incidental to some other purpose, usually scientific or geographic, sometimes philosophical or moralistic but only occasionally historical. Those who have approached the history of the people–weeds relationship thus far have done so from disparate points of view, bringing disparate agendas to the discourse and addressing disparate audiences. Only recently, and then largely within North American environmental history-writing, has any attempt been made to draw those threads together; in New Zealand, seemingly, not at all.⁵

In what follows I have adopted Clarence Glacken's approach of taking illustrations from several places and from different periods. With Glacken, I acknowledge that 'this procedure is open to the obvious criticism that isolated illustrations have little value in interpreting the nature of change over such a large

area or over so long a period'. But I also share his view that in the absence of any coherent body of knowledge, 'they show that certain attitudes did exist'.⁶

In all other respects I have sought to allow the various sources to speak for themselves, so as to avoid, in Frank Uekoetter's words, the 'value laden approaches that only enable historians to reproduce in history certain normative assumptions that they [themselves] subscribed to from the outset'.⁷ The views and positions to which my sources subscribed, rather than my own, are central to Uekoetter's 'organisational approach' to the writing of environmental history.

ORIGINS AND DEVELOPMENT OF THE 'WEED' CONCEPT

'Weeds' and 'weediness' are two ideas that have been constructed and reconstructed across millennia. The flora which have come to be called weeds and we, the species which has called them that, have been contesting places for something like ten thousand years. We know from what the palaeobotanists can tell us of Earth's inter-glacial and post-glacial landscapes, that weeds occupied many of those places long before the contest began. We know too, that the great cultural changes of the Neolithic altered the people–nature relationship as agriculture rippled outwards from the Fertile Crescent.

Somewhere along the way 'weed' emerged as a concept, and became embedded in and expressed through language. Some of the historiographical expressions of the changes in human perceptions of, and responses to, a group of plants with which we have had to contend for places, and the deeper cultural significances of the contest itself, are explored in this essay. Within the literature we can trace the ravelling and unravelling of a set of ideologies from the Neolithic, across the Old World and into the New, and from both places into colonial and post colonial Australasia, particularly New Zealand.⁸

Drawing some of the fragments together gives merely the appearance of a coherent historiography. It also becomes apparent that, however simple the idea of weediness may seem at first sight, it is not. It may seem obvious, for instance, to a mid-western American farmer, that 'weeds' have become so, not from any inherent character, but because they 'take territory and profit from agriculture in some way'.

But if that is all there is to it, why do we still find ourselves considering such questions as, which are weeds, and which are 'not weeds'?⁹ Perhaps 'weediness' is a category of nature?¹⁰ Or is it a set of cultural constructs, particular to people, place and time, something idiomatic? Or something more? Something, perhaps, to do with an evolving relationship between a range of remarkably successful organisms and one competing species, ourselves?

What, to begin with, has been the understanding of the word itself and of its place in western language and culture? That, it seems, is largely dependent on place and time. Lawrence King, lately of the Biology Department at the State

University College of New York, published in 1957 one of the few discussions of some early forms of the weed concept. This, and his 1966 study of weed biology and control factors, considered the history of the term 'weed'.¹¹ He found that the ancient near-eastern languages (Egyptian, Sumerian and Assyrian) apparently did not have an equivalent, collective term, all plants being considered useful.

On the other hand, as we might have known, the Greeks had a word for it. Theophrastus (c.372-c.287 B.C.) used βότᾱνη (botáne) as 'noxious herb', and thus 'weed'. And although weed and weeding concepts were used by Roman writers like Pliny, Virgil and Columella, the modern term has no apparent Latin counterpart. Rather, it is to the ninth-century Old English *weod* that King suggested we might look or to proto-German forms of *weyt* (c. 1150) or the later Belgian *weedt* (c. 1576) and Dutch *weet*, each of which refers to the dye-plant woad, omnipresent in Europe, North Africa and Asia.¹²

We are left then with an English term that appears to have arisen from Proto-Germanic derivatives, a singular noun with no evident intrinsic meaning. It is, King speculates, perhaps 'another example of language as accidental usage'.¹³ And so to define the term, he says, one is dependent upon purely anthropic considerations. He reduced an extensive collection of these, from various sources, to ten principal characteristics, couched in distinctly antipathetic language.¹⁴

On the other hand, Sir Edward Salisbury, late Director of the Royal Botanic Gardens, Kew, writing in 1961, contented himself with characterising a weed as 'a plant growing where we do not want it'. He admitted qualifications, but doubted that a more precise definition is practicable:

In general we may say that a certain aggressiveness is implied that defies easy control, but here again the quality is one that exhibits itself in one environment and not in another.¹⁵

At the same time, it is part of the essence of our concept of a weed that it does in fact flourish and must be 'kept in its place'.¹⁶ Neither King nor Salisbury, however, addressed what is perhaps *the* most fundamental dimension of the ideology of weeds. The conceptual transitions between such terms as 'casual', 'troublesome', 'pest' and 'noxious' have essentially been triggered by and constructed from human experiences wherever and whenever plants behave in ways inimical to our interests. Salisbury came close to the nub of the relationship when he referred to the toxicity of particular arable and pasture plants. Plants like hard rush, ragwort, hemlock, and darnel have had consequences which have been observed and remarked upon at least since Virgil wrote *The Georgics* and, in some instances, from Neolithic times.¹⁷

Like King, Salisbury used the results of archaeological research to reconstruct the forms of association between, and colonisation of, the open habitats of both pre- and post-Neolithic Europe and Britain by humans and their plants. But

because the possible existence of weed species in Britain prior to human colonisation rests on contradictory evidence some of his conclusions are speculative.¹⁸

Nevertheless, he has made one point that is particularly pertinent to the environmental historian:

The capacity of a species to maintain itself without the adventitious aid of the artificial conditions created by man, which usually implies a reduction in competition pressure, is a feature of prime significance.¹⁹

That, as we shall see, is something with which several prominent nineteenth-century naturalists had difficulty in coming to terms. Salisbury argued that the degree to which weeds owe their efficiency to natural or human agency, at least in remote times, is largely unresolved.²⁰ That environmental historians ought to give more agency to nature is a matter that has been remarked upon elsewhere and quite recently.²¹

A contemporary of Salisbury, Charles Elton, of the Oxford Botanic Garden Bureau of Animal Population, took a firmer line on the question of agency. Elton noted in his 1958 book, *The Ecology of Invasions by Animals and Plants*, that few alien plants are capable of invading natural closed vegetation ecosystems. The majority tended to live in habitats 'drastically simplified by man', places like arable farmland, waste dumps, roadsides and railway tracks. In post-glacial Britain, plants like sea plantain and scentless mayweed, now regarded as weeds, were widely distributed in an open tundra landscape with low competition pressures. Elton's view was that the maintenance of what he called the 'conservation of variety', now commonly referred to as biodiversity, provided the most effective means of combating ecological instability brought about by accidental or deliberate introductions of alien plants or animals into indigenous habitats.²²

In his 1986 history of the British countryside Oliver Rackham's attitude to weeds stands in marked contrast to that of King and Salisbury. Weeds are, he says, quite simply 'very specialised plants, intimately linked to farming'. Many could not survive in the wild, being unable to withstand shade and with little power of competition. Rackham sees weeds as part of 'the ordinary landscape ... made by both the natural world and by human activities, interacting with each other over many centuries'. Ordinarity is not, he says, an easy idea to grasp. A couple of centuries ago the countryside stood, as the world of Nature, in contrast to the town. 'The opposite exaggeration now prevails: that the rural landscape, no less than Trafalgar Square, is merely the result of human design and ambition.' The other player in the game, Nature, is hardly mentioned. The concept of countryside as recent artefact prevails.²³

Rackham considered that any certainty about which are weeds and which are not is comparatively modern. Late-glacial survivors got a new lease of life with the arrival of Neolithic agriculture, with its monocultures and open places. Others, introduced from the Near-Eastern homelands of agriculture, 'attached

themselves to farming and found a new function'. Roman introductions like ground elder remained garden plants until recently. Tollund Man, from the Danish Iron Age, ate goosefoot and persicaria in his execution porridge. Seed cleaning and a reduction in crop varieties initiated a modern decline in weeds. That might be welcomed by some, but:

even here it is arguable that enough is enough. Mediterranean peoples live with weeds, enjoy them, and eat some of them. Weedkillers seem to have killed the wrong weeds ... Weeds are part of the historic flora and should be protected from dying out altogether.²⁴

King's, Salisbury's and Rackham's syntheses give us an approximate measure of where and when some plants became the Other, and of where and when humanity, at least in the West, began to conceptualise and articulate weediness. From such starting points it becomes possible to trace a fluctuating Otherness. A reconnaissance of the historical landscape from the medieval to the modern illustrates something of the complexity, confusion and ambivalence that has attached to weed species, and which moved into new worlds with European colonisers and their flora.

WEEDS AND MORALS: FROM MEDIEVAL TO MODERN

In her introduction to her 1995 book, *A Medieval Herbal*, Jenny de Gex makes the point that the early herbals reveal a different universe from our own. Each plant, or its parts, had 'virtues' and 'signatures'. The virtues of the bramble, for instance, were that an infusion of it 'surely healeth' sore ears or eased menstruation. Its leaves healed heartache and its blossoms, wounds. Any part of it 'seethe[d] in wine to the third part' relieved infirmity of the joints.²⁵ Signature related to some physical characteristic(s) of a plant. The red juice of St. John's wort, for example, 'signified its power to heal wounds'.²⁶

Weeds took on a less roseate hue under Will Shakespeare's pen. Dark forces emanated from Elsinore when Hamlet reflected on his father's death:

Fie on't! O fie! 'tis an unweeded garden,
That grows to seed; things rank and gross in nature
Possess it merely. That it should come to this!²⁷

'Darnel hemlock and rank fumitory' or 'hateful docks, rough thistles, kecksies, burrs' speak of social and political turmoil.²⁸ The pre-Romantic hierarchy of plants, thought to mirror the human condition, is reflected, too, in Shakespearean imagery:

Out of this nettle, danger, we pluck this flower, safety.²⁹

Elizabethan aversion to weeds is reflected in Antony FitzHerbert's *Boke of Husbandrie*, published in 1523. May heralded the 'tyme to wede thy corn'. The sixteenth-century English farmer had to deal with 'divers manner of wedes', like nettles and dodder, which 'doe moche harme'. Thistles, docks and kedlokes (charlock), darnolde (darnel) and gouldes (corn marigold) were bad enough. Dog fenell [sic] (stinking mayweed) 'is the worst weed that is except terre' (hairy vetch).³⁰

Such weeds and the hard labour they demanded were a far cry from the land of Virgil's *Georgics*, the land that needed no farming, 'the soil that needed no harrowing' and the Golden Age of Hesiod's *Theogony*.³¹ Those Arcadian myths would, however, survive the powerful Judeo-Christian theology of the Garden and the Fall, symbolic of good and evil, punishment and atonement, which abound among the plants and fruits of the Old and New Testaments.

W. E. Shewell-Cooper, Principal of the Missionary Horticultural College at Thaxted, Essex, in the 1950s and 60s, saw the human condition after the Fall, (Genesis 1:4), as a transition from Arcadia, a life without toil, to 'a battle with weeds ... a hard life of sweat and toil'.

Thenceforth, the Other had to be always contended with:

And on all the hills that shall be digged with the mattock, there shall not come thither the fear of briars and thorns (Isaiah 7:25).

The New Testament parable of the sower carries the same message, couched in the language of grim competition:

And some [seed] fell among thorns; and the thorns sprang up; and choked them (Matthew 13:7).³²

The imagery is particularly explicit in the 'Parable of Weeds Explained', (Matthew 13:33):

The one who sowed the good seed is the Son of Man ... The weeds are the sons of the evil one and the enemy who sows them is the devil ... The Son of Man will send out his angels and they will weed out of his kingdom everything that causes sin and who do evil. They will throw them into the fiery furnace, where there will be weeping and gnashing of teeth.³³

Michael Zohary, Professor Emeritus of Botany at the Hebrew University, Jerusalem, explored the relationships between 'biblical man' and his natural environment.³⁴ Zohary's 1982 work points to a conceptual, if not a textual, consistency across time and translation. Solomon gilded his lily among the brambles (Song of Solomon 2:1–2). Christ's tormentors mockingly crowned him with one or other of the dozen or so spiny species that grow around Jerusalem (John 19:5). The crackling of thorny burnet in a cooking fire 'is the laughter of fools; this also is vanity' (Ecclesiastes 7:6).

Each tree could be recognised by its fruit:

For figs are not gathered from thorns, nor are grapes picked from a bramble bush.
[The good man brings good things out of the good stored up in his heart and the evil man brings evil things] (Luke 6: 44–45).³⁵

In the early thirteenth century the cleric Alexander of Neckam developed this theme of governance of the earth by moral rather than biological causes. The degraded state of mankind and the natural world served as a constant and painful intimation of the Fall and all that had been lost. That poisonous plants now exist when once there had been none, and that they brought unease into the world, were continuing reminders of the consequences of humanity's pride and deceit.³⁶

Post-Reformation reinterpretations of the biblical place of people in the world expanded on the idea of deterioration in nature after the Fall. The earth had degenerated. Thorns and thistles grew up where once there had been fruits and flowers.³⁷ Some commentators revisited ideas of order and purpose, and human domination of the 'lesser' creation, one of the central ideas of Judeo-Christian theology. 'Thou hast given him dominion over the works of thy hands; thou hast put all things under his feet' (Psalm 8:6).³⁸

Taking his cue from natural theologians like John Ray (1627–1705), the herbalist William Cole, in his *The Art of Simples* (1656), thought that even weeds and poisons had their purpose. It required 'the industry of men to weed them out ... Had he nothing to struggle with, the fire of his spirit would be half extinguished.'³⁹ The English jurist, Sir Matthew Hale (1609–76) went further. Not only did order and purpose exist in the world, but Man also had a duty to exercise his growing control over nature. Hale believed, from his reading of Genesis, that:

Man was invested with the power, authority, right, dominion, trust and care ... to preserve the Species of divers Vegetables, to improve them and others, to correct the redundancies of unprofitable Vegetables, to preserve the face of the Earth in beauty, usefulness and fruitfulness.⁴⁰

Hale could also look back to Aristotle and the Stoics for support for the belief that nature existed solely to serve humanity's interests.⁴¹ By his 'superintendent industry' Man could prevent the world becoming 'overgrown with excessive excrescences', a wilderness of trees, weeds, thorns and briars. Thomas Sprat (1635–1713), historian of the Royal Society, advanced Hale's position another step. Deteriorated nature could be improved by art. Environmental improvement could come from plant introductions, by using animals and by 'comparative husbandry'.⁴²

So too, the seventeenth-century farmer drew a distinct line between crops and weeds. The latter were 'an obscenity, the vegetable equivalent of vermin'. To a thorough agricultural improver like Walter Blith gorse, ferns, rushes, bracken and broom were 'such filth'. The eighteenth-century agricultural writer William

Ellis went so far as to lump marigolds, wild irises, honey suckle and water lilies in with weeds. The late seventeenth-century aesthete Roger North proclaimed that 'weeds have no beauty'.

But in seventeenth-century London, willowherb, foxglove and poppies, the last the bane of wheat growers, were sought by gardeners as decorative plants. A mid-century herbalist, William Gerard, noted that some gardeners were wont to 'feast themselves even with varieties of those things the vulgar call weeds'. He admitted that, 'narrowly observed' there is 'a great deal of prettiness in every one of them'. Country gardens, too, could include scabious, campion and larkspur. Keith Thomas tells us that well-known late eighteenth-century gardeners like William Hanbury 'thought heather very elegant and looked kindly on meadowsweet and even thistles'. The agricultural writer William Marshall considered blackberry flowers were 'beautiful beyond expression'. 'Rude, cultivated' tracts of gorse and broom in the royal gardens at Richmond did not, however, impress the Scottish philosopher and agricultural improver, Henry Home, Lord Kames (1696–1782).⁴³

Another group perceived weeds differently too. Herbalists and apothecaries had never doubted the medicinal value of wild plants. William Turner, whose herbal was published in Cologne in 1568, worried that 'precious herbs' were dismissed by the ignorant as 'weeds or grass'. Allied to the herbalists, a growing band of naturalists like Robert Sharrock could see beauty in the great-horsetail of bogs and ditches. 'Botanists', wrote Samuel Pegge in his *Curialia Miscellanea*, penned in 1796 and published in 1818, 'allow nothing to be weeds'.

Both groups took a utilitarian view of the plant world. New discoveries considered to be of medicinal value were recorded and transplanted to 'physic gardens'.⁴⁴ There is a tradition that the Swedish naturalist Carolus Linnaeus (1707–78) fell on his knees at the sight of English gorse 'the enemy of every improver ... and gave thanks for so beautiful a plant'. (Some would have it that it was in fact Johann Dillenius, Sheridan Professor of Botany at Oxford from 1734.)⁴⁵

Other modes of European thought added to a growing confusion about the people–weeds relationship. In the course of one of his critiques of natural theology, the German poet, dramatist and scientist, Johann von Goethe (1749–1832) used weeds to illustrate both the anthropocentric nature of the relationship and the tenuousness of the teleology invoked by the natural theologians. It came as no surprise, given the nature of human experience, that mankind should see itself living in a purposeful world as an end of the creation. The word 'weed', however, revealed the misconception:

Why should [man] not call a plant a weed, when from his point of view it really ought not to exist? He will much more readily attribute the existence of thistles hampering his work in the field to the curse of an enraged benevolent spirit, or the malice of a sinister one, than simply regard them as children of universal Nature,

cherished as much by her as the wheat he carefully cultivates and values so highly.⁴⁶

INTO THE NEW WORLD

The late eighteenth-century American agricultural writer John Lorain took a similar line, albeit at a more practical level. The effect of American settlers' farming practices on soil fertility concerned him. He recognised the interdependency of species within ecosystems, and particularly the role of the smaller organisms ('animalcules') and decaying vegetable matter in maintaining soil fertility:

The fertilizing effects of the perfect system of economy is equally clearly seen in our glades, as in our forests, where nature is suffered to pursue her own course ... The same may be said of weeds, notwithstanding slovenly farmers complain still more loudly of the injury done by them.⁴⁷

He doubted the notion that soil impoverishment is the result of some biblical curse. Weeds were not the cause, although perhaps an effect. He saw soil impoverishment as an even greater curse.⁴⁸

The Romantics and their precursors, too, were articulating other thoughts on weediness. William Cowper (1731–1800), in his long poem on rural themes, *The Task*, written towards the end of the eighteenth century, venerated the fern and gorse on an overgrown common. John Clare (1793–1864), the poet–gardener son of an impoverished Peterborough labourer, wrote frequently of the beauty of common agricultural weeds like ragwort, yarrow, rushes, spear thistle and corn poppies. John Loudon (1783–1843), Scottish founder and editor of *The Gardener's Magazine*, told his readers that briar, sloe thorn, fern and bramble 'would, if introduced into the picturesque grounds of a residence, have a most enchanting effect'. John Ruskin (1819–1900) thought a flower garden an 'ugly thing' compared to wild nature.⁴⁹

Across the Atlantic, Henry Thoreau (1817–62), thought the wild meadow grasses, into which the Pilgrims had stepped two centuries earlier, were more rank, the forests more extensive and open, the trees larger, and the animal population more diverse. The strawberries, the gooseberries, raspberries and the currants were far larger and more abundant than any he knew.⁵⁰ Thoreau, ever the romantic journalist, looked back to the mythical Golden Age.

In the century following the Pilgrims, Rational Europe had busied itself subduing Nature in its front gardens. Unlike Thoreau, French writers like Buffon (1707–88) and Raynal celebrated man's role in transforming the landscape. Raynal believed that the European colonists' capacity to change their environ-

ment distinguished them from 'Indians'.⁵¹ The Philadelphia physician and politician, Benjamin Rush (1745–1813), thought cultivation of a new country by 'draining swamps, destroying weeds, burning brush and exhaling the unwholesome or superfluous moisture of the air' helped to render it healthy.⁵²

To another contemporary writer, the changes wrought upon the New World landscape were reminiscent of something far greater. Writing to a colleague, the clergyman–physician and agricultural improver Jared Eliot enthused:

Take a view of a Swamp in its original Estate, full of Bogs, overgrown with Flags, Brakes, poisonous Weeds and Vines ... The baleful Thickets of Brambles, and the dreary Shades of the longer Growth ... [then after it is drained] Behold it now clothed [sic] with sweet verdant Grass, adorned with the lofty wide spreading well set Indian-Corn; the yellow Barley; ... a wonderful Change this! and all brought about in a short time; a Resemblance to Creation ...⁵³

Eliot's correspondent begged to differ. Practical John Bartram (1699–1777), the first American to lay out a botanical garden, had observed that the entanglement of mud and debris, brought down by floods, among the hazels, weeds and vines of the bottomlands, maintained soil fertility in riverside lowlands. Clearing the weeds would prevent the deposition of debris and enhance soil erosion.⁵⁴

Nevertheless, in the New World, as in the Old, the improvers took the moral high ground. Edward Johnson envisioned the transformations from savage to civilised as 'the planting of a garden, not the fall from one; any change in the New England environment was divinely ordained and wholly positive'.⁵⁵ That, of necessity, included the introduction of Old World weeds. Divinely ordained or not, two rather less positivist commentators recorded that laws were introduced in Connecticut, Massachusetts and Rhode Island at various times during the eighteenth century, to control barberry, a vector in wheat blast disease.⁵⁶

Weeds were one of humanity's camp followers, a global phenomenon, in both the Old and New Worlds of the American lawyer, politician, philologist and diplomat George Perkins Marsh (1801–82). He found that many of the species he had collected during his travels were equally at home in the wheat fields of Upper Egypt, the gardens of the Bosphorus or the cultivations of New England. Man transplanted them.⁵⁷ Nature propagated them. In this instance Marsh granted equal agency to both.⁵⁸ In the struggle that often followed, one or the other might flourish. In some districts in China, weeds had been entirely eradicated. Elsewhere, long after the abandonment of some rural cottage, luxuriant weeds were the only sign that man and his buildings had once existed.⁵⁹ Using the language of rational analysis, Marsh sought to lay open the processes that bound these organisms together.

He had long been a progressivist, albeit a cautious one.⁶⁰ He saw agricultural man as an improver (and, for that matter, an improvement; Marsh saw rural

America in 1847 as the outcome and ‘first example of the struggle between civilised man and barbarous uncultivated nature’). Natural science would contribute much to improving agricultural practice. There were also benefits to be had from improvements to existing farming techniques, including the ‘extirpation of thistles and other weeds, and the destruction of noxious insects’. But things could go too far. Some New England hillsides, stripped of forests, had lost their thin soils to erosion ‘in the rage for improvement’ and now yielded no crop ‘but a harvest of noxious weeds to infest with their seeds the rich arable lands below’.⁶¹

Marsh marked a paradigm shift in the man–nature discourse and the language that structured it. Man ‘modified’ nature rather than the reverse. With Marsh the new relationship found expression as dialectic, ‘a complication of conflicting or coincident forces, acting through a long series of generations’. Moreover the modifications wrought were given a new moral and political dimension.

‘Exploitation’, ‘destruction’, ‘deterioration’ and ‘invasion’ began to colour and shape the discussion among Marsh’s admirers and disciples, and the subsequent environmental debate, for the better part of a century and a half.⁶²

SETTLERS AND SCIENCE: NEW ZEALAND

Since then, in Antipodean colonial and post-colonial literature, two other themes have emerged. Some of the participants turned to the explanatory power of science, in its theoretical and applied forms, to try to understand and in due course to attempt to control the unwanted transformations occasioned by European occupation of new environments and the attempted reconstruction of European landscapes in those environments. At the same time, politics and civic institutions became a forum for expressions of concern about these transformations and a tool against the worst of them. Both occurred in the context of a repetition and, often, a compounding of the North American experience in colonies like Australia and New Zealand.⁶³

Tim Flannery, in *The Future Eaters*, his 1995 ecological history of Australasia, examined the fundamental differences between European and Antipodean ecosystems. The rapidly opening spaces and comparatively young, rich, post-glacial soils of Europe favoured floral species which had the various traits of those species we now call weeds – rapid colonisation of bare ground, fast breeding, wide dispersal, domination of an environment and tolerance of close human settlement:

Mobile, fertile and robust, Europe’s life forms were purpose-made to inherit new lands ... [In the European contest] only the most disturbance-loving hardy and tenacious [had] survived.

On the other hand the ancient, poor soils of the relict Gondwanaland, with their

low energy flows, selected for a diversity of species which, over aeons of time, had become highly specialised, localised and co-operative rather than competitive. One other critical factor influenced what happened next:

... Europeans were blind, and still largely are, to endemism and biodiversity and the importance of these features in an ecosystem. They assumed that all ecosystems worked pretty much like the European ones they coevolved with; with its few tenacious species occupying ranges of hundreds of thousands of kilometres.⁶⁴

Flannery's ecological insight was of course inaccessible to settlers and scientists during the early colonial years. Some of their contemporary responses to weeds and the weediness and the follies resulting from their ignorance have been traced by two post-colonial New Zealand writers. One of them, Gordon Ell, professed to be 'an enthusiast for the outdoors, not a scientist'. The other, Ross Galbreath, came from science to historiography.

Ell's enthusiasm for the profusion of exotic wildflowers-turned-weeds, which have been transplanted into New Zealand from virtually every region of the globe, resembles that of the nineteenth-century Romantics. This multiplicity of both species and origins, Ell wrote in 1983, reflects both 'the sources of our settlers and the seeds and sentiment they brought here'. And he mourns the almost-lost knowledge of their medicinal and culinary properties:

Now that the chemist shop replaces the herb garden, and the vegetable market the roadside patch, the wildflowers are no longer relevant to our survival.

But in a transplanted society, centred upon a utilitarian and improving agriculture, there was little room for sentiment, so that in a very short time the distinction between wildflower and weed became a fine one. Ell was very clear about the mechanisms and agencies involved in this transformation:

Brutally, suddenly cleared of its native cover, New Zealand has grown a new skin ... [in a different climatic and ecological regime] Wildflowers have become 'as common as weeds'.

Moreover:

Their toleration in a country dependent on farming has become unendurable ... In the scientific establishment ... the wildflowers have been a particular concern.

The pursuit of chemical and biological controls for agricultural weeds became an industry in itself. But, Ell argued, there is another side to this realism:

New Zealand shall never be a "virgin" land again. We have remade it with an amalgam of exotic and native wildlife. While it is worth decrying the loss of native species, there remains the fact that much of New Zealand has developed into another country.⁶⁵

Galbreath, in his 1989 biography of Walter Buller, the nineteenth-century New Zealand naturalist, lawyer and politician, explored some of the contemporary scientific efforts to come to terms with this transformation and the attempts to ameliorate, or at least explain, some aspects of it. In particular, he dealt with a nineteenth-century scientific blind alley. Buller and some of his colleagues were attracted to and placed much faith in displacement theory. In their view native flora and fauna, including people, would be displaced by superior European species. They invoked Darwinism. 'It was simply a matter of survival of the fittest.' As an explanatory proposition it had the support of Darwin, Wallace and Hooker. They, each and together, gave natural laws sole agency. In New Zealand W.T.L. Travers, the nineteenth-century gentleman settler, amateur naturalist and politician was one who firmly advocated the theory.⁶⁶

A contemporary, and remarkable, group of largely self-taught settler-scientist-politicians challenged this view. Influenced by his reading of Marsh, the Canterbury runholder Thomas Potts, among others, put a counter-argument. The transformation of New Zealand resulted not from 'any mysterious law of nature, but ... [is] a consequence of human action'.⁶⁷

From his own observations, another runholder, Herbert Guthrie Smith, was in no doubt about human and other animals' agency. He painstakingly chronicled what he called the obliteration of a virgin landscape in the Hawkes Bay region of the North Island and its replacement, largely by his own hand, with alien plants and animals, among which he placed himself. In his preface to the first edition of *Tutira: The Story of a New Zealand Sheep Station*, published in 1921, Guthrie Smith urged his reader to 'mark, learn, and inwardly to digest the subcutaneous erosion of a countryside, the ancient way of the Maori, the fortunes of pioneer man and beast, the acclimatisation of an alien flora and fauna'.

In the wake of our sailors, explorers, soldiers, and pioneers, they steal unnoticed, unobserved. The proverbial sun that never sets on the flag, never sets on the chickweed, groundsel, dandelion and veronicas that grow in every British garden and on every British garden-path ... Following the destruction [of the ancient vegetation of the sheep-run] through man's agency by fire and stock, a huge area of virgin soil was, to use a New Zealand political term, "thrown open to selection" ... [and] a host of ancient and eager rivals rushed upon the soil. With the assistance and assent of the stock the ground was seized, not only by indigenous plants, whom we may imagine to have been for centuries eagerly waiting for expansion and jealous of their hungry foe, but by aliens brought from thousands of miles – from Europe, Asia, Australia and America; from, in fact the four quarters of the globe.⁶⁸

G. M. Thomson, a Dunedin teacher turned professional scientist, also questioned the received wisdom. Thomson considered that the isolated, large islands of New Zealand provided a unique opportunity to explore in some detail the processes and agencies involved in the introduction of a host of exotic

species. In a book put together in 1922, towards the end of his life, he said he first approached the subject from the point of view of natural selection but, from the evidence, soon came to the conclusion that other agencies were involved. He attributed the first introduction of European weed species to James Cook, who planted vegetable gardens at Dusky and Queen Charlotte Sounds in 1773. What happened to Cook's garden at Dusky intrigued him:

In 1791 Vancouver visited Dusky Sound and Lieut. Menzies reported that in the garden (made by Cook eight years previously) there had grown up a dense covering of brushwood and fern, which obliterated all sign of the old clearing ... In view of the struggle between indigenous and introduced plants which exercised the minds of many eminent naturalists, and to which reference is made in the writings of Hooker, Darwin, Wallace and others, the record of [these] further visits to Dusky Sound is interesting.⁶⁹

Thomson went on to trace the history of exotic plant introductions, through garden cultivation by itinerant whalers and sealers and the giving of European garden and agricultural seeds and plants to Maori by missionaries. He remarked on other deliberate and accidental introductions, for example in the seed stores, baggage, bedding, rubbish, ballast and packaging materials of immigrant ships.⁷⁰

He also reviewed provincial and national legislative attempts, from the 1850s onwards, to deal with many introduced animals and plants, which had 'increased at a rate that upset all calculations'. The Noxious Weeds Act of 1900, consolidated in 1908, gave some measure of control including, for the first time, reasonably effective border control. But:

The early settlers were great law-makers, but also great law breakers, for it is of no avail to make laws which cannot be kept or at least enforced, and in a great many of these restrictive ordinances Nature was too strong for the settlers and beat them very frequently.

Lamenting that, one hundred and fifty years after Cook, 'the country has not yet realised the necessity of a scientific treatment of the whole question of naturalisation', Thomson saw the way ahead lying in two directions:

... closer settlement of the land coupled with more intensive cultivation; and better education of all those concerned in the primitive [i.e., primary] industries of the country ... as to the economic waste that ensues whenever undesirable animals and plants are allowed to thrive.⁷¹

On the educational front, F. W. Hilgendorf aimed his 1926 book, *Weeds of New Zealand and How to Eradicate Them*, at farmers, students 'and that large class of people that has no special interest in weeds' but enquired about things generally. Hilgendorf, professor of agriculture at Canterbury Agricultural College, Lincoln, briefly rehearsed some of the history, origins and habits of weeds. He believed that despite a general fear in the 1850s that 'the country would be

completely overrun' by some introduced weeds like Scotch thistle, 'the virulence of the attack' of this and other weeds like foxglove and Californian thistle had, by 1926, passed.⁷²

Regarding science, it is clear from what Thomson wrote that in New Zealand understandings were changing quite rapidly, away from a purely organismic 'displacement' approach to a systemic, ecological consideration of plant naturalisations.⁷³ Among that of others, Thomson used the work of Leonard Cockayne, a pioneer New Zealand ecologist, to illustrate the point. Cockayne, a self-educated naturalist, had in 1919 tartly dismissed displacement in favour of ecological explanations.⁷⁴ Although many exotic plants:

at first sight appear better suited to the soil and climate than are the indigenous species ... this is only the case where draining, cultivation, constant burning of forest, scrub and tussock, and the grazing of a multitude of domestic animals have made absolutely new edaphic [i.e., soil, ground] conditions which approximate those of Europe and there is no wonder the European invader can replace the aboriginal.⁷⁵

In their discourse on the history of the colonial New Zealand flora, Travers, Potts, Thomson and Cockayne were using their science to try to understand the profound changes that they witnessed during their lifetimes. Some, among the rising generation of New Zealand professional scientists were, by the 1920s, considering the application of science, and particularly ecological principles, to weed control.

A short history of the investigation of biological control of weeds in New Zealand by the Cawthron Institute, published in 1970, sheds some light on a shift away from the explanatory towards what the Australian environmental historian Libby Robin has labelled 'government science', a science geared to economic development.⁷⁶ The author, D. Millar, became director of the programme in 1928. Public funding in 1926, to investigate insect control of weeds in New Zealand, followed the success of similar programmes elsewhere in the Pacific.⁷⁷ Limited though Millar's history is, in that it focuses essentially on the narrow framework of the contemporary research and its outcomes, it provides an insight into the emergence of a distinctly agronomic outlook and mode of thought, characteristic of New Zealand agricultural science from then onwards. Miller could still conclude in the late 1960s that 'the successful biological control of any weed is futile unless *something useful* [emphasis added] is grown in place of the weed'.⁷⁸

This ideology is also evident in the contributions of Miller and another New Zealand scientist to a 1940 international symposium on the control of weeds. Bruce Levy, of the grasslands division of the Plant Research Bureau, Palmerston North, advocated weed prevention by carefully balancing sward composition and density, and stock grazing to reduce weed competition and increase land productivity. 'No major work of control can be permanently effective unless the

country is at the same time effectively grazed and farmed.⁷⁹ Miller viewed the reversion of four million acres of former pasture to scrub and second growth indigenous forest, *via* infestation by noxious weeds, as an economic waste. He advocated a cultural solution to the weed problem, dependent on sound pasture and stock management. But, echoing Thomson, he said that 'owing to existing conditions, among which lack of population is prominent, cultural control cannot altogether be depended upon'.⁸⁰

In his 1973 review of the history of noxious weeds legislation in the state of Victoria, Australia, W.T. Parsons, director of the Keith Turnbull research station at Frankstown, came to much the same conclusion as Thomson and Miller about the effectiveness of legislation by itself to control weeds. The fragmented nature of Australian administration within and across state borders constituted part of the problem. Parson promoted an understanding of the ecology of weed species and the use of pasture management to control them. Parsons' comments on fragmentation are pertinent to the New Zealand situation following the relatively recent handing over of weed control to regional councils, and the emerging disparities between their localised policies and methods.⁸¹

This preoccupation with the application of public science to the control of wild nature and thus the enhancement of productivity has been a persistent theme in the New Zealand literature since World War II, virtually up to the present day. An American, A.H. Clark, who spent almost two years in New Zealand during the early years of World War II, drew attention in 1949 to infestations of North Canterbury tussock grasslands by *Nasella* tussock, an Argentinean import. No agreement had been reached on effective control methods, but the time-honoured recourse to legislation got under way just before Clark left the country in 1942. This would establish control boards, similar to rabbit boards.⁸²

Clark also saw the eradication of gorse as problematic. It could be managed where 'good husbandry' kept hedges under control. But farmers held the opinion, almost universally, that wherever gorse had spread across the wide Canterbury riverbeds, up gullies and over hill slopes, cutting and grubbing infested areas became uneconomic because of the low productivity of most of the land involved.⁸³ They held out some hope that quick-growing pines might in some locations out-compete gorse for sunlight and water. Success on any large scale required either 'a labour of love' from farmers or government assistance.

Broom posed a lesser problem, because it had not spread to anywhere near the same extent. Blackberry, which covered thousands of acres in the higher-rainfall regions of Nelson and Westland, presented a different story. Clark attributed its spread to birds eating the ripe berries. He wondered whether its introduction might have had something to do with west-country English immigrants' taste for blackberry pie and clotted cream. Biological control of gorse had met with limited success. With blackberry, it was a non-starter. The preferred parasites were 'too catholic in their tastes' to permit release without endangering the wider fruit industry.⁸⁴

In *The Western Invasions of the Pacific and its Continents* (1963), the Australian historical geographer A.G. Price picked up Clark's general theme of dogged transformations for the sake of productivity. But he took cognisance of the price of that transformation, in terms of wildly fluctuating imbalances in the new, manufactured ecosystems. Price considered (wrongly, as has been demonstrated here) that only from around 1907 did 'the New Zealanders ... see the practical results of the invasions'. Although by then New Zealand depended on exotic species for its economic prosperity, in the 1950's the country continued to face problems arising from ongoing disturbances to ecological balances. The control of rabbits, for example, had brought in its wake the rapid spread of introduced sweet briar.⁸⁵

Nevertheless an emphasis on weeds and weediness as the antithesis of productivity and prosperity continued. In a booklet published in 1949 for both popular consumption and educational use, the geographer K. B. Cumberland felt sure that 'Grass, livestock, fertilisers and enlightened farmers ... build the prosperity of New Zealand.' He contrasted pastures which 'are maintained by careful grazing and frequent topdressing with artificial fertilisers' to those:

where methods and management have been deficient [and] pasture grasses have been largely replaced or crowded out by weeds, second growth and shrubby plants of very great variety.

He did grant nature some beneficial agency. When erosion followed in the wake of forest removal from hill country weeds like gorse, bracken and manuka helped to stabilise sheet erosion and provided a nursery for forest re-growth:

It is a consolation to know that if and when man withdraws from the higher-rainfall hill country, then nature is willing to assume control again.⁸⁶

Not everyone shared Cumberland's patronising, agronomical point of view. Following a sojourn in New Zealand from 1947 to 1949, the American zoologist, ornithologist and oceanographer R. C. Murphy in 1952 set down his own and earlier perceptions of, and current views about, the relationship between people and nature in New Zealand, from pre-European times to the present.⁸⁷ He too, saw the transformation of the indigenous flora and fauna in terms of invasion and, more importantly, ecological disturbance.⁸⁸ Noting Darwin's and Hooker's mistaken conclusion that Old World plants possessed some intrinsic competitive superiority, he reiterated Thomson's and Cockayne's positions, observing that:

European plants were superior only in being dominants in a long-established man-made kind of terrain, to which much of New Zealand in turn was being rapidly converted.⁸⁹

Clearly taken aback by both the speed and scale of the transformation, and the changes that had occurred to the growth and dispersal patterns ('population explosions') of introduced species, Murphy lamented a lack of space to cata-

logue the ‘shocking effects’ upon the indigenous flora and the soil. He agreed with Cumberland on one point. Too much of the land had gone ‘down to the sea in slips’.⁹⁰ But in the same way that Americans had forgotten that their north eastern states had once been a land of wild turkeys and huge white pines, most New Zealanders were, Murphy thought, largely oblivious to what he regarded as changes for the worse. Much ‘manufactured’ grassland had reverted to scrub, through the agency of gorse and broom. Academics, educators, a very few politicians, enlightened agriculturalists and sections of the press were aware of the situation. But the lag between what the few knew and what all should know was great.⁹¹

The generally pessimistic tenor of his remarks was not altogether misplaced. In the June 1960 issue of the *New Zealand Journal of Agriculture*, which marked its fiftieth anniversary, three articles reviewed the history of weeds and attempts to deal with them.⁹²

One, by G.R. Moss, a farm advisory officer with the Department of Agriculture, dealt briefly with attempted legislative and biological controls, before moving on to consider cost-effective control measures. Moss concluded that the problem would remain ‘until every gorse hedge has been destroyed’.⁹³

Another article, by P.R. Stephens, alluded to the role of weeds in ‘man’s struggle to develop agricultural production’ from biblical times onwards. Drawing from *Journal* files, the author saw the war years, 1939–45, as a turning point in weed control in New Zealand. Failures with biological and chemical control had up to then frustrated a string of local researchers. The article concluded that the first introduction of selective organic weed sprays in 1946 had revolutionised weed control.⁹⁴

Controversial attempts to introduce central government legislation to deal with noxious weeds, beginning in 1892, were reviewed in the third article, also by Stephens. By 1910 there had been a realisation, Stephens said, that the legislation which had finally been passed in 1900, could not of itself rid the country of noxious weeds. Stephens advocated ‘careful and repeated cultivation [as] the radical exterminator’. Like Levy before him, he saw salvation from pasture weeds such as Californian thistle coming in the form of competition from stronger-growing grass species.⁹⁵

An ironic twist to the tale of post-war weed control came within a few years. In the late 1970s Cumberland, by then professor emeritus at Auckland University, put together a televised series, *Landmarks*, on human-induced landscape changes in New Zealand, with an accompanying book. The language of agronomy and the imagery of conflict, crusade and battle pervaded his salvational account of the relationship between people and other introduced species:

Nature exacts its revenge. Haphazard introduction of alien animals and plants had unforeseen and often disastrous effects. Man’s fleeting hold was threatened as the

land lost its fruitfulness or the soil slipped away. Lessons were learned the hard way – and only just in time.

But, and for Cumberland it was a very big ‘but’, he worried that if weed-killers like 2-4-5-T (the Agent Orange of Vietnam, used on gorse in New Zealand) were withdrawn due to mounting concerns about their effects on people, the implications for farm productivity could be ‘profound’.⁹⁶

Two other accounts of problems associated with New Zealand weeds, published in the early 1980s, stand in some contrast to Cumberland’s position. A. Rahman attributed the introduction of most arable weeds to seed impurities and farm machinery. He foresaw a greater use of selective weed killers but unlike Cumberland, regarded this as a mere panacea. The outcome would be simply a ‘continuing and faster change of the weed flora of arable land’. L. J. Matthews was equally explicit. He noted that there were no endemic weeds of improved pastures in New Zealand.⁹⁷ ‘Mankind must accept full responsibility for present-day problems.’ The agronomic doctrine that management of grazing animals alone would control pasture weeds had ‘over-coloured’ thinking to the extent that ‘a paucity of knowledge still governs many weed control practices’. It could be demonstrated that weeds were to be found in New Zealand pastures as a direct result of excessive control pressures. He took the position that ‘each and every agricultural practice develops its own set of weed problems’. He advocated a better knowledge and application of weed ecology including, in some cases, the complete withdrawal of all control measures.⁹⁸

Writing in 1981, B. E. V. Parham of the botany division of the Department of Scientific and Industrial Research, Lincoln, thought otherwise. In New Zealand, ‘no form of land use can be undertaken without adequate provision for their control, however difficult and expensive’.⁹⁹ By the end of the 1980s, however, control regardless of cost came under closer scrutiny. R. J. Field, professor, and G. T. Daly, reader of plant science at Lincoln University, Canterbury, separated ‘control’ into three categories – eradication, prophylaxis and containment. Using an economic and ‘cosmetic’ threshold model they, like Matthews, took the view that in those cases where numbers fall below a threshold level, determined by a farm-based cost–benefit analysis, then weeds should be tolerated.¹⁰⁰

CONCLUSION

So, these are some of the ways people have conceptualised and written about their relationships with a specific part of nature, which we in the English-speaking West have come to call weeds. However obscure the etymological roots of our name for a group of plants with which we continue to compete and still seek in some measure to control, it is possible to discern, through the various literatures, the varieties of Otherness in which we have cast them.

The Neolithic monocultures that transformed the ecosystems of the Near East were the seedbeds of a conceptual transition about the relationship between people and their floral competitors. This transition found expression in, among other places, the tribal stories that became the literature of the Old Testament. Genesis 2 and 3 explained not only the 'how' but also the 'why' of the tribulations experienced by an agricultural society in an unforgiving environment.¹⁰¹

Reinforced by Greco-Roman traditions of lost innocence and Arcadian places, the retributive and antipathetic symbolisms of weediness passed into the New Testament. From the Parables, weeds took on a moral as well as a theological Otherness. Both were re-emphasised by the new exegeses of the post Reformation years and flowed into the language and imagery of secular affairs. They coloured not only the literature of Shakespearean England but, as van der Zweep has shown, much of that of middle and western Europe.¹⁰²

In the world of the natural theologians, weeds as part of Nature reflected a purposeful Deity, one, which, moreover, looked kindly upon a self-improving humanity. Weeds became part and parcel of the Halesian imperative to subjugate Nature in the raw, the elimination of their Otherness being held up as a mark of moral rectitude, or at least good husbandry.

In the Enlightened Old and New Worlds, some were not so sure. With weediness, reason seemed often to fly in the face of received wisdom. For some, weeds regained their former utility, retaining something of their moral purposefulness. For others like the apothecaries, morality was subsumed by practicality. For some of the botanists, there never had been Otherness.

And as urban humanity moved away from Nature in the raw, aesthetic and poetical considerations gave weeds yet another hue. Otherness became romanticised. At the same time, the new, positivist science and the newer geography occasioned a quite different rethinking of the nature–humanity relationship, one that came down, increasingly, on the side of Nature. With growing clarity, it came to be seen that weediness is not intrinsic, not a category of nature. Whatever Otherness weeds may possess, it is an outcome of human artifice.

Weeds exercised the minds of the Antipodean settler-scientists, their professional successors and their politicians. In New Zealand the public discourse has been constructed around quite disparate scientific, geographic and historical-geographic positions. Initially it centred on ideas about the role of 'natural laws' *versus* human agency. More recently fairly narrow notions of agricultural productivity within a strictly agronomic context have come up against much wider perceptions and expressions of disquiet, largely articulated by historical geographers, about the directions and practical outcomes of the discourse. A very few, like G. M. Thomson, Leonard Cockayne and Gordon Ell, sought to understand weediness and the success or failure of human responses in historical and cultural as well as scientific terms. They brought new insights into a

relationship that had been intuitively understood by people like John Lorain in eighteenth-century America and Thomas Potts in nineteenth-century New Zealand – that humans and weeds had long been competing for the same places, and that human monocultures had long advantaged the weeds.

Some twentieth-century sciences have, however, been intent not only on understanding the natural world but also on providing measures to subdue or improve it in a way that would have been understood by a sixteenth-century divine like Matthew Hale. The poisoning, however, of both places and people has, in some parts of the Western world, brought the relationship and the age-old competition for open places once again into sharp relief. Gradually, though hardly universally, there seems to be a shift in focus, from controlling the invader by whatever means to managing invaded ecosystems. Recent advocacy for the conservation of biodiversity by changing human behaviours with regard to plant introductions and use, land uses and the management of control measures would have appealed to Leonard Cockayne and his pioneering ecologist colleagues.¹⁰³

With the striking exception of Frieda Knobloch's chapter about weeds in her 1996 book *The Culture of Wilderness*,¹⁰⁴ the discourse surveyed here has by and large been written by men, about men. In New Zealand, as elsewhere in the Western world, women's plants have been largely confined to garden culture. Wider aspects of women's cultures are, for example, tantalisingly hinted at in Ell's wildflowers and garden escapees. What might the historical record yield up to closer scrutiny?

It is a discourse of some breadth, but no great depth. Its existence, particularly in New Zealand, is due largely to disparate authors, other than historians. It is, moreover, an historiography that begs the question, why has the relationship between weeds, people and the places they contest, a contest that has gone on for something like ten millennia, been treated, as it were, only in passing? These and other questions about a remarkable inter-species relationship invite answers from environmental historians interested in a societal contest that shows no signs of abating.

GLOSSARY

Botanical nomenclature tends to vary from author to author and over time. To maintain some consistency with the sources, wherever possible the nomenclature used by authors such as Salisbury (1961) and Rackham (1986) has been replicated below. The particular nomenclature followed by an author is usually stated in her or his Preface or Introduction. In those instances where a botanical name is not given by any author cited, Hilgendorf (6th edition, 1960) has been used.

Barberry

Berberis vulgaris

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Blackberry	<i>Rubus fruticosus</i> , <i>R. laciniatus</i> (Hilgendorf)
Bramble	<i>Rubus fruticosus</i>
Briar	<i>Rosa</i> spp. In New Zealand, usually <i>R. eglantaria</i>
Broom	<i>Cytisus (Sarthamnus) scoparius</i>
Californian Thistle	<i>Cirsium arvense</i> (Hilg.) Also known as Canadian thistle. Actually a native of Europe.
Campion	<i>Silene</i> spp.
Charlock (Wild turnip)	<i>Sinapis arvensis</i>
Darnel	<i>Lolium temulentum</i>
Dock	<i>Rumex</i> spp.
Dodder	<i>Cuscuta epithymum</i>
Fennel	<i>Foeniculum vulgare</i>
Fern (Bracken)	<i>Pteridium esculentum</i>
Foxglove	<i>Digitalis purpurea</i> (Hilg.)
Fumitory	<i>Fumaria officinalis</i> and <i>F. muralis</i>
Golden Thistle	<i>Scolymus hispanicus</i>
Goosefoot (Fat Hen)	<i>Chenopodium album</i>
Gorse (Furze, Whin)	<i>Ulex europeus</i>
Ground Elder	<i>Aegopodium podagraria</i>
Groundsel	<i>Senecio vulgaris</i>
Hairy Vetch	<i>Vicia hirsuta</i>
Hard Rush	<i>Juncus inflexus</i>
Heather	<i>Calluna vulgaris</i> . See also <i>Erica</i> spp.
Hemlock	<i>Conium maculatum</i>
Horsetail	<i>Equisetum arvense</i>
Meadowsweet	<i>Filipendula ulmaria</i>
Manuka	<i>Leptospermum scoparium</i>
Nasella Tussock	<i>Nasella trichotoma</i> (Hilg.)
Nettle	<i>Urtica dioica</i> and <i>U. urens</i>
Persicaria (redshank, knot weed, lady's thumb, willow weed)	<i>Polygonum persicaria</i>
Poppy	<i>Papaver rhoeas</i>
Ragwort	<i>Senecio jacobaea</i>
Rush	<i>Juncus</i> spp.
Sea plantain	<i>Plantago maritima</i>
Scentless mayweed	<i>Matricaria indora</i> ,
St. John's Wort	<i>Hypericum perforatum</i>
Scabious	<i>Scabiosa columbaria</i>
Scotch Thistle	<i>Cirsium lanceolatum</i> (Hilg.)
Stinking Mayweed	<i>Anthemis cotula</i>
Thistles	One or other of <i>Carduus</i> , <i>Carlina</i> , <i>Centaurea</i> , <i>Cirsium</i> , <i>Onopordon</i> or <i>Silybum</i> spp.

Thorny Burnet	<i>Sarcopoterium spinosum</i>
Willow-herb	<i>Epilobium</i> spp.
Woad	<i>Isatis tinctoria</i>
Yarrow	<i>Achillea millefolium</i>

NOTES

This article began in a small way as an Honours research paper. That it appears here is due entirely to the gentle persuasion of my doctoral supervisors, Associate Professors Judy Bennett and Tom Brooking of the History Department, University of Otago. They eventually convinced me it was worth publishing and have subsequently guided and encouraged its various iterations. The initial inspiration came from Professor Tom Isern, North Dakota State University, who observed, in the course of a study visit to New Zealand, that quite a lot is understood about the history of Antipodean faunal invasions but little about the floral.

¹ Cited in W. van der Zweep, 'Golden words and wisdom about weeds – weeds in proverbs, quotations verse and prose', *Biology and Ecology of Weeds*, ed. W. Holzner and M. Numata (The Hague: Junk, 1982), 62. Van der Zweep comments that 'Weed scientists had better consider this a dissonance in their public relations.'

² 'Young' is used here in terms of length of European occupation. Geologically New Zealand is old, a remnant of Gondwanaland. As we shall see, that age is reflected in the nature of its indigenous flora.

³ Leonard Cockayne, *New Zealand Plants and Their Story*, 2nd edition (Wellington: Government Printer, 1919), 145, 146.

⁴ I am indebted to Associate Professor Judith Bennett, of the History Department, University of Otago, who drew my attention to Greg Bankoff's paper 'Societies in Conflict: Algae and Humanity in the Philippines', in *Environment and History* 5, 1 (1999): 97–123. I share Bankoff's critical view that among most historians there is 'an implicit assumption that humanity stands at the apex of life on this planet'.

⁵ Two ideas which have developed some currency in recent years, biodiversity and ecofeminism, may not appear to have been given their due in this essay. With one or two exceptions they are not strongly reflected in the discourse cited here. An essay such as this, however, is by no means exhaustive. Much may have been overlooked in my reading.

⁶ C. J. Glacken, *Traces on the Rhodian Shore, Nature and Culture in Western Thought From Ancient Times to the end of the Eighteenth Century* (Berkeley: University Of California, 1967, reprinted 1990), 317.

⁷ F. Uekoetter, 'Confronting the pitfalls of Environmental History: An Argument for an Organisational Approach'. *Environment and History* 4 (1998): 31–52.

⁸ There is, in addition to the few examples cited here, a large, relatively recent and expanding North American literature touching upon various aspects of the history of the humans–weeds relationship. It is a literature that wants surveying in its own right, beginning perhaps with Alfred Crosby's *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (Cambridge: Cambridge University Press, 1986).

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⁹ F. Knobloch, *The Culture of Wilderness, Agriculture as Colonization in the American West* (Chapel Hill: North Carolina University Press, 1996): 114–15. ‘Not weeds’ is Knobloch’s term.

¹⁰ M. Pollan, ‘Weeds Are Us’, in *Second Nature: A Gardener’s Education* (New York: Dell, 1991), 116. One-liners abound in both scholarly and popular accounts of weeds. Emerson’s, ‘A weed is simply a plant whose virtues we haven’t yet discovered’, is cited by Pollan.

¹¹ L.J. King, ‘Some early forms of the weed concept’, in *Nature*, 179 (1957), 1366; King, *Weeds of the World, Biology and Control* (London and New York: Hill, 1966), 1–6.

¹² For a derivation of the term ‘weed’ see *The New Shorter Oxford English Dictionary* (Oxford: Clarendon Press, 1993), v. 2, 3648. King, *Weeds of the World*, 5, observed that in 1958 A. A. Lawrence of the Dictionary’s editorial staff disagreed with this theory. King conceded that a philological approach could yield only a tentative connection between the modern term and the ubiquity of woad which, with very few exceptions, has not itself been generally classed as a weed. He commented that perhaps the botanical evidence was more compelling than the etymological. To conserve space in the text, common names for plants are used throughout. A glossary of botanical names is appended to this essay.

¹³ King, *Weeds of the World*, 5.

¹⁴ King, *Weeds of the World*, 8–9.

¹⁵ Sir Edward Salisbury, *Weeds and Aliens* (London: Collins, 1961), 18.

¹⁶ Salisbury, *Weeds and Aliens*, 82–3. Other plants, introduced into environments at or near their climatic tolerances, and which tend to be localised or rare, he classed as ‘casual aliens’. An American ecologist Marcel Rejmánek, has separated weeds from ‘invaders’ and ‘colonisers’. These, he says, reflect three different points of view: anthropocentric (weeds being plants growing where they are not wanted), ecological (colonisers appear early in plant successions) and bio-geographical (invaders spread into areas where they are not native). See ‘What Makes a Species Invasive?’ in *Plant Invasions, General Aspects and Special Problems*, P. Pyaek, K. Prach, M. Rejmánek and M. Wade, eds. (Amsterdam: SPB Academic Publishing, 1995), 3. All three aspects of ‘weediness’ are considered here.

¹⁷ Salisbury, *Weeds and Aliens*, 30, 33, 206, 228, 274. His discussion of these aspects of weediness is, however, incidental, unsystematic and fragmentary.

¹⁸ That may no longer be the case, but subsequent scholarship on the question, if there is any, has not emerged in the course of this survey.

¹⁹ Salisbury, *Weeds and Aliens*, 24–9.

²⁰ Salisbury, *Weeds and Aliens*, 23.

²¹ D. Worster, to the conference of the American Society for Environmental History, cited by M. Egan <michaele@sfu.ca> in ‘The Future of Environmental History’, contribution to H – NET List, <H-ASEH@H-NET.MSU.EDU>, 27 April 1999.

²² C. S Elton, *The Ecology of Invasions by Animals and Plants* (London: Methuen, 1958), 117–18, Ch. 9, *passim*.

²³ O. Rackham, *The History of the Countryside – The Full Fascinating Story of Britain’s Landscape* (London: Dent, 1986), xiii, 53.

²⁴ Rackham, *The History of the Countryside*, 53–4. Edward Hyams, *The Story of England’s Flora* (Harmondsworth: Penguin, 1979), *passim*, provides an insight into the exotic origins and the history of the introduction into England of many species which have come to be thought of as indigenous to that country.

²⁵ 'The Herbarium of Apuleius', 11th century, in J. de Gex, *A Medieval Herbarium* (London: Pavilion Books, 1995), 22.

²⁶ de Gex, *A Medieval Herbarium*, 16. For a modern treatment of the history of those weeds considered to have curative properties, see P. Jones, *Just Weeds, History, Myths, and Uses* (New York: Prentice Hall, 1991).

²⁷ *Hamlet*, Act I, Scene ii. All quotations are from B. Hodek, ed., *The Complete Works of Shakespeare* (London: Spring Books, n.d.).

²⁸ Pollan, *Second Nature*, 118.

²⁹ *Henry IV, Part 1*, I. iii.

³⁰ Cited in Salisbury, *Weeds and Aliens*, 32–3, 146–7. Salisbury gives FitzHerbert as John in his text and A. in his index.

³¹ Virgil, Eclogue IV, cited in R. Williams, *The Country and the City* (London: Oxford University Press, 1973), Ch. 3 *passim*.

³² W. E. Shewell-Cooper, *Plants and Fruits of the Bible* (London: Darton, Longman and Todd, 1962), 145–8.

³³ *The New International Version Study Bible* (Michigan: Zondervan, 1984), 1462.

³⁴ M. Zohary, *Plants of the Bible* (Cambridge: Cambridge University Press, 1982), 9, 12–14, 153. Zohary notes that local renderings (Greek, Latin, Aramaic, Syric and so on) of Biblical weed and plant names, often quite unrelated to the Hebrew or Arabic originals, can be attributed to a lack of knowledge of Hebrew floral terminology among translators, from the Septuagint (third century BC) to the present. The same plant, for example, can in English become briar, bramble, thorn and thistle. Something of the significance of the parable is therefore lost in the looseness of the translation. Rackham, p. 23, has made the same general point in relation to the use of translations from Latin, Old English and Norman French as historical sources. Not only do translators misread their texts, but 'guess at the meanings of unknown technical terms or fail to uphold distinctions of meaning'. The 'weeds' in the Parable of Weeds are, according to Zohary, either darnel or Syrian scabious or both. Both plants were difficult to remove from a wheat crop. Both impart a bitterness to flour, while darnel can also harbour a poisonous fungus. Shakespearean England knew it well. 'Want ye corn for bread? 'tis full of Darnel; do ye like the taste?' *Henry VI*, cited in Salisbury, *Weeds and Aliens*, 33.

³⁵ Zohary, *Plants of the Bible*, 153–67. Zohary uses the Revised Standard Version, 1973, throughout. Luke 6:45, added here in parenthesis, is from the *NIV Study Bible*. The bramble in Solomon is probably Golden Thistle. Zohary gives that in Luke 6:44 as *Rubus sanguineus*. For the way in which biblical images of weediness have passed into Western folk culture and literature, see van der Zweep in *Biology and ecology of weeds, passim*.

³⁶ A. Neckam, *De naturis rerum*, ed. T. Wright, London, 1963, cited in Glacken, *Traces on the Rhodian Shore*, 206.

³⁷ Keith Thomas, *Man and the Natural World, Changing Attitudes in England 1500–1800* (London: Allen Lane, 1983), 17.

³⁸ Glacken, *Traces on the Rhodian Shore*, 57–8, 157, 164–5.

³⁹ William Cole, *The Art of Simples*, 1656, 93, cited in Thomas, *Man and the Natural World*, 19–20. Cole classified weeds as one of seven different kinds of herbs, along with potherbs, medicinal herbs, corn, pulse, flowers and grass. For a discussion of John Ray, see N.C. Gillespie, 'Natural History, Natural Theology and Social Order: John Ray and the "Newtonian Ideology"', *Journal of the History of Biology*, 20 (1997), 1–49.

⁴⁰ Sir Matthew Hale, *The Primitive Organisation of Mankind*, 1667, 369–70, cited in Glacken, *Traces on the Rhodian Shore*, 481.

⁴¹ Thomas, *Man and the Natural World* 1983, 17.

⁴² Hale, *The Primitive Organisation of Mankind*, 369–70; Thomas Sprat, *History of the Royal Society*, n.d., 119–121, 386. Both are cited in Glacken, *Traces on the Rhodian Shore*, 480–2. Dr Sprat was Lord Bishop of Rochester.

⁴³ Thomas, *Man and the Natural World*, 272. The anonymous composer of the traditional Scottish air ‘The Broom o’ the Cowdenowes’ did not altogether share his countryman’s view about the ‘bonnie, bonnie broom’. See J.M. Diack, *The New Scottish Orpheus*, Glasgow, c.1922, 32–3 for score and lyrics and Silly Wizard, *Live Wizardry, The Best of Silly Wizard in Concert*, Green Linnet Inc, CD3036/37, 1988, track 13, for a recent rendition. I am grateful to Dr Alison Clarke, Hocken Library, University of Otago, for drawing my attention to this musical celebration of one of the ‘weedy’ flora.

⁴⁴ Each is cited in Thomas, *Man and the Natural World*, 270–2. Blith seems to have been something of a super-improver. He published *The English Improver Improved* in 1649. Sharrock, Archdeacon of Winchester Cathedral, published *The History of the Propagation and Improvement of Vegetables by the Concurrence of Art and Nature* in 1660.

⁴⁵ G.W. Francis, *The Little English Flora*, 1839, 111–12, cited in Thomas, *Man and the Natural World*, 272.

⁴⁶ J. von Goethe, ‘An Attempt to Evolve a General Comparative Theory’, in *Goethe’s Botanical Writings*, trans. Bertha Mueller, 81–4, cited in Glacken, *Traces on the Rhodian Shore*, 535–6.

⁴⁷ J. Lorain, *Nature and Reason Harmonized in the Practice of Husbandry*, Philadelphia, 1825, 27, cited in Glacken, *Traces on the Rhodian Shore*, 693–695.

⁴⁸ Lorain, *Nature and Reason Harmonized*, 518, cited in Glacken, *Traces on the Rhodian Shore*, 695–6.

⁴⁹ W. Cowper, *The Task*, lines 526–30; J. W. Tibble, ed., *The Poems of John Clare*, 1935; E. T. Cook and A. Wedderburn, *The Works of John Ruskin*, 1903–1912; A.T. Tait, *The Landscape Garden in Scotland*, Edinburgh, 1980. Each is cited in Thomas, *Man and the Natural World*, 272. Thomas observes, in a text note, 272, that ‘to the reformer H.S. Salt a garden was merely “a zoo with the cruelty omitted”’.

⁵⁰ *The Journal of Henry David Thoreau*, B. Torrey and F. Allen, eds., New York, 1962, cited in W. Cronon, *Changes in the Land – Indians, Colonists and the Ecology of New England* (New York: Hill and Wang) 1983, 1–6.

⁵¹ Raynal, *Histoire Philosophique et Politique des Etablissements et du Commerce des Européens dans les deux Indes* cited in Glacken, *Traces on the Rhodian Shore*, 682–3. Glacken comments, 663, that Buffon’s ideas about man the improver in many ways anticipated George Perkins Marsh.

⁵² B. Rush, ‘An Enquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, with Hints of Preventing Them’, *Transaction of the American Philosophical Society*, 2, 25 (1786) 206–12, cited in Glacken, *Traces on the Rhodian Shore*, 688.

⁵³ J. Eliot, undated letter in his *Essays upon Field Husbandry in New England and Other Papers, 1748–62*, ed. H.J. Carmen and R.G. Ingwell, New York, 1934, 96–7, cited in Glacken, *Traces on the Rhodian Shore*, 692–3.

⁵⁴ J. Bartram, in *Essays upon Field Husbandry in New England and Other Papers*, 203–4, cited in Glacken, *Traces on the Rhodian Shore*, 691. Bartram’s early interest in things botanical is referred to by Hyams, *The Story of England’s Flora*, 101.

⁵⁵ E. Johnson, *Johnson's Wonder-Working Providence*, J. Jameson, ed., New York, 1910; B. Rush, *Essays, Literary, Moral and Philosophical*, 2nd edn., Philadelphia, 1806, cited in Cronon, *Changes in the Land*, 1–6.

⁵⁶ T. Dwight, *Travels in New England and New York*, B. Solomon, ed., Cambridge Mass., 1969. Dwight, was realist enough to believe that it was 'altogether improbable' that barberry would ever be eradicated. He and Thomas Hutchinson are cited in Cronon, *Changes in the Land*, 155. Cronon does not give a source for Hutchinson. Rackham, *The History of the Countryside*, 42–3, cites moralists who, in the Age of Reason, dismissed the prejudice of farmers against barberry as an example of superstition. He quotes from W. Ellis, *The Timber-Tree Improved*, London, 1744:

This Tree has an ill Name for attracting Blights to the Corn that grows near it an ignorant malicious Farmer of *Frethesden* about the year 1720 conceived such a Hatred against a large one, that grew in his Neighbour's Ground, that he poured several Pails of scalding Water on its Roots, in the Night-season, at different Times, 'till he killed it.

⁵⁷ 'Man' is used here in the same non-gendered sense as Marsh used the term.

⁵⁸ G. P. Marsh, *Man and Nature, or Physical Geography as Modified by Human Action*, ed. D. Lowenthal (Cambridge: Harvard University Press, 1965), 61 and n. 18; 62 and n. 23; 63. This is in some contrast to the central thesis of *Man and Nature*, which eschewed environmental determinism in favour of an examination of man's effect on nature.

⁵⁹ Marsh, *Man and Nature*, 61 and n. 19; 65, 66. Rackham, in his discussion of historical methods and evidence, *The History of the Countryside*, 7, also comments on this aspect of the relationship, insofar as weed pollens may be the only remaining indicators of early agriculture. Similarly, some palaeobotanists point to an increase in weeds associated with cultivation, as markers of particular historical episodes. See, for example P. Hunter Blair, *An Introduction to Anglo-Saxon England*, 2nd edition (Cambridge: Cambridge University Press, 1977), 272 and n. 1, in relation to the Roman occupation.

⁶⁰ For an earlier expression of his views on civilisation and progress see G. P. Marsh, *Address Delivered Before the Agricultural Society of Rutland County*, 30 September 1847, Published by Request of the Society, Rutland, Vermont, Library of Congress, Washington D. C., S532.M36, 1. Marsh gave this address during his first term in the US Congress.

⁶¹ Marsh, *Address*, 17–18.

⁶² 'Marsh, George Perkins', *Britannica Online*, <<http://www.eb.com:180/cgi-bin/g?DocF=micro/378/4.html>> [Accessed 20 May 1999]; K.A. Olwig, 'Historical geography and the society/nature "problematic": the perspective of J.F. Schouw, G. P. Marsh and E. Reclus' in *Journal of Historical Geography*, 6, 1 (1980), 29–45, esp. 36–9; Marsh, *Man and Nature*, 13, 19.

⁶³ The extent to which European and North American traditions of thought shaped the settler view in New Zealand is one of the questions I explore in my doctoral thesis, 'New Zealanders and their Weeds, 1770–1970', University of Otago, New Zealand, in progress.

⁶⁴ T. Flannery, *The Future Eaters* (Chatswood, New South Wales: Reed, 1995) Ch 8, *passim*, and especially 303–306.

⁶⁵ G. Ell, *Introduced Wildflowers, New Zealand Weeds* (Auckland: Bush Press, 1983) 12, 14, 15, 21, 24, 25.

⁶⁶ For their respective positions on displacement of indigenous by exotic species see G. M. Thomson, *The Naturalisation of Animals and Plants in New Zealand* (London: Cambridge University Press, 1922), 526–7.

⁶⁷ R. Galbreath, *Walter Buller – The Reluctant Conservationist* (Wellington: GP Books, 1989), 121–2. For an argument in support of displacement see, for example, T. Kirk, ‘Displacement of Species in New Zealand’, *Transactions of the New Zealand Institute*, 28 (1895), 1–27 and *New Zealand Parliamentary Debates*, 31 July 1874, 351, c.1; G. Wynn, ‘Conservation and Society in Late Nineteenth Century New Zealand’, *New Zealand Journal of History*, 11:2 (1977), 124–136, and esp. 133. Wynn has argued that Potts’ parliamentary and popular advocacy of policies based on Marsh’s arguments had only a small degree of support. It came, he says, essentially from among those immigrants from the middle and upper ranks of British society who interested themselves in post-Darwinian natural history.

⁶⁸ H. Guthrie-Smith, *Tutira: The Story of A New Zealand Sheep Station* (Auckland: Random House, 1999), 236. See especially Chapters 26–35. This edition carries a forward by William Cronon, who was instrumental in having what has come to be widely regarded as a classic in the field of environmental history, republished in New Zealand and the United States after it had been out of print for some thirty years.

⁶⁹ Thomson, *The Naturalisation of Animals and Plants in New Zealand*, 16.

⁷⁰ Thomson, *The Naturalisation of Animals and Plants in New Zealand*, 17–21, 363.

⁷¹ Thomson, *The Naturalisation of Animals and Plants in New Zealand*, 22–3, 543–4, 552, 554–5

⁷² F. W. Hilgendorf, *Weeds of New Zealand and How to Eradicate Them* (Christchurch: Whitcombe and Tombs, 1926), iii, 1–14; 6th edition, 1960, Ch. 7 *passim*. He attributed this supposed loss of vigour over time to toxins secreted into the soil by the weeds themselves. The idea of gradual loss of vigour seems to have been first introduced to New Zealand science by a Swedish naturalist, Dr. Berggren, during a discussion of G. M. Thomson’s paper ‘On some Naturalised Plants of Otago’, presented to the Otago Institute in 1873. See *Proceedings of the Otago Institute*, 6 (1873), 444, 446.

⁷³ L. Robin, ‘Ecology: A Science of Empire’, in *Ecology and Empire, Environmental History of the Settler Societies*, T. Griffiths and L. Robin, eds. (Edinburgh: Keele University Press, 1997), 63–75. Robin discusses the origins of ecological science and argues that it is an outcome of the science of settling. To what extent Thomson’s own understandings were by 1922 grounded in this relatively new science is not clear. He appears to have had at least an intuitive understanding of the explanatory power of ecosystems, although Marsh seems to have remained a stronger influence.

⁷⁴ See *The Dictionary of New Zealand Biography* (Wellington: Auckland University Press, 1990), 3, 109 for an assessment of Cockayne’s contribution to New Zealand science. H.H. Allan, director of the Botany Division, Plant Research Bureau of the Department of Scientific and Industrial Research, Wellington, thought it necessary, as late as 1940, to support Thomson’s and Cockayne’s position on ‘the still all too prevalent views as to the relative aggressiveness of the introduced and the indigenous species’. See H.H. Allan, *A Handbook of the Naturalized Flora of New Zealand* (Wellington: Botany Division, DSIR, 1940), 9.

⁷⁵ Thomson, *The Naturalisation of Animals and Plants in New Zealand*, 528–34; L. Cockayne, ‘Observations concerning Evolution, derived from ecological studies in New Zealand’, *Transactions of the New Zealand Institute*, 44 (1911), 32. Cockayne hammered the point home in two later books, *New Zealand Plants and their Story* (Wellington: Government Printer, 1919), Ch. 10 *passim*, and *The Vegetation of New Zealand* (Leipzig: Engelmann, 1928), 355–62. From the heavy emphasis in the text of the latter it would

appear Cockayne was by then thoroughly exasperated by any remaining proponents of displacement theory.

⁷⁶ Robin, *Ecology and Empire*, 65.

⁷⁷ D. Miller, *Biological Control of Weeds in New Zealand, 1927–1948* (Wellington: DSIR, 1970), 5. Miller, formerly the director of the Cawthron Institute and of the entomology division of the New Zealand Department of Scientific and Industrial Research (DSIR), was seconded by that organisation to compile the history from available records.

⁷⁸ Miller, *Biological Control of Weeds in New Zealand*, 7.

⁷⁹ E. B. Levy, 'Pasture Weeds – Their Ecological Relationship to the Pasture Sward', in *The Control of Weeds, a symposium on the prevention and eradication of weeds on agricultural land by cultural, chemical and biological means*, ed. R. O. Whyte (Aberystwyth: Imperial Bureau of Pastures and Forage Crops, 1940), 144–52.

⁸⁰ D. Miller, 'Biological Control of Noxious Weeds of New Zealand', in *The Control of Weeds, a symposium on the prevention and eradication of weeds on agricultural land by cultural, chemical and biological means*, ed. R.O. Whyte (Aberystwyth: Imperial Bureau of Pastures and Forage Crops, 1940), 153–7.

⁸¹ W.T. Parsons, *Noxious Weeds of Victoria* (Melbourne: Inkata Press, 1973), v-20. I thank Dr. Graeme Parmenter, Invermay Agriculture Centre, Dunedin, for providing a copy of Parsons' material on noxious weeds legislation. See also 'Staff Recommending Reports Evaluating Submissions on the Pest Management Strategies for Otago', *Proposed Pest Management Strategy for Otago* (Dunedin: Otago Regional Council, 2000), 2, 34. Environment Southland (another regional council, bordering the Otago region) expressed concern about inconsistencies between weed control programmes for the two regions. The Southland council took the view that pests knew no boundaries.

⁸² A. H. Clark, *The Invasion of New Zealand by People, Plants and Animals, South Island* (New Brunswick: Rutgers University Press, 1949), 349, footnote.

⁸³ This view seems to have been shared by Canterbury high country pastoralists. At Lake Heron Station, according to one of those involved with running the station in 1942, desultory attempts were made to grub out stands of gorse only if there was nothing more compelling to do. A.M. Patterson, Highcliff Road, Dunedin, personal communication, July 1999.

⁸⁴ Clark, *The Invasion of New Zealand*, 362–5.

⁸⁵ A.G. Price, *The Western Invasions of the Pacific and its Continents, A Study of Moving Frontiers and Changing Landscapes, 1513–1958* (Oxford: Clarendon Press, 1963), 197–201.

⁸⁶ K. B. Cumberland, *This is New Zealand, A Pictorial Description* (Christchurch: Whitcombe and Tombs, 1949), 17, 22–3.

⁸⁷ R.C. Murphy, 'Man and Nature in New Zealand', *New Zealand Geographer*, 8:1 (1952), 1–14. The article first appeared in the *Proceedings of the American Philosophical Society*, 59:6 (1951), 569–82. I am grateful to Roy Goodman, the society's assistant librarian and curator of printed materials, who supplied background material on Murphy's life and work, including the period he was in New Zealand.

⁸⁸ Murphy also thought in terms of ecological climax, rather than continuum, a position that inevitably coloured his conclusions. As well, some of his statements, for instance those about moa extinctions, are contrary to evidence that should have been available to him at the time.

⁸⁹ Murphy, 'Man and Nature in New Zealand', 5.

WEEDS, PEOPLE AND CONTESTED PLACES

⁹⁰ Murphy was referring, 12, to *Down to the Sea in Slips*, a booklet written by A. D. Campbell in 1946 for the New Zealand Soil Conservation and Rivers Control Council. He implies, mistakenly, that Cumberland wrote it.

⁹¹ Murphy, 'Man and Nature in New Zealand', 7–14.

⁹² Although there have been frequent articles about weeds in the *Journal* over the years, these appear to be the only three which consider the historical background to the problem.

⁹³ G.R. Moss, 'Gorse, A Weed Problem on thousands of Acres of Farmland', *New Zealand Journal of Agriculture*, 100, 6 (1960), 561–7.

⁹⁴ P.R. Stephens, 'Weed Control', *New Zealand Journal of Agriculture*, 100:6 (1960), 581. One researcher, A.H. Cockayne, Leonard's only son, had in 1913 reiterated his father's view that the ecological mechanism of weed spread must be understood if control measures were to have a chance of success. Nobody in New Zealand seemed to pay much heed.

⁹⁵ P.R. Stephens, 'Noxious Weeds', *New Zealand Journal of Agriculture*, 100, 6 (1960), 613, 615.

⁹⁶ K. B. Cumberland, *Landmarks* (Reader's Digest: Surry Hills, 1981), 6–7, 178–81, 188–91. Cumberland added emphasis with a rather lurid illustration of a weed-spraying helicopter swooping low across a gorse-covered hillside. Television New Zealand produced and broadcast the television series of the same name.

⁹⁷ This may be compared with the problems Australian farmers faced with endemic weeds. See W. Frost, 'European Farming, Australian Pests: Agricultural Settlement and Environmental Disruption in Australia, 1800–1920', *Environment and History*, 4 (1998), 129–43.

⁹⁸ Rahman, A., 'New Zealand', and L.J. Matthews, 'Pasture weeds in New Zealand', in *Biology and Ecology of Weeds*, ed. W. Holzner and N. Numata (The Hague: Junk, 1982), 299–308. Rahman was then a scientist at the Ruakura soil and plant research station, Hamilton. Matthews was with the Plant Protection Service of the FAO in Italy.

⁹⁹ B.E.V. Parham, *Common Weeds in New Zealand* (Wellington: Government Printer, 1981), 9–11.

¹⁰⁰ R. J. Field and G.T. Daly, 'Weed Biology and Management' in *Pastures, their Ecology and Management*, ed. R.H.M. Langer (Auckland: Oxford University Press, 1990), 409–447. For the time being, that would appear to be a position somewhat in advance of most Regional Councils which, under current New Zealand legislation, are charged with developing and enforcing weed control policies.

¹⁰¹ For a discussion of the etiological nature of Genesis, see L. Boadt, *Reading the Old Testament, an Introduction* (New York: Paulist Press, 1984), Ch. 6 *passim*.

¹⁰² See Note 1.

¹⁰³ For a discussion of this, see 'An Integrated Approach to the Ecology and Management of Plant Invasions', *Conservation Biology* 9, 4 (1995), 761–70.

¹⁰⁴ See Note 9.

Selling the Space Age: NASA and Earth's Environment, 1958–1990

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ABSTRACT

The National Aeronautics and Space Administration (NASA) was created in 1958 to develop America's non-military space effort. But the early leaders of a self-consciously elite science and technology agency rarely saw Earth as a part of 'space' or solar system exploration. This is clear when examining NASA's relations with earthly applications in the late 1950s and 1960s and with fast-emergent environmentalism in the 1970s and 1980s. NASA consistently misread the importance of the most popular science-based political movement of the late twentieth century. NASA was advised from 1959 onwards that earthly concerns – and practical worldly benefits – were necessary to create broad and enduring support for space explorations. Despite this, NASA leaders consistently underestimated, ignored or spun-off Earth 'applications' in the formative period of America's civilian space programme. Power and prestige-focused human spaceflight, Moon and Mars missions, and human settlement of the solar system, became NASA's enduring 'human spaceflight culture'.

KEY WORDS

Environmentalism, space exploration, space policy, earth resource satellites, ecology and state, United States, astronautics

Political ironies abounded in the early space age. Earthly frontiers are developed for use, resources, settlement, profit and protection. NASA's space frontiers, however, normally lack all these characteristics. Fifty years after the birth of the Space Age, space advocates are only beginning to understand that the cosmic place most people care about most deeply is Earth. NASA became a major player in Earth science in the late 1980s. Overall, however, it lagged behind

much ecological, climatological and other research undertaken by other agencies and nations into the 1990s. NASA's institutional blinders and group-think failed to connect it strongly to the major science-based social movement of the late twentieth and early twenty-first centuries.

In July of 1973, the top two managers at the National Aeronautics and Space Administration (NASA) considered a proposal. NASA headquarters' Public Affairs director had been pushing Administrator Dr James C. Fletcher and Deputy Administrator George M. Low about it 'for quite some time'. The idea was, Low recorded, that 'we consider, for P[ublic] R[elations] purposes, the entire NASA program in terms of an environmental theme: the Study of the Earth and Its Environment'.¹

The 'PR' proposal was clearly relevant. NASA's budget and workforce had fallen by one-third since the Apollo II lunar landing of July 1969. It was over three years since the first Earth Day in April 1970. As lunar and planetary enthusiasms lagged, earthly environmentalism had transformed from a collection of local, state-based and specialised groups into a large and growing national and international movement. Five important national environmental organisations including the Natural Resources Defense Council and Friends of the Earth came into existence in the US between 1967 and 1971. Older conservationist groups like the Sierra Club and the National Audubon Society had their memberships double and redouble. Congress took note. The first strong Clean Air Act and the Environmental Protection Agency were legislated into existence in 1970 as NASA's first effort to inaugurate a thirty-year Apollo programme for Mars failed utterly. Most poll respondents wanted NASA spending cut. Public concern with pollution and ecology as an 'important national problem', however, simultaneously rose from one in a hundred to one in every five respondents, and, to the surprise of many pollsters, stayed high. Sixty to ninety per cent of Americans wanted higher spending for cleaner air and water, or for environmental improvements generally. Prominent big business executives who had equated 1960s ecology and product safety efforts by reform-minded public interest lawyers like Ralph Nader with fads 'of the same order as the hula hoop' now muted their voices. Nader wasn't going away; environmentalism wasn't either. By 4 January 1971, even conservative *Time* magazine claimed environmentalism was the 'issue of the year' and was 'a national obsession'.²

The view from the top at NASA, however, was very different. 'Fletcher and I', Low noted in his diary,

have discussed this [environmental theme for NASA] on several occasions and were generally disenchanted with the idea, first, because it doesn't really represent the truth, and secondly, because we believe that the environmental theme in the country as a whole will soon be outdated. In other words, we may be jumping on a bandwagon just about the time everybody else is jumping off.³

SELLING THE SPACE AGE

Low and Fletcher thus avoided trying to improve NASA's fading political and budgetary fortunes by attaching what the agency did to the most dynamic and popular science-based mass movement of the age – even though one of NASA's dozen labs (Goddard Research Center in Maryland) had important earthly interests and expertise. Vague pieties, instead, substituted for policy change. Fletcher, for instance, claimed NASA 'could be called an environmental Agency' because 'space is our environment' and because 'virtually everything we do, manned or unmanned, science or applications, helps in some practical way to improve [or understand] the environment of our planet...' to the Senate space committee later that year. Despite such testimony, Low privately admitted NASA had no 'uniform or unifying approach' to explaining what it did; and, instead explained itself 'only in terms of specific projects' in scores of different scientific specialties.⁴

UNDERSTANDING EARTH

Presuming environmentalism was passé in 1973 was not the first time NASA's leaders had misread the shape of things to come – or the shape of things that already were. From NASA's formative years, it had consistently mishandled opportunities to increase its political support by providing practical and understandable earthly services to citizens and taxpayers.

Mistakes, selective perception and bureaucratic rationalisation for inactivity all began early. A few weeks after the *New York Times* and the *Washington Post* observed Sputnik 1's first anniversary by complaining that a supposedly fickle and uncaring public had lost interest in US space efforts, the Administrator of NASA sought expert advice about gaining popular support for his new agency. T. Keith Glennan, his number two man Hugh L. Dryden and NASA's chief counsel John A. Johnson met with nine experts from Harvard, MIT, Yale, Columbia, Illinois, the Social Science Research Council, the Council on Foreign Relations and the RAND Corporation.

'It is probably not enough', the social science advisors concluded, 'to base our interest in space research and space activities on either (a) military factors or (b) competition with Russia.' Cold War power and prestige races weren't going to legitimise space explorations officially cast in primarily peaceful and scientific terms. In addition to making international agreements and drawing clearer lines between military and civilian space programmes, NASA had to pay close attention to 'public education, public understanding, and public support'. This meant NASA had to listen and learn – not just instruct. It needed to know what interested and informed people most wanted done in space. Strong candidates included space-based weather and communications satellites, with clear worldly benefits.⁵

Keith Glennan, however, was someone who avoided extended and informal meetings with journalists during his two and a half years as NASA's first Administrator. He wanted Americans to love science, learning, liberty and capitalism. But social scientists asked Glennan what kinds of support he wanted from what sector(s) of the population? People – or Congresspeople – weren't going to write blank cheques for all kinds of science and for space exploration simultaneously – and Glennan knew it. Which specific priorities were voters or Congresspeople supposed to support; and what specific non-military, non-Cold War prestige race advantages were NASA's programmes supposed to provide? At a time when only one in ten Americans could specify scientific applications for satellites; one in four knew that any such uses existed; and only one in five were even vaguely aware of new military uses of space, clarifying such issues was important politically.⁶

Despite this, Glennan downplayed his blue ribbon panel's advice about making earthly applications satellites central to NASA's programme. A year later he and a high-level presidential advisory committee opted for a Cold War global prestige-based rationale for NASA centered on the Gemini and Apollo manned spaceflight programmes.⁷

As NASA leaders accented Cold War power and prestige rationales and 'space races', practical applications became a poor relation. The Moon and Mars mattered more than the Earth. This was ironic. Congress modelled NASA on an Atomic Energy Commission whose nuclear mandates were civilian, commercial, energy-centred, military and even medical. New technologies like weather and communications satellites illustrated NASA's relative unconcern with worldly matters. The NASA Act was also written broadly, not narrowly. Space was a place, not a programme. NASA leaders had a menu of responsibilities. NASA was a research and development (R&D) operation to create air and space vehicles. It was to keep the US an aerospace leader and share relevant findings with military agencies. But that is not all it was supposed to do. The legislation creating NASA also said it should do long-range technical and social studies to maximise social understanding and use of aeronautical and space projects for peaceful and scientific purposes. It was also to cooperate with 'all interested agencies' of government to perform 'such other activities as may be required for the exploration of space'. NASA, for instance, needed to locate, track, control and communicate with varied spacecraft and satellites. It built a global Deep Space Network to accomplish this, operated it, and regularly shared access with others.⁸

NASA'S TWO CULTURES

The Deep Space Network was part of an Army Ballistic Missile Agency (or ABMA) in-house or 'arsenal' subculture of NASA's early years. Army rocket-

eers like Wernher Von Braun had designed, built and operated America's first orbital satellite, Explorer I, in January of 1958. To gain their rocketry expertise, first NASA chief Glennan convinced retired Army general President Dwight D. Eisenhower to move ABMA into the new space agency in 1959 and 1960 over sometimes-strenuous Army opposition. Ex-ABMA people in Von Braun's rocket facility in what became the Marshall Spaceflight Center in Huntsville, Alabama were used to creating things in-house and then operating them. So, key portions of the huge orbital and lunar rockets like the Saturn 1-B and the Saturn 5 were accordingly built in Huntsville (where no fewer than one-quarter of all NASA employees worked in the early 1960s). They were initially launched at what became the Kennedy Space Center in Florida by ex-ABMA operations chiefs. Since JPL was also an Army created and funded lab with long ABMA associations, it, too, was accustomed to building, and operating and tracking, planetary spacecraft in-house.⁹

The ABMA almost-half of NASA employees in its formative years, however, were joined to another quite different, and dominant, half. This half was the National Advisory Committee for Aeronautics (or NACA). NACA was a federal research and development lab that had no in-house, operational, or 'arsenal' tradition. It was an R&D-only operation which designed things and sometimes built prototypes and 'technology demonstrators'. Once it had completed this 'mission', however, NACA promptly handed whatever it had accomplished off to private sector aerospace firms or to other government agencies for further development and for all operational purposes.¹⁰

NACA's 'R&D only' traditions subsumed the ABMA's 'arsenal' and internal development and operations folkways in NASA's formative years. The head of NACA, not of ABMA, was NASA's top deputy administrator from 1958 to 1965. Hugh L. Dryden of NACA and NASA had no desire to take on uncustomary activities. NASA, to Dryden and men like him – including Keith Glennan – should develop things and launch satellites. But it should not go looking for operational, service-providing, roles that might even conceivably interfere with the missions given to other government agencies, or compete in any fashion with private or state-sponsored corporations.¹¹

The difference between the NACA and the ABMA approach is illustrated in how NASA Deputy Administrator Hugh L. Dryden and Dr. William L. Pickering, director of the Jet Propulsion Laboratory in Pasadena, California, responded to early space initiatives by other civilian government agencies, or to policy debates within NASA's top leadership. In May of 1960, the chief of the US Weather Service wrote to Dryden politely informing him that he was going to ask Congress for more R&D money for his agency. The world's first meteorological satellite, Tiros 1, had just started transmitting data. NASA had largely built this satellite; and would build and operate others for the Weather Service. Doing such things 'for research purposes', Dryden replied, was all NASA's mission involved. 'NASA', he added, 'has recognized from the beginning that research

in meteorology...and the exploitation of data from weather satellites either for research purposes or for weather forecasting are not within the function assigned to NASA by the NASA Act of 1958.' No legislative history of NASA exists to clarify the point. What is clear is that Dryden's decision demonstrated the NACA R&D-only tradition. Climatological research (which was not then part of the major missions of the Weather Service) was not undertaken by NASA.¹²

Instead, meteorologists, ecologists and oceanographers joined forces. There was a second civilian space agency, the National Oceanic and Atmospheric Administration (or NOAA), half of whose budget went to weather satellites and climate research, after 1970. None of NOAA's post-Earth Day accomplishments benefited NASA. These achievements included discovery of an ozone hole over the Antarctic in 1985, causing political agreement which began the phasing-out of chemicals like chlorofluorocarbons degrading Earth's atmosphere and demonstrated the need for enhanced global environmental awareness.¹³

Combinations of weather satellites, supercomputers and computer modelling also quietly revolutionised the ways hundreds of millions of people looked at deforestation, global warming and other environmental issues from the 1970s to the 1990s. Yet NASA remained only marginally involved in that process until the 1990s.¹⁴

A top aide Dryden worked with in the 1960s later used the weather satellite decision as his best example of NASA's 'frontier mentality' in conversation with the policy historian Howard E. McCurdy. He recalled that NASA leaders 'had a yelling and screaming session [for] several days' when the final transfer of technology development and operations went to the Weather Service in 1965. But NASA was 'not an operational agency, and we never pretended we were'. McCurdy observed that 'operational agencies concentrate on mastering routine. Most NASA officials concentrated on new frontiers. When a NASA programme moved out of the research and development phase and became operational, the dominant philosophy required that it be spun off to another agency'. Then citing one of 'NASA's leading space scientists', McCurdy closed his discussion with the thought that:

Designing something and getting it to operate smoothly, nicely, so that you can use it time and time again forever is not something that gives great numbers of our [NASA] engineers the jollies.¹⁵

Yelling and screaming took place within NASA for several days in 1965, however, precisely because the frontier mentality and the NACA R&D-only approach was the 'dominant', but not the only, way of doing things or thinking about them within NASA. NASA was – and remains – a decentralised agency in which the now-twelve laboratory directors at facilities all around the country possess large degrees of authority. One of these directors was William L. Pickering of the Jet Propulsion Laboratory, or JPL. Pickering, a graduate of the California

Institute of Technology in America's aerospace heartland, saw earthly applications – especially via geosynchronous orbiting weather and communications satellites that NASA technically pioneered – had 'public utility' aspects which NASA should prominently identify and involve itself with to sell its frontier exploration and political prestige projects.¹⁶

Pickering's arguments were never made to newspapers, but at two of NASA's semi-annual conferences for top staff in October of 1960 and March of 1961, and in speeches to expert audiences. During that time, key decisions were made to take NASA out of not only weather/climatology matters, but also out of the fledgling communications satellite industry: another technical arena in which NASA was early and importantly involved.¹⁷

Pickering disputed Dryden's R&D-only approach. He wanted NASA to maintain the 'dominant role' in partnerships with both the US Weather Service and with private telecommunications corporations. He saw the satellite design, launch and communication infrastructure NASA possessed as equivalent to a government-built hydroelectric dam from which others could purchase or draw energy benefits. Meteorological and communications satellites, Pickering also believed, showed the 'man in the street' the concrete advantages of space explorations; while the 'international public' would learn the prestige and power lessons from US 'lunar and planetary achievement'. To a prescient and un-radical Pickering, the fundamental political problem of the Space Age was that the taxpayer paying for progressively more expensive prestige-based space missions was 'ultimately going to revolt against paying rather large bills for something he really doesn't understand'. Practical earthly advantages directly connected to NASA were thus a basic political necessity.¹⁸

Pickering's voice was not a lonely one at the October 1960 gathering of top staff debating 'Where Should NASA's Program Be Headed'. Ira H. Abbott, a 30-year government aerospace research veteran then directing NASA's Office of Advanced Research Programs, seconded Pickering. Earthly applications were 'perhaps our most important area'. NASA should cooperate with industry and other government agencies, but 'should not take too modest a view of its own role' and must 'exercise leadership'. 'The psychological impact of practical applications is great.' Echoing this leadership argument, the head of NASA's oldest lab concluded NASA had a 'statutory duty to exploit space for peaceful purposes, and no other agency has a comparable duty'.¹⁹

Despite such divisions within NASA, Administrator Glennan, Deputy Administrator Dryden and Glennan's successor James Webb pushed the two highest profile early earthly aspects of space out of their agency by late 1962. Despite loud Senate opposition regarding comsats, NASA administrators ignored Pickering's public utility arguments. Their preferred solution to selling space exploration and development was John F. Kennedy's Cold War power and prestige-rationalised 'space race' Apollo lunar programme of May 1961.²⁰

WARNINGS AND DENIALS

Shortly afterwards, in January of 1962, as John Glenn prepared to become the US's first orbital astronaut, the editors of *Aviation Week and Space Technology*, premier trade magazine for the aerospace industry, begged to differ from this analysis. They accurately warned that extraterrestrial power and prestige alone could not guarantee a future for the space programme. Congress expected huge investments in space to pay off in clear earthly benefits for taxpayers. Unless NASA provided 'lucid, effective explanation to Congress and the American people of the full technical and economic significance of the Apollo program [starting to account for a widely-reported 70 per cent of the agency's budget]...they can expect a reaction of public and Congressional indifference in 1963'. After Glenn returned successfully, *Aviation Week* renewed its warnings. Apollo was underway and NASA's budget was doubling every year. But 56 per cent of 100 Congresspeople polled by the magazine also said a majority of their *constituents* felt unsure about billions for space rationalised in Cold War competition terms. A statistically insignificant six per cent felt the people who elected them thought what NASA was doing was a 'waste of money'. Finally, a 38 per cent minority affirmed their constituents believed NASA's activities were a 'worth-while investment'. A Wisconsin Republican quoted at length in *Aviation Week* elaborated that his constituents generally lacked deep feelings about space exploration; while a Connecticut Democrat serving on the House space committee was rightly concerned that NASA programmes were so intertwined with Cold War power and prestige issues that civilian space exploration could not 'stand on its own' or receive 'the continuous support it will need in the years ahead'.²¹

Within three months, *Aviation Week's* forewarnings bore fruit. In May of 1962, after the return of America's second orbital astronaut, *New York Times* editor and columnist James Reston used Kennedy's own words to a White House conservation conference on 26 May to argue that America's global scientific, technological and political priorities were askew. Earthly problems like clean water and enhanced food production were getting much less attention than they deserved, as compared with space. Or, as Kennedy put it, the country that was first in making cheap fresh water out of salt water would have a more lasting benefit than the country that was first in space races.²²

Reston's well-timed dissent was very important. The *Times* was the highest status information bridge in America. Reston headed the paper's Washington bureau, the largest of any news agency. He was both well-connected and influential. His column was also syndicated to over 300 other newspapers nationwide. When, therefore, Reston subsequently wrote five articles in a year arguing ever more strongly that America's lunar or planetary space races should be replaced with international space cooperation, NASA began losing distinguished supporters. Nobel Prize winners Ralph Bunche and Glenn W. Seaborg, *Science* magazine

editor Dr. Philip Abelson, Senate Foreign Relations Committee chair William J. Fulbright, growing numbers of restive Congressmen, and, by mid 1963, the editors of the *New York Times* itself all began attacking NASA spending – and particularly the Apollo programme. NASA's budget was ten times bigger in 1963 than it had been in 1958. But further NASA budget increases were cut back four different times in 1963. President Lyndon Johnson took note. He quickly capped total NASA spending in 1964 to avoid what the *Times*' top space reporter then called the 'growing sales resistance' in Congress.²³

Faced with unexpected opposition, Kennedy's NASA Administrator James Webb sought to resurrect NASA's largely defunct earthly applications role. From 1964 to 1966, Webb asked major research universities flush with NASA R&D awards to apply some of their scientific and technical expertise to the betterment of urban social problems. Webb also believed the management system he'd created for Apollo could successfully address social problems as well. Thus, from a mix of political and philosophical motivations, Webb sought to make NASA part of Lyndon Johnson's Great Society domestic social reform drive. NASA signed agreements with over 25 university presidents. Webb, his biographer concludes, 'probably gave more of his personal time to this small component of NASA's overall effort than to any other non-manned space activity'. Results, however, were minimal. Academics did little, and NASA forced little. There were a few NASA-funded experiments with Webb's 'Space Age Management'. 'Technology utilisation', Webb's new name for 'practical applications', had its official status raised. Early directors, however, lasted an average of only one year.²⁴

Webb's efforts might have been more successful had they gained more backing within the agency. Applied physicist Hugh L. Dryden was NASA's number two administrator from the agency's creation until his death in December 1965. Dryden, however, also basically saw earthly matters as distractions. Less than two weeks before his death, Dryden made his ideas crystal clear in a letter to Neal Bosco, a Master of Science in meteorology from Colorado. Bosco had earlier written to the White House suggesting that pictures of Earth taken at long distance would be of great public and scientific interest; and could help the space programme. The White House staff had then forwarded the letter to NASA for a serious response. Dryden, however, airily dismissed Bosco's idea by dismissing Earth's scientific potential to NASA. 'Such pictures, it is true, would be considerable general interest, but not of great scientific value.'²⁵

Three years later, however, complaining astronauts began being forced to carry cameras on missions. December 1968 Apollo 8 photographs of Earthrise over the Moon thus ironically became one of the most enduring and important images of the Apollo lunar programme. A few months further on, in April of 1970, the images of a 'little blue ball' of humanity's home planet became a central symbol of the first Earth Day, and of fast-growing environmental movements in the US and elsewhere. Dryden died, however, lacking any idea how wildly wrong he was.²⁶

Nor was Dryden unique. Webb left NASA in October, 1968. Dr. Thomas O. Paine of General Electric then took over as NASA's third Administrator in October of 1968. From then until his embittered resignation in July of 1970, just after Earth Day, Paine tried – and signally failed – to recreate a grand new Apollo-style manned spaceflight programme aimed at getting men to Mars in 30 years. Paine was a self-styled buccaneer as oblivious to environmentalism as Dryden. Again like Dryden, he ignored realities he didn't like. Once NASA was not spared the cuts affecting all major science-based agencies in 1970, Paine left NASA feeling – and saying – that the nation was in the hands of hippies, radicals and Black Power advocates who despised reason and science.²⁷

Polemic and paranoia aside, contemporary Americans were not generally hostile to science or technology. They were, however, more discriminating about the uses to which particular sciences were put. More people in a more-educated society, sociologists found, thought of science and technology issues in terms of particular specialisations, goals and effects. Science was no longer a poor relation. As much as one-eighth of the federal budget was allocated to science and technology R&D in the affluent 1960s. In the less-affluent 1970s, however, priorities inevitably mattered more. Scientists and engineers, meanwhile, also faced declines in levels of popular confidence affecting lawyers, physicians, educators and all other major professional groups. Status became more conditional and priorities more important because US politics, society and the professions opened up to new groups, notably racial minorities and women, in the decade from 1965 to 1975. Simultaneously, polls of the general public (eight per cent of whom were then university graduates) and the 50 per cent PhD-ed membership of the American Association for the Advancement of Science from 1964 onwards both showed a trend away from physical sciences, specialisations like engineering, spaceflight and high energy particle physics, and a trend towards environment, medicine, energy use, genetic research and life sciences research priorities. Space exploration had trumped earthly issues like the environment, oceanography and genetics in official Washington before 1970. After 1970, that situation was reversed.²⁸

NASA'S GEORGE M. LOW

Among those at NASA operating within these unsettling new realities was Thomas Paine's deputy and successor, George M. Low. Low, an aerospace engineer, had far fewer buccaneering illusions than Paine. He was an 'insider' manager whose experience as Acting NASA Administrator for six months following Paine's sudden resignation in 1970 and 1971 was a thorough reality-check. NASA's budget continued falling (to one-half its Apollo Era peak by 1975). One of Low's first official acts was to cut the agency's civil service workforce by ten

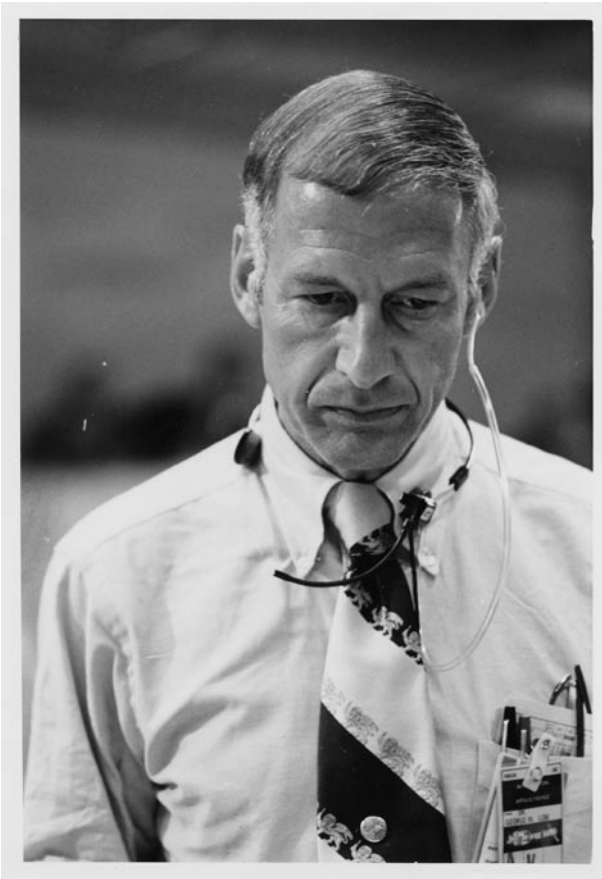


FIGURE 1. Deputy Administrator of NASA George M. Low. Photograph courtesy of Rensselaer Polytechnic Institute Archives.

per cent. Low heard Paine's Mars project ideas dismissed – sometimes in angry four-letter terms – by Congresspeople long supportive of NASA.²⁹

It did not take long, then, for Low to try and improve on Paine's dismal performance. Earthly issues could no longer be ignored or dismissed. Low concluded his first meeting with NASA's twelve Center Directors with a thoughtful summary. In the 1960s, the US had looked outwards towards global leadership. Apollo was the high technology symbol of that primacy. In the 1970s, however, the nation was looking inwards, to issues like environment, education and the

quality of life at home. Space and national defence now had little appeal: a truth demonstrated by 'every poll that has recently been conducted' and by Congress and Executive branch actions as well. 'It is clear', Low concluded,

that if we are to move forward with a strong space program, it, too, must be useful to the people here on earth. This means that a space applications program and, specifically, an earth resources program should be the keystone for the space effort of the 70s.³⁰

A strong human spaceflight programme, Low added, must also continue. So there must also 'be some association between the manned flight program and the earth resources program'. It was all basically William Pickering's logic of a decade before.³¹

Low's ideas were also easier to formulate personally than implement organisationally. To change NASA's ways of doing things and habits of mind from Cold War prestige projects, like a long-proposed space station, space shuttles and lunar and planetary exploration bases, to what Low later termed 'by-products' was not going to be easy.

Low himself seemed ambivalent. He quickly consulted with former NASA Administrator James Webb. Webb emphasised resource-location, aviation and water quality, and introduced Low to the chief federal water quality commissioner. Rocket man and Air Force General Bernard Schriever, meanwhile, proposed a high-level government-industry-public board chaired by NASA's Administrator to propose government-funded advanced technology projects with high civilian payoffs. Low did nothing with Webb's introduction. He told Schriever that he did not wish to engage in 'a lobbying type of activity' which might alienate the President.³²

Simultaneously, Low also kept hold of an idea that 'we cannot sell the space program on its by-product'. This made his approaches towards all earthly matters basically contradictory. The same contradictions, an associate remembered, characterised other Low initiatives, including cost reduction at the agency. Low wanted 'a catechism' not 'a reformation'.³³

As Low considered, a quiet environmental revolution was underway. Seventy to ninety per cent of Americans polled in the two decades after 1970 wanted more government support for key environmental efforts. This compared to only eight to twenty per cent who wanted more support for space exploration. The advantages of NASA alliances with earthly ecologists were increasingly obvious. As early as mid-1970, NASA's Manned Spacecraft Center in Houston published a booklet, *Ecological Surveys From Space*, illustrated with 46 Gemini and Apollo orbital photos. Soon afterwards, there was *This Island Earth*, a much better-produced NASA offering with 162 pages of full-color photos. Lauding the Apollo 8 astronauts, who had helped humanity appreciate Earth for the first time, Low affirmed NASA's skills would now alleviate worldly problems.³⁴

SELLING THE SPACE AGE

NASA's inclusion of Earth in its definition of solar system exploration priorities, however, didn't produce automatic credibility. This was demonstrated when the Manned Spacecraft Center began advertising its use of a spy plane it had first borrowed from the Air Force in 1962 to fly over 26 American cities taking photos from 50,000 feet, to monitor land use patterns, suburbanisation and slum growth in August of 1970.³⁵

The editors of the *New York Times*, in particular, were unimpressed by NASA's new look and by its devotion to the social welfare of cities. In an editorial, they bitterly attacked NASA for hucksterism. 'There may, of course', they began, 'be some value' in planes or satellites 'detecting growth patterns' and revealing 'signs of spreading urban decay'. 'No one', however,

has to go up in the sky to know these signs [of urban blight] are already pretty far along in New York City and in most other metropolitan centers. And it doesn't take a satellite to recognize that one reason for the blight is that distorted national priorities have poured too much money into space programs and too little into domestic ones.³⁶

Journalistic indignation then turned savage. *Times* editors had opposed high levels of prestige-fuelled, space-race Apollo spending for seven years. It wanted a lower-cost programme based on science and international cooperation. The Earth, not the Moon, mattered most. One and one-half million of New York's population – one person in four – was 'living in squalor' or homeless, the editorial continued. Waiting lists for low-cost public housing were 130,000 families – and, at present construction levels, 51 years – long. Meanwhile, 20,000 apartments were being abandoned as uninhabitable annually. 'We trust', the editors concluded, 'that NASA will not consider New Yorkers churlish if they fail to smile into a satellite reconnaissance camera while it is recording this spread of urban cancer.'³⁷

NASA, clearly, had an elite opinion-maker credibility gap. Editors at the highest status paper in the country did not identify the agency with any concrete earthly advantages whatsoever. Earlier decisions not to partner-up with other government agencies regarding weather or to keep a piece of the 'public utility' action regarding communications satellites left NASA with few interest constituencies: as prominent social scientists had earlier predicted. The *Times*' embittered editors treated NASA as an arrogant and uncaring agency producing prestige spectaculars in space at the cost of political tension and social decay at home. 'Bread and circuses' criticisms that *Times* editors had aimed at Russia's communist despots immediately after Sputnik were aimed squarely at NASA leaders now.³⁸

George Low normally avoided television, but he got the printed message. In March of 1971, James Fletcher became NASA's fourth Administrator. Low, at Fletcher's request, resumed his duties as number-two in the agency. Immedi-

ately afterwards, Low went to New York City to ask *Life* magazine how to sell NASA's programmes. *Life* had run a ten-year series of celebratory astronaut exclusives from 1959 to 1969. Its reporters, a senior *Life* editor later recalled, 'virtually abdicated skepticism' while doing so. *Life*'s managing editor Ralph Graves was hardly antipathetic to NASA.³⁹

But *Life*'s Graves was also frank, Low recorded. Selling space exploration via astronauts was 'impossible because all of the astronauts "come out of the same mold" and human beings cannot relate to them'. NASA had 'a terrible reputation for telling the stories only the way we would like to see them printed'. NASA looked from the outside like 'a completely non-responsive outfit'. NASA wasn't impolite; but it ignored anything that didn't fit into its established patterns of belief and action.⁴⁰

CATECHISMS VERSUS REFORMATIONS

After returning to Washington, Low promptly sacked Julian Scheer, NASA's Public Affairs head since 1963. Other changes were harder. NASA produced noble expressions of good intentions if given lots of funding first. But it avoided demonstration projects aimed at building public credibility and support. A Global Atmosphere Research Program (GARP) the Commerce Department and others were starting in 1970, for instance, failed to interest NASA because no expensive hardware-building projects for a 'next generation global meteorological system' were involved. NASA so informed the White House. Energy and environment projects generally were also non-starters. Low and Center Directors decided '...we should not take on new jobs when we aren't even doing our existing jobs in space and aeronautics as well as we should'. 'The national ills' and NASA were not related. Even small ecological projects already underway were rolled back because they were supposedly not very good experiments. These included early wildlife tracking of elk (in Wyoming) and polar bear (in Alaska). Animals were fitted with electronic collars and then tracked via Nimbus weather satellites first developed at the NASA-Goddard lab in Greenbelt, Maryland. Even pleas from the Governor of Alaska didn't sway Low. Wildlife tracking via satellite was too trivial for NASA to fund in an era of declining budgets. A fledgling earth resources satellite programme started in 1969 was also presumed to be of little importance or potential to NASA or private industry users.⁴¹

Overall, NASA's four aeronautical labs belatedly sought – with uneven success – to link their aeronautical work to the passenger aviation revolution of the late 1960s and early 1970s that doubled (to one-half) those American adults who had experienced flight in only ten years.⁴² Meanwhile, NASA's space labs and leadership developed incremental policy strategies. They sold particular projects one-by-one. By 1972, Fletcher and Low got Nixon to approve space

shuttle development, which became NASA's major programme until 1986, when Ronald Reagan authorised what began as a US-only space station.⁴³

However, NASA's ongoing reticence about emphasising Earth applications still cost it heavily in Official Washington. The Energy Crisis hit the US full-force in 1973. Congresses and Presidents put together many and varied directives, Executive Orders and legislative acts calling on federal agencies to expand their activities to assist in resolving the crisis. Prominent Democratic Senators especially introduced bills giving NASA opportunities to restructure itself into a 'civilian research and development agency'. Reversing themselves, Fletcher and Low now concluded 'that for the sake of NASA's future, it does become very important to take on new areas of work'. The alternative, Low wrote, was stagnation and decline.⁴⁴

Environment, however, was something NASA remained hesitant about. Fletcher and Low's 'environmental theme' discussions of mid-1973, as we've seen, saw environmentalism as fundamentally wrong and politically passé. Instead, NASA leaders belatedly tried to concentrate on energy research and development. By 1974, NASA cooperated with a newly-created Energy Research and Development Administration (ERDA), headed by Robert Seamans, third-ranking NASA headquarters manager in the Webb years. Again, however, NASA came up short. NASA refused to move on terrestrial solar power R&D, for example, until convinced that 'there was a firm Administration policy on this subject, and if, so, who had made the policy and on what basis'.⁴⁵

Such hauteur and delay were fatal. As policy entrepreneurs, NASA leaders lagged. NASA – in Fletcher's view – had 'dropped the ball' and 'missed the boat in not throwing our hat in the ring in connection with the energy problem' by mid-1973. Interior, the Atomic Energy Commission and the National Science Foundation all gained. NASA got nothing.⁴⁶

Meanwhile, NASA even avoided expanding some of its most traditional research areas in energy-related directions. As planes became the nation's primary long-distance transport system in the 1970s, aviation fuel conservation became more important. But NASA's second highest-ranking administrator knew of no substantive aeronautical energy-saving research work until Low forced the issue in January, 1975. This helped free up resources for projects like an advanced turboprop effort formally begun at NASA-Lewis in Cleveland, Ohio in 1976. Fletcher thereupon assured Vice President Nelson Rockefeller that 'NASA today is much more "earth oriented" than we were when we first went to the moon'. Low, however, privately concluded ten months later that NASA's upper atmosphere research programme was stalled, and work on issues like ozone depletion and ultraviolet radiation levels at Earth's surface was effectively non-existent. When chlorofluorocarbons were banned in the late 1970s, accordingly, other agencies than NASA discovered problems and proposed solutions. Later efforts to remake the NASA-Lewis lab into a solar energy research centre were unavailing. NASA lost the 'energy' portion of its budget by January of 1976

as a new Cabinet-level Department of Energy was formed. Belated efforts to re-establish NASA as a major player in communications or 'meteorological science' also misfired.⁴⁷

Meanwhile, NASA lost one-fifth of its civil service employees from 1970 to 1975 and about the same proportion of its budget, in purchasing power terms. NASA kept making broad claims about what it could do; but actions still lagged. Low privately admitted that NASA was left in a 'minimum position'.⁴⁸

A major reason why is clarified by a note Low made in March of 1974. Low had participated in four Senate hearings. 'Most of them went quite well', a forceful and assured Low began,

Except that once again I was unprepared in answering [Democratic] Senator [of Ohio Howard M.] Metzenbaum's question concerning why we should do all these space activities. He is looking for simple answers, and we have not been able to give those to him.⁴⁹

Cleveland-born Metzenbaum had earlier impressed Low. Metzenbaum was not only querying Low about human spaceflight (which most scientists had long opposed), but about NASA's programmes generally. He came from the city where NASA had its third-oldest aerospace research centre, built in 1940. Jewish Lawyer Metzenbaum had built his practice and his fortunes in and around Cleveland as Low, a young Austrian-born Jewish refugee from Hitlerism, began his aeronautical engineering career in Cleveland at what became NASA-Lewis (now NASA-Glenn) Research Center. NASA's first Administrator T. Keith Glennan also ran a technical school (now Case Western Reserve University) in Cleveland before and after creating the new agency. That an educated professional like Metzenbaum had little sense of what earthly differences a federal aviation and space agency made which employed thousands of people in his native city spoke volumes. That Low was unable to tell Metzenbaum what practical differences NASA made 16 years after the agency was created spoke volumes more.⁵⁰

In part, the problem was that NASA was unaccustomed to talking with people outside small portions of the Executive branch of the government. *Aviation Week* was still the premier aerospace industry trade journal. Its readers were often bound to NASA by ties of immediate economic interest. *Aviation Week's* editor, Robert Hotz, was still criticising NASA for not knowing how to market itself, and for other reasons. Fletcher so disliked these criticisms he refused to meet with Hotz for three years after becoming NASA Administrator in 1972. Low didn't talk with Hotz either. *Aviation Week* reporters were also routinely denied access to key managers at NASA labs. At the same time, Low and Fletcher were advised that only going to see the long-time chair of the House space subcommittee when they had problems was insufficient. NASA already had significant problems with Congress, the presidential Office of Management and Budget, with other federal science-related agencies including the National Science Foundation. Its withdrawals were self-defeating. But NASA still saw itself in

transcendent, frontier, Cold War terms. Many of its top managers, accordingly, still didn't think NASA should even have to address 'what can we do for you?' questions. NASA should do solar physics; it should not help understand why earth had droughts. NASA was also an elite agency demonstrating America's Cold War prestige and power. It should stay that way.⁵¹

Given such institutional mindsets, Low sent mixed signals. Half the time, he said earthly issues like drought were important. The other half of the time, they vanished amidst catalogues of transcendent exploration goals and cavils by traditionalist lab directors. This vacillation alienated executive branch policymakers who handed NASA major opportunities like stratospheric research only to have NASA do nothing with them. It also increased the list of those government agencies – particularly the National Science Foundation, the Defense Department and the White House's Office of Management and Budget – which believed NASA could not cooperate effectively regarding energy or environmental projects.⁵²

LANDSAT

NASA's LANDSAT (Environmental Resources Technology Satellite (ERTS)) showed what the critics complained about. Here was working earthly environmental hardware. LANDSAT was relatively quick and cheap. The programme cost only about US \$120 million from 1966 until the first of an eventual five NASA LANDSATs was launched in 1972. This included US \$32 million for the first satellite itself. In contrast, NASA's two Viking Mars landers, begun in 1970 and launched in 1976, cost NASA US \$1 billion to build.⁵³

LANDSAT's chequered history, however, demonstrated how inexperienced, unwilling or incapable NASA was at providing services to earthly constituents, even when NASA's public was defined (by NASA's James Fletcher) only as 'other government agencies'. NASA built a system without a business plan about how that system might be used. In addition to not knowing much about what it had to sell or who its customers might be, NASA also ensured it had comparatively little to sell, didn't coordinate users, and couldn't deliver the goods. Muddle followed.⁵⁴

LANDSAT cameras illustrated NASA problems. Earth resources imaging and sensing technology (like weather satellites) evolved out of military spy satellites. But using spying-derived imaging systems to their maximum potential could give away strategic secrets. The Communist enemy could know what Americans could – or couldn't – see. Spymasters helped ensure LANDSAT earthly imagers stayed insensitive...even as compared with out-of-date military technology NASA was then using to map the Moon. Initial LANDSAT images had a resolution of only about 100 metres or 320 feet. Later this was reduced to 61 metres or 190 feet.⁵⁵

The benefits of using such a low-resolution system were also low. In July 1974, to illustrate, NASA was part of a high-level US delegation to Senegal. The group, led by the Director of a new National Oceanic and Atmospheric Administration, was advertising the advantages of Senegalese participation in a Global Atmospheric Research Program NASA leaders had earlier refused to cooperate with when it and NOAA began in 1970. Now, however, George Low wanted to sell LANDSAT – via GARP – as a tool for use for map creation, water source location, crop identification and land-use, dam construction and urban planning.

When Low presented LANDSAT to nine Senegalese environmental, economic and other ministers in Dakar on 25 July, however, he wasn't very persuasive. Low began by stating his knowledge of LANDSAT's technical capabilities was limited; and that he did not even know whether any spectrographic photos of Senegal taken from the satellite existed. Low then affirmed that such maybe-nonexistent spectrographic views could enable fields of wheat to be differentiated from fields of rice if examined by specially trained personnel. After this rousing start, Senegal's Minister of Public Works and the Environment asked his colleagues what their needs were. A deputy minister for urban affairs wanted maps on a scale of 1/50,000 and identification of geological points in the northern portions of Senegal. Low replied NASA's satellite mapping had only been undertaken on a 1/125,000 scale; that he did not know whether a 1/50,000 scale was possible; and that he was also not sure LANDSAT's 100 metre resolution was precise enough to identify prominent geographic features.⁵⁶

Senegal's Public Works and Environment minister then said he needed photos regarding two river deltas and two dam sites to assist planning. Low reiterated he didn't know whether any photos existed for Senegal; probably added that LANDSAT 1 did not have a standard optical (as opposed to a spectrographic) camera; and said that 'perhaps' any photos of Senegal that did exist could be found – if the Minister made an official request for them via the US Ambassador. NASA, a tepid Low continued, would be glad to train Senegalese regarding spectrographic photo interpretation techniques, though 10 per cent of the work required specialised computers. The minister said such training was a good idea, and the meeting closed. NASA had brought no images along. Nor had Low given Senegalese administrators any reasons to value NASA's satellite over, say, high-flying aeroplanes. Low's curious lack of preparation may also not have been accidental. Senegal was a non-aligned nation in the Cold War. International environmental cooperation, Low was warned by NASA's long-time International Affairs chief a month before his Senegal trip, could allow communist enemies to spy on the US and find new reserves of important raw materials in their home territories. Cold War mindsets may thus have weakened more than optical resolution. They possibly weakened NASA's political resolution as well.⁵⁷

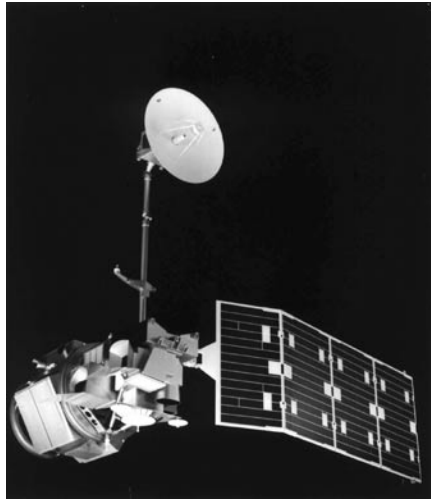
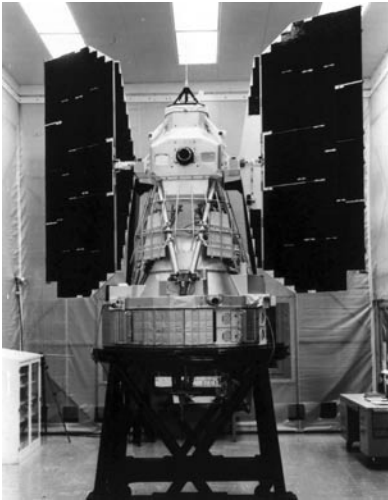
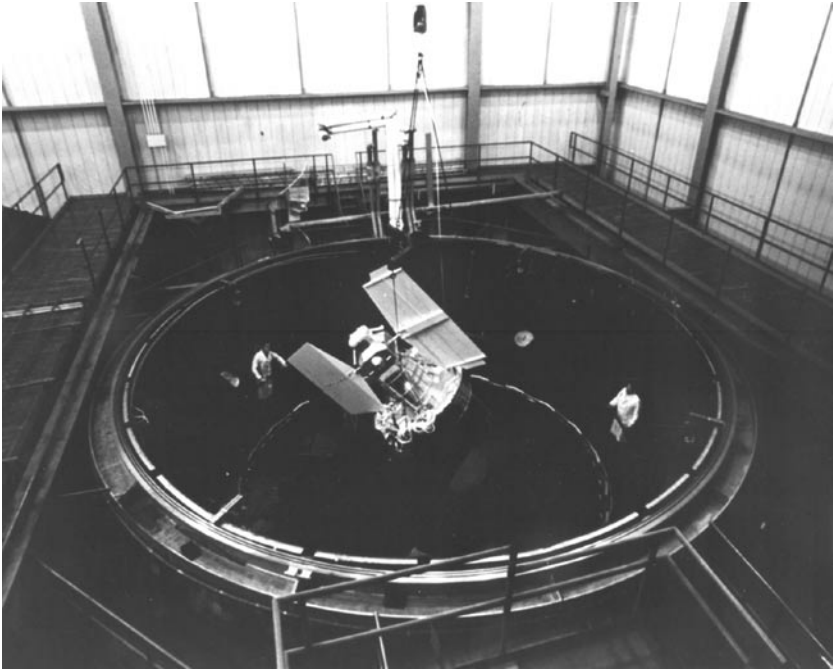


FIGURE 2. LANDSAT 1 (top), LANDSAT 3 (lower left) and LANDSAT 4 (lower right). Photographs courtesy of NASA.

Back home in America, NASA was simultaneously losing the 'first round in the battle for future earth resources satellites'. The agency resembled an academic department trying to run a hardware store. It regularly took NASA six weeks to answer LANDSAT mail. NASA Administrator Fletcher knew even less about LANDSAT than Low. He couldn't, for example, tell the Secretary of the Interior and the chair of the House Science Committee's space subcommittee whether stereoscopic photography might give later LANDSATs better energy resource locating potential in May of 1974. NASA also could not work well with the Department of Agriculture or the Department of the Interior: the former because of NASA's frontier mentality technical overkill; the latter because it wanted LANDSAT for itself. OMB budgeters, meanwhile, thought LANDSAT costs exceeded its benefits. OMB distrusted NASA statistics. It also noted Earth was an afterthought, and that NASA 'indicates its view of priorities through its relative budget requests – i.e., [earth] applications is last'. OMB finally raked NASA for not cooperating with other government agencies to develop linkages to 'real users' who wanted satellite data for everything from crop estimates to pipeline repairs to the elk and polar bear tracking NASA had earlier refused to fund.⁵⁸

So LANDSAT limped along, in Pamela Mack's words, 'tangled in conflicts based on budgetary issues, security concerns, divergence of interests between the developers of the technology and the potential users and bureaucratic competition'. All this made for 'particularly bitter' funding fights within Congress and the Executive Branch. In 1978, President Jimmy Carter finally tired of gridlock and transferred the programme to NOAA. By 1985, President Ronald Reagan made LANDSAT private; and its data soon competed with that of a state-sponsored French imaging firm (SPOT) and even with Russian spy satellite data after 1991.⁵⁹

As NASA lost control of LANDSAT, its failure to include Earth prominently in its solar system exploration programmes had increasingly negative results. 'Science' was technology and useful applications in the popular view, noted contemporary historian of science A. Hunter Dupree. America's government spent more than any other on science R&D. But even 'pure' or 'basic' scientific research got funding on 'deferred practicality' grounds. Sociologist of science Dorothy Nelkin agreed. 'Public acceptance of science', she later wrote, 'appears largely to be based on expectations of immediate applications'.⁶⁰

Nothing NASA did, however, produced clear earthly advantages – immediate or deferred. This spelled political trouble for the agency as Cold War power and prestige started mattering less than energy, the environment, inflation and global economic and industrial competition in the 1970s. Present and former NASA administrators responded to NASA's difficulties in different ways in the 1970s. Glennan misremembered, denying he'd led the campaign to get rid of NASA's highest profile involvements in Earth-focused programmes. Webb advocated water and petroleum finding. Paine and Fletcher reiterated prestige,

frontier and human settlement rationales. Fletcher also quietly supported – and fundraised for – the first general membership US space advocacy organisation ever created in 1974, a National Space Society supporting Apollo-style efforts to expand the Space frontier.⁶¹

Former NASA Administrator Paine, meanwhile, lauded even grander ‘Humanity Unlimited’ ideas first put forward by Princeton physicist Gerard P. O’Neill in 1973 and 1974. Published in 1977, O’Neill’s *The High Frontier: Human Colonies in Space* proposed creating huge solar-powered space habitats to provide ‘new sources of energy and materials while preserving our environment’. Spinning hollow cylinders about four miles wide and 20 miles long would hold between 10,000 and 25,000 people each. They would be built with lunar materials, and located at one of those few locations in space where the forces exerted by the Earth and the Moon’s gravitational fields exactly coincide. Such stable orbiting space cities would feed themselves, and earn operating revenue via solar energy and other exports back to Earth. Paine and O’Neill (and O’Neill’s several thousand devoted followers, who created two more space advocacy groups late in the 1970s) made a bold environmental promise. They claimed NASA, if given enough billions, would do, in creating worlds-in-miniature over 100,000 miles distant, what it had yet to demonstrate it wished to do regarding Earth itself. O’Neill’s designs for orbital human settlements mixed big science, frontier expansionism and 1970s concerns about ecology and resource scarcity in about equal proportions. But space advocates who could not sell a 30-year plan to get astronauts to Mars to Congress or country in 1969 had no hope of selling a vastly more expensive 100-year plan by wrapping it up in environmental clothing less than a decade later.⁶²

In comparison to Thomas Paine, then, NASA’s George Low was realistic. He knew the golden age of Apollo was over. He knew grand space visions meant little or nothing without broad and deep popular support. Low understood, as Fletcher and Paine apparently did not, that US politics was opening up during and after the 1970s, particularly to women and minorities. A bruising civil rights in employment fight which NASA (and Low) lost in 1973 and 1974 taught Low that NASA could not prosper if its astronauts stayed all white and male and its strongest supporters stayed largely male, Caucasian, college-educated, born between the years of 1930 to 1950, and in their formative years in the Apollo decade. By early 1975, Low spent more and more of his time trying to market NASA programmes.⁶³

CARL SAGAN AND JACQUES COUSTEAU

All this led Low in some unusual directions. Instead of focusing on space-friendly conservatives like Donald Rumsfeld and his assistant Dick Cheney, then reorganising the White House staff for President Gerald R. Ford in 1974

and 1975, Low concentrated instead on liberals like planetary astronomer Carl Sagan and foreigners including French oceanographer Jacques Cousteau. 'Space buffs' Rumsfeld and Cheney's primary concerns with space were near-Earth and military. Sagan and Cousteau, meanwhile, were the two primary scientist-popularisers of their day.⁶⁴

Low looked to scientists like Sagan and (especially) Cousteau as counterweights to military spacemen who might seek to end NASA's independent existence, and as spokesmen who could give NASA more bipartisan political legitimacy than it enjoyed. Sagan's rise to intellectual scientific celebrity began in 1973. He presented space exploration as a substitute for earthly war; proposed a search for extraterrestrial life theme as a way for NASA to garner widespread public support; and opposed militarising space as strongly as he supported international scientific and technical space cooperation.⁶⁵

In 1974, Sagan hoped discovering life in the Universe (and especially on the planet Mars) would very soon transform human mindsets on Earth. So Sagan wanted NASA to fund a Search for Extraterrestrial Intelligence (SETI) via radio telescopes and to restart UFO investigations the Air Force had ceased in 1969. Sagan's approach was utterly extraterrestrial. To Sagan, as to Low, most of the time, it was impossible to equate space exploration's transcendent purposes with mere worldly things. '[A]ny thinking audience', Sagan pronounced, 'will realize you cannot sell a product by its byproduct'. Using this logic, electricity could not be sold by the invention of the incandescent light bulb, and unintended beneficial consequences never mattered much. The Space Age itself, ironically, was a largely-unintended consequence of military rocketry during and after World War Two. The Apollo programme was also consistently over-sold on the basis of its supposed political prestige 'by-product' by NASA itself.⁶⁶

However wrong he was, however, Sagan told Low what he already knew. Martian ecology thus meant more to NASA than earthly ecology. Low and Sagan pitched the idea of doing a television special about the upcoming Viking lander missions to Mars to Fletcher in November. Sagan, however, didn't impress a key Fletcher aide. He memoed Low in January, 1975 that Sagan struck him as 'an insufferably egotistical man' who 'talked down' to people and would never be a good populariser of space programmes. Sagan made science of secondary importance to himself.⁶⁷

About Sagan's abilities, the aide was wildly wrong. But he liked another rising star science populariser, French oceanographer Jacques Cousteau. Cousteau had many advantages over Sagan to Low. Sagan, for instance, was hip, academic and antiwar. Many of NASA's military-spawned aerospace engineers might hate him. Cousteau, in comparison, had been a career French Navy captain. During World War Two, Cousteau had co-invented scuba diving technology that allowed divers to breathe pressurised air from tanks strapped to their backs. Sagan was an astronomer who had theories about things. Cousteau was an engineer and explorer who built things. His inventions included the proto-

types for all modern deep-sea human and robotic submersibles. Cousteau was to 1950s and 1960s oceanography what Wernher Von Braun was to 1950s and 1960s rocketry. Cousteau made it possible to get to alien environments at all. Moreover, he made many of the trips himself. The same year Sputnik orbited, Cousteau resigned his naval commission and began using deep-sea cameras and other technology he also helped create to popularise the world's oceans to elites and masses alike.⁶⁸

To accomplish his goals, Cousteau developed impressive media connections. He became a fixture in the pages of *National Geographic*, one of the US's top-ten selling magazines, after the mid-1950s. Best-selling books followed: first *The Living Sea* in 1963; then others including *Oasis In Space* by 1972. Hour-long National Geographic and other television specials further broadened Cousteau's exposure in the post-Earth Day 1970s. Earth, after all, was 70 per cent oceans.⁶⁹

Jacques Cousteau thus became a hot intellectual property in a decade of fast-emergent environmentalism. He was a credible and experienced explorer with a military and engineering background. Conservatives at the Johnson Manned Spaceflight Center in Houston and elsewhere in NASA who dismissed Sagan as an arrogant liberal could not ignore Cousteau. The same key Fletcher aide who despised Sagan came from a long-time naval and maritime family whose own father was 'an ardent follower' of Cousteau. Low, a talented amateur photographer who also shot underwater in scuba gear, had similar direct experience with the sea.⁷⁰

Low sought to use Cousteau to gain NASA earthly credibility. Low also wanted – and got – extended direct experience with Cousteau. In December of 1974, NASA's Deputy Administrator spent five days cruising in the Caribbean with Cousteau on his research ship the *Calypso*. Cousteau was a 'concerned environmentalist' whom Low, normally a very private and very distant man, related to in 'long philosophical discussions' every morning. The French oceanographer, in turn, respected what Low was doing. Not only did Cousteau strongly believe 'the space program will contribute a great deal to oceanography and all other earth-bound sciences', he wanted to go into space himself when the Space Shuttle flew.⁷¹

NASA and Cousteau fit like a hand in a glove. Low hoped this prominent environmentalist might also save a failing LANDSAT and other earth satellite programmes for NASA. Low soon invited Cousteau to NASA to show him LANDSAT, Nimbus G, SEASAT and Skylab space station data and plans. Low also told Cousteau that the manned space station NASA was planning after Shuttle flights began would have a large 'ocean studies' component.⁷²

Cousteau stayed very interested. In May of 1975, he spent four days visiting four NASA labs and one aerospace contractor. Cousteau proposed a film series using LANDSAT data; and talked about the possibilities of the Cousteau Society of America leasing the Space Shuttle and any space station NASA would later

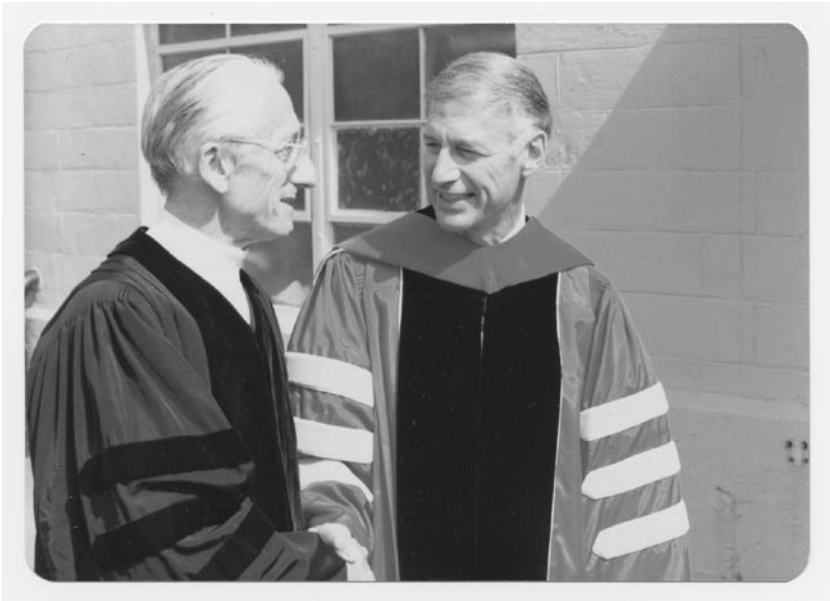


FIGURE 3. Jacques Cousteau and George Low. Photograph courtesy of Rensselaer Polytechnic Institute Archives.

orbit 'for an oceanographic mission'. 'Altogether', Low concluded, 'I think this is the beginning of a very rewarding relationship, not only for Cousteau but especially for NASA.'⁷³

Low pushed ahead. Cousteau came to the Manned Spaceflight Center in Houston in July of 1975, the day of the Apollo-Soyuz docking, to get acquainted. Immediately, internal opposition surfaced. 'Some of our people within NASA', Low noted, 'think that Cousteau is not a real scientist but just a publicity seeker.' Low sought compromises to smooth ruffled bureaucratic feathers and scientific egos. The head of the Goddard NASA lab would have to OK the Cousteau project as 'a good thing for NASA as a whole'. Frenchman Cousteau was also going to be teamed with an American academic 'who will make sure that some good science comes out of the project'. NASA's institutionalised support for international cooperation stayed minimal. Its suspicions about scientific popularisers stayed high.⁷⁴

Gradually, such nay-sayers wore Low down. Experiments on Calypso involving LANDSAT and other satellites began off the Bahamas in September, 1975. Low visited Cousteau's ship again to watch technicians including President Gerald R. Ford's son Jack. Perhaps sensing something was going awry, Cousteau strongly reiterated his interest in selling NASA via 'down to earth'

means emphasising ‘earthly benefits’, offered to do all his part of the work for free, and talked about his ‘greatest ambition’ being ‘to fly in space himself’ – or to have his pilot son Philippe do so. A normally-undemonstrative Low used phrases like ‘strongly believes’ and ‘very serious’ to describe one of those rare men for whom he had a great deal of personal respect. NASA Administrator Fletcher, Low advised almost emotionally, should meet Cousteau because ‘it is important that we handle Cousteau properly and really make him a part of the team, rather than [to] give him the feeling that we are using him’.⁷⁵

No meeting ever took place, and things unravelled. Low, meanwhile, was secretly a very ill man facing a possible medical death sentence. He developed a ‘rather major melanoma’ in the summer of 1975 which was then ‘essentially fatal’ if untreated. Extensive surgery and immunotherapy followed. Low had cancer and maybe not even five years to live. His energies regarding pushing unwilling or uninterested NASA managers – including Fletcher – to support his Cousteau initiative began to lag. So did Low’s proposals to fly either Philippe Cousteau or widely-respected CBS News television anchorman Walter Cronkite on an early Shuttle flight to generate interest and support in NASA’s human spaceflight programme. Problems, meanwhile, surfaced with LANDSAT data-availability. Cousteau proposed inexpensive new ideas to highlight NASA’s commitment to oceanic research in February of 1976. But a burned-out Low promptly handed them off to a less-than-interested head of the National Oceanic and Atmospheric Administration.⁷⁶

Low, meanwhile, went looking for a new job. Aerospace firms weren’t interested. He tried for a job as Federal Aviation Administrator that wasn’t really there. Relations with Fletcher seemed cool. Finally, Low’s alma mater, Rensselaer Polytechnic Institute, hired him to become their President starting in June of 1976. There he laboured until his death from brain cancer in 1985.⁷⁷

DENIAL TRIUMPHANT

For a decade after George M. Low’s departure in mid-1976, environmentalism declined within NASA. A meeting of NASA’s dozen centre directors and about the same number of top headquarters managers in mid-1976 illustrated why. NASA once again argued itself into earthly irrelevance. At a two-day retreat, pseudo-profundities abounded. NASA’s long-time chief financial officer, for instance, confused cause and effect: arguing that NASA should never have created an Office of Applications and should abolish the one it had immediately. Thus NASA would, somehow, be spared unwelcome questions about doing practical worldly things for people. Academician Bruce Murray, soon to become director of the Jet Propulsion Laboratory, meanwhile, argued that NASA didn’t have to concern itself about (bad, and getting worse) public opinion polls because NASA’s real constituents were Congress and the White House (where, as Murray

didn't note, NASA wasn't doing well either). Christopher Kraft of the Manned Spaceflight Center in Houston, to whom women and minorities were a bother, differed. He believed 'the business community' was NASA's important audience. Murray concluded this 'lively discussion' of NASA's leadership by saying NASA was 'leaning too much toward a desire to be practical', and should instead make some transcendent 'exciting things...such as the search for extraterrestrial intelligence' priority goals instead. The thought was pure Carl Sagan⁷⁸

'All agreed to Murray's comment', Low noted. Given such mindsets, earthly environments or applications were non-starters. NASA leaders also concluded again that every earthly matter was some other federal agency's property. Crops belonged to the Agriculture Department; mineral resources belonged to the US Geological Survey; and so on. All the pretty girls were taken. So NASA didn't need to go to the political dance. This was the same narrow reading of the NASA Act Glennan and Dryden had used in 1959 and 1960. It insured NASA understood itself as a research-only agency which only built prototypes and operated nothing. This even as it designed Space Shuttles it claimed it would operate on a regular, continuing and low-cost basis.⁷⁹

Murray and Sagan's cosmic consciousness, meanwhile, didn't develop as expected. Neither the Viking missions of 1976 nor the Voyagers' grand tour to the outer planets beginning with Jupiter in March and July of 1979 excited the quick burst of public interest that Bruce Murray, Sagan and others whose careers were made possible by NASA's science missions expected. Murray and Sagan co-founded the Planetary Society, the fourth single-interest space exploration advocacy group of the Space Age, in 1980. Public interest in deep space and planetary missions rose in the 1980s, not least via Carl Sagan's path-breaking TV series 'Cosmos'. But Planetary Society membership, once at 100,000, had declined to 57,600 by 2004. Other space advocacy organisations have faced similar declines⁸⁰

The big issues of the late 1970s, concurrently, involved earthly energy and the environment, not solar system exploration. The price of gasoline quadrupled again. An era of cheap energy began to end. US inflation rates reached a twentieth-century peak of 20 per cent per year, as official unemployment rates reached 12 per cent, with actual rates twice that. Finally, in March of 1979, as the first Voyager spacecraft approached Jupiter, a major nuclear accident occurred at Three Mile Island nuclear energy plant in Middleton, Pennsylvania.⁸¹

Twenty years of local opposition to nuclear power then quickly reached critical mass and went national. At the same time, NOAA began warning of 'Greenhouse Effect' global warming threats. In April of 1986, a terrible nuclear accident at Chernobyl in the Ukraine irradiated large portions of Russia and Europe, killing thousands.

NASA, meanwhile, had its own tragedy to deal with. In January of 1986, the Space Shuttle Challenger exploded during launch, killing its crew. Challenger rocked NASA far more than the 'public' generally. Most Americans polled by

the National Science Foundation in the most rigorous poll ever undertaken about space understood very well space missions were high risk. NASA's organisational habits-of-mind, however, took a beating. For it still saw things in Cold War prestige terms. America had just failed spectacularly, while Russia hadn't lost any cosmonauts since 1971.⁸²

During the 32 months during which NASA was grounded, a long debate about priorities took place within the agency. Should NASA seek somehow to revive the perceived golden age of the Apollo programme – as NASA 'insiders' like flier, aeronautical engineer and post-Challenger Shuttle astronaut Richard W. Truly proposed? Or should it go for a Low-Cousteau type 'Mission to Planet Earth' – as NASA 'outsiders' like first female astronaut and astrophysicist Sally Ride preferred? The Ride Commission issued a report in August 1987 arguing against high-technology grand leaps like astronauts to Mars, and in favour of an incremental and lower-cost strategy emphasising Earth's environment, robotic science missions and establishing a lunar research base.⁸³

Ride, however, had already made enemies at NASA while on a presidential panel investigating the Challenger explosion. The so-called 'Ride Report' made her more. She left NASA shortly after her report appeared. Truly stayed on, and was chosen as NASA's sixth Administrator in 1989. An unbudgeted thirty-year Moon-Mars astronautics proposal also speedily won out over earthly or environmental priorities. In 1989–1990, a newly-elected George Herbert Walker Bush, America's first aviator president, sought to recreate the grand plans of NASA's Thomas Paine. Fittingly, Paine had recommended Bush as his successor as NASA head in 1970. Again appropriately, Truly, Bush's NASA Administrator, failed as badly as Paine had 20 years before. Even a 25-year and US \$30 billion 'Mission to Planet Earth' environmental satellite system Truly added onto Bush's US \$300–\$500 billion 'Space Exploration Initiative' didn't help. Space had been partisanised by President Ronald Reagan's multi-billion dollar 'Star Wars'/Strategic Defense Initiative programme after 1983. Truly opposed Bush's Moon-Mars plans. He wanted to emphasise, instead, an ever-more over-budget space station and an ailing Shuttle. Bush spent little political capital pushing his own creation. Astronauts to Mars or lunar bases were still not something Congress wanted to pay for, particularly without trustworthy cost estimates.⁸⁴

BACK TO THE FUTURE (AGAIN)

Fifteen years later, in February of 2004, matters looked eerily similar. Congress was majority Republican in both houses by then, something the country hadn't seen since before Sputnik. Another Shuttle – Columbia – had burned-up on re-entry to Earth's atmosphere. Another aviator-President, George Walker Bush, then suddenly and unexpectedly proposed a new space vision reiterating that of Thomas Paine, his own father and NASA traditionalists. Again, in 30 years,

many billions would be spent to reassert America's strength, determination and resolve with an astronautics and prestige-based Moon-Mars effort. Sean O'Keefe, a self-described 'bean counter' outsider from the Office of Management and Budget whom Bush had appointed NASA head in December, 2001 to bring order to NASA's 'notoriously optimistic cost estimates', had strongly argued against any 'destination-driven', Apollo-like approach to setting NASA priorities before Columbia was destroyed. But afterwards, O'Keefe quickly reversed himself. Now he supported what *Aviation Week* called a 'Back to the Future' Moon-Mars human exploration programme. Many in and out of official Washington wondered. Bush, after all, had 'no known previous interest in space'. He had never even visited the major NASA lab in his state while Governor of Texas.⁸⁵

Lost in all of this resurgent Apollo-style prestige approach, yet-again, were earthly applications. From 1992 (when George Bush appointed him to replace a failed Truly) until 2001 (when cost over-runs caused George W. Bush to appoint O'Keefe to replace him) engineer Dan Goldin was NASA's longest-lived agency head. He fervently believed in solar system exploration. He had worked on advanced Mars spacecraft propulsion systems for NASA in his youth. But Goldin also understood that NASA had, finally, to respond to changed political circumstances. Important among these changes was environmentalism: a major concern of both Vice-President Al Gore and President Bill Clinton during their eight years in office from 1993 to 2001. Gore's book *Earth in the Balance: Ecology and the Human Spirit* was his claim to intellectual rigour and political respectability alike in both the 1992 and the 2000 presidential elections. NASA was one of the earliest federal agencies Gore studied as he and Clinton sought to 'reinvent government' to make it more efficient and responsive in the 1990s.⁸⁶

Goldin didn't need to be told anything twice. Environmental applications finally became a NASA priority during the Goldin decade. Especially after Clinton was re-elected in 1996, NASA mission statements moved in a progressively earthly direction. By the time Goldin departed, verbose and something-for-everybody NASA policy priorities got summarised in three punchy lines:

- To improve life here.
- To extend life to there.
- To find life beyond.

Elaborations of this mission statement said NASA's chief purpose was 'to understand and protect our home planet' as well as to search for life and 'inspire the next generation of explorers'.⁸⁷

To ensure such pithy pieties were put into practice, Goldin's NASA started cooperating with NOAA, the military, the European Space Agency and others to build a series of specialised satellites which will soon combine into a Global Earth Observation System. Beginning in 1999, the first Earth Observing Satellite (Terra) was launched; then came Aqua in 2002, and Aura in mid-2004. By then,

a multibillion-dollar six-satellite constellation funded by the US, Canada and France was under construction to make unprecedented efforts to monitor global climate changes on both land and sea, and in the atmosphere. After almost 50 years, NASA even rolled out a new organisational chart: part of which aimed at demonstrating, as a NASA official put it, ‘that Earth is a card-carrying member of the solar system too’. Decades of unwillingness to cooperate with other agencies at home or abroad were slowly being replaced with an awareness that issues like global warming were now matters for international agreements and the beginnings of global regulation.⁸⁸

George W. Bush’s presidential victories in 2000 and 2004, however, put a chill on NASA’s fledgling and long-delayed environmental efforts. Opposed to key international environmental accords, Bush’s post-2004 space policy was one in which prestige mattered far more than pollution. Bush’s new NASA head Michael Griffin proposed cutting US \$1 billion in five years from NASA’s Earth Science budget in mid-2005 to pay for solar system exploration over strong Congressional opposition. The sands of Mars mattered far more than the sands, forests, or plains of Earth – in the White House, at least. Findings by reputable NASA scientists regarding global climate change as a major and growing problem got muzzled by political appointees within the agency in 2005 and early 2006. Scandal then erupted in the columns of the *New York Times*, and reforms were promised.⁸⁹

THE GOSPEL OF OUTER SPACE

Almost 40 years after ‘Spaceship Earth’ became an ever-present icon of global environmental movements, space advocates inside and outside of NASA cannot quite decide whether Earth should be part of their definition of space; or whether Earth is an essential factor in the success of space exploration.

Such confusion began in NASA’s formative years. Power and (especially) prestige particularly mattered to NASA creators because they grew up in a pre-1950s era, one in which flight was a secular religion of educated professionals, a symbol of technological utopia and a marker for military dominance and national power: what Joseph Corn calls *The Winged Gospel*. Planes were panaceas for worldly ills. A major factor that brought this era to an end was the replacement of planes by rockets as symbols of military dominance. Another was the modern passenger aviation revolution of the 1960s. As many as two-thirds of American adults had flown by the end of the 1970s, aeroplanes were no longer panaceas. They were simply everyday tools. Technoutopian symbols had turned into taxicabs.⁹⁰

This utilitarian shift has yet to occur fully in spaceflight, where analogies to Charles A. Lindbergh, Sir Francis Drake, Daniel Boone and Christopher Columbus remain commonplace. Many space advocates are still waiting for a utopian

transformation to occur that will produce a Copernican shift in the way humanity views itself and its relation to the universe. Once this intellectual transformation takes place, the way will be open to the planets and the cosmos beyond. The Golden Age of Apollo will be recovered by astronauts on Mars. Problems will disappear once they are put in spacesuits. A new cosmic consciousness waits to be found: perhaps in Martian micro-fossils.

It was no accident, then, that President Bush waited to announce his space vision of 2004 until immediately after the attempted flight of a replica of the Wright brothers' aircraft on the centennial of the first powered human flight at Kitty Hawk, North Carolina. Heroic symbolism like this still suffuses America's space programme; so does the concept of human spaceflight as a transcendent event. Secular religions and the technological sublime will certainly remain commonplace in US culture. But, as *Saturday Review* editor Norman Cousins put it in 1975, what was – and remains – most significant about Apollo was '...not that man set his foot on the Moon, but that he set his eye on the Earth'. Space advocates, accordingly, must one day learn to pay more sustained attention to their home planet, because earthly environmentalism, not space exploration, still remains the major science-based social movement of the late twentieth and early twenty-first centuries.⁹¹

NOTES

¹ 'NASA Environmental Theme', Personal Notes #97, 7 July 1973, 6; George M. Low Papers, Personal Files, Rensselaer Polytechnic Institute Archives, Troy, New York (hereafter: Low/RPI, PN).

² David Vogel, *Fluctuating Fortunes: The Political Power of Business in America* (New York, Basic Books, 1989), 64–81; Kim McQuaid, *Uneasy Partners: Big Business in American Politics, 1945–1990* (Baltimore, Johns Hopkins, 1994), 138–9; McQuaid, 'The Roundtable: Getting Results in Washington', *Harvard Business Review*, May–June, 1981, 114–21; Samuel P. Hays, *Beauty, Health, and Permanence: Environmental Politics in the US, 1955–1985* (New York, Cambridge, 1987), 13–70; Gaylord Nelson, 'All About Earth Day', <http://www.earthday.wilderness.org/history/>; Benjamin I. Page and Robert Y. Shapiro, *The Rational Public: 50 Years of Trends in Americans' Policy Preferences* (Chicago, University of Chicago, 1992), 150–9, esp. 156.

³ Low/RPI, PN #97 (7 July 1973), 6.

⁴ *Ibid*; for Fletcher's pieties, see: Roger D. Launius, 'A Western Mormon in Washington, DC: James C. Fletcher, NASA, and the Final Frontier', *Pacific Historical Review* (May, 1995), 217–41, esp. 236–7. Launius claims a 'liberal view of the environment' for Fletcher in this essay.

⁵ 'Discussion of Non-Scientific Problems in the Space Age', Washington, 18 December 1958, *passim*; in: T. Keith Glennan Papers, Subject Files, NASA History Office, Washington, DC (hereafter: Glennan/NHO).

⁶ Survey Research Center, Institute of Social Research, University of Michigan, 'Satellites, Science, and the Public: A Report of a National Survey on the Public Impact of Early Satellite Launchings for the National Association of Science Writers', (Ann Arbor, February 1959), 1–6, 39. This 57-page survey, financed by the Rockefeller Foundation, was the most rigorous single opinion survey of the formative years of the Space Age. The writer has found no evidence it ever featured in NASA planning, or in other advisory reports to NASA (e.g. by the RAND Corporation).

⁷ For Glennan's low opinion of social scientists, see: i.e., Glennan to Vannevar Bush, 2 February 1959; Glennan to Philip C. Jessup, 31 December 1958; Glennan to Donald N. Michael, 2 February 1959; Glennan to David Riesman, 24 December 1958; all: Glennan/NHO.

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¹⁰ For NACA, see: Alex Roland, *Model Research: The National Advisory Committee for Aeronautics 1915–1958* (Washington, DC, NASA, 1985).

¹¹ For Dryden, see: i.e., Michael H. Gorn, *Hugh L. Dryden's Career in Aviation and Space* (Washington, DC, NASA, Monographs in Aerospace History number 5, 1996). The best source for Dryden is his papers, deposited at the Johns Hopkins University Archives in Baltimore, Maryland.

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²⁰ For the fierce Senate fight over COMSAT, see: *New York Times*, 8 February 1962, 1, 12; *idem*, 9 August 1962, 8; *idem*, 12 August 1962, 1; *idem*, 19 August 1962, section 4, 6; *idem*, 18 August 1962, 1, 5; *idem*, 15 August 1962, 1, 16.

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²⁵ Dryden to Neal Bosco, 23 November 1965, Chronological Files, Dryden Papers/JHU.

²⁶ A biographical essay with facsimile documents is: Michael H. Gorn, *Hugh L. Dryden's Career in Aviation and Space* (Washington, DC, NASA, 1996).

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³¹ *Ibid.*, p. 14.

³² ‘Schriever Activities’, PN #42, 21 February 1971, 5–6 and ‘Discussions with Jim Webb’, PN #32, Box 70, 6–7, Low/RPI.

³³ Francis T. Hoban, *Where Do You Go After You’ve Been to the Moon?* (Malabar, Florida, Krieger, 1997) is a good survey of Low’s management style. See 192 for quotation. For Low quotation, see: PN #33, 25 October 1970, 4, Low/RPI.

³⁴ Oran Nicks (ed.), *This Island Earth* (Washington, NASA, October, 1970), esp. iv–vi; for polls, see: Page and Shapiro, op. cit., 49, 156.

³⁵ Harold M. Schmeck, Jr., ‘Satellites to Get Urban Plans Role’, *New York Times*, 7 August 1970, 33.

³⁶ ‘Urban Overview’, editorial, *New York Times*, 8 August 1970, 22.

³⁷ *Ibid.*

³⁸ See: i.e., ‘Cost of the Satellite’, *idem*, 8 October 1957, 34; Merrill, op. cit., 40–1; For the *Times*’ continuing influence, see: i.e., Todd Gitlin, ‘It was a Very Bad Year’, *The American Prospect* (July 2004), 31–3.

³⁹ Loudon Wainwright, *The Great American Magazine: An Inside Story of Life* (New York, Knopf, 1986), 251–79, esp. 263.

⁴⁰ ‘Fletcher Confirmed’ and ‘Public Affairs’, PN #44, 21 March 1971, 1–3, Box 70, Low/RPI.

⁴¹ ‘Global Atmosphere Research Program’, PN #12, 21 February 1970, 3–4; ‘Center Directors Meeting’, PN #5, 17 January 1970, 2; ‘Elk Experiment’, PN #15, 14 March 1970, 2–3; ‘Animal Tracking’, PN #25, 21 June 1970, 7 – all in Box 70, Low/RPI.

⁴² For air travel, see: John B. Lansing, et. al., ‘The Travel Market-1955’ (Survey Research Center, Institute of Social Research, University of Michigan, 1955), 5ff; ‘Air Travel Survey: 1993’ (Princeton, Gallup Organization, 1993), 111–2. Both reports were prepared for the Air Transport Association of America, Washington, DC.

⁴³ Incrementalism is covered in Howard E. McCurdy, *The Space Station Decision: Incremental Politics and Technological Choice* (Baltimore, Johns Hopkins, 1996); see also McCurdy’s *Inside NASA: High Technology and Organizational Change in the US Space Program* (Baltimore, Johns Hopkins, 1993).

⁴⁴ ‘NASA and Civilian Applications’, PN #109, 6 October 1973, 9–11, Box 68, Low/RPI.

⁴⁵ Low to Fletcher, ‘Meeting with Bill McGlashan’, 19 March 1973, and ‘NASA and Civilian Applications’, PN #104, 6 October 1973, esp. 10, both in Box 68, Low/RPI.

⁴⁶ ‘Solar Energy Meeting with Congressmen McCormick and Symington, 23 April 1973’, ‘NASA in the Energy Business’, PN #96, 23 June 1973, 6, and ‘NASA and the Energy Problem’, PN #99, 4 August 1973, 7, all in Box 68, Low/RPI.

⁴⁷ Low noted ‘a complete absence’ of discussions on how one might save energy by having more efficient aircraft power plants at NASA’s three aviation labs during visits in May 1974. The Arab OPEC oil embargo had quadrupled gasoline prices eight months before. PN #121, 25 May 1974, 7, Box 67, Low/RPI. See also PN #159, 25 January 1976, 1, Box 65, Low/RPI; PN #150, 9 August 1975, 6, Box 66, Low/RPI.

⁴⁸ See, i.e., ‘Low to Fletcher, Telephone Conversation with Mike McElroy’, 13 January 1975, Box 66, Low/RPI; ‘Meeting on Stratosphere with Mike McElroy’, 15 January 1976, Box 65, Low/RPI; and ‘Research on the Stratosphere’, PN #136, 19 January 1975, 5, Low/RPI.

⁴⁹ ‘Senate Hearings’, PN #115, 2 March 1974, Box 67, Low/RPI.

⁵⁰ For Metzbaum, see: ‘Biographical Directory of the US Congress’, <http://www.bioguide.congress.gov/scripts/biodisplay.pl?index=M000678>.

Low’s life was very personal. I owe my knowledge of key aspects to Ms. Shirley Molloy and Mr. Stephen Wiberley of Rensselaer Polytechnic Institute in Troy, New York. Molloy was Low’s longtime personal secretary; Wiberley a longtime colleague.

For NASA-Lewis, see: Virginia P. Dawson, *Engines and Innovation: Lewis Laboratory and American Propulsion Technology* (Washington, DC, NASA, 1991).

⁵¹ For a typical example of how reluctant top-ranking administrators were to see NASA in ‘what can we do for you?’ terms, see: ‘Minutes of the Center Directors’ Meeting’, 21–22 April 1976, 9–10, Box 65; For *Aviation Week*, see: ‘Meeting with Aviation Week’, PN #132, 10 November 1974, 4–5, Box 66, and ‘Meeting with Bob Hotz’, PN #153, 4 October 1975, 3, Box 65. For OMB (and General Accounting Office) problems, see: ‘Meeting with Elmer Staats’, 7 February 1973 and ‘Meeting with Jim Lynn’, PN #148, 15 July 1975, 8–9 – both in Box 66; For OMB’s power, see: i.e., Lynn to Fletcher, 14 April 1976, Box 65; For inattention to Congress, see: Low to Fletcher, Very Sensitive-Eyes Only, ‘Discussion with Dan Harnett 17 June 1974’, Box 67; For Senatorial lack of interest, see: ‘Senate Committee Reorganization’, PN #84, 7 January 1973, 3, Box 68 – all in Low/RPI.

⁵² For examples, see: ‘Meeting with Mike McElroy, 15 January 1976’, PN #158, 11 January 1976, 2–3, 6–7, Box 65, Low/RPI.

⁵³ Pamela Mack, *Viewing the Earth: The Social Construction of the LANDSAT Satellite System* (Cambridge, MIT, 1990) is the standard source. For costs, see: 1, 83. For Viking costs, see: Edward C. and Linda N. Ezell, *On Mars* (Washington, DC, NASA, 1984), 251.

⁵⁴ Fletcher’s definition is in ‘Minutes of the Senior Management Conference’, 17–19 March 1976, Reston, Virginia, P. 9, Box 65, RPI.

⁵⁵ Mack, *op. cit.*, 3–6, 31–7, 62–7, 75, 89–90, 82. Initial Resolution figures range from 98 to 106 metres.

⁵⁶ ‘Trip to West Africa and the Azores, 22–31 July 1974’, dictated 19 August 1974, and Low to Frutkin, ‘Visit With Senegalese Officials, 1 August 1974’, both in Box 67, Low/RPI; For NASA’s earlier refusal to participate in the GARP, see: PN #12, 21 February 1970, 3–4, Low/RPI.

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⁵⁷ 'Memorandum of Conference [with Senegalese officials]..., 25 July 1974', 3-page attachment to Low to Arthur Frutkin, August 1, 1974, and Frutkin to Low, 6 June 1974 – both in Box 67, Low/RPI.

⁵⁸ The 'lost the first round' phrase is Low's, see: PN #125, 20 July 1974, 4; Low to NASA HQ personnel, 'The Movement of Correspondence in NASA Headquarters', 12 February 1975, both in Box 66, Low/RPI. (Low called a six week delay '...horrible – but not too unusual'.) 'Memo for the Record Meeting with [OMB Deputy Director Frank] Zarb and Taft, 18 July 1974, Box 67 and David Williamson, Jr., 'Note for Dr. Low', 16 October 1974, 3, Box 66, both Low/RPI; Mack, op. cit., 146–70, esp. 146–50.

⁵⁹ Mack, op. cit., pp. 5, 126–7, 131, 176. NASA was left with a lovely folio volume, *Mission to Earth: LANDSAT Views the World* (Washington, NASA, 1976), which sold for 10 times its original government document cover-price only 25 years later.

⁶⁰ Dupree, quoted in: Rae Goodell, *The Visible Scientists* (Boston, Little Brown, 1977), 47; Dorothy Nelkin, *Selling Science: How the Press Covers Science and Technology* (New York, W.H. Freeman, 1987), 77, 79, 114–5. Every NSF-funded survey of public attitudes towards science and technology since 1978 confirms Dupree and Nelkin. See the relevant chapters of NSF's biennial *Science and Engineering Indicators* volumes.

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⁶² Gerard K. O'Neill, *The High Frontier: Human Colonies in Space* (1977); third edition, Apogee Books/Space Frontier Foundation, 2000, 10ff; Thomas O. Paine, 'Humanity Unlimited', *Newsweek*, 25 August 1975, 11; Michaud, op. cit., 81–121; Greg Klerkx, *Lost in Space: The Fall of NASA and the Dream of a New Space Age* (New York, Pantheon, 2004), 66–90.

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⁶⁴ For Rumsfeld and Cheney, see: Low to Fletcher, 'Miscellaneous Items of Interest, 15 October 1974', 2, Box 66, Low/RPI.

⁶⁵ Carl Sagan, *The Cosmic Connection* (1973) (New York, Cambridge University Press reprinted ed., 2000), esp. 59–65. For Sagan's career, see: William Poundstone, *Carl Sagan: A Life* (New York, Wiley, 1999). Poundstone is better for the scientific Sagan; Davidson is better for Sagan the celebrity.

⁶⁶ Low to Fletcher, 'Discussions with Carl Sagan, 12 September 1974 – Eyes Only', and Low to Fletcher, 'Miscellaneous Items – 2, 12 September 1974, Eyes Only'; Low and Fletcher in November, see: 'Meeting with Carl Sagan', PN #133, 30 November 1974, 4–6. All in Box 66, Low/RPI.

⁶⁷ 'Meeting with Carl Sagan', PN #133, 30 November 1974, 5–6, and Harvey W. Herring to Low, 'Additional Thoughts on Television Productions, 8 January 1975', esp. 3, both in Box 66, Low/RPI.

⁶⁸ For an admiring summary of Cousteau's importance to oceanographic research, see: Robert D. Ballard, with Will Hively, *Eternal Darkness: A Personal History of Deep Sea Exploration* (Princeton, Princeton University Press, 2000), esp. 41ff, 58, 62–5, 299.

⁶⁹ For National Geographic's importance, see: Robert M. Poole, *Explorers House: National Geographic and the World It Made* (New York, Penguin, 2004). By the 1970s, a multi-volume series, *The Ocean World of Jacques Cousteau*, was being published at the rate of a book a year. A TV series of the same name followed in the 1980s.

⁷⁰ 'Herring to Low, 13 January 1975', 1–2, Box 66, Low/RPI.

⁷¹ 'Personal Notes: Visit to Calypso, 26–30 December 1974', esp. 8–9, Box 66, Low/RPI.

⁷² 'Low to Cousteau', 13 February 1975, Box 66, Low/RPI.

⁷³ 'Jacques Cousteau', 31 May 1975, PN #145, 3, Box 66, Low/RPI.

⁷⁴ 'Arrangement with Jacques Cousteau', 26 July 1975, PN #149, 6–7, Box 66, Low/RPI.

⁷⁵ 'Memo for the Record – 5 January 1976', with a carbon copy to James Fletcher, Box 66, and 'Visit to Calypso', 7 September 1975, PN #151, 4–5, Box 65 – both Low-RPI.

⁷⁶ Sealed Memo to the Archives, dated 31 May 1984 and 19 June 1984, Faculty/Alumni files, Low/RPI, Low to Fletcher, 'An Experiment That Failed, 24 March 1976', Box 65; Low to Cousteau, 10 June 1975, Box 65; 'Meeting with Cousteau', PN #161, 22 February 1976, 2–3, Box 65, all: Low/RPI.

⁷⁷ 'The Resignation', 21 March 1976, PN #163, 1–6; 'Special Notes on Consideration as FAA Administrator, 13 May 1975', and 'Epilogue to Special Notes...FAA Administrator, 31 May 1975', – both in Box 65; and handwritten notes re: FAA job, with typed notation from Low's executive secretary dated 23 June 1975 stating that he 'accepted the FAA job', Box 66 – all: Low/RPI.

⁷⁸ 'Minutes of Center Directors' Meeting, 21–22 April 1976', 12–3, Box 65, Low/RPI.

⁷⁹ Ibid.; For the cooperation with other civilian government agencies, social research, international cooperation, and studying the most effective use of scientific and technical resources and 'such other activities as may be required for the exploration of space' legislative language NASA ignored, see: Logsdon, et al., op. cit., 335. For the first of many arguments that it was impossible for NASA to do what its leaders didn't want to do anyway, see: Homer Newell, *Beyond the Atmosphere: The Early Years of Space Science* (Washington, NASA, 1980), 374.

⁸⁰ Poundstone, op. cit., 290; Davidson, op. cit., 348–9; For the Planetary Society, world membership was 63,000 as of 30 September 2003; and 57,600 a year later. See: 'Financial Statements: Planetary Society, 30 September 2003 and 30 September 2004' (available from the Planetary Society upon request). The National Space Society has also fallen recently from 35,000 to 20,000, though a very capable new Executive Director of the organisation has started increasing numbers again, via the Internet. George T. Whitesides to author, 15 April 2005.

⁸¹ *New York Times*, 29 March 1979; *idem*, 2 January 1979, 1.

⁸² For the Challenger reaction, see: Jon D. Miller, 'The Impact of the Challenger Accident on Public Attitudes Towards the Space Program: A Report to the National Science Foundation, 25 January 1987', 2, NHO; Burrows, op. cit., 551–77.

⁸³ *Leadership and America's Future in Space: A Report to the Administrator by Dr. Sally Ride, August, 1987* (Washington, DC, NASA, nd. [1987], 7ff.

⁸⁴ Cost estimates for the Space Exploration Initiative ranged all over the map. Burrows, op. cit., 576 says US \$400 billion. The *Economist* of London reported US \$500 - \$600 billion (five times the cost of Apollo in constant dollars). *Space News* put internal NASA estimates at US \$500 billion. *America As The Threshold: Report of the Synthesis Group on America's Space Exploration Initiative* (Washington, DC, GPO, 1991) is the official argument. Lynn Ragsdale's Chapter in Launius and McCurdy, op. cit., provides an overview. 'NASA: Cold War On Mars', *Economist*, 10 March 1990, 94, 96.

⁸⁵ Frank Morring, Jr., (Back to the Future', *Aviation Week and Space Technology*, 12 January 2004, 22–3; 'Bush's Space Plan: Bold Vision or 'Moondoggle?', *idem*, 26 January 2004, 58; Frank Sietzen, Jr., 'Rekindling the Dream', *Ad Astra* (January-March, 2004), 16–7; Frank Sietzen, Jr. and Keith L. Cowing, *New Moon Rising: The Making of America's New Space Vision and the Re-Making of NASA* (Burlington, Ontario, Apogee Books, 2004), esp. 147ff is both polemical and valuable. Based on insider interviews, it will likely long remain the only book-length treatment.

⁸⁶ For critiques of Gore's environmentalist positions, see: John A. Badan (ed.), 'Environmental Gore: A Constructive Response to 'Earth in the Balance'', (San Francisco, Pacific Research Institute, 1994). For Gore and NASA, see: *National Performance Review: NASA* (Washington, GPO, 1994). Gore headed the group doing these agency studies.

⁸⁷ George Cooper III (head of Cuyahoga Valley Space Society chapter of the National Space Society, to author, 3 December 2004, attaching discussion of NASA mission statement by other NSS members and affiliates. For earlier vision statements, see: *NASA Strategic Plan* (February, 1996), (Washington, DC, NASA), 1–2.

⁸⁸ For the quotation, see: 'Shake-up', *Aviation Week and Space Technology*, 14 June 2004, 21. For International and interagency environmental cooperation, see: Michael Taverna, 'Climate Agrees with Them', *idem*, 7 June 2003; Frank Morring, 'Weather Report', *idem*, 10 November 2003, pp. 64ff; Michael Mecham, 'The Big Sniff', *idem*, 14 June 2004, 46–8; Michael Taverna, 'Takin' the A-Train', *idem*, 14 June 2004; Michael Taverna, 'World Watch Widens', *idem*, 25 October 2004, 86–8; Juliet Eilperin, 'Taking the Pulse of the Planet', *Washington Post National Weekly Edition*, 2–8 August 2004, 35.

⁸⁹ See, 'Explore Earth First', *Aviation Week and Space Technology*, 2 May 2005, 21. For the global warming censorship scandals at NASA regarding Dr. James E. Hansen and others, see the coverage in the *New York Times* for 29 January and 16 February 2006, and the 'Washington Outlook' commentaries in *Aviation Week and Space Technology* for 13 February, 20 February, 27 February and 13 March 2006.

⁹⁰ Joseph J. Corn, *The Winged Gospel: America's Romance with Aviation* (Baltimore, Johns Hopkins, 2002 – reprint of original 1983 edition with new preface).

⁹¹ The quotation comes from 'Fiscal Year 1972 Strategy', handwritten notes by George Low, Box 70, and 'The US Space Program...' Eurospace Conference, Monte Carlo, 4 October 1975, 3, Box 65 – both Low/RPI.

Out of the Woods and into the Lab: Exploring the Strange Marriage of American Woodcraft and Soviet Ecology in Czech Environmentalism

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ABSTRACT

It is widely assumed that modern environmentalist thinking was imported into post-communist states such as the Czech Republic post 1989. This paper shows these countries had environmental traditions of their own. From its inception in the late 1950s Czech environmentalism was concerned with nature conservation and youth education. At the core of its pedagogy was a concern to educate about and in nature, following the woodcraft and scouting tradition. But formal educational experiences were also significant. Environmental problems were framed as exclusively scientific issues by communist higher education systems. Thus, Czech environmentalism was a blend of the officially sanctioned rational and scientific perception of environmental issues and a more independent romanticising undercurrent. We show how Czech post-war environmental politics blended Soviet ecology with covert references to the mythology of American West, the virtues of pristine nature and of individual freedom. This heritage allowed Czech environmentalism to adapt to both communist and capitalist systems. However, it also meant it was not equipped to deliver a strategic or systematic critique of either. Our research helps to explain the surprisingly muted role of environmentalism in post-communist politics, and confirms the importance of nuanced and culturally specific analyses of the history of environmental politics.

KEYWORDS

Czech environmentalism, ecological modernisation, Soviet ecological science, woodcraft

Interviewer: Why did you apply for the job of director of Greenpeace Czech Republic?

Respondent: Because I am an old tramp.¹

Environmental movements were prominent catalysts in some of the most dramatic political events of the second half of the twentieth century. They were important components in the alliances that brought down the Central and Eastern European communist states in 1989. But it has been noted that they have had little impact on the trajectory of economic and social development since that time. In this paper we look at the intellectual and cultural origins of Czech environmentalism to excavate some of the reasons for their muted presence in the post-Communist era.²

Perhaps as a consequence of the pivotal role of environmentalism in dismantling the Czechoslovak communist regime, most analyses of the Czech environmental movement have been written from within political science. The dominant perception of the environmental movement is as a civil society actor engaged primarily in democratisation of post-communist society. Hence it is considered in the literatures on resource mobilisation theory and political opportunity structure. These have firmly focused the attention of researchers on the post-1989 period and neglected much of the movement's pre-1989 history. Only a few authors have attempted to put forward a more comprehensive history of the Czech environmental movement between the mid-1970s and late 1980s.³ Much of the more distant past of the 1960s and early 1970s has until recently remained shrouded in mystery. This may in part be because it reaches beyond the personal experience of the majority of people who have been active in the movement since 1989 and who have been the main sources of information for most of the existing literature.⁴

This article has two interrelated aims. First, it traces the distinctive characteristics of the early years of Czech environmentalism during the communist period. This demands an exploration of the long-standing co-existence of its two, seemingly incompatible, fundamental strands: the anti-modern, romantic, first-hand knowledge of nature on the one hand and the representation of environmental problems in terms of rational scientific expertise on the other. The second step taken by the article is to apply the exploration of founding influences to the burgeoning debate on the applicability of the current western hegemonic environmental discourse – ecological modernisation – to societies beyond the political and economic context of western advanced industrial societies for which the concept was originally developed.

In her article 'Legacy of Waste or Wasted Legacy?' on the history of the Hungarian waste management, Zsuzsa Gille convincingly argued that pre-1989 communist systems did, in the 1980s, begin to establish environmental protection measures that were, at the theoretical level at least, parallel with the discourses of

ecological modernisation in the West. However, unlike the Hungarian state-run system of waste management,⁵ the Czech environmental movement's experience, views and style of activities were not rejected in the post-1989 period in large part because they evolved as a critique of the communist management of public policies. We argue in this paper that the Czech environmental movement's complex ideological heritage made it remarkably compatible with ecological modernisation as a political programme that various western agencies began to disseminate in the country in the wake of the 1989 regime change.

This argument will be developed in the rest of the paper. The first section outlines ecological modernisation and the transformation of western environmental movements within that process. It considers the degree to which the Czech environmental movement of the 1990s shared the characteristics of the ecologically modernised Western environmental movement. The second section explores one aspect of this in more depth, that is, the tradition of framing environmental problems as scientific-technical questions. The third section of the paper investigates the other main strand in Czech environmentalism's cultural roots, that is, their relationship with an anti-modern romantic individualism inspired by the American woodcraft movement. The conclusion of the paper shows how these intellectual and cultural influences shaped a distinctive form of environmentalism. It considers how the Czech environmental movement that had its origins in a blend of American woodcraft and Soviet ecological science was capable of adapting to both communist and capitalist systems, but was not equipped to deliver a strategic or systematic critique of either.

ECOLOGICAL MODERNISATION AND CZECH ENVIRONMENTALISM

A fundamental change occurred in the dominant western environment-development discourse between the early 1970s and mid-1980s. Notions of environmental limits to economic growth connected with theories of de-modernisation and de-industrialisation were replaced by a discourse or belief system that incorporated modernity, economic growth and capital accumulation – ecological modernisation.⁶ The basic premise of ecological modernisation is that the environment and the economy can be made mutually reinforcing. The emergence of ecological modernisation is most clearly expressed by the prominence of this thinking in the publications of the OECD and the Brundtland Commission in mid-1980s. Ecological modernisation is often interpreted as a Western elaboration of sustainable development.⁷

Ecological modernisation, both as a theory of social change and as a political programme is not so much about improvements in the physical environment, but rather about social and institutional transformations that will deliver that end. Ecological modernisation became an environmentalist 'norm' in the 1990s. This

is best explained by the reframing of environmental protection in the context of the hegemony of neo-liberalism (comprising the promotion of free trade and market forces as the main engines of economic growth and the retreat of the state from the economy and civil society). Ecological modernisation is essentially concerned with 'the restructuring of the capitalist political economy along environmentally more defensible lines'.⁸ Although environmental degradation is perceived as a structural problem that requires changes in organisation of the capitalist economy, this does not amount to demands for a completely different political-economic system.⁹

Most scholars working in the field would agree on the following core features of ecological modernisation:

- environmental protection and economic growth as a positive-sum game;
- increasing importance of market dynamics and economic agents (producers, consumers, insurers) as carriers of ecological restructuring;
- the preventive role of science and technology through technological and organisational innovations;
- transformations of the nation-state's internal role towards more decentralised, flexible, bottom-up and consensual environmental governance;
- at the same time, the (western industrialised) nation-state remains the central analytical unit of ecological modernisation; and
- greater involvement of environmental movements in public and private decision-making institutions, partnership between public authorities, business and NGOs.

As to the last point, the exact nature of environmental movements' greater involvement in these processes is rarely analysed.¹⁰ However, there appears to be a broad consensus in the ecological modernisation literature with respect to western environmental movements' transformation as part of this process, which can be summarised by a number of shifts from:

- radical opposition to capitalism, industrialisation and bureaucratisation to being more oriented toward institutional reform;
- being part of a broader 'new social movement' including women's rights and the Third World, to being more single-issue oriented towards the environment;
- playing outsider to moving to increasingly insider roles in the environmental transformation of societies;
- being external critics to increasing communication, negotiation and consultation directly with economic agents and state representatives;

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- dominating environmental agenda-setting to being one of actors influencing these processes; and
- working closely with the state to working more closely with market actors.¹¹

There is evidence that the Czech environmental movement in the post-1989 period is largely consistent with this summary of the constituents of an ecologically modernised environmentalism.¹² Most Czech environmentalists view evidence and expert knowledge as the main criteria according to which environmental disputes should be resolved. For them, liberal democracy and the market economy are the preconditions for effective solutions to environmental problems. Conversion at the individual level is held to trigger social change. However, the notion that systemic change might be required to resolve environmental problems is often explicitly rejected. Technology can be a partial solution to current problems, but only in the context of market-based and flexible instruments of environmental policy. The main collective actor is 'civil society', including environmental groups. In this framing, environmental groups represent mediators between individuals or locally based informal groups of citizens, and the central state authorities. Although infinite economic growth and administrative regulation are both stigmatised, the market economy and the ecologically conscious individual are seen as sufficient conditions for progress towards an ecologically modern Czech society.¹³

A tempting line of explanation would be that these views were formed and developed in the course of the 1990s as a result of western influences and that the fundamental change in the form and function of Czech environmentalism experienced in the 1990s¹⁴ was accompanied by a similarly far-reaching shift in their worldviews. But our research points to a much longer heritage for such thinking originating from two startlingly different influences, namely the early twentieth century American woodcraft movement and Soviet ecological thinking. The next section explores the second of these.

UNDERSTANDING ENVIRONMENT – THE PRESERVE OF SCIENTIFIC EXPERTISE

The environmental protests and mobilisations of the late 1980s that made a substantial contribution to the overthrow of the communist regime coalesced around two major concerns. The first and most prominent emerged in the mid-1970s around the adverse effects of industrial pollution on human health and the stability of fragile, mostly mountainous ecosystems. The second was the longer-standing impact of various large-scale government projects such as hydropower plants on biological diversity and landscapes.

Communist institutional understandings of ecological problems were founded in scientific/technical worldviews. Hence ecological problems were interpreted by the regime as mere temporary aberrations that were to be resolved by ever more vigorous application of scientific and technical advancement.¹⁵ The dominance of science and technology in problem solving in Czechoslovak communist society was reflected in all aspects of intellectual life including the curricula at all levels of the educational system,¹⁶ in publishing policy and in research priorities. Starting in the 1970s, environmental studies at the tertiary level of education were taught within university departments and faculties of science and at polytechnics. The limited number of students allowed to enrol on these programmes were required to study a range of highly specialised scientific analytical methods and the (technical) management of protected areas. This model of environmental studies was preserved well into the 1990s.¹⁷

The scientific/technical worldview was dominant amongst elites on account of the nature of graduate and post-graduate education. Graduates represented only seven per cent of the Czech adult population in the second half of the 1980s, and their educational experiences were remarkably homogeneous. About 80 per cent of university degree holders graduated either from polytechnics or faculties of science (including medicine). This emphasis on scientific and technological solutions to all of society's problems ensured that from the 1950s onwards at least 90 per cent of university graduates received a highly specialised education at the expense of holistic or interdisciplinary approaches.¹⁸

Unlike the neighbouring communist countries such as Hungary and Poland, where academics and intellectuals enjoyed some limited access to western social scientific literature, Czechoslovakia was virtually cut off from the wider international intellectual community. Discussion of political, economic, and social issues in Czech publications were descriptive and technical, and lacked analytical and theoretical dimensions.¹⁹ This contrasts with East Germany, where much environmental activism prior to 1989 had a left-wing, anarchistic and autonomous ideological background partly nurtured by the work of western authors such as André Gorz and Ivan Illich. This framing of environmental issues was developed further by East German authors (published in West Germany) such as Rudolf Bahro and Wolfgang Harich.²⁰

The resulting narrow technocratic paradigm in which environmental problems were addressed by the Czech research and academic communities was characterised by strong cognitive-informational capacities for data gathering, analysis and classification. However, this was in tandem with a lack of ability to use the resulting data bases for the development of effective environmental protection policies. An environmental status report produced for the IUCN in 1989 captures the mood of Czechoslovak science of environment in the following words:

Steps are being taken to record and evaluate the rate of environmental change.

Monitoring of the environment is therefore being developed in various forms

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and localities. For example, there are several institutes using remote sensing, such as the State Institute for Protection of Monuments and Nature Conservation in Prague which operates its own Remote Sensing Laboratory principally for monitoring environmental deterioration in a large protected area.²¹

In other words, expertise was almost exclusively directed to ever better recording and understanding of the process of environmental deterioration rather than to developing policy proposals as to how these trends could be reversed or prevented. From the early 1970s onwards the intellectual climate surrounding environmental understanding was influenced by the Soviet landscape school of thought on the environment. The Institute of Landscape Ecology of the Czechoslovak Academy of Sciences, established in Prague in 1971, played an important role in this. In the Soviet Union this intellectual current had a long history, associated with pre-revolutionary and early Soviet-era scientists such as V.V. Dokuchaev and V.P. Semenov-Tyan-shanskij.²²

What distinguished this school of thought from the narrow disciplinary approaches typical of Czech environmental science of the time, was its emphasis on the 'functional and integrated way of looking at the natural environment' and its 'regional, integrated approach to geography, combining natural and human phenomena'.²³ It placed emphasis on revealing regularity, patterns, causality (of natural phenomena) and 'laws of nature'. Its key concept was a landscape, or a landscape zone closely related to the notion of geosystem:

A 'geographical', or 'natural' or 'landscape zone' features common thermal conditions and a moisture regime, which together determine a specific nature of hydrological conditions, geochemical processes, soil formation and character of vegetation cover.²⁴

The key point in relation to environmental problems is that these features determine the resistance of each zone to human disturbance and its resilience, i.e. the ability of the landscape to return to its equilibrium or original state. A landscape zone's capacity to withhold external disturbances depends on its degree of diversity. As a consequence, the same interference with landscape might have vastly different implications depending on the zone in which it occurred.

The value of this holistic approach to environmental problems lay in its ability to describe in a complex and systematic manner the functioning of ecosystems, disclosing 'laws', regularities and patterns characterising human interferences with the environment. It shared with the Czech traditional approach both the virtues of its sound scientific analytical grounding and the vices of its inability, inherent in the structure of Soviet science, to extend its insights to the more prescriptive, policy-making and decision-making sphere.²⁵

An example of an influential Czech publication of the 1980s that contained a number of references to the influence of the Soviet landscape school is 'The Environment through the Eyes of the Scientist' (*Životní prostředí očima přírodovědce*), whose first edition appeared in 1979 and the second edition

in 1989.²⁶ The authors were three leading environmental scientists – chemist Bedřich Moldan,²⁷ plant ecologist Jan Jeník and chemist Jaroslav Zýka. Another important publication of that period was the translation of Paul Duvigneaud's *La synthèse écologique* published under the Czech title *Ekologická syntéza* in 1988. This western book was to some extent influenced by the Soviet school of thought and some of its conceptual underpinnings were compatible with the approach of other Czech and Soviet publications of that period.²⁸

The group that most clearly represented both currents of the 'scientific environmentalism' described above was Ecological Section (*Ekologická sekce*). This elitist academic organisation, in full name Ecological Section of the Biological Society of the Czechoslovak Academy of Sciences, which was, after a decade of thwarted attempts, officially established in December 1978,²⁹ evolved from a group of friends and colleagues, most of whom held jobs in various institutes of the Academy of Sciences. At its peak in 1989, the membership of *Ekologická sekce* reached 400. It effectively ceased to exist after November 1989 when the majority of its leading members joined the newly created Czech Ministry of the Environment. The activity of *Ekologická sekce* initially displayed what some members viewed to be an excessively scientific bias.³⁰ However the more critical strand of its activities gained in strength over time, particularly its concern with access to secret environmental data and the effects of pollution on ecosystems and human health. In practical terms, *Ekologická sekce* was largely involved in integrative and co-operative ventures such as public lectures and seminars, publishing conference proceedings and preparation of expert reports commissioned by government institutions.

As the 1980s progressed, environmental damage was increasingly manifest in industrial air and water pollution with their attendant human health and landscape impacts. These problems were linked to industrial production – above all in resource-intensive industries (metallurgy, mining and coal-based energy production). They became powerful symbols of the communist state's mismanagement of the economy and disregard for its citizens' well being. Members of *Ekologická sekce* were aware of the politically destabilising effects of the degraded environment.³¹ One of the reports commissioned by the government, the 'Report on the State of the Environment in Czechoslovakia' (1983), was leaked to the dissident group Charter '77 and was consequently published in the western press in 1984. This act brought *Ekologická sekce* closest to what could be called a macro-level critique of the system. This undercurrent of environmental critique tacitly levelled the blame for growing environmental degradation on the communist state's management and reached a paradigmatic status in the second half of the 1980s.

However, the members of *Ekologická sekce* were also pursuing less overtly political and more intellectually ambitious interests including global environmental problems and their social and economic dimension. For example, they published semi-official Czech translations of Hardin's 'The Tragedy of the Com-

mons³² and of the Club of Rome's *Limits to Growth*. Nevertheless, as Bedřich Moldan, who was mainly responsible for the latter, recalled in an interview for *Nová přítomnost* monthly at the beginning of the 1990s, this effort had no impact on the wider Czech environmental movement's discourse: it met with very little response. The limited influence of western academic literature and discussions is confirmed by Miroslav Kundera's observation, made in the early 1990s, that 'even within the [Czechoslovak] environmental movement there are few people who have a deep knowledge of the works of the Club of Rome; the names of E.F. Schumacher, A. Toffler, F. Capra and others are almost unknown'.³³

The influence of the Soviet school of ecological thought reached much further mainly through university textbooks and other official academic and popular scientific publications.³⁴ Although most Czech academic authors in this period would occasionally make use of references to Soviet authors as 'libations',³⁵ there is good evidence that the Soviet school of ecological thought was influential amongst the membership of Ekologická sekce, as the book *Životní prostředí očima přírodovědce* makes apparent. This and other writings contained references to the Soviet bio-geochemist and thinker Vladimir Ivanovich Vernadskiy³⁶ and his theoretical concepts including biosphere and noosphere. Leading figures of Ekologická sekce Moldan and Mezříčský were already acquainted with Vernadskiy's theories in the early 1970s.³⁷ During the 1980s, Vernadskiy's ideas were influential in Czech academic debates, as the additional chapter to the translation of Duvigneaud's *La synthèse écologique*, dated in 1985 and co-authored by three senior members of the Institute of Landscape Ecology, demonstrates. The chapter contains a polemical debate with Duvigneaud on the exact meaning of Vernadskiy's concept of noosphere.³⁸

In the late 1980s, Vernadskiy's environmental thought achieved cult popularity in some segments of Czech academia. Not only was the Czech Society of V.I. Vernadskiy founded in that decade, but in 1989 an exhibition dedicated to Vernadskiy was held in Prague and České Budějovice (the seat of the Institute of Landscape Ecology).³⁹ Between 1986 and 1990, Vernadskiy's ideas were widely used as methodological concepts underpinning research projects conducted by the Institute of Landscape Ecology.⁴⁰ Vernadskiy's philosophical approach, synthesising inorganic and organic parts of nature, in some respect resembles Lovelock and Margulis' Gaia hypothesis that was published half a century later.⁴¹ However, a number of Czech leading academic ecologists, for example Alois Zlatník, were dismissive, and stressed the importance of pure disciplinary scientific approaches to ecology.⁴²

Despite the fact that Vernadskiy's holistic philosophical approach could be represented as contrasting with perspectives based in narrow academic disciplines, they shared an important feature with it – the lack of a policy- and decision-making dimension. Scientific, technical, rational, apolitical and value-free interpretations of environmental issues were dominant in the Czech environmentalist circles of the 1970s and 1980s. This was the only type of

reasoning that did not contradict the official ideology of social advancement based on scientific-technological progress and was hence permitted by the authorities. The key goal of the environmental scientists was to gather more data and information, which would enable them to mount more effective scientific arguments in communication with the authorities.

A ROMANTIC EDUCATION: 'BUILDING CHARACTER' THROUGH EXPERIENCE OF NATURE

The academic and other protagonists of the environmental mobilisation of the late 1980s clung tightly to scientific data and arguments in their interactions with the communist state authorities. However there is strong evidence that key formative experiences were, for many of them, drawn from a markedly different tradition of Czech environmentalism. A number of Czech academic ecologists were apparently able to reconcile their professional environmental activity, based on scientific and technocratic rationality, with an older Czech romantic and spiritual cultural undercurrent. This extolled the virtues of direct experience of pristine nature including the character-building potential for the individual. For example, Bedřich Moldan gave the following response to a journalist's question on the origin of his environmental orientation:

When I was 14 or 15, I joined an excellent woodcraft tribe in Děčín. It was several extremely important years of my life. We went on hikes and camped out under the leadership of an erudite forester Klen. He was a person of exceptionally strong principles that were based on the ideas of Seton and woodcraft including extreme modesty and the ability to get by with very little. When we went on a hike, we mustn't have left a trace.⁴³

Václav Mezřícký answered a similar question in the following way: 'And later I joined the scouts where I acquired that romantic attitude to nature and learnt various "Indian" and backwoodsman's traditions...'.⁴⁴ In his book dedicated to the history of the Czech woodcraft movement, Libor Pecha suggests that the majority of Czech academic ecologists are in one way or another connected with scouting and woodcraft and draws up a list of prominent contemporary individuals in support of his argument. Pecha's list of leading environmental academics-activists – all former scouts and woodcrafters – includes Bedřich Moldan, his co-author of *Životní prostředí očima přírodovědce* Jan Jeník, chairman of the Society for Sustainable Living (*Společnost pro trvale udržitelný život*; the 1990s successor of *Ekologická sekce*) Igor Míchal, the Czechoslovak federal minister of the environment between 1990 and 1992 Josef Vavroušek, and the head of the department of ecology at Olomouc University Milena Rychnovská.⁴⁵ Pecha seems oblivious to the contradictory mix of an anti-modern woodcraft ethos

and education that these people grew up with and the scientific environmental discourses that they were practising professionally and in public life.

A number of interviews with contemporary Czech environmental movement intellectuals, who were one or two generations younger than the former leaders of *Ekologická sekce*, identified a broadly similar range of influences on the formative experience of these activists. Five mentioned their tramping (outdoor hiking and camping – more discussion below) experience, and four their childhood membership in scouts. Another four referred to the influence of romantic books on the nineteenth-century American West (by German writer Karl May), North American wilderness and the life of Native Americans (by US writer, artist, educator and naturalist Ernest Thompson Seton) and Czech boy scouting (by Czech writer Jaroslav Foglar).⁴⁶

Scouting, woodcraft and tramping, which, in that order, range from an organisation to a loose movement, are, in the Czech historical context, all manifestations of the same cultural formation whose origin lies in the early years of the twentieth century. The common historical point of reference for all three strands is the work of Ernest Thompson Seton. Inspired by the lives and culture of Native Americans, in 1906 he published, under the title *The Birch Bark Roll of the Woodcraft Indians*, a handbook that set forth the aims and methods of his woodcraft movement.⁴⁷ Some ideas from Seton's book appeared in Baden-Powell's *Scouting for Boys*, published in Britain a year later.⁴⁸

Both scouting and woodcraft almost instantly found their enthusiastic Czech promoters. A high school PE teacher A.B. Svojsík founded the first Czech scout organisation (*Junák-český skaut*) in 1914. Starting in 1912, Seton's ideas were also promoted in the Czech Lands by a high school biology teacher Miloš Seifert. After several years of unsuccessful attempts to develop a movement modelled on Seton's ideas within Czech and later Czechoslovak scouting, an independent organisation called the Woodcraft League (*Liga lesní moudrosti*) was eventually founded in 1922. Seton's romantic books about North American wildlife and woodcraft were hugely popular in the inter-war Czechoslovakia⁴⁹ and were also published during the 1948–1989 communist period.⁵⁰

Although Svojsík's adaptation of scouting to Czech conditions softened the military and religious associations, it was still regarded by many boys in their late teens as an excessively regimented activity. As a reaction to scouting's emphasis on discipline, a loose movement, initially called 'wild scouts' and later labelled 'tramping', quickly sprang up across the country immediately after the First World War. Tramping owed its popularity to the presence of a specific strand of contemporary American culture. This was communicated through Czech translations of literature on the North American wilderness and through early American westerns. Influential US writers included James Fenimore Cooper, James Oliver Curwood, Zane Grey, Bret Harte and, above all, E.T. Seton and Jack London. A leitmotif of this literature was the strong and indomitable individual set within a harsh and dangerous but pristine nature.⁵¹

Tramps went on hikes or canoe trips on scenic rivers, and built camp sites and log cabins where they spent weekends doing sports, carving totem poles and playing guitars and singing songs around the bonfire at night. While tramping and the associated popular culture (music, literature, magazines and films) always nurtured positive attitudes to nature, the movement has gone through several major transformations. Before World War Two tramping represented an alternative and left-leaning youth subculture.⁵² In the communist era tramping enabled people of all age groups to find a refuge from oppressive every-day reality with a group of like-minded friends in their log cabins or campsites. In the same way as other 'silent dissent' movements such as the clandestine woodcrafter and scout groups and in contrast to its pre-World War Two tradition, during the communist period tramping developed anti-left-wing political attitudes. All three movements retained their popularity during the four decades of the communist regime due to their mildly oppositional nature and their rootedness in the 'golden age' of Czech history – the interwar democratic Czechoslovakia. Nevertheless, they needed legitimate, regime-sanctioned protection if they were to maintain their activities. Not surprisingly, given their close affinity with nature and outdoor activities, they soon found this refuge in the science-based, and hence apparently apolitical, sphere of nature conservation.

The proclaimed genesis of the first Czech post-World War Two environmental group shows the influence of the romantic woodcraft tradition of youth education. Zoologist Otakar Leiský tells of how, on 3 March 1957, he went with his family for a Saturday walk to a limestone valley called Prokopské údolí near Prague. They were approached by a group of boys who were eager to learn about the area. From that date on this serendipitous grouping held regular weekly meetings. In the summer of 1957, Leiský, himself a scout in his childhood, organised a summer camp for this group of children with a programme modelled on the woodcraft educational system (outdoor games, hikes to the countryside and basics of ecology).⁵³

Leiský wanted to keep a distance from the Communist Party-controlled Pioneer Organisation and the Czechoslovak Union of Youth, and at the same time to avoid persecution by the authorities. It was essential to find an officially recognised shelter for their activities. Since it was impossible to establish a new organisation, the only option was to join a body sanctioned by the Communist authorities. This led to the formation of a new section of the Scientific Association of the National Museum – the Section for Nature Protection – in 1958. During the 1960s the Section transformed, as a consequence of its growing membership, into the Association for Nature Protection of the National Museum.⁵⁴ Taking advantage of the political thaw associated with the Prague Spring, in November 1969 the Association broke away from the National Museum Society and registered with the Ministry of Interior. From this point on it became an independent organisation under the name Yew Tree – the Union for the Protection of Nature and Landscape (*Tis – Svaz pro ochranu přírody a krajiny*).⁵⁵

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At its peak in 1979, Tis had 16,000 members. Up until 1974 Tis was the only environmental group in the territory of today's Czech Republic, hence the composition of its membership reflected both constituent traditions of Czech environmentalism. A large proportion of Tis's members were children and young people in 'Clubs of Young Nature Protectionists'. The leadership of Tis saw tramping and Tis-style environmental activism as kindred souls. In 1968-1970, Eva Olšanská who was in charge of the Tis's educational section also ran, under the title *The Sprig of Yew (Pod snítkou tisú)* a column in a monthly magazine *Tramp*.⁵⁶ In this way she disseminated information on the work of *Tis* within the tramping movement and recruited new members for the organisation. The intimate relationship between tramping and environmentalism at the local level is illustrated by the recollections of the early 1970s of a tramp and Tis veteran in Valašské Klobouky:

And because I really think that aside from their vision of friendship, romanticism and camaraderie, the tramps always accepted nature as their basic space, we got inspired very quickly and that's why we founded Tis back then.⁵⁷

The second group of Tis members were people with a scientific educational background⁵⁸ – either university teachers and researchers, including some very senior ones, from the Academy of Sciences or professionals who used their tertiary level of education in biology and other scientific disciplines in an applied way – as high school teachers, forest managers and the like. Respected and well-known scientists, including Vernadskiy's critic Alois Zlatník, usually held the top representative posts.⁵⁹

While the leadership of Tis was undoubtedly proud of its capacity to sustain independence from the regime's institutions such as the National Front (*Národní fronta*),⁶⁰ the organisation was at the same time involved in all sorts of co-operative ventures. An important feature of Tis's activities was wide-ranging co-operation with various stakeholders whether it be local schools or state nature protection institutions such as Landscape Protected Area authorities, museums or local governments.⁶¹

Throughout its history as an independent organisation (1969–1979) Tis received no state funding. To fund its activities, Tis raised membership fees, arranged public lectures and film projections, and undertook contracted weekend work for co-operative farms or the state company managing forests. To earn income for the organisation, Tis developed an entrepreneurial culture and drew on the unique skills and expertise of many of its members. During the 1970s it produced 30 consultancy reports, many similar to present day EIAs. These reports were commissioned by various state bodies and included a comprehensive ecological assessment of the site of politically sensitive uranium mining.⁶²

During the last six years of its existence, Tis shared some of its key expert-activists with Movement Brontosaurus (*Hnutí Brontosaurus*).⁶³ The roots of this environmental group date to 1973. Several young researchers in the Academy of

Sciences' Institute of Landscape Ecology in Prague who did not want to join the Communist Party needed to find an alternative means of political engagement. The director suggested that the Institute found a branch of Socialist Union of Youth (*Socialistický svaz mládeže*; SSM) that would specialise in environmental protection and education. The idea was seized upon by the Central Committee of SSM which declared 1974 as the Year of Environmental Protection, the main manifestation of which was a huge media campaign called Action Brontosaurus (*Akce Brontosaurus*) aimed at children and young people and designed by experts from the Institute. Magazines for children and young people and the Czechoslovak Television and Czechoslovak Radio took part in the campaign. Each month of the Year was dedicated to a particular environmental problem such as air pollution, waste management, transport and water pollution.⁶⁴ Following its phenomenal success, the Central Committee of SSM decided to turn *Akce Brontosaurus* into a permanent programme of SSM activity called *Hnutí Brontosaurus*. *Brontosaurus* could count on almost 10,000 volunteers in its 1980s heyday. *Brontosaurus* was engaged in a range of activities, the most popular of which were summer camps located in areas of natural beauty. Participants worked as volunteers for two weeks, yet the demand greatly exceeded the number of available places. Only about a tenth of applicants could participate.

The most important component of the Czech environmental movement in the 1980s was Czech Union for Nature Conservation (*Český svaz ochránců přírody*; ČSOP). This was established by the Czech government in September 1979 to replace *Tis* which the authorities forced to 'voluntarily' disband itself at the end of the same year.⁶⁵ While *Tis* leadership ostensibly refused to join the newly created organisation, many members of local branches, to whom ČSOP was often presented as the *Tis*'s successor, joined the new Union. In fact, they had no choice if they wanted to continue their conservation work. At the end of the 1980s the ČSOP's membership reached 26,000. ČSOP resembled *Tis* not only in the breadth of its activities, but also in its co-operation with a range of institutions and companies which often became its collective members.

The task given to ČSOP by the authorities was 'to develop ideo-educational and propagandistic activities aimed at winning the masses for nature conservation and protection of the environment along the Communist Party line'.⁶⁶ However, several groups in ČSOP, especially in the second half of the 1980s, became engaged in activities that led to co-operation with more openly political groups. A case in point was the publication of the 'ecological bulletin' *Nika*, the official magazine of the Prague City Committee of ČSOP, which throughout the 1980s dared to enter into a direct confrontation with the Communist Party over some environmentally controversial projects. In addition to articles by staff editors *Nika* printed occasional *nom de plume* articles by 'ecological dissidents' and also by distinguished scientists – members of *Ekologická sekce*. Continuing the tradition established by *Tis*, ČSOP placed a great emphasis on children's

education. Several thousand ČSOP members were children under 15 who went through an educational programme based on scouting and woodcraft.

While in their practical nature conservation and expert consultancy work the members of Tis, Brontousaurus and ČSOP were guided by scientific rationality and expertise, the educational programmes of all three organisations were much wider and more culturally rich. These programmes were aimed at instilling in children and young people positive attitudes towards nature, and had strong romantic, aesthetic and spiritual components. They emphasised the importance of experiential learning in the outdoors. The woodcraft and tramping-related tradition was centred on gaining a working knowledge of nature, and emphasised modest lifestyles and self-reliance. This helped to nurture the strong commitments within the Czech environmental movement to the centrality of lifestyle in environmental protection. The emphasis on young people's education was an expression of the importance of reformist 'micro-level' strategies of change to the Czech environmental movement.

PRESENT DAY CONSEQUENCES OF THE HERITAGE OF CZECH ENVIRONMENTALISM

The pre-1989 Czech environmental movement largely developed in isolation from western environmental movements and the influences that informed the latter in the 1960s, 1970s and 1980s. During the communist period communication between Czech environmentalists with their western counterparts was almost non-existent. Czechs had little experience of the foment of critical thinking that was part and parcel of the emergence of new social movements out of which western environmentalism was forged. Up until 1989 Czech environmentalism was shaped by two longer traditions: early twentieth-century American woodcraft and Soviet ecology. This blend of romanticism and scientific/technical rationality shaped a distinctive domestic environmentalism.

From its inception in the late 1950s the Czech environmental movement was concerned with science-based nature conservation and youth education. At the core of its pedagogy was a concern to spread a working knowledge of nature, following the woodcraft, tramping and scouting tradition. Scouting, and its anti-authoritarian sibling tramping, had been hugely popular in inter-war Czechoslovakia. Many environmentally concerned Czechs were thus imbued with woodcraft, scouting and tramping's conviction that individual betterment could be achieved through education about and *in* nature. It was a short step for the environmental movement to conclude that environmentally positive lifestyle changes would be an effective strategy for the transformation of the relationship between society and the environment.

But formal educational experiences were as important as the extramural environmental legacy. During the communist period the structure of secondary

and tertiary education was heavily biased in favour of technical and scientific disciplines. Graduates in these disciplines made up about 80 per cent of all university graduates. This was reflected in the educational background and professional experience of leaders of Tis, Brontosaurus, ČSOP and Ekologická sekce. Some disciplines, primarily biology and ecology, which were in the 1970s and 1980s under the influence of the Soviet school of ecological thought, were clearly more conducive to the involvement of individuals in the environmental movement.⁶⁷ Thus, the Czech environmentalism of the communist period was a peculiar blend of the officially sanctioned moderate current of rational, technocratic and scientific (ecological) perception of environmental issues and the more independent romanticising undercurrent which, with its covert references to the mythology of American West, extolled the virtues of pristine nature and individual freedom.

Contrary to suggestions that modern western environmentalist thinking, framed as ecological modernisation, was simply transported and promulgated within post-Communist states after 1989, we have found that the conditions were already laid for its promotion. The distinct domestic form of environmentalism that emerged in Czechoslovakia during the communist era laid the ground for an embrace of the paradigm of ecological modernisation. Whereas western environmentalism emerged in tandem with a broader New Left counterculture, Czech environmentalism represented a more moderate response to 'existing socialism' and politically leaned to the right or centre. It was well prepared to promote a response to ecological problems founded in free markets and individualism after the fall of communism.

To domestic commentators, the explanation rested exclusively in the fact that 'ecological damage in Czechoslovakia was perceived as a consequence of the communist centrally planned economic system and hence Czech environmentalists saw the capitalist system and market economy as their hope'.⁶⁸ The macro-level environmentalist critique voiced primarily by Ekologická sekce, was not directed against industrialisation *per se*, but against the detrimental effects of industrial pollution on the health of the public and ecosystems. These problems were associated with a particular kind of economic development – the paradigmatic heavy industries representing the alien Soviet model of forced industrialisation. As a consequence of the omnipresent, unaccountable and economically incompetent state Czech environmentalists associated environmental reform with a retreat of the state, from both the economic and the political sphere. Gaining access to data on environmental degradation became an important part of their struggle. Such data could be used in arguments against the communist state. The contemporary doctrine of social progress through science and technology dictated the terms of exchange. Both protagonists – communist state authorities and their environmental critics – felt comfortable with this as they shared the same scientific and technical educational background.

However, it can be argued that environmentalists in other post-communist countries in Central and Eastern Europe, such as East Germany, shared both the experience of ecologically destructive Soviet models of industrialisation and the obligation to frame debates in scientific/technical terms. Yet, unlike East Germany, there was no tradition in the pre-1989 Czech environmental movement of opposition to capitalism or of attempts to merge environmentalism with a left-wing ideology. This points to the importance of the other – anti-modern and romantic – strand in Czech environmentalism, rooted in Seton's American woodcraft movement.

We conclude that the strange marriage of Soviet ecological thinking and American woodcraft tradition at the roots of Czech environmentalism left the movement well adapted for the rapid adoption of ecological modernisation post-1989. The combination of an aversion to state-centred responses to environmental problems, and the promotion of a re-framing of nature-society relations in terms of individual experiential learning meant this variant of environmentalism arrived at the same place intellectually, and at the same time, as its West European form, albeit by a very different route. But this left Czech environmentalism ill-equipped to deliver a mature critical voice in the post-communist era. The years since 1989 have seen rapid economic, political and social changes, but these changes have progressed with minimal reference to environmental frames of thought.

Although in the mid-1990s the Czech movement launched several campaigns aimed at preserving the system of public transport⁶⁹ and returnable bottles it subsequently ran out of strategic space within which it might argue for some of the environmentally valuable legacies of the communist era, whether planned by the state (e.g. an extensive public transport system) or developed in response to its failures (e.g. extensive local self-provisioning and barter in food).⁷⁰ The simultaneous emphasis on the importance of scientific rationality and technical management, and a romantic educational programme aimed at changes in individuals' lifestyle through living 'in nature', stopped the movement from addressing wider structural dimensions of environmental degradation.

NOTES

¹ Interview with co-author, 5 December 2003. Birmingham, UK.

² Hein-Anton van der Heijden, 'Environmental Movements, Ecological Modernization and Political Opportunity Structure', *Environmental Politics* 8 (1999): 199–221. Barbara A. Cellarius and Caedmon Staddon, 'Environmental Nongovernmental Organizations, Civil Society, and Democratization in Bulgaria', *East European Politics and Societies* 16 (2002): 182–222.

³ For political science accounts of the Czech environmental movement see, for example, JoAnn Carmin and Barbara Hicks, 'International Triggering Events, Transnational

Networks and the Development of the Czech and Polish Environmental Movements', *Mobilization* 7 (2002): 305–42; Adam Fagan, *Environment and Democracy in the Czech Republic: The Environmental Movement in the Transition Process* (Cheltenham: Edward Elgar, 2004); Adam Fagan and Petr Jehlička, 'Contours of the Czech Environmental Movement: A Comparative Analysis of Hnutí Duha (Rainbow Movement) and Jihočeské matky (South Bohemian Mothers)', *Environmental Politics* 12 (2003): 49–70. The historian Miroslav Vaněk offers scholarly Czech-language accounts of the history of the Czech environmental movement in the 1970s and 1980s. Miroslav Vaněk, *Nedalo se tady dýchat* [It was impossible to breathe here] (Praha: Ústav pro soudobé dějiny AV ČR, 1996); Miroslav Vaněk, 'Zelené mláďi' [Green youth], ed. by Miroslav Vaněk, *Ostrůvky svobody. Kulturní a občanské aktivity mladé generace v 80. letech v Československu* [Islets of freedom: Cultural and civic activities of young generation in the 1980s' Czechoslovakia] (Praha: Ústav pro soudobé dějiny AV ČR and Votobia, 2002), 237–72. The following English-language historical accounts go beyond the 1989 political change: Andrew Tickle and Josef Vavroušek, 'Environmental politics in the former Czechoslovakia', ed. by Andrew Tickle and Ian Welsh, *Environment and Society in Eastern Europe* (Harlow: Longman, 1998), 114–45; Petr Jehlička, 'The New Subversives – Czech Environmentalists after 1989', ed. by Helena Flam, *Pink, Purple, Green: Women's, Religious, Environmental, and Gay/Lesbian Movements in Central Europe Today* (Boulder: East European Monographs, 2001), 91–4.

⁴ Petr Jehlička and his colleagues found that most key figures of the movement in the late 1990s were veterans who joined the movement during the 1980s. Petr Jehlička, Philip Sarre and Juraj Podoba, 'The Czech Environmental Movement's Knowledge Interests in the 1990s: Compatibility of Western Influences with Pre-1989 Perspectives', *Environmental Politics* 14 (2005): 64–82.

⁵ Zsuzsa Gille, 'Legacy of Waste or Wasted Legacy? The End of Industrial Ecology in Post-Socialist Hungary', *Environmental Politics* 9 (2000): 203–31. Raymond Dominick made a similar point concerning the efficiency of the metals recycling system in former East Germany. Raymond Dominick, 'Capitalism, Communism and Environmental Protection. Lessons from German Experience', *Environmental History* 3 (1998): 322.

⁶ Albert Weale, *The New Politics of Pollution* (Manchester: Manchester University Press, 1992).

⁷ Van der Heijden, 'Environmental Movements'.

⁸ John Dryzek, *The Politics of Earth: Environmental Discourses* (Oxford: Oxford University Press, 1997).

⁹ Maarten A. Hajer, *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process* (Oxford: Oxford University Press, 1995).

¹⁰ For exceptions see van der Heijden, 'Environmental Movements', 201–7; Arthur, P.J. Mol, 'The Environmental Movement in an Era of Ecological Modernization', *Geoforum* 31 (2000) 45–56; David A. Sonnenfeld, 'Social Movements and Ecological Modernization: The Transformation of Pulp and Paper Manufacturing', *Development and Change* 33 (2002): 331–7.

¹¹ This transformation of the western environmental movement along the lines of ecological modernisation is described in Sonnenfeld, 'Social Movements', 331–7.

¹² See, for example, Barbara Jancar-Webster, 'Environmental Movements and Social Change in the Transition Countries', *Environmental Politics*, 7 (1998): 69–90; Jehlička, 'New Subversives', 91–4.

¹³ Jehlička, Sarre and Podoba, 'Czech Environmental Movement', 69–71.

¹⁴ See for example, Fagan, *Environment and Democracy*, 74–121.

¹⁵ Miroslav Vaněk refers to the 1973 quote of the ideologue of the scientific-technological revolution in Czechoslovakia and the director of the Institute of Philosophy and Sociology of the Czechoslovak Academy of Sciences, Radovan Richta: 'Many negative ecological phenomena arise primarily from insufficiently substantiated human interferences in nature, which corresponds with the initial phases of the scientific-technological revolution. Problems often occur not due to excessively active human interference in nature, but due to the insufficient human activity...' Vaněk, *Nedalo se*, 22.

¹⁶ For description of how the emphasis after the 1948 communist coup shifted from the humanistic education of the interwar period to technically focused education see Sharon L. Wolchik, *Czechoslovakia in Transition: Politics, Economics and Society* (London and New York: Pinter Publishers, 1991), 295.

¹⁷ For example, according to the list of all courses related to the environment taught at Charles University in the academic year 1993/94 compiled by the Charles University Center for the Environment, 191 out of the total of 211 were science based. Centrum Univerzity Karlovy pro otázky životního prostředí, *Seznam přednášek týkajících se problematiky životního prostředí na fakultách Univerzity Karlovy 1993/1994* [The list of environment-related courses at Charles University 1993/1994] (Praha: Univerzita Karlova, 1993).

¹⁸ Miroslav Kundra, 'Czechoslovakia', in *Civil Society and the Environment in Central and Eastern Europe* ed. D. Fisher, C. Davis, A. Juras, V. Pavlovic (London: Ecological Studies Institute/Bonn: Institut für Europäische Umweltpolitik/Belgrade: Eko-Center, 1992) 34.

¹⁹ Jiří Musil, 'Education and Research in the Czech Republic: Burden of the Past and Hope for the Future', *East European Politics and Societies*, 7 (1993): 59–73.

²⁰ Dieter Rink, 'Environmental Policy and the Environmental Movement in East Germany', *Capitalism Nature Socialism* 13 (2002): 81–2. Bahro's book *Die Alternative: Zur Kritik des real existierenden Sozialismus* was published in Frankfurt am Main in 1977; Harich's book *Kommunismus ohne Wachstum. Babeuf und der Club of Rome* was published in Reinbek in 1975.

²¹ Jan Čeřovský, 'Czechoslovakia: Environmental Status Report 1988/1989', *Environmental Status Reports 1988/1989: Volume One: Czechoslovakia, Hungary, Poland*. Thatcham: IUCN (1990) 1–58.

²² Jonathan D. Oldfield and Denis J.B. Shaw, 'Revisiting Sustainable Development: Russian Cultural and Scientific Traditions and the Concept of Sustainable Development', *Area*, 34 (2002): 391–400.

²³ David J.M. Hooson, 'The Development of Geography in Pre-Soviet Russia', *Annals of the Association of American Geographers*, 58 (1968): 272.

²⁴ Tatyana Saiko, *Environmental Crises: Geographical Case Studies in Post-socialist Eurasia* (Harlow: Prentice Hall, 2001), 13.

²⁵ Two chapters on the former communist countries – the Soviet Union and Hungary – in the Social Learning Group's *Learning to Manage Global Environmental Risks* (Cambridge, The MIT Press, 2001) bring ample evidence of good environmental science coexisting with poor capacities for the development of environmental policies as a result of the framing of environmental problems as exclusively scientific matters. For more details see the chapter by Vassily Sokolov and Jill Jäger on the Soviet Union, 150–51, and that by Ferenc L. Tóth and Eva Hizsnyik on Hungary, 180–84. According to Tóth and Hizsnyik, their comparisons justify the extension of this analysis to other socialist countries in Central and Eastern Europe, 185.

²⁶ Bedřich Moldan, Jan Jeník and Jaroslav Zýka, *Životní prostředí očima přírodovědce: Člověk v biosféře* [The environment through the eyes of the scientist: Man in biosphere] (Praha: Academia, 1989, 2nd edition [1st edition 1979]).

²⁷ Bedřich Moldan, an analytical chemist by training, pursued a markedly interdisciplinary career. His work straddled chemistry, biology and geology. He was, between 1978 and 1992, a vice-chairman and secretary of Ekologická sekce (more discussion below). After 1989, he became the first Czech minister of the environment. He is now a Senator, a director of Charles University Environment Research Centre and a member of the Scientific Committee of the European Environmental Agency.

²⁸ Paul Duvigneaud, *Ekologická syntéza* (Praha: Academia, 1988) [Czech translation of *La synthèse écologique*, Paris: Doin editeurs, 1980].

²⁹ Jaroslav Stoklasa, *Historie Ekologické sekce Čs. biologické společnosti ČSAV* [The history of the Ecological Section of the Czechoslovak Biological Society of the Academy of Sciences] unpublished manuscript sent to the authors in June 2005.

³⁰ Václav Mezřický, one of the founding members of Ekologická sekce, quoted in Vaněk, *Nedalo se*, 40.

³¹ 'We regarded ecology as a political, and ecological activity, as a way in which the system could be destabilised, which would in turn enable us to open and reflect on this problematic.' Václav Mezřický, quoted in Vaněk, *Nedalo se*, 39.

³² Hardin's text was published as an appendix to the minutes of a meeting.

³³ Kundrata, 'Czechoslovakia', 34.

³⁴ Apart from *Životní prostředí očima přírodovědce* and *Ekologická syntéza*, only a limited number of other books on the environment, many of them of the popular scientific character, were published in Czech during the 1970s and 1980s, often as translations of Soviet authors: Alois Zlatník a kol., *Základy ekologie* [Fundamentals of ecology] Praha: Státní zemědělské nakladatelství, 1973; Z. Madar and A. Pfeffer, *Životní prostředí* [The environment] (Praha: Orbis, 1973); J.J. Dozhkin and I.I. Fetisov, *Rovnováha v přírodě* [Equilibrium in nature; translation from Russian] Praha: Horizont, 1973; Jean Dorst, *Ohrožená příroda* [Endangered nature; translation from French] (Praha: Orbis, 1974); Ivan Laptev, *Planeta rozumu* [The planet of reason; translation from Russian] Praha: Práce, 1974; Miroslav Martiš and Jan Šolc, *Země, krajina, člověk* [Land, landscape, man] (Praha: Horizont, 1977); I.K. Abadashev, *Život zítřka – tragédie nebo harmonie* [The life in the future: tragedy or harmony; translation from Russian] (Praha: Svoboda, 1978); Bedřich Moldan, *Koloběh hmoty v přírodě* [The cycle of materials in nature] (Praha: Academia, 1983); Bedřich Moldan and Tomáš Pačes, *Konec věku plýtvání* [The end of the wasteful era] (Praha: Mladá fronta, 1984); Václav Mezřický a kol., *Životní prostředí, věc veřejná i soukromá* [The environment: a matter both public and private]

(Praha: Práce, 1986); Václav Císař, *Člověk a životní prostředí* [Man and environment] (Praha: Státní pedagogické nakladatelství, 1987). Most of these books were used as supplementary readings on environmental study programmes. However, students on these programmes were required to read *skripta*, teaching texts written by university teachers for their own courses. These often heavily relied on the Soviet sources. Pavel Tobiášek's *Nauka o životním prostředí* [Theory of the environment] (Praha: Vysoká škola zemědělská, 1983) is a case in point. The overwhelming majority of these publications approached the environment from scientific point of view and as the titles suggest, were concerned with issues such as natural equilibrium, homeostasis, functioning of ecosystems and cycles of materials.

³⁵ Writing academic books on as sensitive a topic as the environment in 1970s and 1980s Czechoslovakia was a delicate balancing act. Authors who wished to refer to western sources had to carefully balance them with references to eastern sources, most often Soviet. This does not mean, however, that Czech authors would necessarily be in ontological and epistemological disagreement with their Soviet counterparts – both the Soviet and Czechoslovak literature on the environment was largely written by scientists.

³⁶ Following Saiko, *Environmental Crises*, in this paper we use this transcription of the surname, unless we cite other sources.

³⁷ Václav Mezříčský, professor of environmental law, interview with co-author, 6 June 2005, Faculty of Law, Charles University, Prague, Czech Republic (tape recording and handwritten notes in possession of the authors). Much of the environment-related academic activity in 1970s and 1980s Czechoslovakia was conducted within the framework of the UNESCO international programme Man and Biosphere (MAB), for which Vernadskiy's teachings about biosphere provided the ideological basis. George Kauffman, 'Vladimir Ivanovich Vernadsky (1863–1945), environmental pioneer: On the 70th anniversary of his biosphere concept', *South African Journal of Science* 92 (1996): 523. The importance of the UNESCO MAB programme in the pre-1989 Czechoslovakia is reflected, for example, in the support which the programme provided for the publication of Císař's *Člověk a životní prostředí*. Also the subtitle of the highly influential book by Moldan, Jeník and Zýka *Životní prostředí* was *Člověk v biosféře* (Man in biosphere).

³⁸ Jaroslav Procházka, Jaromír Pospíšil and Rudolf Orct, 'Dodatek. Některé teoreticko-metodologické otázky dalšího rozvoje ekologického poznání' [Annex: Some theoretical-methodological questions of further development of ecological knowledge] in Paul Duvigneaud, *Ekologická syntéza* (Praha: Academia, 1988) 382–387.

³⁹ Miloslav Lapka, senior researcher in the Institute of Landscape Ecology of the Academy of Sciences of the Czech Republic, telephone interview with co-author, 1 July 2005, (handwritten notes in possession of the authors).

⁴⁰ Miloslav Lapka, email correspondence with co-author, July 2005.

⁴¹ Jonathan D. Oldfield and Denis J.B. Shaw, 'V.I. Vernadsky and the Noosphere Concept: Russian Understandings of Society-Nature Interaction', *Geoforum*, accepted for publication, available online 2 August 2005 at <http://www.sciencedirect.com/science>.

⁴² Lapka, telephone interview with co-author, 1 July 2005.

⁴³ Jiří Papoušek, *Hovory o ekologii. Cesty k trvale udržitelnému Česku* [Interviews about ecology: Towards the sustainable Czechia] (Praha: Portál, 2000), 29.

⁴⁴ Papoušek, *Hovory*, 115.

⁴⁵ Libor Pecha, *Woodcraft: Lesní moudrost a lesní bratrstvo* [Woodcraft: sylvan wisdom and sylvan brotherhood] (Olomouc: Votobia, 1999), 178. Pecha's list also contains a number of non-academics, including Ivan 'Hiawatha' Makásek, the editor of the intrepid cult environmental magazine of the 1970s and 1980s *Nika*. Throughout the 1970s and 1980s Makásek was also a leading figure of Prague clandestine scout and woodcraft movement and in the 1990s edited a magazine for scouts and woodcrafters *Wampum Neskenonu*. In the 1980s, he was a member of the Ekologická sekce's steering committee.

⁴⁶ Jehlička, Sarre and Podoba, 'Czech Environmental Movement', 68.

⁴⁷ James Morton Turner traces the origin of woodcraft to the 1890s' US publications of manuals for woodsmen. James Morton Turner, 'From Woodcraft to "Leave No Trace": Wilderness, Consumerism, and Environmentalism in Twentieth-Century America', *Environmental History*, 7 (2002): 464.

⁴⁸ Although Seton was initially part of the leadership of the Boy Scout movement in the US, he increasingly resented the military and authoritarian aspects of scouting. Seton's aims for the movement as set forth in the Birch Bark Roll (the promotion of interest in out-of-door life and woodcraft, the preservation of wildlife and landscape and the promotion of good fellowship among its members were further elaborated in his subsequent *The Book of Woodcraft and Indian Lore* (1912). Brian Morris, 'Ernest Thompson Seton and the origins of the Woodcraft movement', *Journal of Contemporary History*, 5, (1970): 187. Scholarly accounts of the history of the woodcraft movement in the USA and the UK can be found, for example, in H. Allen Anderson, 'Ernest Thompson Seton and Woodcraft Indians', *Journal of American Culture* 8 (1985) 43–50 (USA); David Prynne, 'The Woodcraft Folk and the Labour Movement 1925–1970', *Journal of Contemporary History* 18 (1983): 79–95 (UK); Rich Palser, "'Learn by Doing, Teach by Being": The Children of 1968 and the Woodcraft Folk', *Socialist History* 26 (2004): 1–24 (UK). In contrast, a scholarly English-language history of the woodcraft movement in the Czech Republic, the only country where the movement is still active in its nearly original form, does not exist. The only two books available – Pecha's *Lesní moudrost* and Milan Klimánek and František Kožíšek's (eds.), *Kniha o woodcraftu* [The book on woodcraft] (Katowice: Biblioteczka Walden) – are written in Czech.

⁴⁹ Seton visited Prague in December 1936 and held talks with various factions of the woodcraft and scout movements.

⁵⁰ E.T. Seton, described by H. Allen Anderson already in the mid-1980s as 'America's forgotten artist-naturalist' and 'relatively unknown to many Americans today' (Anderson, 'Ernest Thompson Seton', 43) is still widely known as a writer and educationalist in the present-day Czech Republic. A Prague-based publishing house Leprez has recently set out to publish the complete works of E.T. Seton in Czech. From 1997 to 2004 eleven out of the planned 14 books were published.

⁵¹ Marek Waic and Jiří Kössl, *Český trampingu 1918–1945* [Czech tramping 1918–1945], (Praha: Práh, Liberec: Ruch, 1992), 11, 13.

⁵² Jiří Vágner and Petr Procházka, 'Vývoj českého trampingu a budování trampských osad' [The history of Czech tramping and of building tramp settlements], ed. by Jiří Vágner and Dana Fialová, *Regionální diferenciaci druhého bydlení v Česku* [Regional differentiation of second housing in Czechia] (Praha: KSGRR, 2004), 59.

⁵³ Otakar Leiský, 'TIS – Nezávislé sdružení přátel přírody' [TIS – the independent association of friends of nature], *Veronica*, XVIII, 16th Special Issue (2004): 27.

⁵⁴ Vaněk, *Nedalo se*, 32.

⁵⁵ It is likely that Tis was the only legal organisation in the communist Czechoslovakia without the declaration of the Communist Party's leading role in society in its statutes. Dana Zajoncová, 'TIS: Svaz pro ochranu přírody, krajiny a lidí' [TIS: The association for protection of nature, landscape and people], (BA dissertation, Brno: Filozofická fakulta Masarykovy univerzity, 2003), ch. VII.

⁵⁶ For example, *Tramp* (Ostrava, Czechoslovakia) 9, November 1968, 21; *Tramp* 7, September 1968, 3; *Tramp* 2, February 1969, 19. The magazine was published only during the Prague Spring period in the late 1960s and was banned in 1970. A further interesting evidence of the close affinity between Tis members, tramps and scouts is a chart in a facsimile of the Czechoslovak communist secret police's document from 1976 that under the heading Tis reads: 'tramps, scouts, rightwing and criminal elements'. Libuše Cuhrová, 'Dvacet let ve stínu' [Twenty years in shade], ed. by Miroslav Vaněk, *Ostrůvky svobody. Kulturní a občanské aktivity mladé generace v 80. letech v Československu* [Islets of freedom: Cultural and civic activities of young generation in the 1980s' Czechoslovakia] (Praha: Ústav pro soudobé dějiny AV ČR and Votobia, 2002), 152.

⁵⁷ Former Tis activist and tramp, interview with co-author, 7 June 2004, Valašské Klobouky, Czech Republic (tape recoding and transcript in possession of authors).

⁵⁸ Three out of six founding members of the original Section of the National Museum Society, which later became Tis, were professional zoologists. Zajoncová, 'TIS: Svaz pro', ch. III.

⁵⁹ Zajoncová, 'TIS: Svaz pro,' ch. V.

⁶⁰ Národní fronta was an umbrella organisation for all mass organisations during the communist period.

⁶¹ Jan Čerovský refers to customary participation of and coordination among a range of stakeholders (groups of citizens, public institutions and economic subjects) in activities related to environmental protection during the communist period, an approach compatible with tenets of ecological modernisation. Jan Čerovský, 'Vývoj hnutí dobrovolných konzervátorů, zpravodajů a strážců přírody na území České republiky' [The history of the movement of voluntary conservators, rapporteurs and rangers in the territory of the Czech Republic], *Veronica*, XVIII, 16th Special Issue, 24–5.

⁶² Leiský, 'TIS – Nezávislé sdružení', 30.

⁶³ For example, the Tis's leading activists-scientists Eliška Nováková and Václav Petříček were also involved in Brontosaurus's campaigns. Vaněk, *Nedalo se*, 37; Zajoncová, 'TIS: Svaz pro', ch. IV and IX.

⁶⁴ Vaněk, *Nedalo se*, 36–7.

⁶⁵ Leiský, 'TIS – Nezávislé sdružení', 33.

⁶⁶ Vaněk, *Nedalo se*, 41.

⁶⁷ Out of 19 leading figures of the Czech environmental movement, interviewed in 1998/99 by Jehlička and his colleagues who held a university degree or were currently studying for it, seven had a background in scientific disciplines, including four who studied biology or ecology. Seven were graduates of polytechnics or agricultural universities, two respondents were lawyers, two studied linguistics, and one did sociology. Jehlička, Sarre and Podoba, 'Czech Environmental Movement', 68.

⁶⁸ Vaněk, 'Zelené mládí,' 250.

⁶⁹ For example, the environmental group *Děti Země* challenged the first increase in the price of the public transport and another group *Hnutí Duha* coordinated campaign for the protection of Czech railways as a network.

⁷⁰ Joe Smith and Petr Jehlička, 'Stories around food, politics and change in Poland and the Czech Republic', *Transactions of the Institute of British Geographers*, 32 (2007) (forthcoming).

Riding the Tide: Indigenous Knowledge, History and Water in a Changing Australia¹

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ABSTRACT

Indigenous people's knowledge of their environments, often called Traditional Environmental Knowledge [TEK], is widely invoked today in many arenas of environmental analysis and natural resource management as a potential source of beneficial approaches to sustainability. Indigenous knowledge is most often discussed in this literature and practice as if it were a static archive of data, largely unchanging since the point of colonisation and/or modernisation in the area under study. This paper discusses the contested and relational nature of indigeneity and challenges the ahistorical conceptualisation of indigenous knowledge. It does so by drawing on the work of historians and anthropologists to argue that indigenous knowledge, about environmental and other matters, should be seen as a process rather than an archive. This approach offers a way to understand how indigenous knowledge of environments might continue to be meaningful and relevant in conditions of rapid environmental change. A case study of one such situation is the upper Darling River region in Australia, colonised by the British from the 1840s. Water courses, springs and water holes have been critically important both in the conservation of indigenous environmental knowledge and in shaping the way it has developed in interaction with the long and challenging conditions of colonisation. Tracing the historical changes in indigenous knowledge offers the possibility not only of identifying continuing viable alternatives to western agricultural or conservation strategies but also of identifying environmental change over the time of colonisation, particularly in relation to areas associated with the passage and use of water.

KEYWORDS

Aboriginal, indigenous knowledge, TEK, history, water, Darling River, natural resource management, conservation, memory, colonisation.

Indigenous knowledge and water are at the centre of the conflicts in Australia today over land ownership. Federal Court Judge Olney used metaphors of water to naturalise his 1998 rejection of the Native Title claim by the Yorta Yorta people of the Murray River to be recognised as the continuing custodians of their land and the river running through it: 'The tide of history has indeed washed away any real acknowledgement of their traditional laws and any real observance of their traditional customs'.² This was the Yorta Yorta's seventeenth attempt since the 1860s to reclaim secure title over their land from the colonising British who had taken control of the Australian continent in 1788. Central to the Yorta Yorta's increasingly bitter demands, just as it was to the Olney judgement, is the question of history. What does the passage of time and the effect of dramatically changing conditions mean to the complex of beliefs, understandings and practices which are 'indigenous knowledge'? Is such knowledge a fixed archive which can be eroded and 'washed away' over time as Justice Olney claimed?

The questions around the continued presence and value of 'indigenous knowledge' are of high interest in environmental politics both internationally and locally. Since the World Parks Congress in Durban in 2003, the recognition of indigenous people's rights to and knowledge of environmentally sensitive and endangered lands has been escalating.³ In Australia, one of the most progressive non-government environmental advocates, the Wilderness Society, has recently launched a national program engaging actively with Aboriginal people in planning and implementing its Wild Country campaigns across the continent. At all levels of government, conservation agencies have recognised the importance of indigenous knowledge in various ways. Yet in each of these initiatives, the meaning of 'indigenous knowledge' is uncertain and undefined. So while the importance of indigenous knowledge rises on the agenda of government and non-government conservationists, so too do the continuing unresolved questions about how to understand indigenous knowledge in contemporary circumstances.

This essay will argue that 'indigenous knowledge' can be more effectively understood as a process rather than as an archive, both before and after colonisation. Water and rivers have played a key role in the continuing practice of such cultural processes by Australian Aboriginal peoples, not only in the recently colonised 'remote' areas but throughout the turbulent centuries of intensive colonisation in the country's south east. This means putting the recognition of historical change back into the analysis of indigenous knowledge both before and after the invasion by the British. It contradicts the more usual 'watershed' view of colonial impact which suggests that there is an unbridgeable difference between indigenous life, or indeed ecologies, before and after the invasion. The cost of an argument which reintroduces history like this into the post-invasion period is that it destabilises the concept of 'indigenous knowledge', opening it up to questions about its loss or dilution. The result of recognising historical change

is to offer a more fruitful way to recognise the high value of indigenous people's understanding of changing places and environments both past and present.

The focus for this discussion is the floodplain of the upper Darling River in rural north western New South Wales, an inland delta crossed by several interlaced rivers which flow into the Darling. Australia is the driest continent on earth and so water everywhere is a key resource. The upper Darling is more fertile than other areas but its waters are unpredictable: it faces severe droughts and expansive floods, so Aboriginal harvesting demanded extensive knowledge of its extreme conditions.⁴ Water is a constant presence in the early collections of the legends of the Yuwalaraay and the Ngiyampaa, suggesting its central role in the symbolic as well as the material life of pre-invasion Aboriginal societies along the river.⁵ The region was first invaded violently by the British in the 1830s and penetrated by the settler grazing economy by the mid-1840s. Settler management has since then been aimed in essence at controlling its water: storing it in weirs and dams, modifying flows to contain the rivers strictly within surveyed banks and locking up the land in between as private property. My work has involved a series of projects investigating the relationships between Aboriginal people, settlers and environmental change in the Darling River region and in Central Australia.⁶

The Darling River in rural New South Wales is not the type of area usually discussed in relation to indigenous environmental knowledge in Australia. Popular accounts of conservation movements and their interaction with indigenous knowledge concentrate on northern and Central Australia as does the new initiative of the Wilderness Society, focusing on the remote Aboriginal communities living a most recognisably 'traditional' lifestyle and whose lands have only recently been drawn into the western economy.⁷ The vast majority of identified Indigenous Protected Areas advertised enthusiastically by the Federal government as heralding a new era of recognition of indigenous knowledge, are also all in northern and north-western Australia. Yet the state with the greatest number of Aboriginal people is the longest settled, intensively farmed and densely populated New South Wales in the south east, which holds 30 per cent of the overall Aboriginal population of 500,000.⁸ It is followed closely by the adjoining south-eastern areas of Queensland. In the upper Darling itself, which straddles these two states, between 40 per cent and 50 per cent of the region's rural population of 50,000 are Aboriginal.⁹ Does this mean that the majority of the Aboriginal population, located in this south-eastern quadrant of the continent, has no 'indigenous knowledge' of interest in conservation matters? If so, how are the nine 'co-managed' protected areas in NSW to be managed?¹⁰ What role will Aboriginal people play in them? While there are no simple answers, the themes of water and history are central to understanding how indigenous knowledge has been sustained and is mobilised in these south-eastern states today.

RELATIONAL INDIGENEITY

Perhaps the first unresolved question concerns the meaning of the word 'indigenous' (or 'aboriginal', meaning 'original'), which continues to be widely used in Australia and in much of the west, as if it is a simple concept which has a global meaning. The concept of 'indigeneity' is a complex one which invariably involves an interaction between the self-representation of the individuals and groups asserting their indigeneity on the one hand and, on the other, the pressures and goals of allies and enemies, whether within the nation state or internationally.¹¹ Aboriginal analysts in Australia have been cautious in their use of the term, reserving it for the context of international comparison and preferring to use local language names for groups of Aboriginal people within Australia.¹² An unproblematised definition of 'indigenous peoples' tends to be used by researchers and activists working in 'first world' and 'settler colonial' situations, where Europeans became the majority population after displacing small-scale societies practising economic forms labelled 'hunter gatherer' or 'shifting cultivator'.¹³ For analysts like Baviskar and Li, working in India and Indonesia respectively, the definition of indigeneity is relational and unstable and needs to be considered cautiously. Nor can cultures and economic practices be regarded as congruent, because societies alter their economic strategies in conditions of pressure. People regarded as shifting cultivators in India could move to dependence on harvesting (hunting/gathering) if circumstances changed and at other times might chose cultivation over harvesting, regardless of their categorisation by others as 'tribals' or as 'farmers'.¹⁴ This continuing complexity is evident in the Durban and later IUCN documents, which by 2006 had recognised the shared interests and at times shared identities across groups identified as 'indigenous peoples, mobile peoples and local communities'.¹⁵

THE MYTH OF TIMELESSNESS AND PRESSURES FOR STATIC INDIGENOUS KNOWLEDGE

Unresolved questions also exist around whether 'indigenous knowledge' was a fixed body of information before and after colonisation and then after 'modern' development. The confusion around this question is reflected in the variety of terms used to identify indigenous environmental knowledge. Some authors have referred to it as Traditional Ecological Knowledge¹⁶ and others discuss it as 'pre-colonial' or 'non-western'.¹⁷ The implication of each of these terms has been that this body of knowledge was static in time and was opposed to 'western' systems of scientific knowledge of environments and their changing ecologies.

There have been strong pressures which have led to a focus on pre-colonial 'tradition' as the model for all 'indigenous knowledge' and which have defined this as if it were unchanging even in pre-colonial cultures. One pressure has

arisen from settler interests in the European dominant colonies. Lands which had been shaped by centuries of harvesting or swidden agriculture were mis-read by settlers as previously untouched and stable 'wilderness'. These myths of a 'pristine wilderness' were used to justify undisputed settler possession and have continued to shape relationships between indigenous colonised peoples and dominant populations in countries with settler colonial backgrounds like Australia, Canada and the United States.¹⁸ Another pressure to see indigenous knowledge as static has arisen from the western environmental movements which emerged in the 1960s and which rejected 'modern' commercial exploitation of environments but retained the mythology of pre-modern 'wilderness' where indigenous people were depicted as exotic 'noble environmentalists' living 'in harmony' with the non-human environment. This movement continued the assumption that indigenous societies had taken no role in shaping and managing a 'wild' environment.¹⁹ The mythology of 'wilderness' held by early conservation advocacy groups was used to exclude Aboriginal people from a role in management and this continues to be a pervasive attitude among the more conservative wings of the movement, as Aboriginal environmentalist Fabienne Bayet-Charlton has described.²⁰ The unrealistic yardstick of 'noble environmentalist' is used to criticise contemporary Aboriginal people who do not live a recognisably 'traditional' lifestyle, and who use guns and four-wheel-drives to hunt game or who seek an economic return on community owned land.²¹

Yet the pressure to consider indigenous knowledge as a static repository of pre-colonial knowledge has not arisen only from colonial settlers and non-indigenous conservationists. The victories of long-fought Aboriginal campaigns to have their rights of prior ownership to land recognised in Land Rights and Native Title legislation have ironically locked inflexibilities into the small gains made from those achievements. Both the bureaucratic nature of land registration under these acts and the intensely adversarial court cases necessary to 'prove' title have shaped the outcomes to fit entirely into a model of western property rights based on a slice of time frozen at the point of colonisation. The tests of evidence rely on biological inheritance and settler-authored historical documentary records. The flexibility of traditional cultural land responsibilities and the complexity afforded by oral accounting of land affiliation are ignored.

One of the few Aboriginal people to have written about indigenous environmental knowledge in the long-settled south east is Tex Skuthorpe, a Yuwalaray man from the Nhunggabarra clan on the Darling River floodplain, whose long history of creating visual art and storytelling about the river will be discussed below. His recent writing in collaboration with a western researcher in Business Knowledge Management has been directed towards environmental management but depicts indigenous knowledge as a timeless, static and 'intact' pre-invasion knowledge system which can be viewed whole and in opposition to western land management. Nhunggabarra society, according to Skuthorpe and Sveiby, ended in 1828 with the first appearance of British invaders.²² While few other Aboriginal

analysts would agree with the depiction of an abrupt end to indigenous society or culture, there has still been a focus on considering indigenous knowledge of the environment as it exists in remote areas. Marcia Langton is the most widely published Aboriginal analyst of land and environmental knowledge and she has addressed indigenous knowledge largely in terms of its maintenance and resilience in conditions of high retention of traditional languages and of relative ecological stability and biodiversity maintenance.²³ Neither Skuthorpe nor Langton answer questions about how to understand indigenous knowledge under conditions of long colonisation and intensive cultural interaction.

INDIGENOUS KNOWLEDGE AND ENVIRONMENTAL MANAGEMENT

The attempt to integrate the knowledge of indigenous people into environmental management has largely been enacted within this paradigm of a static repository which was complete prior to colonisation. Its fragments now need to be 'captured' in order to use it to restore health to ecologies disrupted by globalising commercial management. The result has usually been to present 'indigenous knowledge' as if it were a list or a database because these are the forms in which such information is recognisable to scientifically trained professionals and it is the most readily searchable for use in planning resource management.²⁴

Yet 'indigenous knowledge' is not held or transmitted within indigenous communities in the form of a list or a database. It may be passed on during practical activities but it might also be remembered and orally performed as narrative in very different genres to the catalogued arrangements of data familiar to the cultures of literacy. Several theorists have drawn cautionary attention to the idea of straightforward 'information transfers'. Bruno Latour's work has demonstrated how 'field work' and the necessity to catalogue specimens of everything from soil samples to 'knowledge', changes the meanings we can make from that material.²⁵ Virginia Nazarea has asked whether the cultural production of environmental knowledge is reducible to the Linnean taxonomic systems of western science.²⁶ Oral narratives are dismembered in the same damaging way for legal or historical research.²⁷ Roy Ellen argues that rather than static, permanent structural relations, classifications should be seen as situational and dynamic.²⁸

The Dene people of Canada have asserted that indigenous knowledge must be seen in a holistic sense to include both everyday knowledge and the more formal narrative 'stories' which are recognised as oral tradition. They hosted an international symposium in 1990 which suggested both the strengths and the limitations of the concept of Traditional Environmental Knowledge.²⁹ The course of the discussions between indigenous people from very different areas demonstrated the continuing questions around the actual use of such knowledge and the difficulties of taking the outcomes beyond the static database approach.

Work which does recognise historical change is Firket Berkes' extensive research with Aboriginal people in Canada and elsewhere.³⁰ Rejecting romantic notions of essentialised indigenous knowledge, Berkes explores the responsive capacity of indigenous and local knowledge systems as environments change. Trained in natural resource management rather than cultural analysis, he distinguishes everyday environmental information gathered in hunting and gathering from the formal narrative conventions of 'stories', ceremonies and mythology. Berkes is only able to trace processes of flexibility and historical change in the elements of indigenous knowledge which comprise everyday environmental understanding, which is transformed by feedback in isolated communities in which the 'resources', like caribou, remain under the sole control of the indigenous people. Then 'social learning' occurs when, for example, ecological feedback demonstrates over-harvesting, thus allowing adjustments to occur over time.

The most recent work on indigenous knowledge engages anthropological approaches with natural resource management but it largely returns to considering remote rather than long-settled societies. Benjamin R. Smith's 2007 account of the development of hybridised knowledge systems in the mid Cape York area of sub-tropical northern Queensland points out the fragmented nature of western science, rather than just the local indigenous system.³¹ Change is discussed in Smith's account as being the active engagement of a relatively stable pre-invasion indigenous knowledge system with a localised variant of western science, producing a hybridised and responsive body of environmentally specific new approaches to land management. It still does not allow us to understand the long and heavy impact of colonial economies and social controls on indigenous knowledge in the south east of Australia, or indeed in any long settled area.

THINKING THROUGH ORAL TRADITIONS

Historians may have something to contribute to this work because they have tried to make sense not only of what may have happened in the past, but of how the past has been represented. This has included the oral traditions of societies which did not use writing as well as the historiographies of societies which rely on written accounts of the past. Even literate societies, like those of Europe, have oral traditions maintained by marginalised groups such as the Roma or women midwives. There was a great deal of interrogation of oral tradition by historians in the 1960s, as western trained historians like the Belgian Jan Vansina tried to fit the oral narratives of African and Pacific societies into the rigid templates then demanded of written sources in order to justify their use.³²

Vansina revised his earlier simplistic approach in 1985 and made a major contribution to the better understanding of the flexible creation and reception of oral tradition.³³ This in turn allowed rich insights into the social processes of memory and historical change in cultures which did not use writing. Written

sources have themselves since been opened up for intensive critique, first on the basis of their frequent origin within colonial processes and later as discourse analysis has effectively undermined claims for unquestioned 'authenticity'. It is clear, as recent African historians have demonstrated, that every medium, whether written, visual or oral, has its own qualities but that none can be drawn on as a source without careful interrogation.³⁴ However, the question has now reemerged in the very different forum of conservation politics as indigenous knowledge is celebrated but at the same time called on to carry the burden of finding solutions to major environmental crises, without allowing such reflection on how such knowledge might be constructed and transmitted.

Yet while oral tradition is open to creative interventions in the socially mediated and interactive performances of any oral culture, this is not at all how oral traditions present themselves within indigenous societies, including Australia's.³⁵ Instead oral traditions contain a rhetoric of enduring permanence built structurally into their narratives which asserts an unchanging quality to their forms and content.³⁶ The words used to describe oral tradition in Pitjantjatjara country in central Australia, for example, is *Tjukurpa* or Law, suggesting unchanging permanence, while the identification of the narrative participants as ancestors locates the stories far in the past. Such narrative strategies assert authority by claiming trans-human creation of both stories and their forms, by ancestral or divine figures whose power is said to be far greater than that of today's human population.

Certainly some types of knowledge are transmitted unchanged over many generations, entrusted to skilled experts in verbatim memorisation and faultless recall. These are generally those few relating to survival, which no society can afford to lose, like the skills of over-the-horizon navigation in Pacific Island cultures or those of inland desert navigation in Australia.³⁷ Most oral knowledge is passed on in the far more flexible conditions of performance, often, as in much Australian ceremony, in participatory and interactive settings. Here there are opportunities to engage apparently unalterable narratives with the historical changes in both environment and social life. The important observation from historians working on oral tradition is that this process was occurring in 'pre-colonial' times. It is how such oral performances have always been created and how they are able to negotiate the continuing dynamic of lived change with the cultural imperative of appearing to be enduring and authoritative. There was therefore no 'colonial watershed' in the way that indigenous oral societies recorded, transmitted and enacted cultural learning. Oral traditions have always been a dynamic form, which engaged with and reflected changing social and environmental circumstances however much they then presented themselves as fixed, received truth. This continued after settlement began just as it had beforehand.

As stories about historical events moved into oral traditions, whether this happened before or after colonisation, they lost their chronological markers and

took up the thematic, narrative and locality-related markers which allowed them to be fitted seamlessly into the existing oral performance. Only in situations of sudden cultural change can we see this process occurring. A striking example is the development by the Yanyuwa people in the Northern Territory of a whole ceremonial performance known as 'Aeroplane Dance' which tells the story of the rescue of a World War 2 American bomber pilot whose plane had crashed nearby in 1942. The traditional narrative form of the dance and song cycle was able completely to dramatise the sequence of events, and only the unusual subject matter demonstrated that this was not a 'traditional' event, but instead a recent 'historical' event which had been woven seamlessly into a traditional genre.³⁸ Examples from the western inland desert, but also many other areas, show how the key symbols of western imperialism in Australia, like Captain Cook's voyage of 1770 in which he claimed the country for the British Crown, have been appropriated into the very traditional narrative and performative genres of oral traditions to offer a powerful counter analysis of colonialism.³⁹

Not only does oral tradition allow the recording and analysis of recent, historical events. The flexibility of oral tradition and traditional knowledge also allows societies to have some mechanisms to cope with enormous, sudden changes like displacement and distant resettlement. Francesca Merlan has described this process as it occurred in Katharine, a town on the edge of the tropical wetlands in the Northern Territory to which the Jaywon people were moved for resettlement. They were then at some distance from their traditional country and while continuing to maintain interest in that original country, they paid close attention to their surroundings in Katherine, expecting and seeking a meaningful connection to their new inescapable home. As Merlan has written:

...there is always the possibility of the 'discovery' of existing but newly revealed and interpreted significances, whether or not these be clearly attributed a mythic dimension⁴⁰

One such site was 'Catfish', an area near a long established Aboriginal camp in the town which over many years came to be seen as a place of significance which offered a link to more distant ceremonial stories in the areas from which people had migrated.⁴¹ The concepts of revelation and discovery allow communities to feel that close attention to the new site might be rewarded with the affirmation of traditional legitimacy. The many genres of oral traditions which may carry environmental knowledge are often transmitted in this participatory performance mode, which offers the capacity to be responsive to the recording of changes in the environment within which humans were participating. The possibility of discovering newly revealed episodes to story cycles, particularly in unfamiliar places, offers a powerful stimulus to close observation of environments. This dimension of pre-invasion cultural process developed even more importance with the increasing experiences of displacement which occurred after British settlement.

MAKING PLACES, MAKING PEOPLE

Seeing how apparently unchanging oral tradition actually develops as a flexible and interactive engagement with the past and the present leads us to consider the broader questions of how societies relate to places. Arjun Appadurai has sketched out an ethnography of modernity which might encompass both small scale and large scale societies. He argues convincingly that the link between small scale societies and place, which is so often presented as if it were just as unchanging and enduring as oral tradition, is in fact a work in progress. He argues that 'locality', (the ways humans know and understand material places), is an 'inherently fragile' social creation, reached and sustained only because societies work at it.⁴² Rather than 'local knowledge' being the enduring record of a revealed truth about an ideal and stable environment, Appadurai focuses on the ceremonies which are seen to be a record of the connection between people and place. He argues that they are the means to continuously create and then regenerate that bond. He discusses the way these processes intersect with the ordinary, everyday conditions of life, making what is actually uncertain and precarious look ordinary and taken for granted.⁴³

Appadurai describes the production of 'local subjects', that is people who are confident of their links and ownership of the places they live in because they know them, and the networks of social relations between 'local subjects', people who feel they are secure because they *have* a place. It is this which Appadurai argues is the central role of much of the performative ceremony in any society. His argument is helpful in considering societies undergoing substantial change and in states of displacement, such as the present case study on the Darling River floodplain and in other research in which I am involved with Aboriginal people living on a river in suburban Sydney. Many are recent migrants from rural areas and struggle with producing locality in drawing on their conceptions of themselves as Aboriginal.

Kingsley Palmer's discussion of dramatic change in remote desert societies of Western Australia offers other insights into indigenous knowledge and place making. Palmer argues that the concept of a responsible adult in traditional, pre-invasion societies was one who had and was exercising custodial rights over country. Land custodianship developed in a flexible way over a person's life, and the social processes of marriage and alliance linkages reshaped responsibilities to and power over land, which all meant that attention to places was a necessary part of daily life. Palmer documents this flexible means by which extension of traditional social processes could generate affiliations to new places when western desert peoples were forcibly moved into the iron ore mining areas of the Pilbara.⁴⁴ The possibility of such flexibility in creating *locally*-affiliated people must have existed throughout the two centuries of colonised land and social relations in the south east, offering a means to understand how the Aboriginal communities devastated by invasion violence and either displaced themselves

or taking in people displaced from elsewhere, might have been able to make some form of cultural recovery. The expectation that such a process could occur placed demands on newcomers that they accumulate the knowledge about the new homeland which would allow them to fulfil appropriately the roles of owner and custodian. So both customary social arrangements and resulting custodial roles could contribute to a means to cope with disruption and dislocation in the turbulent conditions of colonial life.

HISTORY AND THE DARLING FLOODPLAIN

By drawing history back into the analysis, we can consider how the changes caused by colonial economies and technology intersected with indigenous peoples' continued interactions with their environments. The upper Darling floodplain is an area of relatively fertile grasslands which was subject to intense, violent invasion in the 1830s. Rivers, creeks and water holes were invariably the places over which Aboriginal owners and British settlers fought because the water sources were vital to both for the survival of people and livestock. For each, these waters held a symbolic value far beyond their essential biological and economic role. For Aborigines, water forms a key structural role in traditional narratives, as the local stories collected on the Darling floodplain in the 1890s by Katie Langloh Parker demonstrate, where many of the stories are about the creation of rivers and springs.⁴⁵ They tell about ancestral heroes battling over water or creating river beds in their travels or burrowing the invisible, underground water channels which are said to connect one river or spring with another, which the ancestors used to travel secretly across country to outwit their enemies, rescue their loved ones or revenge their deaths. So it is unsurprising that water might be a significant element in contemporary narratives. But it has played a more complex role.

Settler pastoralism became the dominant economic land use by 1860 and Aboriginal workers were recruited into the pastoral companies as seasonal and casual workers. In that role, and for most of the twentieth century, Aboriginal people would not be regarded as living a 'traditional life'. Yet today, despite the dramatic changes which have occurred, most of the Aboriginal population in the upper Darling area know where their family's traditional country, in the broadest sense, and their language area lies and they live in reasonable proximity to it. Most of these Aboriginal people regard themselves as being traditional owners of land in the region in which they are living and they exercise an active role in land campaigns or management processes. In these rapidly settled areas of the south east, at least until the 1920s, stock densities on large properties were low enough to allow some compatibility of economies, and Aboriginal workers combined subsistence harvesting with stock work and droving. This meant they were effectively subsidising the settler economy but it allowed Aborigines to

maintain both ceremonial and kinship obligations across wide distances. But from the 1920s onwards the big pastoral runs shifted to mechanised pastoral management or were cut up into smaller, family-run grazing businesses using less labour or were turned into more intensively farmed wheat and horticultural farms, making further compatibility with Aboriginal subsistence harvesting virtually impossible. The fencelines around properties had been of little significance when Aborigines were widely employed on the properties and they had continued to move freely across land they still regarded as their own country. But with the widespread loss of employment, the fencelines became closed borders. Most recently, rising hostility by white property holders to Aboriginal claims for land and native title have meant that the gates into the few remaining hospitable properties have been locked and real access to country had been choked off.

Water had always been essential to the pastoralists and Aboriginal knowledge of where to find water and how to move between water sources was an invaluable resource for the stockowners who employed Aboriginal drovers, shepherds and stock workers. Periods of high employment in the pastoral industry had meant learning a whole new range of uses for water knowledge as Aborigines developed skills in managing large numbers of sheep and cattle in relation to the rivers, soaks and springs they had known as far more fragile watering points for people and native stock like kangaroos. The developing settler infrastructure involved expanding the watering points. First, settlers dug earth tanks, in technologies for rainwater harvesting learnt from India via the British. Then, in 1878, the ground water resources from the Great Artesian Basin was tapped by the first deep bores at Bourke in north western NSW and then in south western Queensland, increasing the number of off-river water supplies not only for domesticated stock but for native marsupials and birds, allowing kangaroo and emu to multiply rapidly.

But water remained scarce and the legal structure of access to it reflected its high value for life rather than profit. In NSW the rights to flowing water had been retained in the public hands, in a careful set of decisions in the mid-nineteenth century, which were made after inquiries in all colonies into the riparian property models available in British and United States. Beyond public rights in flowing water, the access to water was retained as a public right.⁴⁶ Both water itself and, in theory, the routes across land to gain access to it remained open to the general public, including Aboriginal people, even as their real access to the lands of pastoral properties began to close down with the loss of employment. The most reliable access routes to water were the Travelling Stock Routes (TSRs), long strips of land also reserved for public ownership for drovers moving stock long distances to markets. The TSRs included access to watering points at regular intervals along each route, following the natural above ground water courses and so showing the way water flowed.

REMEMBERING COUNTRY THROUGH WATER

The ways in which Aboriginal people in rural NSW today are documenting their environmental knowledge reflects this history. Earlier general research in anthropology⁴⁷ or history⁴⁸ was framed in a search for the sites of cultural significance or social history, like work sites, camp sites and conflict sites. Later historical and environmental studies⁴⁹ have been focused on water because the severe impact of water scarcity has been felt during the last 25 years of low rainfall or drought, and government agency catchment management strategies, such as Streamwatch, emerging in this situation in the 1990s tried to learn more about alternative approaches. Most recently, rather than imposing a priority theme, studies have asked Aboriginal people to map out the places of significance to them, seeking to chart an alternative geography defined by Aboriginal people rather than by the infrastructure of settler fences and surveys, and to identify those places where Aborigines are aware of the presence of high environmental knowledge among members of their community.⁵⁰ The results for all of these methodological approaches are strikingly similar: water, rivers and springs appear frequently and are of high significance in all these studies as Aboriginal people recount important places and tell the stories which carry environmental knowledge. Such accounts are fragmentary. There are many stories which appear no longer to circulate and there are only segments of others which are known. More notable is the geographic unevenness of the information: it largely focuses on places along or close to rivers, springs or water sources.

(i) *Lists/ecologies/networks*

The types of information which can be derived from these documentations in collaboration with Aboriginal people tend to occur in three forms. Firstly there is the sort that readily translates as catalogued items into databases and encyclopedia entries of 'traditional' knowledge. This offers a rich body of information on the biology and hydrology of water. There are many forms of plants and fish, water creatures, birds and land animals both in and around rivers, lagoons, estuaries and springs which have been recorded in this format according to their distributions and uses for nutrition, medicine or crafts like weaving and fishing, as well as for their cultural meanings and presence in various stories and performances.⁵¹ What is evident from these studies is the prevalence of knowledge about water-related biota throughout the Aboriginal community. Cotter points out that although water sites are most commonly the location of high concentrations of environmental knowledge among the Gamilaraay, people speak also about travelling stock routes along which they travelled between water points and the higher stoney ridges which have not been intensively developed. She argues that sustained access and relatively lower levels of damage from the incoming settler industries have each contributed to this higher transmission of knowledge about native species.⁵² The Gamilaraay and Pikampul people working with Thompson

on Boobera Lagoon and the Wiradjuri working with English and Gay on the Macquarie Marshes have all explained that they were very conscious of the loss of their access to other places on their country and that these water sites have become increasingly important to them for this reason.

These lists of plants and animals are different from those which tend to be generated in the 'local knowledge' of white grazing and cotton farming residents in the Darling floodplain, because the purposes brought to activities by farmers have been different from those of most Aborigines, despite often sharing a productivist dimension to their interest.⁵³ Graziers have been looking for sloping banks down which they can safely lead stock to drink, whereas Aborigines have been interested in steep or high banks as valuable sites for yabby fishing and other forms of harvesting. Cotton farmers want empty water, with no fish or reeds which will clog up the pumps so they can fill their storage tanks, and they want predictable even flows to water their crops. Aborigines want variable flows, to make the fish run and to refresh the river for the many other species of river creatures which they use.

Although it is older people who are most often the contributors of such information in this study, younger people were involved too and were active in learning, particularly in relation to frequent activities like fishing. Thompson, Cotter and English and Gay each argue that cultural knowledge, meaning both the stories within which such biological information is entwined and the context in which these stories are retold and discussed are essential to understanding the full meaning of the animal, fish or plant to the Aboriginal people involved. Rather than a classificatory database of individual species, the stories suggest the ecologies of interaction within which such lifeforms are actively sustained. The contexts for transmission allow an insight into the distribution of species, for example, are they found below the waterline or above, in drought or flood, what season are they present. Context offers information about the practical enactment of the knowledge about particular species: whether it is eaten or avoided, for example, or how it might be found. Perhaps most importantly, it suggests the conditions necessary for this form of knowledge transmission to continue. Continued fishing, for example, means continuing conversations about bait, habits of fish, troublesome or interesting insects on the bank, the state of the river and of course the stories about them all. Contexts also indicate the anomalies which signal change. Phrases like 'we used to get ...' or 'you don't see them now ...' are common in discussions about species and about behaviours of the river water. People involved in the above studies and in my own research in the north west talk frequently about the river water being more or less turbid than it was in the past, having more or less of any species of reeds or mussels or the invasive carp and of the water itself moving in a different way. They grieve particularly about the loss of 'the freshes', the unpredictable small changes in the flow pattern as water entered the system in the some distant northern tributary and flowed suddenly past.

(ii) *'Water shows us country'*

The second form of indigenous knowledge documented in the upper Darling area is much harder to dismember into a taxonomy. It might be thought of more usefully as an approach to land and water management embedded in narrative, rather than as an item of data. One example is the awareness commonly expressed among Aboriginal people on the floodplain that the river system cannot be thought of as being 'naturally' confined within banks. This approach is evident in the landscape paintings of Tex Skuthorpe, who as an artist has been teaching young Aboriginal people for many years, in work which tends to contradict his recent published work arguing that the circulation of Nunggabarra knowledge had ceased. A painting he did in the early 1990s of the Yuwalaraay region showed three rivers flowing south west into the Darling and a fourth which ended just to the north of the main river, in the Narran Lake. Official maps of the area show the rivers neatly confined to their banks, flowing past the towns and paddocks on down to the south. Tex used concentric lines, a feature of traditional Yuwalaraay graphic design previously incised on skins and wood, to show the flow of water beyond the river banks, onto the floodplain and through the areas identified as townships. In the ebbs and flows of the concentric designs he has drawn young fishlings, mussels and other animals which breed on the plains when the river is in flood. His painting depicts a 'flood dependent' ecosystem, which needs flooding to regenerate. This painting, like so many of the ground designs and earth sculptures of the region, is a medium intended to be one element in complex performative oral genres which are interactive and participatory. So Tex talks about his painting and as he does so he explains the traditional Yuwalaraay stories of the area. 'The water *shows* us the country' is a phrase Tex repeats often in his explanation, stressing the need to see not just one but many floods to gain a deep understanding of the landforms beyond the river banks, made up of subtle variations of low black soil and higher stony ridges. The water not only creates the land of the floodplain by depositing its black silt. More than the shape of the country, the flow is important for the meanings it reveals. Tex explains that an important site in his country is a series of rocks within a river bed. Only when the level of the river reaches a certain depth does the water flowing over the rocks make visible the shape of the ancestral being whose spirit is embodied within the rock, allowing the story not only to be told but to be seen. Again, Tex repeats, 'the water *shows* us'.⁵⁴

Another example is suggested in the cautionary approach to the environment embodied in the narrative of the Kurriya at Boobera Lagoon. Thompson has documented the extensive oral tradition about this site, actively passed on to many younger people in frequent visits to the area over many generations under colonial conditions.⁵⁵ The Kurriya is a powerful and frightening ancestral figure with creative powers. Through these powers, it created much of the region's landforms and watercourses, above and beneath ground. It is understood by Aboriginal owners to rest in the deep recesses of Boobera Lagoon, a large body

of water understood to be permanent because it was fed from a mysterious and very deep underground water source which never ran dry, a fact witnessed by many Aboriginal people who relate how they saw the waters rising in the middle of dry periods with no explanation.⁵⁶ Hydrologists now believe that there are strong indications that the Lagoon is fed by a deep recharge spring from the Great Artesian Basin, but there is as yet no conclusive evidence.⁵⁷ While the narrative refers to the water source, the real issue of concern for Aboriginal communities is the terrible power of the Kurriya, the need to respect and protect it and particularly to avoid swimming in or making noise near the Lagoon, due to the spirit's ability to consume anyone who goes into the water. The recounting of this story makes it clear that this power to destroy has continued since the invasion and is just as effective against white settlers and their stock as it is against Aboriginal people.⁵⁸

The Lagoon has over the last fifteen years been the site of a new conflict as Aboriginal people tried to gain protection over the Lagoon not only from the stock of graziers and the cotton farmers who were seeking to irrigate, but also the region's boating recreation body, whose high power waterskiing activities was not only damaging the Lagoon's banks but desecrating the cultural meaning of the site with their noisy and intrusive presence on the water. The central effect of the Kurriya narrative was to protect the water body by denying entry to it. The impact of the settler activities is now clear: siltation from stock and power boat bank erosion as well as clearing for grazing and irrigated farming has silted up the floor of the lagoon and appears to have obstructed the underground water recharge inlet to the lagoon from the Great Artesian Basin.⁵⁹ This precise outcome is not explicit in the Boobera Lagoon narrative, but if the general precautionary principle had been honoured in this case, impacts on the water body would be have been minimised and siltation would not have occurred. Aboriginal people are arguing that their knowledge contained an approach which would have protected an important resource, of value to both settlers and Aborigines, which has now been harmed and perhaps irreparably damaged by ignoring the warnings inherent in the traditional narrative.

(iii) *Water and colonialism narratives*

The third form in which indigenous knowledge can be identified is in emerging narratives and performances about the ways Aboriginal societies in south eastern Australia have engaged with and remembered colonial life. This process is normally discussed in terms of loss, considering the decimation of population, the disruption of ceremonies and the denial of access to country have all made it harder to perform and transmit the fullest versions of any oral tradition. But the conditions of colonialism have intensified Aboriginal people's experiences with water and this has been reflected in the ways indigenous knowledges about water are expressed. One of the narratives of colonialism relates to the way

Aboriginal people's knowledge of water sources was used by settlers when they hired Aboriginal stockworkers and drovers. Aboriginal people based their new employment on established traditional knowledge, but they had to learn innovative ways to manage the limited water sources they knew because they now had to water large flocks of sheep or herds of cattle. Once artesian water was discovered, in 1878, the new bores became additional watering points on the long routes for droving stock across the arid areas down to metropolitan markets. There was some congruence with the previously Aboriginal-known mound springs, the naturally occurring outlets from the deep artesian sources, but many of the bores were in country which before had been entirely unwatered. Aboriginal drovers became confident authorities in navigating from water to water, building the new water knowledge into the traditional frameworks. Many, like George Dutton in far western NSW, were able to incorporate their fulfilment of custodial and ceremonial obligations into their droving routes, maintaining an active ceremonial life by taking part in long ceremonial routes across long distances in the central desert areas of South Australia, Queensland and the Northern Territory, all adjoining to the NSW border and accessible to Dutton because he was a respected drover.⁶⁰

Such interweaving of traditional water knowledge and European pastoral skills was not all the drovers did. As they travelled, they taught young male relatives new trades, and they also taught them the invasion histories of the country over which they travelled. Wilpi, an old Wangkumara man I interviewed in Bourke, recalled how as a young droving apprentice, he was taught by his elders as they moved from water hole to water hole:

Old fellas used to tell us, 'you want to come out, learn to work' and we was pleased to too, didn't know what horses was like. So we went down onto the Cooper then, onto the flood water country then, they took us out there. And the old fellas used to show us sandhills here and sandhills there, all different islands, y'see. And they had names for these waterholes, see, where all the Abos got shot down there when the troopers came in to shoot them. They was killin' cattle, see, at the waterhole. So anyway, they told us all these names, showin' us where they were shot and all..... So we went out, we were workin' with'em there, oh for a good while, riding' about with'em, mustering cattle and they used to say, 'well, you go to a waterhole', you know they name'em there. Like they call'im *Watuwara*, that's 'water where the birds live', then next, where they shot the Murris⁶¹, they call that *Thuliula*, that's a mussel see, *Thuliu*, and the next one, about a mile away, they call that 'little *Thuliula*'.⁶²

This was an oral transmission of the memory of invasion violence across generations, and into the present, not only conserving but situating historical knowledge. It allows Aboriginal people to pose a counter narrative to the colonisers' history of 'peaceful settlement', which continues to be retold in school history texts of the twenty-first century. Where there are some European authored accounts of

these incidents of invasion violence, the differences between indigenous oral accounts and the non-indigenous written accounts can offer important insights into the way indigenous people have understood invasion and colonisation.⁶³ What researchers have not yet done is identification of the environmental knowledge, and changing ecologies under the impact of settler land management, which may be entangled in these new narratives.

Virtually all of these stories of massacre violence occurred at water places either because the conflict was over a contested watering site or because Aboriginal people were camped beside water when they were attacked. It is the role of water places as both resource and as a central element in the human use of the landscape which structured the patterns of violence. Just in the area of the upper Darling there is Hospital Creek, Boobera Lagoon and Myall Creek, where massacres occurred which were partially documented by Europeans. Others remain known only in the oral record, but no less powerful for that. Such emplaced oral accounts were experienced by young Aboriginal people growing up in the 1910s and 1920s. The stories continue to be retold in the same manner today, tangled up with language learning and family histories, taught to young Aboriginal people as their families travel. But they are also of high importance in the ways rural Aboriginal communities induct and orient newly arrived non-Aboriginal lawyers, teachers and other staff in Aboriginal-controlled organisations. I was one of those people, taken out to see Hospital Creek by local Aboriginal spokespersons Kevin Williams and Tombo Winters in the 1970s. I was shown the creek side location of this disturbing story, was introduced there to bush foods and traditional medicines, and was shown the landscape conditions around the creek. Nick McClean, a current graduate student and environmental activist, has recorded similar experiences with Ted Fields, a senior Yuwalaray man from Walgett.⁶⁴ There are deep analytical and symbolic dimensions to these stories, offering political analyses and histories which are embedded in the land and which demonstrate continuing Aboriginal knowledge to both younger Aboriginal people and to non-Aborigines, testing newcomers, challenging their complacency and demanding their allegiance.⁶⁵ This has become very much a ritual occasion – and certainly an important example of the ‘place-making’ which Appadurai has discussed as *making* local subjects, in which political, social and cultural knowledge is imbricated with environmental knowledge.

Finally, there are the narratives of family life which circulate actively. They are located in the intersection of life story and oral tradition, but again environmental knowledge is threaded throughout the narratives as they anchor episodes to places of work, camping and water. Working life under colonialism involved movement for Aboriginal families, as the jobs available on the Darling River pastoral properties were seasonal. Aboriginal people had a ‘beat’ of stations they regularly worked on, living in the camps on the station, and travelling across country, often on the TSRs, from station to station for the next job. Children

grew up familiar with camping out next to creeks and waterholes, gathered round campfires listening to stories under the stars at night, and navigating more by the water courses than fencelines. Many people working around Boobera Lagoon, for example, camped on the lagoon when they were travelling between jobs, and so children learnt the stories about the Kurriya and how they must not swim in the lagoon.⁶⁶ But many people were forced to live more sedentary lives, particularly after 1912 when the state government began systematically to remove any Aboriginal children it could argue were 'neglected', in order to incorporate them into an indentured labour scheme which it hoped would 'cure' them of their desire to return to their families.⁶⁷

Rivers again played a critical role. Rental accommodation was invariably segregated, and many Aboriginal families lived on vacant land near the river banks. The river was a necessary economic resource. While families lived near towns, they often had to do without paid work and the fish, yabbies, mussels and birds to be found around the rivers became their only source of nutrition. When parents were working on properties out of town, or mothers were employed cleaning in the hotels or hospitals or private white town homes, grandmothers particularly would take children out along the river to fish and catch yabbies. Long days on the river bank became opportunities for teaching and learning about country. As access to the wider countryside began to close down because employment was falling, the only remaining safe places for Aboriginal people to live and travel along became the rivers. Whether going fishing for food (or for the love of it), to escape the pressures of the hostile white town or the increasingly crowded camps, many Aboriginal people found their main access to their country was now along the river banks.⁶⁸

The rivers clearly reflected the harsh politics of country racism. White townships frequently planned their development so the rivers functioned as a border and a barrier to Aboriginal access. Aboriginal people were allowed to camp but only on the 'other' side of the river or out of town – always the floodprone side. There were unofficial curfews in most towns in which Aboriginal people could not be seen on the 'white' side of the river after dark and times when Aboriginal people remember swimming the river towards the camp to escape arrest from police for breaking the curfew, while in other situations men who had been drinking in the camps tried to swim the rivers drunk to avoid arrest, and sometimes didn't reach the safe side at all.

The continuous struggle to protect children from removal was intimately linked to the river as well. Women recall swimming in the rivers away from the camp with children on their backs to escape the authorities who had come to take children away. Even if children were enrolled in schools (from which they were often excluded on racial grounds) they would be vulnerable if they were noticed for not being clean enough or for having pediculosis or scabies, the perennial minor contagious infestations faced by all children in poor schools. But for Aboriginal families, it could mean the intervention of the state to take

away their children, so faces had to be shining and nails scrubbed. Even so, children still faced the humiliating line up each day to check their heads and nails. Such daily attention meant many buckets of water hauled up the steep river banks by women to boil in the coppers so there would be hot water to wash kids and clothes. If school children did develop scabies or head lice, there were traditional remedies involving infusions from local plants. But as mothers recall: 'that meant *another* bucket of water!'⁶⁹

The river banks were important for other reasons. The Darling and its tributaries on the flood plain have banks with deep gullies and tangled gum tree roots in black silty soil, which forms a sucking, impassable bog when wet. On the riverbanks Aboriginal people were also safe, at least to some extent, from the pursuit of police who came to regulate their lives, control who they associated with and sometimes to take their children. Transgressive meetings for drinking, gambling and sex were all possible, for whites as well as Aborigines, and at night the river banks were sites where daytime colour bars were sabotaged. Some of the most powerful political campaigns of the 1970s were assertions of the collective energy regained from having river banks as safe places in which to conserve a sense of identity and counter solidarity. The demands to restore rights to land in NSW were generated by the urgent need to reclaim rights to water as in Brewarrina in 1974, and in later years when the cultural identity of the Aboriginal community was reasserted to demand control over local cultural festivals which had appropriated Aboriginal river symbols.⁷⁰ Water sites have been sites of segregation but also of resistance, sites of massacres and exclusion but also of learning and social regeneration.

IMPLICATIONS: HISTORY, WATER AND INDIGENOUS KNOWLEDGE

Indigenous knowledge has been sustained since the invasion although in substantially altered forms, at some times reflecting pre-invasion conditions and at others reflecting newly emerging content arising from traditional bases but in engagement with very changed conditions. The capacity of indigenous people in conditions of historical change to identify and reflect on environmental changes is an important dimension of the broader value of indigenous knowledge. It is not a dimension which is welcomed by the contemporary Australian state or its legal structure. In 2002 the High Court decision on the Yorta Yorta appeal against Olney's 'tide of history' judgement was one of a cluster that year which narrowed the already limited rights available to Aboriginal traditional owners. It confirmed Olney's approach that no indigenous knowledge, however directly based on continuing oral tradition, but which had been generated after the invasion began, could be considered as 'authoritative' or 'legitimate' tradition. The decision effectively excised history from any consideration of what indigenous knowledge might be or of the high value it might hold.

This discussion in this paper demands the question be posed: to what extent, if at all, can what has been described in this paper be regarded as 'indigenous knowledge'? It has been explicitly dismissed as such by Justice Olney in the Yorta Yorta native title case. It has been largely ignored by the conservation movement to date.

There are a number of reasons to consider this as indigenous knowledge. First, it is based on and sourced in pre-invasion knowledge of oral traditions, formal and informal. Secondly, its production and circulation occurred because it is motivated by the desire to fulfil traditional social and cultural goals of achieving responsible adult roles by becoming knowledgeable land custodians. It is expected by Aboriginal people of themselves and each other that they will notice and comment on the state of the land and waters around them, and that they will care about what happens to them. This reflects a continuing social and cultural process of engaging with the material environment to generate locality and from there, to relate to people as neighbourhoods, even if far flung. Thirdly, this knowledge of the state of the rivers has been acquired and to some extent intensified because of the historical conditions of colonisation in the repression, dispossession and impoverishment of indigenous peoples. This has forced them into an even more continuous and intimate relationship with rivers and river banks than would ever have been the case under the conditions of mobility of pre-invasion life. Their knowledge about rivers, creeks and waterholes now records the events of the invasion and the exercise of colonial power. Finally, this new knowledge has been recorded in stylised forms and retold in conventionalised performances which echo the processes of pre-invasion indigenous knowledge. The memories of massacres, conflicts and a life working in the grazing industry are now inscribed onto the landscape through being incorporated into stories which are themselves embedded in places. Such stories are retold, across generations, in a similar way although no longer in the same forms as those transmitted in pre-invasion oral traditions. So the stories record the events in a traditional way, but the content of the stories, is a dramatised and analysed account of colonial interactions.

What are the implications then for the practice of research in environmental history and conservation to recognise historical change and to see indigenous knowledge as a process rather than an archive? Once rivers and water sources are understood to have played a critical role, not only in sustaining life or the pre-invasion oral tradition, but in the historical, social, spatial and political life of Aboriginal people, it is no surprise that such places will have concentrations of meaning and significance for Aborigines including much knowledge about pre-invasion conditions. Waterways are the places which will offer a partial glimpse of the ecological relationships in pre-invasion times, in very different environmental conditions of active Aboriginal management, more riverine flooding and less artesian water. The extent to which oral traditions have been retained is the extent to which these narratives which thread human dramas

with environmental details and embed them in places are available. And so research in collaboration with indigenous communities to record and sustain such knowledge associated with rivers is a priority.

There are insights too into approaches to land management which are outside western development paradigms, although still productivist. They may differ from the goals of some environmental movements which seek to reduce production of any sort from protected areas. The conception of a river which assumes that water will be present across the floodplain, rather than being 'normally' confined in a river bed is a significantly different approach to living with variable environments than is found in the British-Australian water management strategies. This parallels approaches that Rohan d'Souza has discussed, relating to eastern Indian deltaic systems, between a managed landscape which is 'flood dependent' and the British strategy to control rivers which generated a 'flood vulnerable' landscape.⁷¹ Benjamin Weil has identified similar contrasts in relation to the western Indus river.⁷² So collaborative work with indigenous communities should be seeking to learn the broadest forms of narrative and performative expressions of community knowledge, in order to understand approaches to and interpretations of environmental relationships, rather than expecting to reduce indigenous knowledge to a taxonomy.

The body of knowledge held by indigenous people in western NSW today offers an account of changes in the environment under colonial economies of the last 200 years. While not systematic or blanket coverage, it is unique and invaluable for identifying the types and pace of change. It is geographically focused as well, as Aboriginal people have increasingly found that only the rivers and their banks remained accessible to them. Other special places, about which environmental knowledge might have been retold and learnt have not been visited so often or recently because the access to them has been closed off. Nevertheless, given the central role water plays in both pre-invasion and settler post invasion economies, working towards gathering perceptions of change in rivers, springs and water systems will continue to be of high importance.

Aboriginal people in north-western NSW continue to be deeply concerned about the ongoing changes. The interest in fulfilling custodial responsibilities continues to be relevant and enacted by Aboriginal people, perhaps the most important continuation of the social processes of indigenous tradition. The most detailed oral traditions about important places away from the rivers have become harder to maintain in active circulation as access has been cut off, but Aboriginal interest in re-engaging with off-river land management and regeneration has been rising. This is most evident where Aboriginal people have real security of tenure over significant areas of land, a possibility which has been rare until recently. Only now, with some land acquisitions directly in Aboriginal hands and tentative steps towards co-management of some protected areas, have communities begun to reacquaint themselves with the country from which they had been excluded for many years. With their communities still living in impoverishment,

they have often had to make hard decisions between managing the few acres they have for short term profit or giving up hopes of profits in order to develop regeneration strategies.

Water remains an urgent priority. One elderly Yuwalaraay Walgett man explained to me in 2000 his worries about the large amounts of water being sucked out of the river by cotton irrigation pumps on one of the properties he knew well, his traditional country and land he had worked as a stockman on horseback for most of his life. He decided to show me the damage so we drove across the black soil plains towards the river. We entered the property and crossed ungrazed and heavily wooded paddocks to where we should have been able to see the water, but found our way blocked by a massive water storage, with bulldozed earthen sides rising 15 or 20 metres and stretching far into the distance on either side. This was where the river water was going. More deeply disturbing for this knowledgeable senior man was that he had lost his way on country he had known intimately. The huge scale of the water storage meant that all his landmarks had been wiped out. He eventually admitted that he was defeated, humiliatingly lost on his own country. But he was beaten only in the short term. Soon after, he embarked on the process of recording his knowledge of the complex watercourses, tracing out the water and the stories with young researchers, black and white, in tow.⁷³ He sustained his recordings until his death in 2006, drawing together his memories of traditional stories and performance, his historical knowledge and awareness of change. Most importantly he was teaching: his stories, overflowing again, continue to dissolve the symbolic walls of that massive water storage. In a way that doesn't look at all like a traditional ceremony, this Yuwalaraay man was producing *locality*, making indigenous knowledge live on.

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NOTES

¹ This paper was first discussed in a presentation to The History of Waters conference at Jadavpur University, Kolkata, India, March 3, 2006. An early version will be published in the conference proceedings, to be edited by Professor Ranjan Chakrabarti, for the

Association for South Asian Environmental History. When used in relation to human beings, Australian Aboriginal people sometimes refer to themselves or other *people* as 'Indigenous people' but this usage and spelling is not universal. The use of capital 'I' to spell the word 'indigenous' is varied around the world. In this essay, 'indigenous' is used as an adjective without capitalisation.

² Atkinson, 1995; Commissioner for Social Justice, 2002.

³ Borrini-Feyerabend et al., 2004; IUCN, 2003; World Council on Protected Areas/IUCN, 2003.

⁴ Australian Aboriginal people usually identified as 'hunters and gatherers', are more usefully described as 'harvesters' in acknowledgement of the high degree of environmental knowledge, planning and active intervention in the landscape which allowed reliable food gathering. Aboriginal responses to British agriculture from 1860 included a range of strategic adoptions of farming in independent blocks across the south eastern coastal and central districts at precisely the same time as the settler government was pronouncing them irretrievably primitive and unable ever to learn the rudiments of farming. This paper uses the term 'harvesters' to describe the Aboriginal economy and society.

⁵ Langloh Parker, 1953 [1897]; Robinson, 1965, pp.126, 131.

⁶ Goodall, 1996; Flick and Goodall, 2004; Goodall, 2002; 1994; 1999; 2001; Goodall and Lucas, 1997.

⁷ Mulligan and Hill, 2001.

⁸ ABS, 2004.

⁹ Chief Health Officer, 2004.

¹⁰ NSW National Parks and Wildlife Service: <http://www.nationalparks.nsw.gov.au/npws.nsf/Content/Which+parks+are+co-managed+in+NSW>

¹¹ Baviskar, 2005.

¹² Bayet-Charlton, 2003; Langton and Rhea Zane, 2003.

¹³ As an example, consider the difference between the work of Tania Murray Li, researching in Indonesia, with that of Ronald Niezen, discussing First Nations societies in Canada. Li, 2000; Niezen, 2000.

¹⁴ Cederlof, 2005; Morrison, 2005.

¹⁵ IUCN, 2003; Kothari, 2006.

¹⁶ Johnson, 1992.

¹⁷ Sillitoe, 2007, *passim*.

¹⁸ Cronon, 1992; Dove et al., 2007; Griffiths and Robin, 1997.

¹⁹ Adams, 2004; Cronon, 1996; Dove et al., 2007.

²⁰ Bayet-Charlton, 2003; Langton, 1996.

²¹ Adams and English, 2005; Head, 2000; Head et al., 2005.

²² Sveiby and Skuthorpe, 2006, p. 164.

²³ Langton, 1998; 1996; Langton and Rhea Zane, 2003.

²⁴ See, as one example, the itemised list of plants and their uses known to the Kamilarai and Pikampul peoples around Boobera Lagoon in northwestern NSW. Hawes, 1993.

²⁵ Adams, 2004; Adams and English 2005; Latour, 1999; 1987.

²⁶ Nazarea, 1999.

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- ²⁷ Goodall, 1992.
- ²⁸ Ellen, 1993.
- ²⁹ Johnson, 1992.
- ³⁰ Berkes, 1999.
- ³¹ Smith, 2007.
- ³² Vansina, 1965.
- ³³ Vansina, 1985.
- ³⁴ White et al., 2001.
- ³⁵ Merlan, 1998; Myers, 1986; Vansina, 1985.
- ³⁶ Magowan, 2001.
- ³⁷ Vansina, 1985.
- ³⁸ Graham and Wositsky, 1994.
- ³⁹ Mackinolty and Wainburranga, 1988; Rose, 1984.
- ⁴⁰ Merlan, 1988.
- ⁴¹ *Ibid.*; Myers, 1986; Kolig, 1980.
- ⁴² Appadurai, 1996.
- ⁴³ *Ibid.*, p. 181.
- ⁴⁴ Palmer, 1983.
- ⁴⁵ Langloh Parker, 1905.
- ⁴⁶ Powell, 1976; 1991.
- ⁴⁷ Beckett, 1978.
- ⁴⁸ Goodall, 1996.
- ⁴⁹ Goodall, 2001; Lucas, 2004.
- ⁵⁰ Cotter, 2006; English, 2002; English and Gay, 2005; Flick and Goodall, 2004.
- ⁵¹ Byrne and Nugent, 2004; Cotter, 2006; English, 2002; English and Gay, 2005.
- ⁵² Cotter, 2006.
- ⁵³ Goodall and Lucas, 1997.
- ⁵⁴ Goodall, 2001; Herman, 1996.
- ⁵⁵ Thompson, 1993.
- ⁵⁶ Interviews with Ted Fields, 2000, conducted by author for work in progress.
- ⁵⁷ Eigeland, 1993.
- ⁵⁸ Goodall, 1995.
- ⁵⁹ Eigeland, 1993.
- ⁶⁰ Beckett, 1978.
- ⁶¹ Local language word for 'Aboriginal people' or 'our people'.
- ⁶² Goodall, 1996, p. 34.
- ⁶³ Goodall, 2003; Rose, 1991.
- ⁶⁴ Nick McClean, 'Narran Lakes Oral History Project', unpublished Honours Thesis, UTS, 2007.
- ⁶⁵ Reece, 1982.
- ⁶⁶ Thompson, 1993.

⁶⁷ There is now a large literature on this policy, which existed in different forms in each state. The children so ‘apprenticed’ or otherwise removed are now often referred to as the ‘Stolen Generations’. Haebich, 2000.

⁶⁸ Flick and Goodall, 2004.

⁶⁹ Goodall, 2006a.

⁷⁰ Goodall, 2006b.

⁷¹ D’Souza, 2002.

⁷² Weil, 2006.

⁷³ Research being undertaken collaboratively with Nick McClean, conservation activist, for ‘Rivers Lakes And Plains: Stories from Yuwalaray Country – The Narran Lakes’, unpublished Honours thesis, UTS, 2007.

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Landscape and Ambience on the Urban Fringe: From Agricultural to Imagined Countryside

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ABSTRACT

This article stems from ongoing research on the creation of penurbia since 1945 which examines the development of hybrid city-country landscapes around large urban areas that mesh stylised countryside with functional links to the cities. Simply put, penurbia looks like country but often thinks like the city, and gives a name and an explanation for a concept that had previously been neglected. The term amalgamates the solar metropolis' penumbra as an area of influence and visual awareness without defined focus.

The urban fringe has grown dramatically since 1945, as emigrants from urban areas hoped that life in the country would provide a haven against the rush and thrust of life in the city. Ill-formed and dimly understood cultural ideals fuelled flight to rural areas where individuality, nature, familiarity, purity, hope and tradition would trump practical and economic considerations. This paper relates the story of the development of distinct penurban landscapes and ambiances in three eastern U.S. counties.¹

KEYWORDS

Urban-rural fringe, urbanisation, suburbanisation, hobby farming, viticulture, horse/equine industry

INTRODUCTION

Over the last generation, historians have advocated the study of the interrelationship of the city and the environment, in part to stop the gaps in knowledge resultant from sub-disciplinary specialisation and to create a holistic understanding of the processes separately researched by environmental and urban historians. Joel A. Tarr (2000) noted that ‘historians have paid limited attention to the effects of cities on the environments on their hinterlands’.¹ While Tarr conceived of influence flowing from the city to the hinterland, this paper suggests a more even interlacing of influences to create patterns of urban-rural hybridisations based on reciprocal flows of people, ideas and physical objects. In the process, pastoral urban hinterlands can also influence urban areas as ideal, idealised and aspirational states of mind and physicality are projected back.² Thus conceived, nature blends roles as a socio-cultural construction and an actor in its own right.³

Arguably the urban-rural borderlands stage the most significant negotiations of cultural ideas with physical environments in the U.S., as emplaced by diverse networks of actors – including farmers, urban émigrés, government administrators and corporations. In the process new landscapes emerge which are fashioned socially and culturally, yet are still reliant on physical surroundings. Swirling within this mix of countryside and urbanity is a form of stylised nature or ‘socio-nature’: part constructed, part physical and partly dissembled.⁴ Incomers to the urban fringe imagine such areas to be nature, or at least predominantly natural, whereas displaced farmers and others more clearly recognise resultant landscapes as being enacted upon both them and their locales by outside forces. Together a fragmented, uneasy and contested patchwork of amenity and agricultural landscapes may result, in which an incomers’ landscape of leisure fizzles against, and fuses with, a landscape of production.⁵

Landscape transformation appears most visibly in the functional borderlands of urban areas.⁶ Describing this phenomenon demanded new terms of the professionals and observers concerned. August Sectorsky (1956) coined ‘Exurbia’ as a description of elective farming and ranching on New York City’s borderlands at mid century; William Whyte (1958) wrote of pervasive ‘Urban Sprawl’ at the city’s edge in *Fortune* magazine; Jean Gottmann (1961) described America’s eastern seaboard (Massachusetts to Virginia) conurbation as a continuous ‘Megalopolis’; Richard Louv (1982) argued that Americans elected to fuse tradition and nature with opportunity in a reworked and rejuvenated ‘America II’; John Herbers (1986) showed how metropolitan edge migration left decentralised city-country mixes of settlement patterns which he depicted ‘new American heartlands’; Joel Garreau (1991) recorded how urban life had spread to ‘Edge Cities’ on the metropolitan periphery; and Adam Rome (2000) highlighted the environmental effects of post-1945 spatial and demographic movements of ‘the Bulldozer in the Country’; while Rob Lang and Jennifer

LeFurgy (2007) described the texture of twenty-first century elusive and rapid urbanisation as ‘Boomburbs’. At a crude level, these authors described the urban fringe in very different terms, from celebratory (Spectorsky and Garreau) to catastrophic (Rome), depending partly on whether they focused on physical or cultural phenomena.⁷ More widely, concern over landscape and ambience change held the attention of people across the United States, the United Kingdom, and in other developed western nations, even as manifestations of change at the urban fringe varied.

Exurbia and sprawl emerged as the most durable terms for metropolitan edge growth by professionals and the popular mind respectively, with exurbia understood as extra-metropolitan urban and suburban growth rather than Spectorsky’s electively rural lifestyle.⁸ Exurban studies brought forth useful and innovative research, most of which was quantitatively based within the social sciences (economics, demographics and statistics) and presupposed that distance from urban area reduced the attractiveness of a location. Meanwhile, the softer culture of the urban fringe remained largely subsumed by the numbers, leading to oversimplifications and a lack of understanding of textual differences. For many, distance from urban areas – measured in commutes of up to two hours – continued to be a positive factor as it provided access to nature and protection from urban contamination. Fixations on the bricks and tarmac sprawl of monster homes on clustered subdivisions stifled discussion of cultural sprawl, of ‘neo-ruralites’, ‘new-country’ and ‘neo-pastorals’, who mobilised deep-set ideas and sought expansive, leisured lives in at the urban fringe. Moreover much recent research had the mournful loss of farmland and countryside to asphalt and bricks as its primary concern, rather than an assessment of landscape change and hybridisation. This paper scrutinises changing landscapes and ambience in three dissimilar metropolitan edge counties in the eastern U.S. – Loudoun County, Virginia; Howard County, Maryland; and Niagara County, New York – using census data, state reports, extension reports, news-media and interviews.

Thirty-three percent of Loudoun’s farms are really homesites This proportion appears to be rising and reflects the ... national trend among urbanites towards a return to rural living There are more takers for what Loudoun has to offer ... with Washingtonians crossing the Potomac in a ... discovery of her fertile possibilities in land and living.⁹

(1949 Loudoun County promotional brochure)

People and ideas spilled between the cities and the countryside during the latter half of the twentieth century, as illustrated in the Loudoun booster brochure above – altering the character of the American landscape in the process. Some city dwellers forsook their urban homes for rural living, while others left the country for the city. Agricultural change contributed to this development, as did the actions of governments and others. Arable farming landscapes were lost in urban edge expansion, yet countryside vistas frequently and counter-intuitively

became more complex, with greater diversity of flora and fauna. Grapes, horses, exotic animals, wildlife and new plant types thrived – replacing cereal and dairy farming – with fun or essentially non-commercial leisure farming taking over from hard nosed commercial farming. The minds and activity of new country dwellers – penurbanites – imagined, preserved and fashioned rich new pastoral landscapes in the unlikeliest of settings.

Loudoun County lies thirty miles from Washington D.C. in northern Virginia, Howard County lies about twenty miles from Baltimore, Maryland and Washington, D.C., and Niagara County lies some fifteen miles north and east of the Baltimore-Niagara urban complex (at their closest points). Rural backwaters in 1945, all three subsequently came under the sway of nearby metropolitan areas as transport links to them improved. Populations increased and diversified dramatically: in terms of religious, ethnic and racial composition. Secondly, settlement dispersed widely, with the development of suburbs and the infusion of urban concerns into local politics. Thirdly, metropolitan mindsets overlaid local societies, leaving them substantially changed. Fourthly, traditional agrarian livelihoods became marginal to local economies in value and employment terms. Lastly, physical urban frontiers – whether as tangible lines of development, linear tendrils, or as exclaves – advanced into these counties.

For observers, however, these counties remained predominantly rural and verdant, despite the roar of the bulldozer. In fact, portions of the counties seemed more rural to city eyes in 2007 than in 1947. Deliberate preservation schemes help to explain this, but just as often the pastoral feel stemmed from the collective result of individual actions as settlers moved in. Thus, county and regional governments in Loudoun, with a 2006 population (estimate) of 268,817 (up 98,000 since 2000), Howard with a 2006 population (est.) of 272,452 (up 24,000 since 2000), and Niagara residents with a 2006 estimate of 216,130 (down 2,000 since 2000) cultivated rural flavours in some areas – despite eight to tenfold post-war population increases for Loudoun and Howard.¹⁰ This observation becomes doubly remarkable as the developed areas of these counties magnified beyond population increases.¹¹ Simultaneously, western Loudoun, central western Howard and eastern Niagara became greener, more forested, more diverse in plant, insect and animal life. In all three counties, larger populations jar against more verdant and less traditional farmland, challenging assumptions that the U.S. has become a 'suburban nation' and created a sprawling 'isomorphic geography of nowhere' in the process.¹²

To exemplify and analyse the construction of an urban borderland neo-pastoral landscape, five markers came under examination: the diversifying agricultural economy and landscape; the extent of the equine industry; agricultural fairs; the development of viticulture; and preservation and park development. The first four reflected ill-articulated cultural ideas operationalised by individuals, as they required a leisured use of extensive landholdings in order to create more of a 'dreamscape' than a productive landscape. As a prerequisite, such non-commercial

use relied on incomes independent of agriculture or horticulture, relatively cheap real estate prices, and often well thought out business plans. To employ cultural capital in a transformative way economic capital probably helped. Preservation and park development resulted from collective action and relates how local societies collectively reacted to the growing influence of the city.

THE DIVERSIFYING AGRICULTURAL LANDSCAPE AND ECONOMY

Farming influences landscapes immensely, so changes in farming affect how people perceive places. Farming landscapes in the three counties transformed between 1945 and 2007. Incomers staked claims on the countryside, envisaged land differently, and prized aesthetics above utility. New country types saw land as a setting; the countryside conjured images of places to live in rather than work on. Not surprisingly, then, farmer and settlers clashed over attitudes, as one Maryland cattle farmer indicated:

One reason for a lot of the conflict is what non-farmers think of farms Environmentalists call farms natural resources, planners call them open space, and most people relate to them as parks. We think of a farm as a factory.¹³

For penurbanites, land could never be a factory. The countryside altered as incomers employed their ideas, shown through changed crop and animal husbandry trends, the availability of alternative agricultural advice and research, and the growing influence of the leisure economy. Between 1964 and 2002, as farmland was built over or left fallow, nearly two thirds of farmland was withdrawn from commercial agriculture in Howard, and between one quarter and one third in Loudoun and Niagara.¹⁴ The complexion of remaining fields changed, witnessing the influence of new farming practices and of the scale of farming. The most important agents of change in the three counties – apart from farmers and land consumers themselves – were the Cooperative Extension Services (CES) acting in concert with county governments' building and zoning policies.

Cooperative Extension Services reoriented themselves towards non-standard, 'alternative', or 'new' agricultural production from about 1980 as many commercial farms broke into mini-homesteads. Part-time 'farmettes' proliferated from the 1970s, starting a relative trend which extends to the present. Growing numbers of smallholdings grabbed media attention in a 1974 *Howard County Times* article which estimated that there were two hundred 25-acre and smaller farms in Howard alone.¹⁵ Penurban farmers conducted small-scale hobby-farming (smallholder farming with limited commercial impact), dude-ranching (oriented towards leisure and tourists), horse farming, organic farming, subsistence farming, collective farming, themed farming, pumpkin patches, petting farms, advanced forms of animal husbandry including exotic herds of llamas, alpacas, angoras, water buffalo and ostriches, and horticulture, including viticulture. Some back-to-the-landers were inspired by Scott and Helen Nearing's mid-century 'good

life'; others followed Spector'sky's wealthy weekend farmers of the 1950s; and still others sought ways of paying their property taxes.¹⁶ Incomers worked both landscapes and perceptions of landscapes. New, elective farmers frequently relaxed commercial criteria, but still needed specialist advice. Smallholder Peggy Schultz captured the new farmers' motivations in a 1979 *Baltimore Sun* interview: 'Farming just makes you feel good'.¹⁷

Despite rural sympathies, many new farmers knew little about country life, so the CES offered support – such as Howard CES basic farming course which started in 2000.¹⁸ The CES reacted to the ark-like diversity of alternative farming: the mindset of the 'farmette' organic wool producer grated with specialised agronomists. Few traditional farmers practised alternative agriculture, so alternative usually meant incomer farming – as CES personnel in all the counties confirmed during interviews.¹⁹ The need for profits and the massive capital invested deterred alternative farming for traditional farmers; especially as globalising food markets left scant leeway for experimentation. As staff retired, the CES increasingly hired specialists with skills tailored to diverse contemporary farming, often in regional specialists groups such as for producers of wine and horses in Maryland, Virginia and New York.²⁰

Small-scale producers complicated the marketing of food and fibre as niche and marginal farmers demanded more CES help in finding buyers for their goods, for instance by encouraging farmers' markets and subscription services to quicken the journey from field to table. Such marketing protected small producers from market price fluctuations by connecting them with local customers. Putting faces to produce, places for farms, and stories to consumers, were positive attributes that echoed with customers and allowed consumers to pitch their identities with the farming community. Nurturing niche products like lambs, goats, exotic vegetables, or items with value added on-site, such as cheese and wine also encouraged finely meshed penurban economies.

Recognising diversity, the CES support themed farming, including pumpkin patches targeting suburban families who could combine farm visits with pumpkin cutting, wine tours where the tippler could follow the grape from field to bottle, and the Bed and Breakfast weekend farming experience. Collectively, such initiatives 'humanised' farming for the outsider; which was especially important given mounting unease over the methods and the quality of agribusiness produce.²¹ Overall, CES organisations reoriented themselves towards consumer-minded strategies. Loudoun County's 1998 rural development programme represented the clearest acceptance of the hybridisation of agriculture by reconnecting the agrarian dream with the metropolitan present.²² The realisation that farming on the fringe held challenges and opportunities singled Loudoun out as a pioneer in deliberately weaving the seductive and productive landscapes which attracted incomers.

In recent years, agricultural crises associated with global markets, low commodity costs, and growth pressure hampered family farmers' ability to carry debt,

LANDSCAPE AND AMBIENCE ON THE URBAN FRINGE

improve productivity or add value to produce. Few traditional farmers could confidently pass their livelihoods on to their offspring, suggesting links between alternative and new farming and opening the door for incomers who could bear investment costs and low returns or think differently. 'Ethnic' farmers who cultivated intensive and high value products for émigré communities grew. After 1980, numbers of African, Asian and Latin American farmers rose seven-fold in the Washington-Baltimore region. Termed 'New American Farmers' by the *Washington Post*, they served between 500,000 and one million local customers through networks of supermarkets and speciality grocery stores. Ethnic farms looked little like traditional American monocultures and reinforced penurbia's exotic impression.²³

Parts of the changing agrarian economy could only be inferred from qualitative sources, as census materials only registered them incompletely. Examples include organic farming and more exotic crops and animal husbandry, where figures were very shaky due to self-reporting and classification. Censuses did not distinguish between organic and non-organic farmers, and different states operated different classificatory regimes, making comparisons between counties and across time virtually impossible. Likewise, the variety of livestock types relied on self-reporting. Data for both sectors needed to be gleaned from elsewhere. Horses, wine and agricultural fairs provided good sources describing changing rural life that can be monitored over time. These are examined later.

TABLE 1. Farm Size and Distribution

	Total farmland acres	Percentage area farmland	Under 50 acre farms	Under 10 acre farms
Howard County				
1964	87,000	54%	137	17
2002	38,000	23%	222	72
Loudoun County				
1964	234,000	70%	251	73
2002	165,000	49%	977	99
Niagara County				
1964	181,000	54%	598	108
2002	148,000	44%	346	70

(Source: U.S. Census of Agriculture, see note 7.)

Farm sizes reflected the development of a hybridised pastoral landscape, characterised by the leisure farming and dude ranching where horses were present. Agriculture in all three counties transformed, as shown in Table 1 above. The distribution of farm sizes was squeezed as medium sized family farms fell to giant agribusiness on the one hand, and to the development of small lot and scarcely commercially viable leisure farming on the other. Micro lots gained much more significance. In Howard the total farm area fell from 87 thousand

acres in 1964 (when suburbanisation took off), to 38 thousand acres in 2002 – from 54% of land area to 23%. Simultaneously, the number of under-50 acre farms nearly doubled, from 137 in 1964, to 222 in 2002. Eye-catchingly, the number of tiny farms (under 10 acres) shot up from 17 to 72 during the same period. Loudoun's 234 thousand acres of farmland in 1964 fell to 165 thousand in 2002 (with much of the fall after 1980 when development began to encroach) from 70% of land area to 49%. Here, sub-50 acre farm numbers rose nearly fourfold; from 251 in 1964 to 977 in 2002. Niagara also saw land in farms decrease; from 181 thousand acres in 1964 to 148 thousand acres in 2002 – from 54% to 44% of land area. Small farm numbers here, however, collapsed by half from 1964 to 1992 (598 to 273) as the county suffered rustbelt malaise. From 1992, however, the number recovered strongly (to 346).

The stunning growth of lifestyle farms is well established, with less farmland distributed among many more small plots – despite the effects of different data collection methods or tax code changes on statistics. The huge increase in plots of 10 acres in the most developed county – Howard – may predict the future for other metropolitan edge counties. Certainly, the visual impression of these smallholdings would be of greater diversity than for traditional arable dairy farm, or agribusiness. While too small to farm, a patchwork of 10 acre landholdings helps create pastoral landscapes and ambiances where monoculture once predominated. For urbanites, the horse and leisure country of western Loudoun, western Howard and eastern Niagara became more alluring as a potential homestead: a trend confirmed at the national level by successive Gallup polls since 1972. The motif value of hayfields and horse manes billowing in the wind captured the hearts of the country-minded urbanite.²⁴

THE EQUINE INDUSTRY

Horses, the second marker of landscape construction, are a vital feature of the penurban fringe. Loudoun, Howard and Niagara counties saw rising numbers of horses within their areas between 1940 and 2002; despite mechanisation and despite declining arable farming acreages and employment. Increased horse populations relied on changes in farming: from for profit to for fulfilment. Local hay production rose even as dairying declined, suggesting that this hay was finding new markets.

The equine industry infused the feel of a community, as horses need space to feed and graze, for riding, and for hay and silage. Pasturage transformed cornfields into lush meadows. Simultaneously, the landscape was embellished with the feel of an elective, landed, leisurely and pastoral lifestyle: the 'country' ambience that drew city dwellers. State agricultural departments and local CES offices charted rising horse numbers through Equine Census Reports. Owning horses provided rich commercial returns, while servicing the equine market sup-

ported a growing equine economy, including blacksmithing and riding schools that can be tracked through city directories and telephone books. Descriptions for property for sale with equine references in publications such as the upper crust lifestyle monthly *Town and Country* suggest a spin off for real estate values. In recent years Maryland, Virginia and New York states reported spending for equine products of \$476 million, \$504 million and \$704 million respectively. Capital employed reportedly exceeded yearly expenditure by a factor of ten.²⁵ Though county breakdowns of annual expenditure were not available, horse census numbers revealed rising horse ownership rates. Loudoun became Virginia's premier equine county, and increasing horse numbers refuted the idea that mechanisation and closeness to the metropolis meant fewer horses.

Equine surveys are innovations of the last two decades. State Equine Surveys recorded more horses and dollar values than Census figures, and showed that the equine market deserved serious attention. Bridging economics and lifestyle, equine industry numbers and values suffered under-reporting and uncertainty. Due to collection methods and the lack of incentives to report, this uncertainty remained even though owner interests including the American Horse Council and CES offices encouraged members to respond.²⁶

Howard agricultural census figures listed 1,032 horses in 1997; less than the post-war high of 1,579 in 1987, but above the 935 reported in 1969.²⁷ In part, this rise in numbers from 1964 to 1987, and then fall thereafter reflected two distinct phases in the county's development; a first in which metropolitan attitudinal influence strengthened, and a second where penurban development within the county was superseded by physical development, leaving less land for leisure pursuits. Highlighting data uncertainty, the 2002 Maryland Equine Census counted 5,190 horses in Howard County – five times the census figures. Howard's horses were valued at \$61 million dollars and located in 1,200 places totalling 11,200 acres, or nearly 5% of the county's total area. Howard stabled one horse per 25 inhabitants. The Maryland Equine Census noted that nearly half of the state's horses were located in five outer Baltimore-Washington region counties; intuitively where they would least be expected due to development pressures.²⁸

Loudoun County reported a post-war high of 4,135 horses in the 1997 U.S. Agricultural Census, up from 2,405 in 1969. Strikingly, the 2001 Virginia Equine Report counted seven horses for every one tallied by the census: 15,800, or one for every fifteen Loudouners. Inventory value amounted to nearly \$295 million, explaining why the Loudoun Department of Economic Development monitored the industry conscientiously. Rising numbers may result from greater distance from metropolitan cores than Howard. Loudoun dominated Virginia horse numbers and value rankings, along with adjacent Fauquier County, repeating the link between horse number and proximity to metropolitan areas seen in Maryland.²⁹ Niagara listed 871 horses in the 1997 U.S. Agricultural Census, down from 1,107 in 1964. In contrast, the 2000 New York Equine Survey estimated Niagara's

equine population nearly four times higher, at 3,000 with a value of \$12 million – unchanged from the 1988 report. Consistent with other states nationwide, the New York Survey found more horses in near-urban areas.³⁰

Clear differences between 1997 U.S. Agricultural Census figures and 2000–2002 State equine reports underlined the growth and uncertainty of the equine market. The 2002 U.S. Agricultural Census returns greatly increased the reported number of horses in all three counties; from 1,032 in 1997 to 1,382 in 2002 in Howard (30%); from 4,135 in 1997 to 6,162 in 2002 in Loudoun (nearly 50%); and from 871 in 1997 to 1,698 in 2002 in Niagara (nearly 100%). More farms registered horses present in 2002 than in 1997; up from 111 to 158 in Howard; up from 401 to 731 in Loudoun; and up from 129 to 222 in Niagara. Three strong indicators emerge: the large size of the equine market, the growth of the market over the last generation, and the outer metropolitan fringe location of the industry. The precise size and value of the equine market probably surpassed even the higher equine report numbers.³¹

Farmers probably served the equine market for hay for cash from the barn door, especially given hay's weight, bulk and cost of transport. Substantiating barn-door sales would be impossible, although there is indicative data. Hay production in Loudoun increased markedly despite smaller yields per reporting farm; from around 50 thousand tons in the 1960s to around 70 thousand tons from 1987, and despite the collapsing dairy industry. Moreover, the average yield per reporting farm fell from the 1990s. Hay production in Niagara fluctuated wildly, while it dropped in Howard until the 1990s. Thereafter it stabilised, interesting because commercial dairying and ancillary industries had all but disappeared. Uncertainty reigns with regard to reporting criteria. Bountiful harvests and collapsing traditional markets beg the question of where the hay was going, with horses (and perhaps sheep, goats, llamas and other exotic species) providing a probable answer.³²

Listings by equine-related businesses in City Directories and Yellow Pages recorded vital and growing activity in Howard and Loudoun measured over ten year intervals since the 1960s, revealing growth to be especially strong after 1980. Howard saw a lone entry for horses in the 1972 phone book rise to seventeen in 2003, including three horse centres, four breeders, four trainers and six saddle and equipment vendors: a staggering increase, especially as much farmland had been lost. For Loudoun, the increase was still more dramatic. Entries for a single harness maker and one blacksmith in 1962, multiplied to eleven breeders, eight dealers, three furnishers, 26 trainers, three transporters, six blacksmiths and 22 saddle and harness sellers in 2001. Seventy-nine entries, the 2001 sum of Loudoun area horse related businesses, described a dynamic, vibrant community. Even Lockport and the rural eastern half of Niagara County increased its listings of such businesses, from one lone blacksmith in 1949 to two racers, a breeder, a blacksmith and two riding academies in 2000.³³

The huge increase in horse business entries could partially be explained by cross-county regional listings, multiple listings and a greater propensity for businesses to list. Yet together with census and survey numbers, increasing numbers of businesses testified to increasing horse numbers and the \$368 million importance of the industry in the counties, and indicate an increasingly leisure-inspired landscape. What were people doing with all these horses? One answer is provided by county agricultural fair classifications: a huge expansion of showing categories took place, which is reflected in 2003 programmes. Howard's fair listed 24 categories, from pulling to horsemanship; Loudoun's included 30 riding categories; and Niagara included seven major categories.³⁴ Cooperative Extension Service (CES) were acutely aware of rural transformations through links with 4-H programmes and targeted programmes at the horse minded newly-rural incomers.

AGRICULTURAL FAIRS

Agricultural fairs – a third area attesting to landscape and attitudinal change – shaped, reflected and bound local identity by bringing people together, and shaping community and togetherness in an atmosphere of entertainment. Fairs showcased rural life and the changing face of rural society, the shifts in agricultural production, landscape consumption and attitudes through schedules of events, classifications and competitions. Two generations ago, fairs exhibited produce raised or grown for sale – such as food and fibre – and items made or transformed for home use, such as clothes, cooking and canning. Recent fairs demonstrated that rural life now included hosts of other activities. These new activities created feelings and transformed symbols (rather than objects), leavening traditional rural life with a penurban synthesis of country and heritage that celebrated ambience and consumed landscape. Examples included the Niagara Fair's native dancing, Celtic dancing, clog dancing and antique tractor and equipment parade, Howard Fair's hand spinning and hair goat exhibitions, and Loudoun Fair's quilting, crocheting and hunting categories.³⁵ These classifications imagined rural life in non-commercial terms through stylised impressions of tradition and emphasised the break between countryside as an arena of production, and its contemporary function as a field of dreams.

CES youth 4-H programmes (Heads, Hearts, Hands and Health) played active roles in Howard, Loudoun and Niagara county shows. Fairs grew in length from a day or two in the 1940s and 1950s, to a week by 2006/7. Show categories increased gradually in Niagara and more rapidly in Howard and Loudoun, especially after 1980. Howard categories in 1946 included meat, vegetables, beef, and farm crops, poultry, household and 4-H demonstrations; as did Niagara in 1957, which also included tractor-pulls and flower arranging; and Loudoun in 1954, which held classes for vegetable canning and freezing.³⁶ Post-war Loudoun

fair programmes carried advertising for various staples of rural life: farm equipment, insurance, banking and feedstuffs. By 2007, CES programmes – which fed into show categories – served farm folk and other people interested in rural life, gardening, woodcraft and food production and treatment.

Many participants of recent CES programmes knew little of country life; consequently 4-H streamed programmes, with advanced instruction for farm children and basic skills for suburban kids. Fewer farm children, the massive suburban market, a wish to remain relevant, and incomer interest in rural life encouraged 4-H outreach to a broader public. County shows reflected change through the introduction of non-ownership categories for exhibitions so that everyone could join in, including the showing of borrowed sheep, and a prolific range of ‘pet’ categories including rabbits and goats, baked goods, fashion and ponies – all of which appealed to a non-traditional public.³⁷

Fair categories demonstrated the un-commercial hybridisation of countryside connected to penurbia and the shortcomings of the Agricultural Census. Llamas debuted in the 1998 Loudoun show, despite no census listings recording llamas in the county. In Howard, hand spinning surfaced; since 1973 the county has hosted the annual Maryland Sheep and Wool Show, reinforcing its craft heavyweight-status.³⁸ While Howard registered sheep numbers halved between 1964 and 1997, the number of farms with sheep remained virtually unchanged, suggesting cottage rather than commercial production. Similarly, Loudoun saw more small producers emerging. The 2003 Howard fair included eight sheep divisions, fifteen wool categories and nineteen meat categories for sheep, and the Loudoun fair listed seven major ownership divisions with an array of sub-classifications. While goats, llamas and alpacas did not appear consistently in census statistics, fair entries insisted that the animals had to be there. The 2003 Howard show included five divisions and fifty categories for goats – incredible as the 1997 Census counted only 213 goats. The 2003 Loudoun fair offered two classes and eight classifications for a 1997 Census count of 412 goats, and the Niagara show offered four events for its 154 reported goats.

Almost certainly, agricultural censuses undercounted the diversity of marginal wool, milk and meat categories. Niagara offered a home winemaking competition, and all three counties included beekeeping.³⁹ The rearing of llamas, sheep, goats, horses, bees and ponies and the growth of winemaking painted a picture of agriculture and land use as arenas for a stylised, leisure economy. These agricultural leisure economy activities could be perceived to require part-time attention and self-management, although reality often turned out differently. Agricultural fairs showcased the rise of a leisured agricultural economy, increasing diversity and the hybridisation of countryside. Country-minded incomers moved to the fringe and tended intricate gardens of leisured, esoteric production that partly replaced traditional farming. Fair categories presented texture that census figures missed due to underreporting, especially on the most marginal micro farms.

VITICULTURE

Tending vineyards – a fourth indicator of landscape and ambience change – reflected the pastoral idyll in the ancient world, taken up by America's founding fathers who reflected upon ideas of natural purity and order. Winegrowing mixed idylls with the sophistication and urbanity informing America's revolutionary republican class. Penurbanites brought and bought the symbolic value of the vineyard to the present and fed the nationwide viticulture boom. Since 1970 winery numbers nationwide have probably more than quintupled.⁴⁰ A key 2005 report noted that 36 thousand New Yorkers owed their livelihood to grape products and the industry provided over \$400 million in tax revenue. Three of the major producer areas (The Niagara Escarpment, The Seneca Lakes and Long Island) lay within commuter distance of the state's largest metropolitan areas: Buffalo; Rochester/Syracuse; and New York City.⁴¹ Virginia's biggest winegrowing counties also straddled the outer orbit of Washington, D.C. and Charlottesville.⁴² A 2004 Maryland report reconfirmed the geographical link between winegrowing and penurban areas.⁴³

New country people founded many wineries in the three counties after 1970. Loudoun boasted 54 winegrowers in the 2002 Agricultural census, up from 17 in 1978. Grape production in Loudoun rose one-hundredfold, to 836,000 pounds by 2006. The Loudoun Rural Economic Development Office responded vigorously by establishing the 'County Wine Trail'.⁴⁴ Niagara re-orientated its massive grapes-for-the-table industry towards added value wine production from 1964 to 2002.⁴⁵ In March 2004, Niagara County planned the distribution of 100,000 new Niagara Wine Trail Brochures to support the craft through agro-tourism. Even Howard managed an increasing number of producers from 1987. Howard's 15th annual 'Wine in the Woods' festival in May 2007 spotlighted local wines and drew over 20,000 visitors and 70 artisans.⁴⁶ The multi-year horizon for grape cropping meant that growers needed outside incomes before their first payday, confirmed by census data recording non-fruit bearing vines in the 2002 census which augurs for significant increases in the 2007 census.

Deep-set cultural dispositions and pragmatic responses to zoning rules together encouraged grape cultivation. Protective land policy in many counties stipulated minimum sizes for rural area housing lots, typically between two and fifty acres. Too big to mow, too small for traditional farming, these plots lent themselves to viticulture or horse keeping. The CES in Maryland, Virginia and New York honed their winegrowing expertise through regional viticulture coalitions. CES advice towards production, processing and marketing underscored the huge confidence in the wine business's potential – as an industry, to draw tourists, and to enhance rural qualities. Increasingly sophisticated winemakers fermented grapes from other producers, providing markets for micro-producers who could not make their own wine. Almost certainly wineries suffered undercount as some ventures simply amounted to loss-making hobbies, financed by salaries or home

sale bonanzas. Winemaking's banner value overwhelmed its commercial value, as the rows of grape vines draped across plots of land endowed an area with genteel, rural sophistication. Rising wine production, wine country allure, and the greater prestige of local wines brought the producer, the consumer, and the imagination together in a collective appreciation, and confirmed that the cultural importance of wine trumped its economic value.

PRESERVATION AND PARK DEVELOPMENT

Cultural ideas drove landscape change at two levels. The four examples sketched above relied generally on individually chosen, functional factors, which then formed recognisable patterns for support services to deal with. Larger scale factors – as flagged earlier – were also important, in terms of zoning rules implemented by county governments and preservation and park creation policies advanced by municipality, county, state and federal policy.

Concern over sprawl affected near-metropolitan counties from the early twentieth century. Zoning became a common method of controlling development and directing land use. Women's organisations, such as the Garden Club of Virginia, led in campaigns to introduce rural zoning in Loudoun in 1941–2. Howard implemented zoning in 1948, whereas Niagara introduced zoning on a piecemeal township basis between the 1920s and the 1970s.⁴⁷ In all three zoning ultimately mandated minimum lot-sizes for homes in sensitive countryside areas or wilderness under 'Agricultural-Rural' or 'Agricultural Residential' classifications.⁴⁸ Rules covering lot-sizes also protected property values by ensuring exclusivity. Zoning regulations were tightened from 1970, revealing growing concern over encroaching development. Minimum agricultural plots in designated countryside areas grew: Howard quintupled lot-sizes to five acres, and Loudoun up-zoned from one to ten acres. Western New York used zoning to reduce linear 'ribbon' development by preventive zoning for road-front property.⁴⁹ Protective agricultural zoning bestowed rural feelings to countryside development by stopping intensive suburban-style development.

County services like water and sewer lines supported planning policy. Howard and Loudoun attempted to direct development through water and sewer provision by focusing services tightly on designated areas, and discouraging development in unserved regions.⁵⁰ Both counties saw growth as given, while in Niagara water and sewer systems crisscrossed the county by the 1960s to facilitate development.⁵¹ Large-lot owners beat servicing policy by relying on well-water and septic tanks, a factor influencing the lot size increases during the water pollution conscious 1950s and 1960s: Big plots were essential for well-water extraction and sewage disposal without the imminent worry of contamination.⁵² More recently, small-scale private treatment plants coupled with high cluster-zone densities and favourable property prices increased the ability of developers to

ignore county services. However, micro-treatment plants blighted the penurban landscape and fuelled resistance to further growth, as the *Loudoun Times Mirror* noted of one scheme: 'One major roadblock is the sewage and water treatment plant that will spray highly treated sewage on neighbouring undeveloped land.'⁵³ Many fringe settlers would have regarded human slurry as an intrusion upon the countryside vistas they imagined.

Large-lot rural development left penurban homeowners flummoxed over how to use their five to fifty acre mini-estates, while the difference between agricultural returns and development profits chased commercial farmers out of the market as some farmers could not afford to pay spiralling taxes. Using the land and earning a tax-offsetting return instead of hours of mowing strengthened the attraction of Cooperative Extension Service offerings for incomers.⁵⁴ The CES helped where it could – such as Virginia's 2004 courses in forest management which allowed small 'woodlot owners to see the forest beyond the trees', Niagara's environmental education programmes, and Howard/Maryland's 'Basics of Farming' short courses.⁵⁵ Capital costs of landholdings amounted to near zero for some, with land values being secondary to the house price. Contrastingly, traditional farmers had to invest heavily to produce profits. That incomers could discount their investment explains how the countryside diversified so rapidly since 1970. Paradoxically, large-lot housing, a product of zoning changes inspired by environmental concern, encouraged countryside transformation. Tax and investment factors helped explain the ageing of the farming profession: few younger farmers could finance a traditional farm as land values outstripped farmers' means to produce a return.

After 1980 zoning policies became more sophisticated in fighting the loss of open countryside through mini-estate privatisation. Cluster zoning (clustering), allowed more houses in one part of a plot in return for the preservation of the rest – with overall housing densities unchanged. Transferable Development Rights (TDR) programmes aimed to concentrate agricultural reserves and permit builders greater densities and profits on some sites if they purchased land elsewhere for preservation. For both, increased building densities on smaller plots saved infrastructure costs for builder and the county. Yet some observers felt cluster zoning and TDRs legitimised development. Suburbanites complained that building densities in their areas were already too high, while pretty rural areas enjoyed TDR protection paid for with their taxes. Sectional, suburban-country jealousy poisoned Loudoun politics from the late 1990s, as it had in Howard in the 1980s. Tellingly, zoning, clustering and TDR policies had limited success in staunching development. Howard and Loudoun – in line with other outer Washington-Baltimore region counties – grew despite policies targeted to maintain their rural character. A 2002 University of Maryland 'Landsat' satellite study recorded that development consumed 28,000 acres a year in the Washington region: build-outs actually accelerated as anti-development policies increased.⁵⁶

Public concern over sprawl persisted, was recognised by political representatives, and manifested itself in ways two ways. Farmland protection enriched cultural landscapes, and parks framed natural landscapes. Both meetings saw dollar returns deluged by attitudinal returns and were generally implemented and administered by county governments. Voters supported park creation and land development rights because they saw enough intrinsic value in these programmes to bankroll them. This self-sacrifice – despite resistance – indicated that incomer-farmland and wilderness attitudes were actualised into constructed places. And even where other factors such as flood protection and water quality maintenance worked into decisions to preserve or establish parks, the parks quickly blended into the background natural vista.

Penurbia united worlds of consumption and preservation. Aesthetics and the economics of farming combined to create unique syntheses which maintained open, rural habitats, like Loudoun's horse and hunt country, Niagara's escarpment, and Howard's wool and crafts. Preservationism was important, yet penurbia's heritage-hugging mindset also transformed landscapes. The preserved countryside itself became an object of consumption, a backdrop to country passions, and a setting for the selective eulogisation of tradition and crafts. 'Rural fringes require farmland and forest protection to retain their attractive cultural landscapes', wrote urban historian Dolores Hayden.⁵⁷ Landscape preservation uneasily united farmers, incomers, penurban values, local politics and administrations. Farmer and Howard Agricultural Preservation Board member, Ridgeley Jones caught the essence of preservation in 1981: 'This land has served countless generations and once it goes into development, it will never be put back'. Agricultural preservation did not go uncontested when introduced in Howard in the 1980s.⁵⁸ Still, by 2007 Howard had preserved over 20,000 acres.⁵⁹ In Loudoun, preservation schemes introduced in 2000 now protect about 1% of the County.⁶⁰

Criticism of preservation policies which purchased development rights (PDRs) came from farmers, taxpayers and some politicians, and covered inadequate compensation, exorbitant costs, 'snob' zoning favouring the already favoured, and the misuse of scarce resources. Leading farmers wondered if the PDR rules – keep the land in agriculture and forego the right to sell the land for development – could stand judicial challenge as development land values skyrocketed. Ironically, preservation cost most where it was most needed, and once preserved, neighbouring land rose in value – increasing development pressures. Other mechanisms employed for agricultural preservation included agricultural districting and right to farm rules. All three counties established agricultural districts that fixed land taxes to agricultural values to discourage farm sales due to taxes. Huge schools enrolments led to breathtaking development costs in Loudoun with increased tax burdens for all. To counter this, Loudoun dedicated 70,000 acres to the Agricultural and Forestal District Program (AFDP), beginning in 1979. The AFDP reduced the County's potential tax base, but also forestalled service-hungry development.

Howard introduced right-to-farm laws in 1978; Virginia created state-wide rules that affected Loudoun in 1981, and New York state rules applied to Niagara in 1971 – in response to pressure and compromise between farmers and political leaderships.⁶¹ Right-to-farm regulations protected farming landscapes and farmers from potential nuisance suits. In their minds, incomers had split the rural landscape from its means of production, to then challenge the courts to rule against the irritations of farming. The need for right-to-farm ordinances provided hard evidence of the sometimes-frayed farmer-settler relationship. Simultaneously, preservation policies and ordinances underlined the status of agriculture as a worthy ‘museum’ repository of (redundant) rural values.

Some farmers repeatedly claimed that agricultural and residential uses were incompatible and that pockets of housing amid swathes of agricultural land disrupted farming by making the movement of equipment difficult. Farmers claimed that incomers trespassed, stole or destroyed crops and harassed livestock, whereas incomers retorted that noisy agricultural machinery held traffic up, loose animals destroyed gardens, and that muck spreading literally stank. Farmers and migrants together claimed that TDR policies preserved fragmented and low-grade countryside and that the money was better used elsewhere. Local and regional newspapers in all three counties repeatedly dedicated column inches to farmer-suburbanite conflicts.⁶²

The setting of nature aside for leisure and sublime experiences has a long history in the U.S. George Catlin famously (1832) proposed that America protect ‘pristine beauty and wilderness ...’ for posterity, while Frederick Law Olmsted added utility to nature and wilderness in 1865, declaring, ‘It is a scientific fact that the occasional contemplation of natural scenes ... is favourable to the health and vigour of men.’ From around 1850 municipal and federal authorities established city parks and national parks that celebrated wilderness by constructing and stylising it.⁶³ This section looks at the development of park and preservation policy for amenity and aesthetic values.

Open spaces – parks, reserves, sanctuaries and recreational facilities – enlivened the city edge sensibility, as un-built and stylised natural environments differentiated country from the metropolis. Continuous belts of open land dividing the metropolis from countryside created valued settings. By establishing focal places beyond the city, open land made credible a penurban self-identification, even when such areas were deliberate reconstructions. Open spaces frequently surrounded historic houses and monuments, such as the Rust Sanctuary in Loudoun that consisted of an imposing manor house and sixty acres and a protective barrier against growing Leesburg.⁶⁴ The Patapsco Female Institute Historic Park perched above Ellicott City connected visually with 32-mile-long riparian Patapsco Valley State Park, providing a country backdrop to the city and a rural exoskeleton to Howard County.⁶⁵ Howard, Loudoun and Niagara counties established recreational and open space areas from the late-1960s, partly in response to development. Other open spaces resulted from neighbourhood

planning concepts, as places where suburbanites could conveniently spend leisure time. In 1990, Loudoun created the 357-acre Claude Moore Park which served the most densely populated areas of the county. The park combined wilderness, woods, sports and recreational areas, and housed the Loudoun Heritage Farm Museum in a nature-heritage-leisure complex.⁶⁶

‘For reasons not easily explained, most people seem to achieve a great deal of pleasure and satisfaction from being in natural surroundings’, the Howard County 1960 General Plan argued, acknowledging the urgent need for preservation of open land. The plan proposed saving up to 25,000 acres.⁶⁷ Commenting on the disappearance of open space in 1961 (the year Jean Gottmann published *Megalopolis*), *Times, Ellicott City* ran the headline, ‘Parks Needed: Merging Cities Threaten Open Space’.⁶⁸ Subsequent plans trumpeted open space as a primary objective. Patapsco and Patuxent Valley State Parks – 14,000 and 6,700 acres respectively – formed virtually continuous and effective riparian green belts protecting Howard County’s interior mixing feral and stylised nature, old mill buildings and hewn stone. Maryland State funding and local planning helped in the creation of river parks, as concern over water pollution worried many people close to Chesapeake Bay’s precarious ecology and rich fishing ground – especially after Rachel Carson’s 1962 bestseller *Silent Spring*. Locally and nationally, the League of Women Voters was consistently a strident voice for such preservation.⁶⁹

Loudoun County’s 1969 plan remarked that the county had ‘not ... felt the need for developed public recreational space ...’ beyond that associated with schools and the new Sterling Park subdivision, due to the rural feel of the county. The plan proposed the creation of county and developer-financed public and private parks and recreation areas. Later plans recognised the essential necessity of maintaining open and recreational spaces for Loudoun’s character and quality.⁷⁰ The emphasis on landscape and greenery protection in Howard and Loudoun matched the influence of resident opinion favouring open and natural space. Park regionalisation into green networks that joined separate areas together across jurisdictions became a goal of organisations like the American Farmland Trust and the Chesapeake Bay Foundation, and for regional organisations like the Metropolitan Washington Council of Governments.⁷¹

Frederick Law Olmsted had been a prime mover in the creation of the Niagara Reservation Park in the 1880s. Creating the Reservation led to the removal of energy-dependent and water-consuming industries from the Niagara Falls gorge and established parkland backdrops to the American Falls. ‘Renaturing’ the industrial landscape allowed Olmsted license. 1950s automotive mobility and the Robert Moses Parkway saw the city severed from the water again. In 2002, the Niagara Heritage Partnership campaigned successfully to close the road for a trial period.⁷² Illustrating the deeply intertwined character of environment and imagination, environmentalists fêted the re-establishment of Olmsted’s reconstruction.⁷³

Sanctuaries and reserves embellished penurban countryside. They owed their existence in all three counties to private largesse, the philanthropy of prominent citizens, and vocal local interests. Partnerships between governments and various interests created places like Loudoun's Claude Moore Park or the Niagara Reservation restoration. Philanthropic and citizens' interests organised the Waterford Foundation in Loudoun and raised nearly \$3.7 million for PDR's in 2003 to protect Waterford's achingly beautiful village vistas from development. Increasingly, private interests saw profits in preservation, such as in the 'South Riding' master built community in Loudoun that registered its land with the National Wildlife Federation's 'Backyard Wildlife Habitat Program'. Cluster-development regulations and developer self-interest converged to create storied open spaces complete with salamanders and rattlesnakes for potential buyers.⁷⁴

The political compromises underlying the complex interests at the urban fringe showed the convergence of amenity and utility values. Without open land, the neo-rural dream would die, and without the direct and indirect financial support of the rest of the community, farming would expire. Between the two, scarce tax dollars were traded for limits on land-use freedom. Purchasing and maintaining parks cost money, underlining the compromise between the support of economic and aesthetic values. Governments knew that open, agricultural land drew people to the fringe and that keeping it needed their support. Indeed county demographers in Loudoun regularly and consistently measured how Loudouners conceived of their county. Beginning in the 1960s in Howard County, private corporations learned that access to open space sold real estate and could generate richer profits than traditional subdivisions, and interests showed that preservation motivated by profit or altruism could gain public and political support.⁷⁵

CONCLUSION

On the urban fringe, beyond the gritty sprawl of the metropolis lies penurbia: a developing zone of imagining as much as transition, a place where ideas could be superimposed on the landscape. Here, the metropolitan mind – without the cookie-cutter subdivisions of metropolitan physicality – spilled across agricultural landscapes and created hybridised leisure countryside. One National Public Radio journalist accurately captured the atmosphere of hybrid farm country:

Western Loudoun County, just minutes from downtown Washington, D.C., is still undeniably farm country, but you'll see more than the traditional fields of corn and dairy cows. Today, many of the local farmers are self-taught specialists raising water buffalo, llamas, goats, emus and bees. Others grow flowers and herbs, Christmas trees, organic vegetables and fruits, and grapes for wine.⁷⁶

Blinding heterogeneity marked the landscape and ambience of the penurban fringe, not agricultural monoculture. The scenery created truly allowed the mind to wander and to consider the proposition of whether landscapes were degraded or improved by the interplay of rural and urban elements.

Academic and journalistic reports bemoaned the loss of agricultural land under development pressure, yet the leisured countryside which incomers laid over farmland was more 'Edenic' garden or park than empty vacuum. Although accurate quantitative data over time is hard to come by, Howard, Loudoun and Niagara probably housed more trees and bigger trees in 2008 than in 1945, and may well have housed greater overall biodiversity in the sections of the counties housing imagined countryside. Qualitative data is even more elusive, what type of trees, how big, or how native? With trees come wildlife; all three counties reported concern over the explosion in deer populations, especially over the increasing number of vehicle-animal collisions.⁷⁷ In recognition of the problem, Howard County created a 'Deer Task Force' in 1996.⁷⁸ Certainly, in the fall breeding season, road kill peppered roadsides and was often removed for game before transport cleanup officials arrived. Feral plots and gardens represented a veritable 'buffet for deer', as well as other fauna.⁷⁹ Beyond the damage to vehicles and gardens, disease motivated scrutiny of deer as (apparently) the prime vector of Lyme disease. Loudoun Lyme disease cases shot up after 1990, and accounted for fully half of Virginia totals, with strong increases observed in neighbours Fairfax and Montgomery counties. The interface between deer and humans was probably as much the result of habitat gain as a habitat encroachment through development. European aristocrats intentionally created deer parks for enjoyment, hunting and leisured restitution for centuries; American penurbanites created derivative landscapes almost by accident in their yearning for countryside. The anecdotal value of the return of large fauna – including deer, bears and coyotes – for the new country fringe ultimately seemed double edged, with pressure building to permit increased hunting.

Penurban landscapes emerged pragmatically as migrants from the city moved to the country to practice rural living, as they saw it. Incomers carried with them ideas of how countryside should look, sound and smell, ideas which resided deep in cultural appreciations of ideal landscapes. And they certainly also bore with them prejudices against certain kinds of landscape, including the highly specialised, productive and sanitised (yet still periodically smelly) agrarian vistas which emerged as viable farm sizes increased and mechanised. Ideas of countryside appropriateness probably also suffered a nostalgic idea of what a rural – or even rustic – landscape should look like. Granted the wherewithal from metropolitan incomes, jobs and house sales, incomers could literally take a vision from their mind's eye and project it across a plot of land, complete with the amenity care of horses, growing of wine, keeping of exotic animals and so on. In the process they supported a fine grained economy and visual culture which embellished landscapes through horse pasturage, riding

schools, vineyards, vineries and the like. Moreover, the dispositions of incomers received timely support from county policy decisions such as land policy that had intended and unintended consequences. A five- or a ten-acre plot provided a substantial canvas for the penurban incomer to paint over, as well as soothing the needs of autonomy by providing exclusive domains. Protective policies such as agricultural zoning, districting, parks and preserves aided the creation of an imagined and then emplaced countryside in terms of an enduring backdrop and a greater textual cohesion.

The landscapes and ambiances of the urban fringe discussed in this paper are not 'natural', but contemporary cultural constructions superimposed on earlier agricultural landscapes and their underlying physical constructions. These hybrid constructions are the result of individual dispositions writ large, cultural ideals, economic opportunity and political support. They rest upon the cross pollination of ideas in mind and physical surroundings; envisaged, created and consumed. While few Americans live in small towns, villages or rural locations, most people express a preference for living in such places – despite their lack of first hand experience in living on the land or in small towns. Clearly the idyll of small scale and rural life has deep roots in the popular psyche, which some people can fulfil in part by buying a penurban home while others remain with their dreams in metropolitan surroundings.

While this paper rests on an examination of three eastern U.S. counties, preliminary research suggests that comparable patterns would emerge from close study of urban fringe counties elsewhere in the northern and Midwestern U.S. In other areas, water, climatic and regulatory concerns may force different manifestations of imagined countryside to emerge, such as the multi-acre 'ranchette' patterns in Colorado. Moreover, the creation of amenity landscapes in the countryside may also have a global reach, or at least reach into many western countries.⁸⁰ Post-1945 agricultural landscapes have transformed, to provide the imagined and hybridised countryside of contemporary penurbia. These new landscapes will probably evolve and prove transitory as development pressures increase, bringing more metropolitan and rural ideas in to dialogue.

NOTES

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¹ Joel A. Tarr (2000) 'Urban History and Environmental History in the United States: Complementary and Overlapping Fields', in *Historiography Series in Global Environmental History*, H-Net. (<http://www.h-net.org/~environ/historiography/historiography.html>)

² See, for example, lifestyle magazines such as *Country Living* and *Country Home*, founded around 1980. These two magazines have over a million sales an issue, advertising revenues in the tens of millions, and with dedicated sections for capturing country style in the city.

³ The conceptual divide between nature and culture ultimately fuels a cognitive incompatibility which at least partly lies between the relative comprehension of urban fringe phenomena by cultural geographers and environmental historians. See Judith Gerber, 'Beyond Dualism – the Social Construction of Nature and the natural and Social Construction of Human Beings', *Progress in Human Geography* 21, 1 (1997): 1–17.

⁴ For more on hybrid socionatural landscapes, see Erik Swyngedouw 'Modernity and Hybridity: Nature Regenerationismo, and the Production of Spanish Waterscape, 1890–1930', *Annals of the Association of American Geographers* 89, 3 (1999): 443–65.

⁵ Amenity landscapes in a broader sense rely on differences in purchasing power between natives and incomers; made more extreme by a widening income gulf between winners and losers in an increasingly globalised economy and labour market. For more on the relationship between countryside, hybridity, and globalisation, see Michael Woods 'Engaging the Global Countryside: Globalization, Hybridity and the Reconstitution of Rural Place', *Progress in Human Geography*, 31, 4 (2007): 485–507. Woods sees countryside as being enacted upon, rather than an actor in its own right.

⁶ By functional, I mean beyond the administrative and even occasionally statistical limits to urban areas. These limits vary according to the specific urban area studies, the history of the urban area, the region in which the urban area is located, and the size of the area.

⁷ See Auguste Sectorsky, *The Exurbanites* (Philadelphia, PA: J.B. Lippincott Company, 1955); Albert LaFarge, *The Essential William H. Whyte* (New York: Fordham University Press, 2000); Jean Gottmann, *Megalopolis; The Urbanized Northeastern Seaboard of the United States* (New York: Twentieth Century Fund 1961); John Herber, *The New Heartland: America's Flight Beyond the Suburbs and How It Is Changing Our Future* (New York: Times Books, 1986 [first published in 1978]); Richard Louv, *America II* (New York: Tarcher, Inc., 1983); Joel Garreau, *Edge City: Life on the New Frontier* (New York: Anchor Books, 1991); Robert Lang and Jennifer LaFurgy, *Boomburbs: The Rise of America's Accidental Cities* (Washington, D.C: Brookings, 2007); Arthur Nelson and Thomas Sanchez, 'Lassoing Exurban Sprawl', (pre-publication draft, 2002); Arthur Nelson and Thomas Sanchez, 'Debunking the Exurban Myth: A Comparison of Suburban Households', *Housing Policy Debate* 19, 2 (1999): 689–709; Arthur Nelson and Thomas Sanchez, 'Exurban and Suburban Households: A Departure from Traditional Location Theory?' *Journal of Housing Research* 8, (1997): 249–276.

⁸ Defined in general terms by scholars working at Virginia Tech's Metropolitan Institute and elsewhere, including Arthur Nelson and Thomas Sanchez.

⁹ 'Let's Look at Loudoun' – Loudoun County promotional brochure (1949).

¹⁰ 2006 U.S. Census estimates. See <http://quickfacts.census.gov/qfd/index.html>

¹¹ Anne Sorensen, Richard Greene and Karen Russ, 'Farming on the Edge', co-published by *The American Farming Trust* and The Centre for Agriculture and Environment, North Illinois University (1997).

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¹² Andres Duany, Elizabeth Plater-Zyberg and Jeff Speck, *Suburban Nation: The Rise of Sprawl*, (New York: North Point Press, 2002); James Howard Kunstler, *The Geography of Nowhere: The Rise and Decline of America's Man Made Landscape* (New York: Touchstone, 1993).

¹³ Joe Surkiewicz, 'Greener Pastures: When Suburb Meets Country, Conflicts Can Arise', *Baltimore Sun*, 29 Jan. 1995.

¹⁴ U.S. Agricultural Census figures are used throughout this paper except where otherwise stated.

For Howard: Department of Commerce (1972) 1969 Census of Agriculture, Vol. 1, Part 23 Maryland County Data; U.S. Department of Agriculture (1999) 1997 Census of Agriculture, Vol. 1, Part 20 Maryland State and County Data; and 2002 Census of Agriculture website, <http://www.nass.usda.gov/census/> (for 1997 and 2002 data).

For Loudoun: Department of Commerce (1972) 1969 Census of Agriculture, Vol. 1, Part 24 Virginia, Section 2 County Data; U.S. Department of Agriculture (1999) 1997 Census of Agriculture, Vol. 1, Part 46, Virginia State and County Data; and 2002 Census of Agriculture website, <http://www.nass.usda.gov/census/> (for 1997 and 2002 Data).

For Niagara County: U.S. Department of Commerce (1972) *1969 Census of Agriculture*, Part 7 New York, Section 2, County Data; U.S. Department of Agriculture (1999) *1997 Census of Agriculture*, Volume 1, Part 32, New York State and County Data; and 2002 Census of Agriculture website, <http://www.nass.usda.gov/census/> (for 1997 and 2002 data).

¹⁵ Missy Zane, 'Farmettes: New Way of Life', *Times, Ellicott City*, 16 Nov. (1974)

¹⁶ Scott and Helen Nearing, *Living the Good Life: Being a Plain Practical Account of a Twenty Year Project in a Self-Subsistent Homestead in Vermont, Together with Remarks on How to Live Sanely & Simply in a Troubled World*, (Harborside, ME: Social Science Institute, 1954); Spector, op cit; interview with Corey Childs, Director, Loudoun County Office, Virginia Cooperative Extension, 29 Oct. 2003.

¹⁷ Michael Clark, 'Farming Withers Under Developer Pressure', *Baltimore Sun*, 18 Mar. 1979.

¹⁸ Jamie Smith Hopkins, 'Farmer Wannabes Warned', *Baltimore Sun*, 11 Nov. 2001.

¹⁹ Personal interviews with extension agents in all three counties were carried out in the fall of 2003.

²⁰ See the Cornell Cooperative Extension of Niagara County homepage, <http://www.cce.cornell.edu/niagara/niagara.html#local-programs> and the Virginia Agricultural Extension Services Department of horticulture, <http://www.hort.vt.edu/> for winemaking regionalism.

²¹ All three were available in Loudoun County. For wine tours see Loudoun County Wine Trail, http://www.rural-loudoun.state.va.us/wine_trail.htm, Loudoun 2003 Farm Color Tour, <http://www.rural-loudoun.state.va.us/fguid1.htm>, and the Loudoun County Bed & Breakfast Guild webpage featuring many farm B&Bs, <http://www.vabb.com/vabblist.asp>.

²² 'The 200,000 Acre Solution: Supporting and Enhancing a Rural Economy for Loudoun's 21st Century', Loudoun County Rural Development Task Force, 1998.

²³ See Judith Weinraub, 'New American Farmers', *Washington Post*, 15 Oct. 2003. Joan Thirsk, *Alternative Agriculture: a History from the Black Death to the Present Day*

(Oxford: Oxford University Press 1997), argues historically that marginal farmers are often by necessity the most innovative.

²⁴ Emphasised in regular Loudoun County surveys that analyse the most important factors why people move to the County. See: Loudoun County Department of Economic Development, *Survey of Loudoun Residents*, Mar. 1990; *Choices and Changes Survey Results Summary*, Department of Planning Zoning and Community Development, Loudoun County, 1 May 1990 (4,000 respondents); *1997 Survey of Loudoun County Residents*, commissioned by the Office of County Administrator, Loudoun County, 1997 (1,000 respondents); *1999 Survey of Loudoun's Residents*, commissioned by the Office of County Administrator, Loudoun County, 1999 (1,000 respondents); *2001 Survey of Loudoun's Residents*, Department of Economic Development, Loudoun County, 2001 (1,000 respondents);

2002 Survey of Loudoun's Residents, commissioned by the Department of Economic Development, Loudoun County, 2002 (1,000 respondents).

At a national level, see successive Gallup Polls asking on place of living preferences (city, suburb, small town, country), George H. Gallup, *The Gallup Poll: Public Opinion 1935–71 (Vol. III)*, (New York: Random House, 1972), Volume III, 1996 & 2238; George H. Gallup, *The Gallup Poll: Public Opinion 1972–77 (Vol. I & II)*, (Wilmington, Delaware: Scholarly Resources Inc., 1978), 78 & 112, and Vol. II, 914; George H. Gallup, *The Gallup Poll: Public Opinion 1978*, (Wilmington, Delaware: Scholarly Resources, Inc., 1979), 83–86; George H. Gallup, 'Urban America: A Special Gallup Report', in the *Gallup Poll: Public Opinion 1978*, Wilmington, Delaware: Scholarly Resources, Inc., 83–86 Released March 2; George H. Gallup, 'Urban Problems Special Survey' in the *Gallup Poll: Public Opinion 1981*, (Wilmington, Delaware: Scholarly Resources, Inc., 1981), 82–83; George Gallup, JR., 'Ideal Place to Live' in *The Gallup Poll: Public Opinion 1985*, (Wilmington, Delaware: Scholarly Resources, Inc., 1986), 64–65; George Gallup, JR., 'America's Large Cities' in *The Gallup Poll: Public Opinion 1989*, (Wilmington, Delaware: Scholarly Resources, Inc., 1990), 207–9; George Gallup, JR., 'America's Large Cities', in *The Gallup Poll: Public Opinion 1998*, (Wilmington, Delaware: Scholarly Resources, Inc., 1999), 238.

²⁵ See Maryland Equine Census (2002) online, <http://www.marylandhorseindustry.org/census2.htm>, Virginia Equine Report (2001) online, <http://www.nass.usda.gov/va/2001equinereport.pdf>, and New York Equine Survey (2000) online, <http://www.nass.usda.gov/ny/Equine2000/equine.htm>.

²⁶ Interview with Caragh Fitzgerald and Martin Hamilton, Howard Cooperative Extension, 11 Nov. 2003 confirm underreporting. State organisations exhorted owners to report, see New York State Horse Council Newsletter, September 2007: <http://www.nyshc.org/newsletters/SeptOct05.pdf> (<http://horsecouncil.org/about.html>)

²⁷ U.S. Agricultural Census. See note 7.

²⁸ See Maryland Equine Census (2002) and Dawna Klosner-Wehner, 'Howard Farms Still a Growth Industry', *Baltimore Sun*, 'Howard County Hometown Guide', 21 Mar. 2004

²⁹ See Virginia Equine Report (2001). Louis Nicholls, Agricultural Development Officer at the Loudoun County Department of Economic Development confirmed the county's interest in equine industry research during an interview on 16 Oct. 2003.

³⁰ With the exception of Saratoga County. See New York Equine Survey (2000).

³¹ U.S. Agricultural Census online:

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³² U.S. Agricultural Census, see note 7.

³³ Lockport Sources: *Lockport City Directory* (Buffalo, NY: R.L. Polk & Co., 1949); R.L. Polk & Co; and *Lockport City Directory* (Livonia, MI: R.L. Polk & Co., 2000); Loudoun Sources: *Leesburg, Middleburg, and Purcellville City Directory* (Richmond, VA: Hill Directory Company 1962); C & P Telephone, Bell Atlantic; and *Loudoun-Fauquier Yellow Pages* (Verizon, 2001). Loudoun Directories are on hand at the Thomas Balch Historical Library in Leesburg, VA. Howard Sources: *Columbia Directory 1972*; *Howard County Telephone Directory, 2003* (all lodged with the Columbia Archives, Columbia, MD); and *The Community Phone Book Columbia, Ellicott City, MD, 2004* (online).

³⁴ See Joseph Goddard, 'The Creation of Penurbia: A Geography of the Heart, 1945–2005', (Ph.D. diss., University of Copenhagen, 2005).

³⁵ See '58th Annual Howard County Fair', 2–9 Aug., (2003 programme): 14 & 119. For the 2007 fair, see http://www.howardcountyfair.org/fair_schedule.htm. See '68th Annual Loudoun County Fair', 28 July – 2 Aug., (2003) programme): 23 & 35. For the 2007 show see: http://loudounextra.washingtonpost.com/events/search/?category=100&q=&age=&cost=&start_date=2007-07-19&end_date=&x=35&y=13. See the '2003 Niagara County Fair' July. 30–Aug. (press packet.) For the 2006 fair, see <http://counties.cce.cornell.edu/niagara/2006%20fair%20events%20schedule.pdf>

³⁶ 'First Annual Howard County Fair', 21–22 Aug. (1946 programme).

³⁷ '58th Annual Howard County Fair', 4-H Sheep-Lead, (2003 programme): 237, and '68th Annual Loudoun County Fair'. Department 3.1 Non-Ownership Sheep (2003 programme) p. 19.

³⁸ 'Maryland Sheep and Wool Festival' website, <http://www.sheepandwool.org/index.htm>.

³⁹ 'The 2003 Niagara County Fair' (2003 press packet).

⁴⁰ 'Maryland Wine: the Next Vintage', Maryland Wine and Grape Advisory Committee Report, 2004: 4. <http://www.marylandwine.com/mwa/media/stories/wgacreport.shtml>

⁴¹ 'Economic Impact of New York Grapes, Grape Juice and Wine', 2005, MKF Research for the New York Wine and Grape Foundation: <http://www.nywines.org/articles.root/804/Economic%20Impact%20of%20New%20York%20Grapes%20Grape%20Juice%20and%20Wine%202005.pdf>

⁴² 'Virginia 2006 Commercial Grape Report', Virginia Department of Agriculture and Consumer Services, online at: http://www.nass.usda.gov/Statistics_by_State/Virginia/Publications/Grape_Report/2006%20grape%20publication.pdf

⁴³ 'Maryland Wine: the Next Vintage', Maryland Wine and Grape Advisory Committee Report, 2004: 33.

⁴⁴ The 'County Wine Trail' was established in cooperation with the Loudoun Rural Economic Development Office, <http://www.loudounfarms.org/Default.asp?Page=16>

⁴⁵ See New York Orchard & and Vineyard Survey, 2001, online at: <http://www.nass.usda.gov/ny/FruitTree/fruittree2002txt.pdf>, and Thomas Prohaska, 'Niagara County Legislature Panel Won't Vote on Trucks-Only Bridge', *Buffalo News*, 18 Mar. 2004.

⁴⁶ The 'Niagara Wine Trail' is described on the Niagara USA website, <http://www.niagara-usa.com/attractions/winetrail.html>. The 'Wine in the Woods' festival webpage is recorded here: http://www.howardcounty.com/calendar/event_details.asp?ID=25466

⁴⁷ The role of women's organisations as pioneers in local environmental struggles has been well documented elsewhere, not least by Richard Walker, *The Country in the City* (Seattle: University of Washington, 2007).

⁴⁸ Maximum zoning in Niagara measured around one acre in 2003, less than in Howard or Loudoun.

⁴⁹ Townships, not the County determined land use policy in Niagara County.

⁵⁰ See *Howard General Plan*, 1960: 63.

⁵¹ See *Erie-Niagara Regional Plan Summary Report*, 1961: II-N-25.

⁵² See Adam Rome, *The Bulldozer in the Countryside* (Cambridge: Cambridge University Press, 2000) for the adverse effects of self-servicing.

⁵³ Anne Keisman, 'Development Races the Court', *Loudoun Times Mirror*, 5 May 2004.

⁵⁴ Agricultural land could be assessed for reduced levels of tax in all three counties.

⁵⁵ Adrian Higgins, 'Teaching Woodlot Owners to See the Forest Beyond the Trees', *Washington Post*, 22 Jan 2004; Cornell Cooperative Extension, local programmes in Niagara: <http://counties.cce.cornell.edu/niagara/#local-programs>; Basics of farming short courses in Maryland, Howard Ag. Newsletter, 2: 2006 at: http://www.hceda.org/uploads/pdfs/HowardAg_2006_Issue_02.pdf.

⁵⁶ American Farmland Trust (AFT) and Chesapeake Bay Foundation 'Conserving the Washington-Baltimore Region's Green Network: The Time to Act is Now', report, released May 2004. <http://www.farmland.org/greennetwork/Conserving%20a%20Green%20Network.pdf>.

⁵⁷ Dolores Hayden, *Building Suburbia: Green Fields and Urban Growth*, (New York: Pantheon Books, 2003): 238.

⁵⁸ Gill Chamblin, 'Fighting for Their Land', *Howard County Times*, 29 Oct 1981.

⁵⁹ See Howard County Department of Zoning and Planning website: http://www.co.ho.md.us/DPZ/Agricultural/dpz_agricultural_preservation.htm

⁶⁰ See The Loudoun County Purchase of Development Rights Program webpage, <http://www.co.loudoun.va.us/omagi/pdr/index.htm>.

⁶¹ Virginia Agricultural Protection Act, 1981, and New York's Agricultural Districts Law, 1971.

⁶² Including the *Loudoun Times-Mirror*, *Howard County Times*, *Times*, *Ellicott City, Niagara Gazette*, the *New York Times*, the *Washington Post*, and the *Baltimore Sun*. Local historical societies in all three counties maintain clippings of conflicts in their archives.

⁶³ In Roderick Frazier Nash, ed., *American Environmentalism: Readings in Conservation History* (New York: McGraw-Hill, 1990), 33; and Carolyn Merchant, ed., *Major Problems in American Environmental History* (Lexington, MA: D.C. Heath, 1993), 383–384. See also Witold Rybczynski, *A Clearing in the Distance: Frederick Law Olmsted and America in the 19th Century* (New York: Touchstone, 1999).

⁶⁴ See Audubon Naturalist Society Rust Sanctuary website, <http://www.audubonnaturalist.org/rustsanct.htm>.

⁶⁵ See Patapsco Female Institute Historic Park website, <http://www.patapscofemaleinstitute.org/friends.htm>.

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⁶⁶ See Claude Moore Park, Loudoun County Department of Parks, Recreation & Community Services website, <http://www.loudoun.gov/prcs/parks/claude.htm>. The National Wildlife Federation owned the park from 1975 to 1986.

⁶⁷ Howard County General Plan, Howard County Planning Commission. 1960: 39.

⁶⁸ Byline: 'Parks Needed: Merging Cities Threaten Open Space', *Times, Ellicott City*, 8 May 1963.

⁶⁹ Rachel Carson, *Silent Spring* (Boston, MA: Houghton Mifflin, 1962).

⁷⁰ Loudoun County, Loudoun County Choices and Changes General Plan, 1990–2010, 1991.

⁷¹ Anne Sorensen et al., op cit.

⁷² Bill Michelmore, 'The Parkway Problem', *Buffalo News*, 20 Feb. 2000.

⁷³ The Niagara Heritage Partnership maintains an extensive electronic campaign archive of articles and letters. See: <http://niagaraheritage.org/index.html>.

⁷⁴ See the National Wildlife Federation's 'Backyard Wildlife Habitat' website, <http://www.nwf.org/backyardwildlifehabitat/southriding.cfm>.

⁷⁵ Loudoun County Department of Economic Development surveyed local residents' attitudes regularly from 1990, as did Howard Research and Development – builders of Columbia new town. George Gallup polled nationally. Local newspapers in the counties also carried out irregular and relatively unscientific self-reported surveys.

⁷⁶ See Rudy Maxa, 'Western Loudoun's Rural Landscape – It's Not Your Father's Farm', June 2001, online, <http://www.rudymaxa.com/article.php?ArticleID=45>

⁷⁷ John Hanchette, 'Mountain Views: Exploding Deer Population Presents Problems for Officials and Motorists', the *Niagara Falls Reporter*, 28 June 2005.

⁷⁸ Howard County Department of Recreation and Parks, 'Deer Management', http://www.co.ho.md.us/RAP/RAP_Deermanagement.htm (accessed 25 Jan. 2008)

⁷⁹ Amy Gardner, 'Swelling Herds, A Growing Risk', in the *Washington Post*, 27 Mar. 2007.

⁸⁰ See Woods, 'Engaging the Global Countryside', 487.

Uncertain Environments: Natural Hazards, Risk and Insurance in Historical Perspective

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ABSTRACT

Natural catastrophes are not just sudden events; they are also embedded in historical patterns of vulnerability and resilience. In modern societies, risk is one of the most important principles applied to the challenges that natural hazards pose and insurance is an ever more important tool of risk management. The contributions to this special issue of *Environment and History* all stress the fact, however, that environmental risk is not simply a phenomenon 'out there' but the result of social, scientific, economic and cultural processes. They also illustrate that the understanding of risk varies over time.

KEYWORDS

Environment, risk, uncertainty, insurance, science, history

INTRODUCTION

German historian Frank Uekötter has compared natural catastrophes to bees: they sting, and then they die.¹ At first glance, this metaphor seems to be very fitting. Floods, earthquakes and volcanic eruptions last for only a few seconds, minutes or hours. They happen unexpectedly, they have an enormous impact and, once the event is over, they are quickly forgotten. If we take a closer look, however, it becomes clear that natural hazards and catastrophes have a history. They are anticipated long in advance and they are remembered, often for a long time after the actual event takes place. Structural and non-structural measures

1. Frank Uekötter, review of *Naturkatastrophen. Beiträge zu ihrer Deutung, Wahrnehmung und Darstellung in Text und Bild von der Antike bis ins 20. Jahrhundert*, eds. Dieter Groh, Michael Kempe and Franz Mauelshagen (Tübingen: Gunter Narr, 2003), *Historische Literatur* 2 (1/2004): 21.

of catastrophe prevention, for example, such as levees or building codes for earthquake-prone areas, have profoundly shaped the built environment. Such measures do not represent ‘momentary’ but rather permanent defences. US environmental historian Donald Worster made a distinction between the two ways of countering catastrophes when he defined the difference between flood control and irrigation. It is a difference, he explained, ‘between holding an umbrella over your head when it rains and making the rain go somewhere else. The first is a momentary defense, the second a concerted attempt to control and defeat a threat once and for all.’² Such concerted attempts to control or cushion the impact of catastrophes include emergency financial reserves or insurance policies. Likewise, scientific and legal discourses, as well as novels and films, influence the way we imagine or anticipate disaster. These examples demonstrate the need to analyse and understand natural catastrophes within a larger, long-term context of risk-taking and coping, of anticipation and preparedness.

In recent years, the history of natural catastrophes has become a flourishing field of research. To date, however, most studies have treated the disasters as singular events. This volume takes a different approach. It locates disasters within an analytical perspective of *longue durée*. Specifically, it seeks to understand natural catastrophes by identifying long-term patterns of vulnerability and resilience and by discussing, analysing and acknowledging the importance that questions of risk and uncertainty possess in an ongoing relationship between nature and society.

RISK AS THE MODERN CONDITION

While current scholarship exhibits many different and sometimes conflicting definitions of risk, all concepts do ‘presuppose a distinction between *predetermination* and *possibility* ... for if the future were either predetermined or independent of present human activities, the notion of ‘risk’ makes no sense’.³ Viewed from a historical perspective, however, the idea that the future is not determined by fate and destiny, but is in fact, manipulable and open, is a rather new one. Only as of the early modern period, with the grip of religious power over society gradually loosening, could ‘a system, which operates (as a matter of principle) via ... open human control of the natural and social worlds’ gain ground.⁴ Today, risk is often understood as one of the most important and fun-

2. Donald Worster, *Rivers of Empire. Water, Aridity, and the Growth of the American West* (New York: Pantheon, 1985), 20.

3. Carlo C. Jaeger et al. eds. *Risk, Uncertainty, and Rational Action*, (London, Sterling, VA: Earthscan Publications, 2001), 17 (emphasis by Jaeger et al.).

4. Anthony Giddens, *Modernity and Self-Identity: Self and Society in the late Modern Age* (Stanford, CA: Stanford University Press, 1991), 109.

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damental characteristics of modern society in the western world.⁵ ‘To live in the universe of high modernity’, Anthony Giddens has pointed out, is ‘to live in an environment of chance and risk, the inevitable concomitants of a system geared to the domination of nature and the reflexive making of history’.⁶ Some social scientists have even argued that risk is ‘the mark of a new consciousness, a way of looking at a world of technological and environmental uncertainty’.⁷

For a long time, research on risk has been dominated by rational approaches whereby risk was the product of the expected loss from a harmful event and its probability of occurrence. Risk, so it seemed, could be quantified and calculated in its entirety by rational operations. German sociologist Niklas Luhmann has described the way the problem of risk has been conceptualised within the rational tradition as follows: ‘[L]osses are to be avoided as far as possible. Since this maxim alone would restrict the radius of action too greatly, one does have to permit, and that means “risk”, actions that can in principle cause avoidable loss, provided that the estimate of the possible degree of loss appears acceptable.’⁸ Uncertainty and ignorance, so it seemed, could be completely transformed into certainty and security by scientific methods and technical solutions.⁹ Conflicts arose only when the allegedly subjective perception of risk did not match the results of seemingly objective technical risk analyses.¹⁰

This belief in risk as an exclusively rational operation has been shattered – first by the appearance of new risks in the late twentieth century and secondly by new theoretical approaches.¹¹ A series of disasters and near-disasters such as the catastrophic release of toxic gases from Union Carbide’s pesticide plant in Bhopal in 1984, or nuclear accidents in Harrisburgh, Pennsylvania in 1979 and Chernobyl in 1986, magnified doubts about the controllability of modern technology. In recent years, the human impact on climate change has been the most prominent topic in our discourse on the connection between modernity, risk

5. This is not necessarily true for other parts of the world. See, for example, Lisa Raphals, ‘Fatalism, Fate, and Stratagem in China and Greece’, in *Early China/Ancient Greece: Thinking through Comparisons*, eds. Steven Shankman and Stephen W. Durrant (Albany, NY: State University of New York Press, 2002), 207–234.
6. Giddens, *Modernity and Self-Identity*, 109. Giddens, *ibid.*, acknowledges, however, that ‘notions of fate and destiny have by no means disappeared in modern societies, and an investigation into their nature is rich with implications for the analysis of modernity and self-identity’.
7. Jaeger et al. eds. *Risk, Uncertainty, and Rational Action*, 9.
8. Niklas Luhmann, *Risk: A Sociological Theory* (Berlin, New York: Walter de Gruyter, 1993), 14. See also *ibid.* 18: ‘It is clear that the rationalist tradition ... although offering us a form, does not provide a concept of risk.’
9. See Wolfgang Bonß, *Vom Risiko: Unsicherheit und Ungewißheit in der Moderne* (Hamburg: Hamburger Edition, 1995), 21.
10. See Keith Smith, *Environmental Hazards: Assessing Risk and Reducing Disaster* (London, New York: Routledge, 1996), 55.
11. See Bonß, *Vom Risiko*, 22; Mary Douglas and Aaron Wildavsky, *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers* (Berkeley: University of California Press, 1982).

and vulnerability. In contrast to the challenges posed by ‘older’ hazards, such as famine or disease, the ‘new risks’ seem to be invisible, inescapable, and intrinsic to the workings of society. Also, every class and stratum of society seems to be threatened, whether rich or poor, young or old.¹² Thus, as Harriet Bulkeley has pointed out, ‘in risk society, risks arise not from a lack of modernity, as hazards associated with poverty and underdevelopment might be conceived, but rather as the side-effects of modernization’.¹³ Consequently, the ‘risk society’, as laid out by Beck, Giddens and others, no longer tries to achieve security and certainty by any means; rather, it accepts uncertainty and ignorance as an unavoidable element of modernity and tries to manage, rather than to abolish, them.¹⁴

RISK AND NATURE

Interestingly, the concepts that sociologists, anthropologists and geographers developed in order to understand the far-reaching social, political and cultural impact of risk have hardly been taken up by historians.¹⁵ This is surprising insofar as natural hazards played a crucial role in the evolution of risky behaviour and attitudes – phenomena that scholars of modern history have frequently worked on. Above and beyond that, both productive and destructive natural forces have reached new heights in modern times; and they need to be integrated into historical narratives as well. The steady growth of industries, commerce, science and cities, for instance, was based to a large extent on the colonisation of nature. Rivers, to take one example, were cut, regulated, straightened and bordered with levees in order to function as commercial arteries of industrialised countries. At the same time, the damage potential within floodplains has grown immensely, thus creating a new vulnerability to flooding. Today, the relationship between risk and natural processes presents itself most of all in the debates surrounding climate change – ‘surely the ultimate uncertainty and the ultimate risk’.¹⁶

While the current ‘return of uncertainty’¹⁷ in all fields of society is celebrated by neoliberals as a productive force in the economic realm, it is increasingly creating discomfort as far as the control of natural forces is concerned. Ironically,

12. See, most prominently, Ulrich Beck, *Risk Society: Towards a New Modernity* (London: Sage Publications, 1992); Ulrich Beck, *World Risk Society* (Cambridge: Blackwell, 1999); Giddens, *Modernity and Self-Identity*.
13. Harriet Bulkeley, ‘Governing Climate Change: The Politics of Risk Society?’ *Transactions of the Institute of British Geographers* (New Series) **26** (4/2001): 430–447, 432.
14. See Michael Power, ‘From Risk Society to Audit Society’, *Soziale Systeme* **3** (1/1997): 3–21; Jens O. Zinn, ‘Recent Developments in Sociology of Risk and Uncertainty’, *Historical Social Research* **31** (2/2006): 275–286, 280; Bonß, *Vom Risiko*, 25.
15. One of the reasons for this neglect may be the close association of sociological and other risk theories with the new risks of the late twentieth century.
16. James F. Short, Jr. ‘Foreword’ to Jaeger et al. eds. *Risk, Uncertainty, and Rational Action*, 9. See also Bulkeley, ‘Governing Climate Change’.
17. Bonß, *Vom Risiko*, 22 (‘Rückkehr der Unsicherheit’).

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as Bruno Latour has pointed out, the victory of capitalist and (more or less) free market systems over socialist societies which marked the end of the cold war has gone hand in hand with a growing awareness of a changing climate and hence the limits of this very system. Nature, ‘over which we were supposed to gain absolute mastery, dominates us in [a] global fashion, and threatens us all’.¹⁸

Risk has been a way of dealing with uncertain environments – not just over the last few decades but for a long time, and the essays in this volume attest to this. The etymology of the term ‘risk’ is unclear but it appears to have developed out of many different contexts between the late Middle Ages and the early modern period. Tellingly, however, one of its first significant applications was in navigation and trade – two fields that are strongly influenced by the vagaries of the natural environment. Long before risk was associated with nuclear accidents, the vanishing (and reappearance) of the ozone layer, the extinction of species or climate change, it was a way for societies to cope with more traditional hazards such as forest fires, animal diseases, flooding and earthquakes. Furthermore, (natural) risk has taken on many different forms over the past centuries. It can be the unintended consequence of modernisation projects such as an engineered forest or the rationalisation of food production, as Sam Temple and Dorothee Brantz point out in their respective articles. In both narratives, the role of the state is of critical importance. In its attempt to control nature, it has extended its power not just over the environment but over people as well. At the same time, the transformation and administration of the natural environment has proliferated risk and uncertainty.¹⁹

Temple explains in his paper how the *Landes de Gascogne*, originally a moorland supporting a sparse, agro-pastoral society, was transformed into an engineered landscape by an intense programme of pine forestation. The maritime pine became a ‘key technology of land reclamation and territorial modernisation, as important as drainage ditches, irrigation canals, dikes, roads, railways and bridges’. Not only did the maritime pine yield large profits; it also became an agent of change and modernisation in an area that had formerly been regarded as a backward and unhealthy wasteland. The mono-cultural region was plagued, however, by recurrent and disastrous fires and by the middle of the twentieth century, almost half of the forest had been destroyed and with it the hopes for a better future. Thus, the *Landes* remained a profoundly unstable environment that was difficult to control.

The creation of risk as a by-product of modernisation is also at the core of Dorothee Brantz’s essay on epizootics. Brantz concentrates on the risks and hazards posed by livestock diseases in eighteenth- and nineteenth-century France

18. Bruno Latour, *We Have Never been Modern*. Translated by Catherine Porter (Cambridge: Harvard University Press, 1993), 8.

19. See James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition have Failed* (New Haven: Yale University Press, 1998); David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (New York: Norton, 2006).

and Germany, focusing on the history of *Rinderpest* (cattle plague), which killed more than 200 million cattle in eighteenth-century Europe.²⁰ She identifies several human activities that contributed to the spread of the disease such as war, the transportation of cattle by rail, and the centralisation of slaughter. She also highlights different strategies of containment. Indemnities, for example, were paid to farmers in order to prevent them from selling infected cattle or their hides as well as to accelerate the rebuilding of healthy herds. Other strategies included disinfection, quarantine or *cordon sanitaire* and vaccination as forms of biological insurance. The most common method of containing the disease was, however, the large-scale culling of both infected and healthy animals and the destruction of their cadavers.

Slaughterhouses, with their dense concentration of animals, were particularly risky places. Both La Villette in Paris and Berlin's Central-Viehhof capitalised on the centralisation of meat production. At the same time, however, the transportation of ever larger numbers of animals over large distances by rail also increased the risk that sick animals would infect one another and hence heightened the potential to spread contagious diseases. As a result, state authorities progressively realised that it was no longer sufficient simply to react to the outbreak of a disease once it was there, but that it was necessary to introduce measures of preparedness. This led to the establishment of hygiene laws, inspections, and the fostering of scientific knowledge about epizootics. In sum, Brantz's article shows how this shift from *ad hoc* to *anticipatory* measures was accompanied by the realisation that contagious animal diseases 'remained a constant threat that could be contained but not totally eradicated'. Through the 'growing control of the slaughterhouse environment and containment of potential hazards', Brantz concludes, epizootics were turned into a 'calculated risk'.

SCIENTIFIC AND TRADITIONAL HAZARD KNOWLEDGE

Science, too, has had a major impact on the way societies have dealt with environmental hazards and risks. According to Luhmann, 'it is no accident that the risk perspective has developed parallel to the growth in scientific specialisation. Modern risk-oriented society is a product not only of the perception of the consequences of technological achievement. Its seed is contained in the expansion of research possibilities and of knowledge itself.'²¹ Andrea Westermann illuminates this process in her article on the discipline of

20. For animals and disasters see also Greg Bankoff, 'Bodies on the Beach: Domesticates and Disasters in the Spanish Philippines 1750–1898', *Environment and History* 13 (3/2007): 285–306; Uwe Lübken, "'Poor Dumb Brutes" or "Friends in Need"? Animals and River Floods in Modern Germany and the United States', in *Beastly Natures: Human-Animal Relations at the Crossroads of Cultural and Environmental History*, ed. Dorothee Brantz (Charlottesville: University of Virginia Press, 2010), 246–263.

21. Luhmann, *Risk*, 28.

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seismology at the turn of the twentieth century. Until that time, the scientific analysis of earthquakes was to a large extent dependent on personal recollections of seismic experiences. This experience often shook not only the earth but also convictions and belief systems. Alexander von Humboldt, for example, noted in a well-known passage: ‘When ... we suddenly feel the ground move beneath us, a mysterious and natural force, with which we are previously unacquainted, is revealed to us as an active disturbance of stability.’²² Seismologists at the end of the nineteenth century took a totally different view of these events. With the creation of a global network of observers collecting, comparing and interpreting data, tectonic activity was converted into a continuous seismic record. Their instruments allowed them to listen into the earth and literally discipline the seismic hazard. Thus, earthquakes, while to Humboldt still a mysterious force, were later more and more rationalised and stripped of their ominous qualities. By emphasising the normal character of earthquakes, these experts dissociated them from their uncertain and catastrophic aspects. At the same time, however, increased seismological knowledge about earthquakes facilitated the mapping of hazards and thus created new concepts of risk.²³

Scientists played a prominent role in the interpretation of natural hazards; but they were not the only ones who sought to understand such events.²⁴ Thus, for example, as Jamie Pietruska demonstrates in her article on the U.S. Weather Bureau, traditional ways of acquiring environmental knowledge coexisted with scientific methodologies. Originally, the Weather Bureau shied away from long-term predictions since, in its reinvention of weather forecasting as a modern scientific practice, it deemed such undertakings a hallmark of meteorological amateurism if not outright quackery. In addition, due to their alleged inaccuracy, the Bureau regarded long-range forecasts, especially those of extreme events such as storms, floods, or droughts, as a threat to agriculture, industry and commerce. Long-range weather forecasters, on the other hand, the so-called ‘weather prophets’, constantly challenged the Weather Bureau – not only with their predictions but also with their methods. They employed planetary meteorology and periodicity as well as lunar phases. Furthermore, examining the behaviour and special conditions of animals was a central part of vernacular forecasting traditions. Cries of yellow-billed cuckoos, the colouring of caterpillars in late fall or the shadow of the famous groundhog all helped weather prophets in making predictions. (In a similar vein, as Dorothee Brantz points out in her paper,

22. Alexander von Humboldt, *Cosmos: A Sketch of a Physical Description of the Universe*, (New York: 1860), 215–216.

23. See Mark Monmonier, *Cartographies of Danger. Mapping Hazards in America* (Chicago: University of Chicago Press, 1997). For seismic risk in California, see also Ted Steinberg, *Acts of God: The Unnatural History of Natural Disaster in America* (New York: Oxford University Press, 2000), 36, who holds that the ‘Californization of seismic risk was manufactured as a product of western expansion and land development in league with twentieth-century scientific knowledge about the relatively high seismicity of the state’.

24. See Zinn, ‘Recent Developments in Sociology of Risk and Uncertainty’, 278.

farmers had, for centuries, applied all sorts of remedies they deemed helpful in combating animal diseases. Thus, herbs were tied to animals' horns, tongues were scraped or rubbed with different pastes and, in Flanders, peasants buried affected cows in mud holes up to their heads for nine hours.)

Such traditional methods of long-range forecasting 'posed an epistemological threat to professionalising government meteorological science', as Pietruska points out, because of the 'disruption of the boundary between the scientific and the supernatural'. Weather bureaucrats in the 1890s reacted to this challenge by cultivating a culture of certainty 'to which all forecasters were expected to conform'. From this perspective, the uncertainty of long-range forecasting was a 'liability in a science of accuracy'. With the issuing of its own weekly long-range forecast in 1908, however, the culture of certainty gave way to a culture of probability, and the Weather Bureau accepted uncertainty as a key element of long-range weather forecasting.

SOCIAL RISK

For a situation to be classified as 'risky', it is crucial that a potential loss is contingent and avoidable – hence the important role that decisions play in an environment of risk.²⁵ But what if such a decision – for example about new building standards in an earthquake-prone region – is made by someone else? What if people are 'put at risk' against their will or are forced to 'take a risk'? Recent research on the history of natural disasters has shown that risk is manufactured by society and it affects different parts of the population in varying degrees.²⁶ In many cities, for example, land (and hence rents) within the floodplains of rivers is comparatively inexpensive. Thus, urban floodplains have historically often been a place where large numbers of poor people reside in cheap boarding houses or simple structures. Even if these segments of society were not forced to move to or stay in a hazardous area, they often did not have as many choices as other parts of the population. Sometimes, this unequal distribution of risk was evident even after death, as in the case of the Philips Park Cemetery in

25. See Luhmann, *Risk*, 16; Beck, *World Risk Society*, 75–76.

26. See Piers Blaikie et al. *At Risk. Natural Hazards, People's Vulnerability and Disasters* (London, New York: Routledge, 1994). Greg Bankoff, *Cultures of Disaster: Society and Natural Hazards in the Philippines* (London, New York: Routledge, 2003), 3, states that 'hazards may be physical phenomena, but disasters occur as a result of a community's political structure, economic system and social order that expose its people to the dangers inherent in extreme seismic or climatic disturbances'. See also Anthony Oliver-Smith and Susanna M. Hoffman, eds. *The Angry Earth: Disaster in Anthropological Perspective*, (New York, London: Routledge, 1999), 74–88, 84; Susanna M. Hoffman and Anthony Oliver-Smith, eds. *Catastrophe and Culture: The Anthropology of Disaster*, (Santa Fe, Oxford: School of American Research Press, 2002); Christof Mauch and Christian Pfister, eds. *Natural Disasters, Cultural Responses: Case Studies Toward a Global Environmental History*, (Lanham et al.: Lexington Books, 2009).

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Manchester, where the high ground was reserved exclusively for Protestants. So, when the Medlock River flooded in 1872, only the low-lying Catholic section of the cemetery was affected.²⁷

In her study of race and class in nineteenth-century disaster relief, Marian Moser Jones demonstrates that the relief efforts of the American Red Cross after the Johnstown flood in 1889 and after the Sea Islands Hurricane in South Carolina in 1893 entailed vast disparities. In Johnstown, Pennsylvania, after a vast earthen dam collapsed, causing the deaths of more than 2,000 people, the Red Cross provided \$39,000 in cash donations and \$211,000 in supplies. The relief organisation also built temporary lodgings for more than a hundred families and, among many other efforts, it furnished survivors with food, clothing and shelter.

In a stark contrast to this effort, the Sea Islands hurricane of 1893 received only scant coverage in national newspapers, which resulted in much smaller donations from the public (\$30,000). Of the more than six hundred people who died and the approximately 30,000 who were driven from their homes, the great majority were African-Americans. The Red Cross reacted more slowly than it had four years before and in many instances displayed paternalistic behaviour toward the victims of this disaster. Still, the Red Cross was the only relief organisation to offer assistance in the devastated area, and it filled a vacuum created by the lack of governmental relief efforts.

SEEING LIKE AN INSURANCE COMPANY

Societies have reacted to the challenge of natural hazards in many different ways. They have built dams and levees to protect themselves from flooding, they have set aside financial or material reserves to prepare for times of emergency and they remember as well as forget past catastrophes according to the needs of their cultural environments. Insurance schemes were a late addition to this toolbox of disaster management. By converting natural processes into statistical data, an insurance company could calculate, price and, at least theoretically, distribute risk over space and time. The prospect of being reimbursed after a damaging event saves capital and the energy of the policyholder and, more importantly, it substantially reduces uncertainty.

As an organising principle of society and as an instrument to socialise hazard, insurance has been so successfully applied to such diverse fields as unemployment, car accidents and health over the last 150 years that one might even speak of an 'insurance society'.²⁸ In its early years, however, the insurance industry had

27. Harold L. Platt, "'The Hardest Worked River': The Manchester Floods and the Industrialization of Nature", in *Cities and Catastrophes/Villes Et Catastrophes: Coping with Emergency in European History*, eds. Geneviève Massard-Guilbaud, Harold L. Platt and Dieter Schott (Frankfurt a.M: Peter Lang, 2002), 163–183, 178.

28. See Francois Ewald, 'Die Versicherungs-Gesellschaft', *Kritische Justiz* 22 (1989): 385–393.

to overcome many obstacles – the biggest of which was the notion that to invest money in insurance policies equalled betting against God’s will. Life insurance proved to be especially difficult to establish since customers who believed that their future was determined by fate were hard to convince of the advantages of insurance against death. By and by, however, the ‘ultimate responsibility for dependents was taken away from God and handed to man’.²⁹

The same was true, albeit more slowly, for insurance against natural hazards, as Frank Oberholzner explains in his contribution to this volume. He traces the discourse on natural hazards in general and on hail in particular from antiquity to the early modern period. He looks at one of the first theoretical attempts to tame natural hazards by actuarial means. A group of German mercantilists, the so-called cameralists, launched this view. They hoped that the availability of insurance would alleviate personal hardship and thus increase individual happiness. Furthermore, they argued that by contributing to the prosperity of the agrarian sector, hail insurance would add to the overall economic wealth of the state. Finally, hail insurance, according to the cameralists, would also abolish and replace traditional support payments and thus relieve the state’s budget. Even if the theoretical groundwork had been laid out in the eighteenth century, it would take until the mid-nineteenth century for hail insurance to find wide acceptance. Its road to success was inhibited by a lack of capital, by a dearth of precise data and by religious constraints. In sum, as Oberholzner explains, the profanation of hail was a much more protracted process than has been generally assumed.

If natural hazard insurance has much in common with other branches of the insurance industry, it also differs in many respects from its ‘relatives’. Knowledge about the temporal distribution of floods, earthquakes or landslides, etc. is remarkably limited. While the number of household fires or car accidents remains relatively constant over the years, extreme natural events ‘tend to be random in time rather than regular in occurrence’, as Keith Smith argues. ‘This means that the 100-year flood has a probability of 1/100 in any year and only has an *average* return period of one century: in practice such a flood could occur next year, not for 200 years or be exceeded several times in the next 100 years.’³⁰ Thus, natural hazards are much more difficult to contain by probabilistic methods than other hazards.

Also, unlike other dangers to society, natural hazards are in most cases confined to a distinct geographical space, which limits the number of potential customers who demand protection by insurance. It would be next to impossible, for example, to sell avalanche insurance to people in the Baltic region or, for that matter, insurance against tidal inundations to a Swiss person. This also means that insurance companies specialising in natural hazards attract a large number of ‘bad risks’, which makes them highly vulnerable to extreme events because

29. Viviana A. Rotman Zelizer, *Morals and Markets: The Development of Life Insurance in the United States* (New York: Columbia University Press, 1979), 52.

30. Smith, *Environmental Hazards*, 61 (emphasis by Smith).

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of the ‘highly unfavourable, if only temporary, ratio of claims to premiums’.³¹ In California, earthquake premiums in 1994, the year of the Northridge disaster, amounted to \$500 million while \$11.4 billion had to be paid out for property damage.³² Consequently, the market for most natural hazard insurance schemes is extremely volatile. Private flood insurance companies have therefore suffered bankruptcy time and again. In one extreme case in 1899, even the office buildings of one firm were washed away by a flood in Cairo, Illinois³³.

As a result of these structural challenges, natural hazard insurance schemes are often backed up by the state, or, as the two final papers in this volume by Nora Rohland and Franz Mauelshagen illustrate, by reinsurance. Rohland, who provides us with a ‘look behind the scenes of the reinsurance industry’, shows that the attempts of insurance companies to avoid the concentration of bad risks can significantly influence the material composition and the destiny of a city. In a case study that looks at fire insurance and reinsurance in a Swedish city where the most common building material was wood she discusses the material and cultural constructions of fire hazards. While urban fires were not as frequent as one might assume, the devastating fire that burned down large parts of Sundsvall in 1888 led to the renegotiation of insurance terms and ultimately to the redefinition of fire risk in Sweden.

New regulations after the fire stated that reinsurers would only cover a small amount of fire loss in cities made predominantly of wood. This new policy induced fire insurance companies to raise their rates for wooden houses, which in turn exerted economic pressure on local authorities to improve fire protection and, hence, to reconstruct the town in stone. Here, too, risk was apportioned unequally among different parts of the population. Swedish insurers, as Rohland explains, ‘were withdrawing insurance cover from the wooden peripheries of the city’.

The experience of vast losses in a short time-span also characterised and shaped the history of crop insurance in Switzerland, as Franz Mauelshagen points out in his contribution. Insuring against hail – arguably the greatest hazard for farmers – was extremely problematic. Indeed, for the greater part of the nineteenth century, the history of hail insurance was one of failure. Swiss (Cantonal) hail insurance was as unsuccessful as the many attempts of foreign companies to enter the Swiss market. Thus, at the beginning of the twentieth century, there was only one company left offering hail insurance in Switzerland. Swiss Hail, founded in 1880, struggled throughout its existence.

Luckily for Swiss Hail, however, the company had managed to enter into an agreement with the Swiss Reinsurance Company in 1928, still at the beginning of a catastrophic period of devastating hail storms. In the long run, the reinsurance

31. Ibid. 91; see also Uwe Lübken, ‘Die Natur der Gefahr. Zur Geschichte der Überschwemmungsversicherung in Deutschland und den USA’, *Behemoth: A Journal on Civilisation* 1 (3/2008), Special Issue: Surviving Catastrophes (Anne Dölemeyer, ed.): 4–20.

32. Smith, *Environmental Hazards*, 91.

33. Charles Grutzner, ‘Flood Insurance: Pros and Cons’, *New York Times*, 28 August 1955.

agreement strengthened Swiss Hail and made it less vulnerable to extreme events. For the reinsurance company, however, entering the hail business proved to be a 'costly gamble' on the weather, as Mauelshagen points out. Interestingly, lack of climatic stability was seen as an especially troubling problem for insurance companies. The annual report of Swiss Re held in 1929 that, 'In looking at the course of our business in the preceding years, one has to ask whether or not we need to take into account a general change of weather conditions, which would question our bases built on long-term statistical material and confront us with new problems concerning hail.'

All contributions to this special issue stress the fact that environmental risk is not simply a phenomenon 'out there' but the result of social, economic and cultural processes. They also illustrate that the understanding of risk varies over time. Risk, hazards and disasters, as well as our collective responses to these phenomena, have profoundly shaped our social institutions and determined our belief systems; and they will continue to do so as long as we inhabit a world of uncertain environments.³⁴

34. This collection grew out of conference at the German Historical Institute in Washington, DC. The editors would like to thank the staff of the GHI, most of all Christa Brown and Bärbel Thomas, for their help and support in organising this conference. Editorial assistance by Arielle Helmick, Marc Landry, Katie Ritson and Lisa Spindler of the Rachel Carson Center in Munich, to whom we are truly grateful, made this collection much better. We would especially like to express our appreciation to the two anonymous reviewers and to Georgina Endfield and the editors of *Environment and History* for their thoughtful comments and constructive criticism of this volume, the publication of which has been generously supported by the Deutsche Forschungsgemeinschaft (DFG). Last but not least, we would like to thank all the participants in the conference for three days of lively discussion. Finally, special thanks go out to Elizabeth Bishop for her innovative ways of resurrecting conference participants after the lunch breaks.

Endangered Species and Threatened Landscapes in Appalachia: Managing the Wild and the Human in the American Mountain South

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ABSTRACT

Faced with the ideological and practical shortcomings of the American wilderness ideal, many environmentalists and scholars have redefined debates over managing wild lands in terms of biodiversity. Through a process of reduction, endangered species and threatened habitats have gradually become shorthand for biodiversity and hence touchstones of preservation efforts. This article draws on examples from the southern Appalachian Mountains to explore the benefits and drawbacks of placing endangered species and habitats at the centre of wildlands management, and suggests that this management rubric suffers from the same lack of historical context that plagues the wilderness idea. It traces the histories of two endangered habitats and their rare species in southern Appalachia. In the cases of endangered plants on Grandfather Mountain, North Carolina and the Roan Mountain grasslands along the Tennessee/North Carolina line, human disturbance actually benefited biodiversity. Contemporary management at both locations restricts traditional activities – activities that may have contributed to the formation and maintenance of these habitats – in the name of conservation but perpetuates similar disturbance practices in preservation efforts. This essay does not suggest abandoning the concept of endangered species or the work of the Endangered Species Act but instead warns against the facile replacement of the wilderness idea with a management alternative that carries many of the same burdens. The preservation of species and the rare habitats that support them is immensely important but managers must recognise that their preservation efforts always place an anthropocentric value on nature. Successful preservation of some of the most threatened species and landscapes depends on embracing this reality.

KEYWORDS

Appalachian Mountains, endangered species, landscape management, public lands, wilderness

'The only thing we have to preserve nature with is culture; the only thing we have to preserve wildness with is domesticity.' Wendell Berry, 1985.¹

'The assumption that nature lacks a human past or presence denies the history of New England.' David Foster, 2005.²

How do we preserve the wild and what wild do we wish to preserve? The first question has long been central to American conservation; the second has less often been asked, though when it has been voiced the answer has commonly been 'wilderness'. In a nutshell, this American wilderness ideal celebrates the pristine nature of large stretches of land superficially unaffected by human use, sites almost always characterised by monumental beauty or geological rarity. Wilderness is a place to convey 'the condition that prevailed [on a given site] when the area was first visited by the white man', the antipole of civilisation, preserved in perpetuity.³ Over the past twenty years this wilderness consensus has faced an ever-increasing attack. For roughly two decades now, scholars and activists ranging from J. Baird Callicott and William Cronon to Ramachandra Guha and Dave Foreman have struggled over the remaining value of the received wilderness idea.⁴ Faced with the ideological shortcomings of wilderness and a continued need to preserve threatened ecosystems, many environmentalists have redefined these debates over wild lands in terms of biodiversity, which has in turn often been reduced to a focus on endangered species and the landscapes on which they rely. In many cases, endangered species and threatened habitats have replaced wilderness as the touchstones of preservation efforts. This article

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1. Wendell Berry, *Home Economics: Fourteen Essays* (San Francisco: North Point Press, 1987), p. 143.
 2. David R. Foster, 'Conservation Issues and Approaches for Dynamic Cultural Landscapes', *Journal of Biogeography* 29 (2002): 1533.
 3. A. Starker Leopold, et al. 'Wildlife Management in the National Parks', in J. Baird Callicott and Michael P. Nelson (eds.) *The Great New Wilderness Debate* (Athens: University of Georgia Press, 1998), p. 106.
 4. For representative examples, see J. Baird Callicott, 'The Wilderness Idea Revisited: The Sustainable Development Alternative', *The Environmental Professional* 13 (1991): 235–247; William Cronon, 'The Trouble with Wilderness, or, Getting Back to the Wrong Nature', in *Uncommon Ground: Toward Reinventing Nature*, William Cronon (ed.) (New York: W. W. Norton, 1995), pp. 69–90; Ramachandra Guha, 'Radical American Environmentalism and Wilderness Preservation: A Third World Critique', *Environmental Ethics* 11 (Spring 1989): 71–83; Michael L. Lewis, *American Wilderness: A New History* (New York: Oxford University Press, 2007); and Dave Foreman, 'Wilderness: From Scenery to Nature', *Wild Earth* 5, 4 (Winter 1995/1996): 9–16. The best sources to quickly survey the ongoing wilderness debate are two wonderful anthologies compiled by Michael P. Nelson and J. Baird Callicott: Callicott and Nelson (eds.) *The Great New Wilderness Debate: An Expansive Collection of Writing Defining Wilderness from John Muir to Gary Snyder* (Athens: University of Georgia Press, 1998); and Nelson and Callicott (eds.) *The Wilderness Debate Rages On: Continuing the Great New Wilderness Debate* (Athens: University of Georgia Press, 2008). These two collections reprint the above four articles in addition to 78 other essays on the subject.

ENDANGERED SPECIES AND THREATENED LANDSCAPES

draws on examples from the southern Appalachian Mountains of North America to explore the benefits and drawbacks of placing endangered species and habitats at the centre of wildlands management and suggests that these concepts often suffer from the same lack of historical context that plagues the wilderness idea.

Since at least the 1930s, wilderness has served as the driving force for the efforts of American preservationists. Conservationists had and have other concerns, of course, ranging from more liveable urban spaces to wildlife conservation but, from the early twentieth century onward, the idea of wilderness has been central to American environmentalism. Indeed, as environmental historian Thomas Dunlap has noted, wilderness, as the epitome of 'nature,' has all but become a secular religion.⁵ Scholarly critics have challenged the wilderness idea and its management utility on a number of grounds. Among many critiques, they have argued that preservationists intent on 'saving' wilderness ignored the fact that many wild landscapes have long cultural as well as natural histories,⁶ that the creation of designated wilderness areas often dispossessed people and prohibited traditional practices in the name of scientific management,⁷ that energy spent preserving remote areas draws vital attention and efforts away from conservation in less pristine landscapes,⁸ that American middle-class preservationist ideals are the product of a nation that has moved beyond the third-world concerns of starvation and the right to a dignified existence⁹ and that the wilderness ideal

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5. Thomas R. Dunlap, *Faith in Nature: Environmentalism as Religious Quest* (Seattle: University of Washington Press, 2004), pp. 68–94.
 6. Michael Pollan, *Second Nature: A Gardener's Education* (New York: Grove Press, 1991), esp. pp. 176–201; William Cronon, 'The Riddle of the Apostle Islands: How Do You Manage a Wilderness Full of Human Stories?' in Nelson and Callicott (eds.) *The Wilderness Debate Rages On*, pp. 632–644; Stephen Pyne, *Fire in America: A Cultural History of Wildland and Rural Fire* (Princeton: Princeton University Press, 1982); and Kenneth R. Olwig, 'Reinventing Common Nature: Yosemite and Mount Rushmore – A Meandering Tale of a Double Nature', in Cronon (ed.) *Uncommon Ground*, pp. 379–408.
 7. Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 2000); Louis S. Warren, *The Hunter's Game: Poachers and Conservationists in Twentieth-Century America* (New Haven: Yale University Press, 1997); and Karl Jacoby, *Crimes against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2003).
 8. Cronon, 'The Trouble with Wilderness'; and Brian Donahue, *Reclaiming the Commons: Community Farms and Forests in a New England Town* (New Haven: Yale University Press, 1999), pp. 6–9.
 9. Guha, 'Radical American Environmentalism'; Guha, 'Deep Ecology Revisited', in Callicott and Nelson (eds.) *The Great New Wilderness Debate*, pp. 271–279; Fabienne Bayet, 'Overturning the Doctrine: Indigenous People and Wilderness – Being Aboriginal in the Environmental Movement', in Callicott and Nelson (eds.) *The Great New Wilderness Debate*, pp. 314–324; and Arturo Gomez-Pompa and Andrea Kaus, 'Taming the Wilderness Myth', in Callicott and Nelson (eds.) *The Great New Wilderness Debate*, pp. 293–313.

pays little attention to its very origins in, and reliance on, elements of modern technology.¹⁰

These various critiques have forced some management professionals to seek an alternative to wilderness as the core of a conservation ethos. A number of academics have found such an alternative in the concept of biodiversity or, more specifically, in a focus on the importance of endangered species as keystone elements of ecosystems. Epitomised in the work of conservation biologists and organisations such as the Nature Conservancy, conservation focused on biodiversity through the maintenance or restoration of endangered species and threatened habitats seeks to ensure the largest genetic pool possible.¹¹ Management for ecosystem preservation and biodiversity also sprang from within federal institutions, such as the Forest Service, which fostered independent scientific research and thinking.¹² Although preserving biodiversity does not necessarily have to mean a focus on endangered species – and, some conservationists argue, the concept should not suffer from such reductionism – the Nature Conservancy, national parks and allied organisations have often associated the campaign to ensure genetic diversity with addressing threats, both human and natural, to rare species and the habitats on which they rely. Endangered species serve as effective touchstones; they are often the first to disappear from disturbed ecosystems and federal and state programmes that shape ecological research are often designed to protect listed species. This viewpoint declares that endangered species serve as both indicators of the health of and key cogs in their respective ecosystems.¹³

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10. Paul Sutter, *Driven Wild: How the Fight Against Automobiles Launched the Modern Wilderness Movement* (Seattle: University of Washington Press, 2002), esp. pp. 3–18; and David Louter, *Windshield Wilderness: Cars, Roads, and Nature in Washington's National Parks* (Seattle: University of Washington Press, 2006).
 11. Reed F. Noss and Allen Y. Cooperrider, *Saving Nature's Legacy: Protecting and Restoring Biodiversity* (Washington D. C.: Island Press, 1992); Michael McCloskey, 'Conservation Biologists Challenge Traditional Nature Protection Organizations', in Nelson and Callicott (eds.) *The Wilderness Debate Rages*, pp. 551–560; J. Baird Callicott, 'Should Wilderness Areas Become Biodiversity Reserves?' in Callicott and Nelson (eds.) *The Great New Wilderness Debate*, pp. 585–594; R. Edward Grumbine, 'Using Biodiversity as a Justification for Nature Protection in the US', in Callicott and Nelson (eds.) *The Great New Wilderness Debate*, pp. 595–615; Sahotra Sarkar, 'Wilderness Preservation and Biodiversity Conservation: Keeping Divergent Goals Distinct', in Nelson and Callicott (eds.) *The Wilderness Debate Rages*, pp. 231–251; and Bruce A. Stein, Lynn S. Kutner and Jonathan S. Adams (eds.) *Precious Heritage: The Status of Biodiversity in the United States* (New York: Oxford University Press, 2000), esp. pp. 3–18, 201–254.
 12. The case of the spotted owl in the Pacific Northwest illustrates the importance of ecosystems thinking within the Forest Service itself, rather than pressure from environmental activists. See Thomas R. Wellock, 'The Dickey Bird Scientists Take Charge: Science, Policy, and the Spotted Owl', *Environmental History* 15 (2010): 381–414.
 13. Gary Paul Nabhan, 'The Dangers of Reductionism in Biodiversity Conservation', *Conservation Biology* 9 (1995): 479–481; John N. Thompson, 'Evolutionary Ecology and the Conservation of Biodiversity', *Trends in Ecology and Evolution* 11 (1996): 300–303; and Stein, Kutner and Adams, *Precious Heritage*, pp. 93–118.

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To be fair, I must stress that the linkage of biodiversity and endangered species is not universal, especially among ecologists and conservation biologists. Almost every ecologist and biologist, no doubt, would assert that biodiversity is more than the simple enumeration and conservation of species, just as an ecosystem is more than the sum of its parts. Struggles over the nature of ecological communities and species dynamics are ongoing and heated and extend to the very notion that ecosystems operate under a basic equilibrium, in which competition over time serves to ensure population stability (this equilibrium model in turn replaced the earlier climax community conception of ecosystems). Within these debates, the place and importance of endangered species as indicators of biodiversity range across a wide spectrum.¹⁴ Some ecologists have even gone so far as to argue that invasive species – whether through filling vacant niches or through forming symbiotic relationships with native species – benefit biodiversity and can thus be positive assets in certain ecological communities.¹⁵ Ecology's emphasis on biodiversity as a conservation model also stems, at least in part, from a reaction to the wide-ranging US law, the Endangered Species Act (ESA, 1973). Some conservationists worry that the ESA is overly reductionist and believe that an emphasis on biodiversity as a conceptual framework can shift the 'conservation focus from species to processes, ecosystems, and habitat'.¹⁶ In light of these ongoing debates over the conceptual foundations of ecology, putting an ethic of biodiversity into practice remains a challenging task.

Part of the temptation for park and wildlands managers to associate the concept of biodiversity with endangered species protection comes from the very legislation that has fostered a biodiversity focus among some scientists. A legal framework, especially one as sweeping and clear-cut as the ESA, provides for legal action (and, critically, money) to protect and conserve selected species. Park officials, foresters and conservation biologists may appreciate the need to preserve all of an ecosystem's diverse components but the political reality is that there is more funding, legal protection and public sentiment behind efforts to save a few, selected species. Thus the spotted owl or the California condor becomes the cutting edge of management for biodiversity in a given region.¹⁷ As biologist Peter Brussard points out, 'we don't have an Endangered Old Growth

14. Klaus Rohde, *Nonequilibrium Ecology* (New York: Cambridge University Press, 2005), esp. pp. 1–26.

15. Judith H. Myers and Dawn R. Bazely, *Ecology and Control of Introduced Plants: Evaluating and Responding to Invasive Plants* (New York: Cambridge University Press, 2003), pp. 80–87.

16. David Takacs, *The Idea of Biodiversity: Philosophies of Paradise* (Baltimore: Johns Hopkins University Press, 1996), pp. 64–69, quote on p. 69.

17. Peter S. Alagona, 'The Ghosts of Endangered Species Past: Recent Lessons at the Intersection of History and Biology', *Bioscience* 54 (2004): 984–985; Peter S. Alagona, 'Biography of a 'Feathered Pig': The California Condor Conservation Controversy', *Journal of the History of Biology* 37 (2004): 557–583; and David Pimentel *et al.* 'Conserving Biological Diversity in Agricultural/Forestry Systems', *Bioscience* 42 (1992): 354.

Act; we have an Endangered Species Act. So that's why we're fighting over the spotted owl.¹⁸ This disconnect that often exists between ecological research and management practices is further exaggerated by scientists' common objections to activism. As environmental historian Peter Alagona notes, there is often an intentional wall between ecologists and conservation biologists and the managers who attempt to put their discoveries to work. This barrier results from a worry among scientists that through open advocacy they may lose their reputation for objectivity and thus their credibility.¹⁹

Endangered species, especially charismatic megafauna, have the proven ability to galvanise public opinion and natural management decisions and these preservation issues have played out most dramatically in the National Parks of the West. Perhaps the most famous episode in American endangered species management is the reintroduction of gray wolves in Yellowstone National Park. Wolves, along with other apex predators such as mountain lions, were largely eliminated from the American West during the first decades of the twentieth century. The federal government spearheaded this predator elimination campaign and justified these actions through an ideology that classified wolves and other predators as 'varmints' which threatened such 'useful' species as deer, elk and Dall sheep.²⁰ Thanks in part to the new ecological sensibilities of the late twentieth century, a plan to reintroduce wolves to Yellowstone gathered steam in the early 1990s. The plan was not without opposition; ranchers in particular resented and feared the return of wolves and an Environmental Impact Statement concerning reintroduction drew 160,000 public comments for and against the plan. Despite this mixed sentiment, the National Park Service and the United States Fish and Wildlife Service jointly released a group of Canadian wolves in Yellowstone in 1995 and the animals remain in the park to this day. Wolf reintroduction stimulated fantasies about the preservation of a pristine western wilderness, though the fact that wolves had been driven from the land and returned only with the

18. Brussard in Takacs, *The Idea of Biodiversity*, p. 69.

19. Peter S. Alagona, 'Credibility', *Conservation Biology* 22 (2008): 1367.

20. Thomas R. Dunlap, *Saving America's Wildlife* (Princeton, NJ: Princeton University Press, 1988), esp. pp. 48–61; Richard W. Sellars, *Preserving Nature in the National Parks: A History* (New Haven, CT: Yale University Press, 1997), pp. 72–73, 158–160; Mark David Spence, *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks* (New York: Oxford University Press, 1999), p. 88; and Jon T. Coleman, *Vicious: Wolves and Men in America* (New Haven, CT: Yale University Press, 2004), pp. 191–224. For the most famous, and perhaps most poignant, account of the systematic extermination of wolves in western twentieth century America, see Aldo Leopold's essay, 'Thinking Like a Mountain', in *A Sand County Almanac, and Sketches Here and There*, reprint (New York: Oxford University Press, 1989), pp. 129–133. For a fictional counterpart to Leopold's ruminations on wolf extermination, see Cormac McCarthy, *The Crossing* (New York: Knopf, 1994).

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aid of wildlife managers implied that there was a good deal of human history in places as remote and unpeopled as the West's National Parks.²¹

As a replacement for the wilderness ideal as a management rubric, even biodiversity reduced to the preservation of endangered species is not without its benefits. The shift eliminates several of the standard criticisms of the wilderness ideal. A focus on endangered species avoids the wilderness ideal's emphasis on a static nature untrammelled by human influence – indeed, the most common threat to endangered species is human action. Likewise, endangered species and their habitats exist across a range of spaces and are almost as likely to occur in suburban America as in the expanses of the rural West, a broad geographical dispersal that might satisfy Cronon's criticism of preservation centred on distant landscapes rather than the nation's backyards. But the endangered paradigm is much less satisfactory at addressing other critiques of the wilderness ideal. Often the preservation and conservation of rare plants and animals under contemporary management techniques still displaces people and eliminates or curtails traditional land uses both in the United States and abroad. Perhaps most significantly, management plans for endangered species and the habitats on which they rely suffer from the same lack of historical perspective as the older wilderness ideal. Conservation biologists and the natural resource managers who draw on their research often subsume cultural history into natural history. Their management thus becomes ahistorical, treating rare plants and animals as completely separate from the people who define and labour to preserve them. In select instances where endangered species management has reintroduced people into the historical landscape narrative they almost always appear in the role of destroyer, a caricature that proves far too simplistic in the following illustrations from southern Appalachia.

GRANDFATHER MOUNTAIN

Although the management of endangered species has stirred less public controversy in the South-east than in the West, rare and threatened plants and animals, and the habitats on which they depend, have shaped the region's wildlands over recent decades. One of the most intriguing examples of the historical nature of certain endangered landscapes and their associated management challenges is found in the mountains of north-western North Carolina. Grandfather Mountain rises from the Blue Ridge Mountains that divide the Piedmont province to the east from the Appalachian ranges of the state's western edge. Long a privately-owned scenic tourist attraction, Grandfather became the newest state park in the North Carolina system in 2008. The peak attracts visitors with a

21. Sellars, *Preserving Nature*, p. 276; and Coleman, *Vicious*, pp. 225–235. For early opposition to wolf reintroduction plans in the West, see Dunlap, *Saving America's Wildlife*, pp. 166–167.

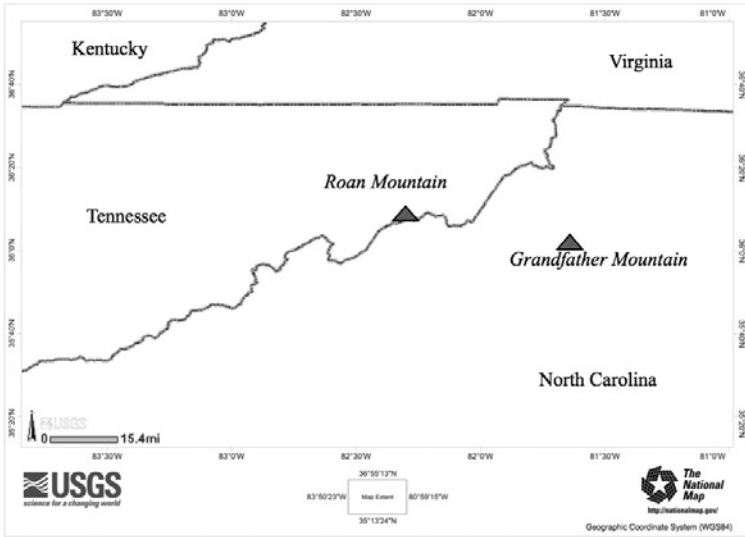
steel swinging bridge, a nature museum, interpretive programmes and a small zoo but its most powerful lure has long been the beauty and diversity of the mountain's environment.²² For most of the park's quarter-million annual tourists, their visit entails traversing the famous 'mile high' swinging bridge spanning a rocky chasm on Linville Peak.²³ On sunny days, tourists flock across the bridge to enjoy the stunning vistas overlooking surrounding valleys and neighbouring peaks. As they stroll from the stone visitor's centre to the end of the bridge, tourists pass through a flat cliff-top habitat that bears a striking resemblance to an alpine meadow. During the late spring and summer months the thick green plant cover ruffles and sways in the regular breezes and a profusion of purple, yellow and pink wildflowers blankets the ground.

The observant visitor – who reads the interpretive displays in the nature museum – might notice that endangered herbaceous plants make up the majority of the cliff-top vegetation: among the most numerous are *Liatris helleri* (Heller's blazing star), *Solidago spithamea* (Blue Ridge goldenrod), *Geum radiatum* (spreading avens), *Houstonia montana* (Roan Mountain bluets) and *Scirpus cespitosus* (deerhair bullrush).²⁴ Various interpretive signs inform tourists that the railing that separates the meadow from the paved walkway accessing the bridge is a barrier designed to preserve these rare plants from the harmful effects of careless feet, a necessary evil needed to save an endangered plant community. At first glance, the area surrounding the swinging bridge appears a laudatory example of thoughtful and educational ecotourism or, as former private park owner Hugh Morton declared in a local newspaper, part of the park's goal to make the mountain 'inoffensively accessible' while preserving its natural beauty and biodiversity.²⁵ Upon deeper examination, the plant community represented as natural has a long 'human' history and demonstrates the reification of a selected form of nature rather than the preservation of a pristine ecosystem or the restoration of a pre-tourist landscape.²⁶

Far from being a natural habitat saved from sightseers, the swinging bridge area is actually a hybrid landscape, a product of environmental processes and

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22. For a history of the park and its use of nature in advertising, see Drew A. Swanson, 'Marketing a Mountain: Changing Views of Environment and Landscape on Grandfather Mountain, North Carolina', *Appalachian Journal* 36 (Fall 2008/Winter 2009): 30–53.
 23. Attendance figures come from, 'About Grandfather Mountain, FAQ' <<http://grandfather.com/about/faq.php>> (Accessed 4 April 2006).
 24. Though common names are included here, they are highly changeable for such rare species. For example, *Liatris helleri* is alternately referred to as 'Heller's blazing star,' 'blazing star' and 'gay feather' and *Geum radiatum* as 'spreading avens' and 'Roan Mountain avens.' Following references in this article use the genus name as an abbreviation for these species.
 25. *Morganton News Herald*, 14 Feb. 1996: 9.
 26. On modern Appalachian ecotourism and its problems, see Al Fritsch and Kristin Johannsen, *Ecotourism in Appalachia: Marketing the Mountains* (Lexington: University of Kentucky Press, 2004), esp. pp. 163–165.

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MAP 1. Grandfather and Roan parks are located in the southern Appalachian Mountains. Map adapted by the author from the United States Geological Survey's National Map Viewer, available at <http://nationalmap.gov/>.



FIGURE 1. *Liatris helleri* on Grandfather Mountain, North Carolina. Photograph courtesy of Jesse Pope, Newland, North Carolina.

selective human intervention, both intentional and inadvertent.²⁷ An examination of the historical record reveals that these cliff tops have not always supported the same botanical populations and certainly not in modern numbers. Beginning in the late eighteenth century, a number of prominent scientific explorers and plant collectors visited the mountain and recorded their observations. Attracted to Grandfather's imposing cliffs, dense forests and the possibility of finding previously unrecorded plants, these men ascended the slopes intent on creating new knowledge while conquering nature. Geologist Elisha Mitchell – later made famous by his crusade to identify the highest peak in eastern America – climbed Grandfather in 1828 and provided one of the earliest detailed accounts of the ridge line vegetation. Mitchell wrote in his journal that the peaks of the summit were covered entirely in stands of wind-flagged Fraser firs (*Abies fraseri*) dwarfed by elevation and extreme weather.²⁸ Botanist Asa Gray confirmed Mitchell's observations little more than a decade later. In a letter to fellow scientist William Hooker recounting an 1841 excursion on the mountain, Gray recorded that the summit was 'entirely covered with trees, except where the rocks are absolutely perpendicular' and that even rocky outcrops were almost uniformly blanketed with sand myrtle shrub (*Leiophyllum buxifolium*) in clumps as tall as a man.²⁹

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27. This conception of hybrid landscapes comes from Richard White, 'From Wilderness to Hybrid Landscapes: The Cultural Turn in Environmental History', *The Historian* 66 (2004): 557–564. Much recent scholarship in environmental history – especially of the American South – has emphasised the human components of hybrid landscapes and explicitly or implicitly called into question the search for an undisturbed nature. For selected examples, see Mark Fiege, *Irrigated Eden: The Making of an Agricultural Landscape in the American West* (Seattle: University of Washington Press, 1999); Mart A. Stewart, 'What Nature Suffers to Groe': *Life, Labor, and Landscape on the Georgia Coast, 1680–1920* (Athens: University of Georgia Press, 1996); Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995); Jack Temple Kirby, *Poquosin: A Study of Rural Landscape and Society* (Chapel Hill: University of North Carolina Press, 1995); Megan Kate Nelson, *Trembling Earth: A Cultural History of the Okefenokee Swamp* (Athens: University of Georgia Press, 2005); Joseph E. Taylor, *Making Salmon: An Environmental History of the Northwest Fisheries Crisis* (Seattle: University of Washington Press, 1999); Mart A. Stewart, 'If John Muir Had Been an Agrarian: American Environmental History West and South', *Environment and History* 11 (2005): 139–162; Mart A. Stewart, 'Southern Environmental History', in John B. Boles (ed.) *A Companion to the American South* (Malden: Blackwell, 2002); Lynn A. Nelson, *Pharsalia: An Environmental Biography of a Southern Plantation, 1780–1880* (Athens: University of Georgia Press, 2007); Jack Temple Kirby, *Mockingbird Song: Ecological Landscapes of the South* (Chapel Hill: University of North Carolina Press, 2006); James D. Rice, *Nature and History in Potomac Country: From Hunter-Gatherers to the Age of Jefferson* (Baltimore: Johns Hopkins University Press, 2009); and Paul Sutter and Christopher Manganiello (eds.) *Environmental History and the American South: A Reader* (Athens: University of Georgia Press, 2009), pp. 1–4, 18–19.
28. Elisha Mitchell, *Diary of a Geological Tour by Dr. Elisha Mitchell in 1827 and 1828*, ed. Kemp P. Battle, James Sprunt Historical Monograph No. 6 (Chapel Hill, NC: University Press, 1905), p. 35.
29. Asa Gray, 'Notes of a Botanical Excursion to the Mountains of North Carolina, &c.; with Some Remarks on the Botany of the Higher Alleghany Mountains', *American Journal of*

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Botanists A.A. Heller in 1891 and John Harshberger in 1903 reaffirmed these earlier descriptions, detailing a peak covered in sand myrtle interspersed with blueberry bushes, mountain laurel and stunted Fraser firs.³⁰ These observations correspond to the modern vegetative patterns along the majority of Grandfather's ridge line, habitat dominated by wind-twisted firs, dwarfed sand myrtle and various species of *Vaccinium* (members of the blueberry family).

Tourism of a less scientific bent also has a long history on Grandfather. As early as 1885 a hotel at the headwaters of the Watauga River on the western flank of the mountain attracted hikers and urbanites intent on relaxing in the great outdoors and the business's proprietors maintained a trail to the summit. Investors founded the resort town of Linville at Grandfather's southern end in 1891. Linville catered to wealthy northern vacationers who sought a second home in the southern mountains; in addition to horse trails that climbed Grandfather, the resort offered tennis, fly fishing and an extensive golf course. The impact of these tourist destinations on the upper reaches of the mountain paled in comparison to that of a toll road opened by the Linville Improvement Company (which managed the resort town) in the early 1930s. The new road allowed cars to travel two-thirds of the way up Linville Peak. The creation of Grandfather Mountain Park (a private scenic attraction) followed in 1952, with an extension of the road to the summit, the construction of a stone visitor's centre at the top of the mountain and a steel swinging bridge spanning the cliffs of Linville Peak. This steady development transformed the trickle of sightseers who explored the Grandfather ridge line in the 1880s into a torrent of thousands by the mid-twentieth century and the impact of so many cars and feet began to change the mountain environment.³¹

Science and Arts 42 (1842): 31, 36, quote on 31.

30. A.A. Heller, 'Notes on the Flora of North Carolina', *Bulletin of the Torrey Botanical Club* 18 (1891): 190–191; and John W. Harshberger, 'An Ecological Study of the Flora of Mountainous North Carolina', *Botanical Gazette* 36 (1903): 379. Heller discovered the eponymous endangered *Liatris* on his expedition. Other notable eighteenth and nineteenth century visitors included André Michaux (1790s), François André Michaux (1802), John Lyon (1808), Moses Ashley Curtis (1839), Leo Lesquereux (1850s) and Charles Sargent (1879), none of whom noted extensive clearings of *Liatris helleri* and associated montane herbaceous plants. See André Michaux, 'Journal of André Michaux, 1787–1796', ed. Charles S. Sargent, *Proceedings of the American Philosophical Society* 26 (1888): 112; François André Michaux, *Travels to the Westward of the Alleghany Mountains, in the States of Ohio, Kentucky, and Tennessee, in the Year 1802* (London: Barnard & Sultzter, 1805), p. 95; Joseph Ewan and Nesta Ewan, 'John Lyon, Nurseryman and Plant Hunter, and His Journal, 1799–1814', *Transactions of the American Philosophical Society* 53 (1963): 8; Ronald H. Petersen, 'Moses Ashley Curtis's 1839 Expedition into the North Carolina Mountains', *Castanea* 53 (1988): 114; Winona H. Welch, 'The Moss Foray in North Carolina, June 13–15, 1936', *The Bryologist* 39 (1936): 122; and J. H. Redfield, 'Notes of a Botanical Excursion into North Carolina', *Bulletin of the Torrey Botanical Club* 6 (1879): 331–339.
31. Swanson, 'Marketing a Mountain': 32–33, 36–40.

Despite this flood of tourists, a few pieces of documentary visual evidence support the survival of the vegetative conditions observed by Mitchell and Gray until well after the opening of the swinging bridge. A set of panoramic photographs of the Grandfather summit taken around 1900 for a government survey of forest conditions in the southern Appalachians reveal a thickly vegetated ridge line exhibiting some small trampled and worn paths leading to the most dramatic overlooks. These pictures show evidence of small-scale tourism but the ridge line habitat closely resembles the spruce-fir forest a few hundred yards below the peak.³² Several images from the mid-1900s provide evidence that these vegetative conditions persisted a half-century later. Grandfather Park advertising pamphlets from the 1950s and early 1960s reveal that the vegetated areas on the cliffs surrounding the visitor's centre differed greatly from the current flora as late as the mid-twentieth century. Photographs in these flyers showed tourists scattered over the current meadow's location – the swinging bridge existed but there were no limiting railings at the time – where the ground was still covered with a dense growth of Fraser fir and Allegheny sand myrtle. In these images the species composition of the cliff top habitat closely resembled that of the surrounding ridges.³³

What these pictures make obvious is that an extensive mantle of herbaceous endangered species did not cover Linville Peak until more recently, perhaps as late as the 1970s. The explanation for this endangered species invasion lies in the ecology of *Liatris* and its cohorts and in tourists' feet. Botanists and ecologists who study these high montane endangered plants have determined that species such as *Liatris* require acidic humus or clay loam, high elevations, direct sun and, most importantly, a lack of competition. *Liatris* typically exists in small pockets of decomposing rock on sheer cliffs faces or boulders where most plants are unable to survive and may temporarily expand its range via wind-born seeds to areas of disturbance. *Liatris* and similar montane cliff species are opportunists that can put down roots in bare rock, where they cling tenaciously, gathering wind-born debris and creating thin bands of soil that less hardy plants, such

32. US Department of Agriculture, *A Message from the President of the United States Transmitting a Report of the Secretary of Agriculture in Relation to the Forests, Rivers, and Mountains of the Southern Appalachian Region, December 19, 1901* (Washington D.C.: Government Printing Office, 1902), plate 6, parts 1 & 2, facing p. 19.

33. 'Grandfather Mountain, Linville, North Carolina', pamphlet, n.d., NC Box File – Grandfather Mountain, Stirling Collection, James H. Carson Library, Lees-McRae College, Banner Elk, NC (hereafter cited as LMC); 'Grandfather Mountain, North Carolina: "Carolina's Top Scenic Attraction"', pamphlet, n.d., NC Box File – Grandfather Mountain, LMC; and 'Grandfather Mountain, North Carolina: Carolina's Top Scenic Attraction', pamphlet, n.d., Vertical Clippings File: Grandfather Mountain, W. L. Eury Appalachian Collection, Carol G. Belk Library, Appalachian State University, Boone, NC. While these pamphlets are undated, visitor centre construction and the model years of automobiles pictured allow for a rough determination of the dates of publication.

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as sand myrtle, can then colonise.³⁴ As competition is the limiting variable in population size, human trampling may be an immediate threat to individual plants but a hidden boon for *Liatris* populations as a whole. The tourist activity of the second half of the twentieth century that compacted the soil and trampled out the fir and sand myrtle on Linville Peak thus created a habitat eminently suitable for several endangered herbaceous plants. A 1999 United States Fish and Wildlife Service (USF&WS) report highlighted this paradox, stating that in the area surrounding the swinging bridge, ‘populations of Heller’s blazing star are the largest and most vigorous known, despite heavy recreational use of the general area’.³⁵ In short, the endangered montane plant species surrounding the swinging bridge are ‘weeds’ – if we accept the botanical definition of weeds as ‘plants that grow spontaneously and prolifically in habitats that have been modified by human activity’, rather than the labelling of weeds as nuisance species.³⁶ Pressure from visitors’ feet and the construction of a gift shop and a parking lot near the top of the mountain in the 1950s combined to disrupt the existing plant communities and created an ideal habitat for *Liatris* and its cohorts.

Despite historical and botanical evidence that the bridge-area flora was in part an anthropogenic creation, the preservation of endangered species – including *Liatris* – had seized the popular imagination of the region’s federal and private management experts by the early 1990s. Noting the hazard of trampling to individual plants, *Liatris* researchers called for the control and limitation of hiking and recreation in sensitive areas and a USF&WS flyer pessimistically claimed that ‘vegetation on popular high mountains has virtually been destroyed

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34. Nora Murdock, *Recovery Plan for Liatris helleri (Heller’s Blazing Star)* (Atlanta: United States Fish & Wildlife Service [USF&WS], 1999), pp. 1, 4, 7; Harshberger, ‘An Ecological Study of the Flora’, p. 371; Albert E. Radford, Harry E. Ahles and C. Ritchie Bell, *Manual of the Vascular Flora of the Carolinas* (Chapel Hill: University of North Carolina Press, 1968), p. 1050; Thomas E. Hemmerly, *Appalachian Wildflowers: An Ecological Guide to Flowering Plants from Quebec to Georgia* (Athens: University of Georgia Press, 2000), pp. 132–133; and B. Eugene Wofford, *Guide to the Vascular Plants of the Blue Ridge* (Athens: University of Georgia Press, 1989), p. 172. A USF&WS species account specifically states that ‘woody vegetation may overcrowd and overshadow the plant[s] making it impossible for the species to survive unless this threat is mitigated by proper habitat management and planning’. This report calls for preserving *Liatris* from human disturbance and managing plants through selective disturbance. See USF&WS, Division of Endangered Species, ‘Species Accounts: Heller’s Blazing Star’, <http://www.fws.gov/endangered/i/q/daq4n.html> (Accessed 16 March 2006).
35. Murdock, *Recovery Plan*, p. 7; Bart Johnson, ‘The Ecology and Restoration of a High Montane Rare Plant Community’, (Ph.D. diss., University of Georgia, 1995), pp. 147–148.
36. Charles T. Bryson and Michael S. DeFelice (eds.) *Weeds of the South* (Athens: University of Georgia Press, 2009), p. 1. The ‘weedy’ trait of rapid reproduction in disturbed areas is in reality a common characteristic of most plants, invasive or native. A number of ecological studies have determined that the most important factor in plant establishment is often the availability of potential germination sites, and events such as grazing, burning, agriculture and storm damage often create these niches. See Myers and Bazely, *Ecology and Control*, pp. 59–60.

by human trampling'.³⁷ Grandfather Mountain officials heeded these warnings and thickly plastered the first sections of their ridge line hiking paths with 'stay on the trail' signs. Despite claims for the primacy of trampling as a destructive force, several management documents admitted that the exact degree of danger posed by a plethora of factors was unknown, as successional encroachment, climate change, pollution and a limited genetic pool were also variables in the health of high elevation plants.³⁸

By 2001, Grandfather management and the USF&WS decided they must take further action to preserve the swinging bridge area from the perceived effects of visitor trampling. Officials erected a barrier railing and placed educational information in park brochures and on interpretive signs, informing tourists that the restrictions were for the benefit of threatened remnants of the mountain's original flora. Describing the colonies of *Liatris* now protected by the railing, Nora Murdock of the USF&WS stated, 'That's what all those high-elevation ridges used to look like. The destruction of the populations has come from trampling; the blazing star is really susceptible to trampling.'³⁹ To ensure that bridge area populations of endangered species remained stable (despite the implication that they were now in a protected state of natural equilibrium), the park and USF&WS signed a contract with the Atlanta Botanical Garden to propagate *Liatris*, *Houstonia*, *Solidago* and *Geum* to supplement sites that had 'been extirpated due to trampling and other disturbances'. Working under USF&WS guidelines, the botanical garden's staff experimented with organic planting bags and stainless steel mesh bolted to the rocks to provide anchoring material and ground cover for additional populations of *Liatris* and *Geum* on nearby cliffs that once supported Fraser fir. Truly epitomising the hybridity of the mountaintop landscape at the beginning of the twenty-first century, today these test plots support stands of endangered plants cultivated in Georgia before being transplanted into steel mesh and fiber bags on the site of a former stand of conifers.⁴⁰

Ongoing management efforts highlight the contradictions between the cultural and natural histories of Grandfather's high elevation plants and the management

37. Mary Jo W. Godt and J.L. Hamrick, 'The Mating System of *Liatris helleri* (Asteraceae), a Threatened Plant Species', *Heredity* 75 (1995): 399; and US Department of the Interior, *Heller's Blazing Star – Flyer* (Asheville: USF&WS, August 1995).

38. See for example, Jamey Donaldson, 'Monitoring Protocols for the Federally-Rare Spreading Avens (*Geum radiatum*), Roan Mountain Bluet (*Houstonia montana*) and Blue Ridge Goldenrod (*Solidago spithamea*)', (unpublished paper, 1998): 3, Vertical File – Endangered/Exotic, Grandfather Mountain Ranger Office Collection, Grandfather Mountain Park, Linville, NC (hereafter cited as GFM); Godt and Hamrick, 'The Mating System of *Liatris helleri*': 399; and Johnson, 'Ecology and Restoration', p. 147.

39. *Johnson City Press*, 3 Sept. 2001: 3.

40. Grant agreement between US Department of the Interior Fish and Wildlife Service and Atlanta Botanical Garden, Agr. # 1448-40181-01-G-134, 2001, Vertical File – Endangered/Exotic, GFM. The primary test site is a bare cliff top defoliated by several decades of use as a launch site for hang-gliders.

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FIGURE 2. Endangered species recovery efforts on Grandfather include planting rare seedlings under protective steel mesh, as shown here near the park visitor centre. Photograph courtesy of Jesse Pope, Newland, North Carolina.

practices intended to maintain their numbers. In the 1990s National Park Service officials supervising the eastern flank of Grandfather along the Blue Ridge Parkway built a boardwalk on a rocky ridge that harboured significant stands of *Liatris* and *Houstonia*. The structure was designed to keep visitors on the path and off the rare plants. The boardwalk (coupled with wildfire suppression) has been so successful that native blueberries, rhododendron, azaleas and the spruce-fir forest are beginning to encroach on the rocky outcrop, a successional movement that park officials have countered using spot burning with propane torches.⁴¹ As on the summit of Grandfather, these efforts not only ignore the historical elements of contemporary montane habitats, they attempt to create a static landscape from the stochasticity that characterises all ecosystems. *Liatris* and similar endangered plants now flourish on the stony ridge as they do around the swinging bridge but Grandfather's managers have created a garden made in the image of a wildland. Grandfather, though it appears rugged and untouched, is another form of what Leo Marx called 'the middle landscape'.⁴²

41. Author conversation with Jesse Pope, naturalist at Grandfather Mountain Park, 2009.

42. Leo Marx, *The Machine in the Garden: Technology and the Pastoral Ideal in America*, reprint (New York: Oxford University Press, 1970), p. 71.

This creation in and of itself is not particularly problematic; humans, after all, were in part responsible for historic aspects of these environments. The quandary that current management poses for the future of these landscapes lies in the disconnect created between the public and the resulting ecosystem. Humans have been a part of *Liatris*'s story over the past century plus, and they continue to manage the plant but the professionalisation of this management separates the public from the environment rather than bringing the two together. Despite overt management, this dichotomy once again seeks to define the mountain's environment as a 'wilderness', with endangered plants as its signifiers.⁴³ Park visitors observe the endangered environment from boardwalks or behind cables and railings as a form of ecotourism and park workers attack sand myrtle and fir saplings on the park ridges in the name of restoration. As things stand, never the twain shall meet.

ROAN MOUNTAIN

A rare landscape bearing remarkable similarities to the rocky upper reaches of Grandfather exists roughly thirty miles to the south-west, along the rugged border of North Carolina and Tennessee. The Roan Mountain balds are an expanse of high-elevation grassland that blankets the crests of Roan, Yellow, Little Yellow and Hump mountains. In all, the balds total a little more than 1,000 acres, all above 5,500 feet in elevation.⁴⁴ The grasses, and their accompanying Catawba rhododendron (*Rhododendron catawbiense*) and mountain alder (*Alnus viridis subsp. crispa*) stands, spread prairie-like from ridge to ridge, swelling from narrow spurs of open ground in mountain saddles to wide meadows on the highest points. Indeed, the open grounds of the balds are reminiscent of the Salzburger countryside in *The Sound of Music*. Like Grandfather Mountain, the Roan balds harbour significant populations of *Geum*, *Houstonia* and *Solidago*, as well as stands of the endangered Gray's lily (*Lilium grayi*) and rattlesnake root (*Prenanthes roanensis*).⁴⁵

43. The notion that Grandfather, despite its all-to-obvious human usage, remained a wilderness landscape never truly died among park management. For claims that the mountain remained a wilderness, see Randy Johnson, 'The Grandfather Experiment', *American Forests* **89** (1983): 22–27, 54–55; Randy Johnson, 'Facing Off over User Fees, Appalachia', *Bulletin of the Appalachian Mountain Club* **51** (1985): 8–10; and Randy Johnson, 'Grandfather Mountain: A Private U.S. Wilderness Experiment', *International Journal of Wilderness* **2** (1996): 10–13. Johnson served as manager of the Grandfather backcountry trails programme from 1978 to 1990.

44. Jennifer Bauer Wilson, *Roan Mountain: A Passage of Time* (Winston-Salem: John F. Blair, 1991), p. 33. The highest point on the mountain is 6,286 feet above sea level. See 'Roan Mountain: A Jewel of Nature', United States Department of Agriculture, Forest Service Pamphlet, 1998, available online at <http://www.cs.unca.edu/nfsnc/recreation/roanmntn.pdf>.

45. Gray, 'Notes of a Botanical Excursion': 41; J. W. Chickering, 'A Summer on Roan Mountain', *Botanical Gazette* **5** (1880): 144–148; Dalton Milford Brown, 'Vegetation of

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FIGURE 3. Portions of the Roan Mountain balds remain open, but the high-elevation forest is steadily encroaching on the grasslands. Photograph courtesy of the author.

The balds are a historic landscape; explorers, botanists, and early mountain settlers noted the existence of Roan's high grasslands as early as the late eighteenth century. The French botanist André Michaux visited the peak in 1795 and again in 1796 and referred to it as 'Round Mountain', perhaps because of its smooth, treeless summit.⁴⁶ One of the first observers to record his thoughts on the landscape in detail was the 'botaniser' John Lyon, who visited the mountain at some point in 1808. After passing through the spruce-fir forest ringing the peak and onto the balds, he wrote:

Then commences what the mountain people calls the high bald grounds, these are the summits of the highest mountains and are in many instances comparatively

Roan Mountain: A Phytosociological and Successional Study', *Ecological Monographs* **11** (1941): 61–97; James D. Yelton, 'Houstonia Montana, a Species, Not an Ecological Variety', *Castanea* **39** (1974): 149; Petersen, 'Moses Ashley Curtis's 1839 Expedition': 116; Roy B. Clarkson, 'Notes on the Distribution of *Alnus crispa* in Eastern North America', *Castanea* **25** (1960): 83; and *Sensitive Plants of the Cherokee National Forest* (Atlanta: USDA Forest Service, 1981), pp. 19, 22. Gray's lily is so frequent on Roan that the above Forest Service plant guide lists the alternate name of the species as 'Roan lily'.

46. Michaux, 'Journal of André Michaux': 99.

[sic] level grounds of very considerable extent, soil deep and rich producing fine grass and herbage more like that of natural meadows than mountains, with a few clumps of *Vacciniums* and other shrubs but of very humble growth interspersed. Probably the reason that nothin [sic] of the tree kinds grows on these bold grounds is cold, or the action of the wind, or perhaps both these causes combined owing to their great elevation or height. It is sufficiently remarkable that this highest mountains [sic] are alwise the richest soil.⁴⁷

Elisha Mitchell was also impressed by the grasslands. After an 1835 visit, he described the open mountaintop ‘as a vast meadow, without a tree to obstruct the prospect; where a person may gallop his horse for a mile or two, with Carolina at his feet at one side, and Tennessee on the other, and a green ocean of mountains raised into tremendous billows immediately about him’.⁴⁸ The parade of scientific explorers who found the balds fascinating continued throughout the nineteenth century. Moses Curtis made similar observations concerning the balds in 1839, Asa Gray found the ‘bald and grassy summit’ with its ‘magnificent view’ enchanting in 1841 and botanist J. W. Chickering declared the grasslands unchanged during his summer stay in 1880, when he admired the rocky bluffs, long vistas and ‘deep, rich and black’ soil of the peaks.⁴⁹

Almost every visitor to Roan shared a similar passion—explaining the presence of the distinctive balds. Although none of the early botanical explorers recorded it, the Cherokee had their own origin story for the open landscape. Cherokee oral history held that the grasslands were created in an ancient struggle between the Cherokee people and Ulagu, an evil spirit in the form of a giant yellow-jacket who carried off children. One day, as Ulagu was escaping with a child, spirits sympathetic to the Cherokee sent lightning to strike down the monstrous hornet and the forest refused to re-grow where it fell to earth.⁵⁰ Although they lacked the poetry of the Ulagu legend, the botanists and settlers who found the balds long after the Cherokee crafted their own creation stories, with speculation peaking in the early twentieth century. Various expositions attributed the lack of trees on the mountaintop to wind damage, the lasting effects of regular winter storms (following Lyon’s speculation), insect infestation, Indian clearing for ceremonial purposes, wildfire and soil acidity, among other causes.⁵¹

47. Ewan and Ewan, ‘John Lyon, Nurseryman’: 38. Though less well-known than André Michaux, John Fraser or Asa Gray, Lyon traveled and collected extensively in the southern mountains, often using the same guides and visiting the same sites as the other three men.

48. Elisha Mitchell, ‘Notice of the Height of Mountains in North Carolina’, *American Journal of Science and Arts* 39 (1839): 378.

49. Peterson, ‘Moses Ashley Curtis’: 116; Gray, ‘Notes of a Botanical Excursion’: 40; and Chickering, ‘A Summer on Roan’: 145–146. See also Joseph Leidy, ‘Rhizopods in the Mosses of the Summit of Roan Mountain, North Carolina’, *Proceedings of the Academy of Natural Sciences of Philadelphia* 32 (1880): 333.

50. Wilson, *Roan Mountain*, pp. 33–36.

51. *Ibid.* pp. 36–42; Harshberger, ‘An Ecological Study’: 382–383; and Dalton Milford Brown, ‘Vegetation of Roan Mountain: A Phytosociological and Successional Study’, *Ecological*

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Although there was no shortage of proposed explanations, with a few exceptions scientists and local residents alike seemed reluctant to attribute the continued presence of the balds to human activity – or, more specifically, to controlled burning and pastoral practices.⁵² This hesitancy flew in the face of extensive documentation of human use of the mountain. The Ulagu legend's account of lightning hints at the possible importance of fire in forming the balds and, more concretely, Lyon alluded to livestock grazing on the grasslands in the early nineteenth century. He noted in his journal that Roan 'will probably one day become some of the finest sheep pasture in the world'.⁵³ Mitchell also commented on the importance of Roan's grazing lands, writing that the balds were 'the pasture ground for the young horses of the whole country about it during the summer'.⁵⁴ Both Chickering and bryologist Joseph Leidy confirmed that seasonal grazing remained common practice following the Civil War, as locals drove sheep, cattle and hogs – 'those enemies of all botanists' – onto the highland balds for the summer months, a practice that continued into the early 1900s.⁵⁵ Settlers also applied fire to promote the growth of new grasses and forbs, burning the balds each spring during the nineteenth century once the winter snows cleared. In late life a resident from the North Carolina slope of the mountain recalled witnessing the fiery preparations for the arrival of a season's sheep, horses and cattle: 'I can still see the black spring smokes a-risin' from the top of the mountain.'⁵⁶ There can be little doubt that these intensive burning and grazing cycles over more than a century altered vegetation patterns on the balds.

Further contributing to the impact of these pastoral uses, a steady stream of scientists walked the mountain ridges collecting specimens of local plants and animals and tourists intent on taking the curative air of the mountains flocked to Roan. John Wilder, a Union general during the Civil War, built a twenty-room log hotel on an expanse of rhododendron bald in 1877 and by 1879 'Good carriage roads to the summit from each side' serviced the new hotel and 'made it very

Monographs II (1941): 61–97.

52. The most satisfying explanation of the the occurrence and persistence of Roan's grasslands comes from park ranger and historian Jennifer Wilson, who believes the balds were among the last locations to begin reforestation following the most recent glacial withdrawal, were thinned by harsh weather, lightning or insect damage and were then kept open or even enlarged by intentional burning and grazing. This explanation meshes nicely with the available ecological and historical evidence. See Wilson, *Roan Mountain*, p. 44.
53. Ewan and Ewan, 'John Lyon': 38.
54. Mitchell, 'Notice of the Height': 378.
55. Leidy, 'Rhizopods in the Mosses': 333; Brown, 'Vegetation of Roan Mountain': 65-66; and Chickering, 'A Summer on Roan': 147, quote in the latter.
56. Wilson, *Roan Mountain*, p. 42. See also Brown, 'Vegetation of Roan Mountain': 65, 92. In just one example of the way in which regular burning might have affected species composition on the balds, the woody alder that is one of the predominate colonisers of the balds is highly fire-intolerant, dying back to its roots after burns of only moderate intensity.

accessible.⁵⁷ In 1885 Wilder expanded his lodge to more than one hundred rooms (perhaps as many as three hundred, as the surviving accounts vary), complete with its own sawmill, croquet and bowling lawn, water reservoir tanks and a small golf course. Wilder billed his new Cloudland Hotel as an escape where ‘Consumption is unknown and malaria finds no refuge ...’. The hotel brought thousands of tourists to Roan to tramp the balds and adjoining spruce-fir forest during the summer months. The owners who followed Wilder abandoned Cloudland around 1910 and the hotel burned shortly thereafter but remnants of the structure and the activities of its guests still litter the top of Roan.⁵⁸ Despite its short duration, Cloudland’s tenure on the top of Roan marked a period of especially intense land use.

By the mid-twentieth century, scientists and other concerned observers noticed that the balds seemed under attack, not from invasive species or development, or even from livestock and hikers, but from the surrounding forest. In 1953, ecologist Dalton Brown concluded that the balds were roughly half their historical size, as alders, Catawba rhododendron, red spruce (*Picea rubens*) and Fraser fir slowly eroded the grassland’s margins.⁵⁹ This in-fill was the product of multiple forces. Seasonal grazing had diminished by the early 1900s, as fence laws gradually closed the open range and fewer local people relied on farming and herding for their livelihood. Brown catalogued historic sheep and cattle trails on what had recently been grassland, but by the 1940s was covered in a recent overgrowth of rhododendron and alder thickets.⁶⁰ As early as 1879, J.H. Redfield had noted the tendency of the forest to encroach on the balds, and he attributed the relative stability of the open ground to human labours. Redfield believed coniferous forest the next successional stage on the balds, ‘but as it is now being largely cut for fire-wood and fencing, any such encroachment is likely to be checked, perhaps too effectually’.⁶¹ Roan had been privately owned from the first white settlements of the late 1700s but in 1941 the federal government had purchased 7,000 acres, which included the mountain’s peaks, placing the eastern slopes in the Pisgah National Forest and the Tennessee side in the Cherokee National Forest.⁶² National forest designation eliminated or severely constricted traditional subsistence activities, such as wood cutting, grazing and burning, in the name of preservation and the limitation of human and livestock labours on the bald slowly permitted the expansion of rhododendron, alder,

57. Wilson, *Roan Mountain*, p. 82; Chickering, ‘A Summer on Roan’: 146; ‘Roan Mountain Gardens’ (Atlanta?: USDA Forest Service Pamphlet, 1982), p. 2; and Redfield, ‘Notes of a Botanical Excursion’: 337. Quote in the latter.

58. Wilson, *Roan Mountain*, pp. 83–114, quote on p. 90.

59. Dalton M. Brown, ‘Conifer Transplants to a Grassy Bald on Roan Mountain’, *Ecology* 34 (1953): 614–617.

60. Brown, ‘Vegetation on Roan Mountain’: 95.

61. Redfield, ‘Notes of a Botanical Excursion’: 338.

62. *Ibid.* 65; USDA Forest Service, ‘Roan Mountain Gardens’, p. 2; and USDA Forest Service, ‘Roan Mountain’, p. 3.

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FIGURE 4. The red crossbill is one of many rare animal and plant species that rely upon southern Appalachia's spruce-fir forest. Photograph courtesy of Jesse Pope, Newland, North Carolina.

spruce and fir. Forest Service officials faced a difficult quandary: how could they 'preserve' the mountain balds that formed a centrepiece of two new national forests when natural forces seemed so intent on transforming the grasslands into an alternate – and in their minds less valuable – habitat type?

Compounding the difficulties of preserving the mountain balds was the rarity of the encroaching habitat type. Balds management forced officials to make hard decisions between the grassland habitat and the high elevation red spruce and Fraser fir (spruce-fir) forest that surrounded and threatened to engulf it. Spruce-fir forests only grow at elevations above 5,000 feet in the southern mountains and were and remain quite threatened, as acidic deposition, global warming and invasive insects have placed tremendous pressure on these scattered coniferous stands.⁶³ Roan's spruce-fir forest was clear-cut over the course of the 1920s and 1930s and attacked by an insect pest, the balsam woolly adelgid (*Adelges*

63. W. L. Silver, T. G. Siccama, C. Johnson and A. H. Johnson, 'Changes in Red Spruce Populations in Montane Forests of the Appalachians, 1982–1987', *American Midland Naturalist* **125** (1991): 344; and Claire Bird and Coleman McCleneghan, 'Morphological and Functional Diversity of Ectomycorrhizal Fungi on Roan Mountain (NC/TN)', *Southeastern Naturalist* **4** (2005): 130. Balsam woolly adelgid heavily damaged Roan's spruce-fir forest, beginning in 1962.

piceae), in the 1960s but had largely recovered by the late twentieth century.⁶⁴ Like the balds, the spruce-fir forest supported a number of endangered species, from ectomycorrhizal fungi (truffles and false truffles) and the northern flying squirrels (*Glaucomys sabrinus*) that feed on them, to the spruce-fir moss spider (*Microhexura montivaga*), a tiny and perilously rare tarantula that survives only in the damp mosses of southern spruce-fir stands. Disturbance of the forest thus threatened to harm a number of interdependent plant and animal species.⁶⁵ Even some of the ecotone plants actively colonising the open grasslands were themselves rare or endangered: the closest mountain alders to those choking out stretches of Roan's balds were found in Vermont, over 800 miles away.⁶⁶

As on Grandfather, Roan's managers sought methods that replicated the impact of historic land use practices while avoiding or denying the importance of those activities in creating the landscape they sought to preserve. Park workers and volunteers continued to cut back alders, rhododendron and coniferous saplings with brush trimmers or dug them out by the roots and officials even experimented with goats penned in wire enclosures on certain stretches of the balds.⁶⁷ The approach that was and remains conspicuously absent was the old one: limited seasonal grazing by free-ranging stock complemented by periodic burning. Managers, like so many scientists and travellers before them, credited livestock and herdsmen with threatening the bald ecosystem and the endangered species it harboured when in fact it seems quite probable that they had a hand in creating and maintaining the high-elevation grasslands.

The vegetative powers and successional tendencies of plants, once harnessed for the benefit of pastoralists, have been transformed into a threatening imbalance more through a change in thinking than a change in nature. What modern officials see as threatened habitat was once a liminal landscape in the eyes of herders, who understood the necessity of fire and grazing to keep the grasslands open. The present balds management plan calls for Forest Service officials to achieve contradictory goals. A 2004 land management plan for Roan lists four priorities (in no particular order): to 'perpetuate the existing plant and animal species', to preserve unique plant and animal associations, to provide recreation and to

64. USDA, 'Roan Mountain', p. 3; and Bird and McCleneghan, 'Morphological and Functional Diversity': 130.

65. Bird and McCleneghan, 'Morphological and Functional Diversity': 121–122; *Revised Land and Resource Management Plan, Cherokee National Forest*, Management Bulletin R8-M13 114 A (Cleveland: USDA Forest Service, 2004), p. 108.

66. Roy B. Clarkson, 'Notes on the Distribution of *Alnus crispa* in Eastern North America', *Castanea* 25 (1960): 83; Brown, 'Conifer Transplants': 614; USDA Forest Service, *Revised Land and Resource Management Plan*, p. 106; and *Sensitive Plants*, p. 5. Although the extent of alder invasion has increased, the species has existed on Roan for more than 150 years; Gray noted the presence of alders on the edges of the balds during his 1841 visit. See Gray, 'Notes of a Botanical Excursion': 42.

67. USDA Forest Service, *Revised Land and Resource Management Plan*, pp. 106–107; and observations of the author.

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preserve the mountain's scenic qualities.⁶⁸ Taken alone, any one of these aims is admirable. Conjoined, they force officials to consider the 'scenic' qualities of alder versus lily, grassland versus spruce-fir and the recreational qualities of open ground versus forest. Further complicating matters, the plan challenges Forest Service staff to retain 'the existing natural appearing character' of the balds—using a toolbox of fire suppression, 'limited vegetation management', the introduction of non-native plants for wildlife food and other actions to 'restore, maintain and monitor grassy balds' – implicitly acknowledging that ecology and historical use have created a landscape deeply shaped by humans and their activities.⁶⁹ Management officials' dedication to the notion of an untouched wild landscape, despite these subliminal admissions of historical land use on Roan, has proved a Faustian bargain; workers labour with weed-trimmers and mat-tocks to re-create a stable natural landscape that for the past two hundred years existed as an admixture of natural and historical processes. As on Grandfather, these management techniques owe much to the aesthetics of wilderness, despite their emphasis on biodiversity and endangered species conservation. Officials work to maintain the appearance of wilderness using the tools of species and habitat conservation.

Grandfather and Roan mountains are far from the only examples of southern Appalachian landscapes that harbour endangered species despite long histories of human use. With a notable exception, places such as Mount Mitchell, North Carolina; Mount Rogers, Virginia; and other mountain balds in North Carolina, Tennessee, Virginia and West Virginia beg for careful studies that combine ecology and history.⁷⁰ These south-eastern landscapes have a great deal in common with the more famous public 'wildernesses' of the West, where managers have recently accepted the utility of some historic human actions, such as setting or permitting regular fires, in managing for the present and future (Yellowstone again is the classic example).⁷¹ Like their western counterparts, these wildlands of the East are neither true wilderness nor exemplars of prelapsarian nature and, if Grandfather and Roan are representative examples, even the endangered species that rely on their environments have long histories of interacting with people; they may even rely on them.

68. USDA Forest Service, *Revised Land and Resource Management*, p. 105.

69. *Ibid.* pp. 106-107.

70. The exception is Timothy Silver's, *Mount Mitchell and the Black Mountains: An Environmental History of the Highest Peaks in Eastern America* (Chapel Hill: University of North Carolina Press, 2003).

71. Nancy Langston, *Forest Dreams, Forest Nightmares: The Paradox of Old Growth in the Inland West* (Seattle: University of Washington Press, 1995), esp. pp. 247-263; Sellars, *Preserving Nature*, pp. 256-258, 275-276; and William G. Robbins, *Landscapes of Conflict: The Oregon Story, 1940-2000* (Seattle: University of Washington Press, 2004), p. 194. For a wide-ranging and authoritative history of the use and persistence of American fire, see Stephen J. Pyne, *Fire in America: A Cultural History of Wildland and Rural Fire* (Princeton, NJ: Princeton University Press, 1982).

CONCLUSION

Of course campaigns to preserve or protect endangered species in the southern mountains have also failed because of a simpler reason: an incomplete understanding of species' natural history. Attempts to save the Little Tennessee River's snail darter (*Percina tanasi* – a tiny perch) in the 1970s and efforts to restore red wolves (*Canis rufus*) to the Great Smoky Mountains National Park in the 1990s both failed for a number of reasons, not the least of which was partial knowledge of the needs and behaviours of the darters and wolves themselves. Conservationists who attempted to use the snail darter to block the completion of the Tellico Dam on the Little Tennessee River were slow to ascertain the complete range of the fish and their loss in the Supreme Court case *TVA v. Hill* (1978) undermined the power of the newly-created Endangered Species Act.⁷² Red wolf restoration efforts in the Smoky Mountains ignored a lack of significant evidence of past red wolf habitation of mountainous areas and, while a restoration programme in eastern North Carolina made significant progress in the 1990s, the mountain reintroduction (or, perhaps, introduction) efforts fizzled and died.⁷³ Management struggles of this type are unavoidable. Researchers and officials will never completely understand the ecological functions and life histories of any single species, much less those of every endangered plant and animal. But management that refuses to carefully consider the cultural histories of landscapes and the species that inhabit them makes an avoidable error and is doomed to repeat the conservation struggles that are still taking place on Grandfather and Roan.

Although this essay challenges certain wildlands management techniques, it is not intended to challenge the validity or importance of the Endangered Species Act or biodiversity as an intellectual concept. The rare plants that inhabit the tops of Grandfather and Roan deserve space to photosynthesise and reproduce as they have done for thousands of years and the snail darters and red wolves of the world merit preservation both for their own sake and as representatives of healthy ecosystems. Biodiversity as a conservation rubric does avoid some of the worst ideological pitfalls of the older wilderness ideal and is a noble attempt to ascribe to non-human life its own intrinsic value.

Rather, the lessons of Grandfather and Roan reveal that effective and sustainable conservation of the wild places vital to the survival of threatened species

72. Kenneth M. Murchison, *The Snail Darter Case: TVA Versus the Endangered Species Act* (Lawrence: University Press of Kansas, 2007); and William Bruce Wheeler and Michael J. McDonald, *TVA and the Tellico Dam, 1936–1979: A Bureaucratic Crisis in Post-Industrial America* (Knoxville: University of Tennessee Press, 1986).

73. USF&WS, *Red Wolf (Canis rufus) 5 Year Status Review: Summary and Evaluation* (Manteo: USF&WS, 2007), pp. 20, 57; USF&WS, *Endangered Red Wolves* (Washington D.C.: USF&WS, 1997), p. 8; and Christopher J. Manganiello, 'From a Howling Wilderness to Howling Safaris: Science, Policy and Red Wolves in the American South', *Journal of the History of Biology* 42 (2009): 345–347.

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must rely on an informed and nuanced understanding of human as well as natural history. Perhaps the best example of the potential of historically-informed wildlands management comes from the Harvard Forest in Massachusetts. Directed by ecologist David Foster, the Harvard Forest interweaves understandings of past landscape uses with present needs in managing both wildlands and resource-extraction areas (or ‘woodlands’) and its staff has created an ambitious plan to protect half of the state of Massachusetts as some form of forest.⁷⁴ This wildlands and woodlands plan emphasises that management efforts must take into account the historical uses of a landscape – even one that seems wild – or else they are doomed to fail the needs of both humans and of other species. Foster and his fellow researchers state, ‘the intent of Wildland reserves is not to return to an idealized wilderness past, nor to re-create a prehistoric landscape or particular reference condition. Rather, the intent is to maximize the natural quality of the landscape in representative locations and to provide broad lessons and experiences to humans.’⁷⁵ As Foster has elsewhere declared, ‘The importance of land use and disturbance legacies is apparent in all ecosystems and provides one of the fundamental reasons that historical research will continue to be a critical part of ecology, environmental science and conservation planning.’⁷⁶ The work at Harvard Forest takes the impact of historic land use as seriously as ecological measurements of the contemporary woodlands.

Following Foster’s advice, we must understand that our decisions to preserve or manage all landscapes are rooted in our own very human needs and desires. We seek to preserve wild places and rare species because they are novel, beautiful, have economic value, ensure the survival of other life forms, because we consider such activities moral or simply because doing these things makes us feel good. To deny the human role in creating contemporary wild and endangered landscapes – or to construe all human impact as harmful to all species – is just as obtuse as refusing to see anthropocentric motives in current preservation and conservation efforts. The study of landscape history must go hand-in-hand with efforts to preserve and manage endangered species and the wild landscapes of the future, not just in southern Appalachia but throughout the world.

Of course it is easy to point out the ironies and difficulties of current management but much more difficult to offer constructive suggestions. The staffs of the National Park Service, Grandfather State Park and the nonprofit agency that currently administers a portion of Grandfather have preserved the endangered species that crown the mountain’s summit and USFS officials have kept Roan’s majestic balds open and accessible to the public. It is not the intent of this essay

74. David Foster *et al.* *Wildlands and Woodlands: A Vision for the Forests of Massachusetts* (Petersham: Harvard Forest, 2005). For more information on the wildlands and woodlands programme, see <http://www.wildlandsandwoodlands.org/>.

75. Foster *et al.* *Wildlands and Woodlands*, p. 11.

76. David R. Foster, ‘Conservation Issues and Approaches for Dynamic Cultural Landscapes’, *Journal of Biogeography* 29 (2002): 1533.

to belittle these noble efforts. Instead, the author suggests that officials could do worse than to consider management based on careful study of each site's historical ecology. On Roan this might mean the return of seasonal grazing and perhaps fire. On Grandfather, it might translate to a removal of guard rails and greater tourist access to the mountain's rocky peaks. In both cases management would no doubt restrict access to portions of the sensitive areas to serve as test sites and species refuges. Management along these lines would be controversial, just as wolf reintroduction in Yellowstone pitted ranchers against environmentalists. Cattle would graze or trample the occasional Gray's lily as they ranged the balds and some tourists would walk over *Liatris* and other endangered plants to get a better view of the surrounding peaks. And reintroducing human use poses obvious questions of quantity and quality: are cattle acceptable but all-terrain vehicles prohibited? Should cliff overlooks permit hiker access but prohibit wheelchairs or pets? These questions are thorny and still require natural resource managers to make complex value judgements. But such an approach, especially if accompanied by robust interpretive efforts acknowledging the history that humans and plants share, might do much to bring people and the fragile but beautiful landscapes that they helped create together again.

Renarrating a Biological Invasion: Historical Memory, Local Communities and Ecologists

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ABSTRACT

The historical case study has become an important tool in developing understandings of biological invasions and biological control and, as with any historical investigation, it may be appropriate to supplement written records with oral evidence. This article explores memories of a biological control programme in French colonial Madagascar involving introduced cochineal insect predation on equally exotic prickly pear. Drawing on data collected in Malagasy communities over a twenty year period (1981–2003), it charts the dramatic revisions that local narrative has undergone as the eradication of ‘Malagasy Cactus’ in the 1920s has become a powerful rhetorical tool in the context of present-day controversy over another, highly invasive, prickly pear. Experience of biological invasion in the present has been reshaping historical memory while reinterpreted narrative of past biological control is informing current debates. The paper relates these narrative shifts to broader political and social developments, highlighting the way encounters with green governmentality and humanitarian assistance are mediating renarrated pasts.

KEYWORDS

Local knowledge, memory, plant invasions, biological control, Madagascar

INTRODUCTION

My paternal grandmother, my ancestor, told me the story of how Malagasy Cactus was once our food.

When *vazaha* [French colonisers] arrived in this land, they could see no people because they were all hiding in the thickets of prickly pear. This intrigued the *vazaha*. ‘What are you doing in the woods?’ they asked.

‘Oh, we’re just in the woods’, came the reply.

‘Ok’, said the *vazaha*, ‘explain properly. How do you survive in the woods? What do you eat?’

‘We get by on prickly pear cactus’, replied the *gasy*. ‘That’s our staple food’.¹

You see people in those days weren’t farmers. They didn’t grow crops, didn’t wear clothes. All they did was eat prickly pears in the woods.

The French were surprised to hear this! It was something they’d never encountered before.

Our food, Malagasy Cactus, was a wonderful food for us *gasy*. It made us podgy, plump. The colonisers killed it because they couldn’t find workers. We didn’t *choose* to give up Malagasy Cactus. It was killed by the state because people hid in the thickets.

The French at Toliara fetched *poizy* to kill Malagasy Cactus. So then there was no food. And the French ordered them to stop fighting, to stop the killing. All people did in those days was quarrel and murder one another in amongst the prickly pears.

And after Malagasy Cactus died the *vazaha* said ‘Here are hoes, here are axes, grow crops, cultivate fields. Here’s money. You’ll be *gasy* no longer. You’ll become *vazaha*.’

And they distributed *raketambazaha* [lit. foreign, coloniser’s or white man’s cactus]. *Raketambazaha* was already around. But when Malagasy Cactus died, the French ordered [people] to plant it so ‘you can eat the leaves’.²

Interview, Sikina, Befeha, 3/12/2002.

Invasion by alien species has attracted a great deal of academic attention over recent decades.³ A rising concern with the economic and environmental impacts

1. *homan-raketa avao* (lit. all we eat).

2. A more or less spineless *Opuntia*, probably a cultivar of *Opuntia ficus-indica*, introduced into the region by French military officers in the early 1900s and promoted well into the 1950s by the colonial state.

3. J. Drake, H. Mooney, F. di Castri, R. Groves, F. Kruger, M. Rejmánek and M. Williamson (eds.) *Biological Invasions: A Global Perspective* (Chichester: John Wiley & Sons, 1989); Quentin Cronk and Janice Fuller, *Plant Invaders: The Threat to Natural Ecosystems* (London: Chapman and Hall, 1995); O. Sandlund, P. Schei and Å. Viken (eds.) *Invasive Species and Biodiversity Management* (Dordrecht: Kluwer Academic, 1999); H. Mooney and R. Hobbs (eds.) *Invasive Species in a Changing World* (Washington DC: Island Press, 2000); Daniel Simberloff, ‘A Rising Tide of Species and Literature: A Review of Some Recent Books on Biological Invasions’, *Bioscience* 54 (2004): 247–54; Harold A. Mooney,

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of introduced species has also stimulated interest in methods of control.⁴ The historical case study has become a key tool in developing understandings of these phenomena. Natural scientists look regularly to the past to provide a broader evidential base for theory about invasive species and their management than can be provided by the standard scientific methodologies.⁵ Scholars in the humanist disciplines explore the importance of interests, values, needs and aspirations in determining attitudes to exotic species by revisiting contestations in the past.⁶ By excavating historical narratives about species introductions, they highlight the deeply cultural significances that underpin the very concepts of ‘useful plants’ and ‘weeds’.⁷

For scholars of all disciplines, however, written documents can be less than satisfactory points of departure. A natural science enquiry into alien species based on the searching of historical records often encounters unreliable species identifications and a paucity of quantitative data that limit the value of the case

Richard N. Mack, Jeffrey A. McNeely, Laurie E. Neville, Peter J. Schei and Jeffrey K. Waage (eds.) *Invasive Alien Species – A New Synthesis* (Washington: Island Press, 2005); Charles Perrings, Mark Williamson and Silvana Dalmazzone (eds.) *The Economics of Biological Invasions* (Cheltenham: Edward Elgar, 2000).

4. See e.g. Gregory Ruiz and James Carlton (eds.) *Invasive Species: Vectors and Management Strategies* (Washington: Island Press, 2003); L. Child, J. Brock, G. Brundu, K. Prach, Petr Pyšek, P. Wade and Mark Williamson (eds.) *Plant Invasions: Ecological Threats and Management Solutions* (Leiden: Backhuys, 2003); and many of the works cited in note 2.
5. See, for example, in addition to many of the works listed in notes 2 and 3, Mark Williamson, *Biological Invasions* (London: Chapman & Hall, 1996); and, on prickly pear, Helmuth Zimmermann and V.C. Moran, ‘Ecology and Management of Cactus Weeds in South Africa’, *South African Journal of Science* **78** (1982): 314–320.
6. Humanist scholarship on exotic species is vast and growing but see, for example, Peter Coates, *American Perceptions of Immigrant and Alien Species: Strangers on the Land* (Berkeley, Ca. and London: University of California Press, 2006); Iftekhhar Iqbal, ‘Fighting with a Weed: Water Hyacinth and the State in Colonial Bengal, c. 1910–1947’, *Environment and History* **15** (2009): 35–59; William Beinart, *The Rise of Conservation in South Africa: Settlers, Livestock, and the Environment 1770–1950* (Oxford: Oxford University Press, 2003), Ch. 8. For an overview that makes a strong argument for interdisciplinary approaches to the subject, see William Beinart and Karen Middleton, ‘Plant Transfers in Historical Perspectives: A Review Article’, *Environment and History* **10** (2004): 3–29.
7. The quest for an ‘objective’ technical language free of value judgements has spurred extensive literature – see e.g. Charles S. Elton, *The Ecology of Invasions by Animals and Plants* (London: Methuen, 1958); Pierre Binggeli, ‘Misuses of Terminology and Anthropomorphic Concepts in the Description of Introduced Species’, *Bulletin (British Ecology Society)* **25** (1994): 10–13; James Perrin, Mark Williamson and Alastair Fitter, ‘A Survey of Differing Views of Weed Classification: Implications for Regulation of Introductions’, *Biological Conservation* **60** (1992): 47–56; David Richardson, Petr Pyšek, M. Rejmanek, Michael Barbour, F. Panetta and Carol West, ‘Naturalization and Invasion of Alien Plants: Concepts and Definitions’, *Diversity and Distributions* **6** (2000): 93–107. For the purposes of this essay, I use the term ‘invasive’ to mean a plant that has the capacity to spread exponentially without human assistance and that poses problems for locally available methods of control.

study in building predictive models,⁸ while marked asymmetries in the opinions recorded for posterity restrict insights into historical debates. It is generally accepted that the cost–benefits of introduced species are seldom distributed evenly among ‘stakeholders’. Moreover, many major incidents of species spread and control took place in European colonies. People at the margins of state, the argument might go, are usually less well represented in written sources than are elites, governments, and colonial rulers. Thus, the histories of introduced species are likely to be retold more from the perspective of scientists and government officials than of the local communities who actually lived with the plants and were impacted on by their control.

The problems of imbalance in written sources can be overstated. Marginal ‘voices’ are often better represented in written records than is at first apparent and/or can be recovered by reading such records for the ‘silences’ or ‘against the grain’. Even so, it may still be thought useful to supplement search of the written records with the collection of oral evidence from local people, particularly in instances of species spread and eradication that occurred in living memory. The precedents for such an undertaking appear encouraging. An extensive literature in environmental history now claims to draw on local knowledge and social memory to provide alternative insights into past landscapes, often challenging received wisdoms.⁹

There is, however, hardly a consensus on the place of memory in academic history-writing.¹⁰ Many historians value oral testimony, seeing it as a source specific to subordinate and marginalised historical experience and thus a way of producing alternative (and in colonial contexts genuinely non-Western) histories. Some even question the preference given by ‘scientific history’ to written

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8. Cf. Richard N. Mack, ‘Assessing the Extent, Status, and Dynamism of Plant Invasions: Current and Emerging Approaches’, in Mooney and Hobbs (eds.) *Invasive Species*, pp. 141–68; M. Sagoff, ‘Do Non-Native Species Threaten the Natural Environment?’ *Journal of Agricultural and Environmental Ethics* 18, 3 (2005): 215–36.
 9. James Fairhead and Melissa Leach, *Misreading the African Landscape* (Cambridge: Cambridge University Press, 1996); Terence Ranger, *Voices from the Rocks: nature, culture and history in the Matapos Hills, Zimbabwe* (Oxford: James Currey, 1999); Ramachandra Guha, *The Unquiet Woods: Ecological Change and Peasant Resistance in the Himalaya* (New Delhi: Oxford University Press, 1989); K. Sivaramakrishnan, *Modern Forests: Statemaking and Environmental Change in Colonial Eastern India* (Stanford, Ca.: Stanford University Press, 1999); Ann Grodzins Gold and Bhoju Ram Gujar, *In the Time of Trees and Sorrows: Nature, Power and Memory in Rajasthan* (Durham, NC: Duke University Press, 2002); Partha Chatterjee and Anjan Ghosh, *History and the Present* (New Delhi: Permanent Black, 2002). For an exploration of prickly pear in South Africa that supplements written sources with oral evidence see William Beinart and Luvuyo Wotshela, ‘Prickly Pear in the Eastern Cape since the 1950s – Perspectives from Interviews’, *Kronos: Journal of Cape History*, 29 (2003): 191–209. To my knowledge, the study of introduced *Opuntia* in India and Queensland, Australia has not yet attracted this kind of approach.
 10. On history and memory, see Maurice Halbwachs, *The Collective Memory* (New York: Harper and Row, 1980 [1950]); Pierre Nora, ‘Between Memory and History: les lieux de mémoire’, *Representations* 26 (1989): 7–23.

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documentation as historical evidence.¹¹ But others view popular narratives as a qualitatively different and less reliable resource than written material. Highlighting a ceaseless dialectic of remembering and forgetting, they point to the role of narrated pasts in identity construction and to the way memory is co-opted by contemporary political projects.¹² Some note that ‘memory’ is often characterised by epistemologies and mythical temporalities that are at odds with the linear perspectives of time that inform modern history. In its strongest version, this approach reduces memory to a form of cultural production that constantly reconstructs the past in line with present needs. From this perspective, there is no true or false memory. People are in effect ‘remembering the present’ (to deploy Johannes Fabian’s turn of phrase) rather than the past.¹³

This paper addresses some of these issues by exploring community memories of a biological control programme in French colonial Madagascar involving insect predation on a prickly pear. I shall refer to this prickly pear as ‘Malagasy Cactus’ in translation of *raketa gasy*, the name my Malagasy informants gave to the plant.¹⁴ A variety of *Opuntia* (Cactaceae) native to South America, it had been introduced into Madagascar in the late eighteenth century, via Tôlañaro (Fort Dauphin) in the southeast. By the late nineteenth century, when France annexed Madagascar as a colony, the plant was found throughout the island but had become especially dominant, some say invasive, in its southernmost parts. Boom subsequently turned to bust in the 1920s when the plant succumbed to an introduced cochineal insect within the space of a few years.

In its day the circumstances and consequences of this event caused intense controversy in French colonial circles. While commentators agreed that an extraordinary landscape transformation had been wrought in southern Madagascar, they agreed on little else. One faction emphasised the socio-economic benefits that Malagasy Cactus had brought to vulnerable people trying to survive in a dryland while the opposing faction saw dense, thorny thickets that grew up to 4–5 metres high and 7–8 metres deep as an obstacle to ‘progressive’ forms of

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11. Ajay Skaria, *Hybrid Histories: Forests, Frontiers, and Wildness in Western India* (New Delhi: Oxford University Press, 1999); Paul Thompson, *The Voice of the Past* (Oxford: University of Oxford Press, 1988).
 12. Michel-Rolph Trouillot, *Silencing the Past: Power and the Production of History* (Boston: Beacon, 1995); Paul Antze and Michael Lambek (eds.) *Tense Past. Cultural Essays in Trauma and Memory* (London: Routledge, 1996); Elizabeth Tonkin, *Narrating Our Pasts: The Social Construction of Oral History* (Cambridge: Cambridge University Press, 1992).
 13. Johannes Fabian, *Remembering the Present: Painting and Popular History in Zaire* (Berkeley and Los Angeles: University of California Press, 1996).
 14. There is an emerging consensus that the correct identification for Malagasy Cactus is *Opuntia monacantha*. However, while I recognise that it would be useful for readers to have the scientific names for prickly pears discussed in this article, I am reluctant to make definitive pronouncements given the inconsistencies in a literature too often authored by non-specialists in *Opuntia* taxonomy.

land and labour use.¹⁵ In the following decades relatively little was published on the incident. On the whole, opinion within the colonial administration came to view the intervention as ill-advised. Today, there has been a resurgence of interest in the story, partly in the context of modern environmental concerns.¹⁶ Identified early as a ‘hotspot’ for megabiodiversity, Madagascar has long been the focus for international conservation efforts but it was only in the mid-1990s that greater recognition of biodiversity in the island’s ‘spiny dry forest’ began to focus global attention on the natural history of the Malagasy Deep South.¹⁷

Given the enduring impasse over key issues in Malagasy Cactus history, it is tempting to turn to social memory in an attempt to address all kinds of questions on which we seem unable to agree on the basis of available written evidence. Was Malagasy Cactus invasive? How important, economically speaking, was the plant? To what extent were local people dependent on Malagasy Cactus? Did they welcome its spread? Was Malagasy Cactus killed accidentally or intentionally? And, one of the most contested points in colonial literature, did people die in large numbers as a result?

At first blush local people would seem ideally placed to settle at least some of these questions. No one, surely, is better able to remember Malagasy Cactus and what happened when it died than those who lived with the plant and who directly experienced its loss? Yet longstanding debates over the significance of memory for historical reconstructions, even of quite recent events, suggest possible difficulties with such an approach.

This essay has three objectives. First, by comparing and contrasting two sets of narrative collected in the early 1980s and the early 2000s, it charts the radical

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15. See e.g. Georges Petit, ‘Introduction à Madagascar de la cochenille du Figuier d’Inde (*Dactylopius coccus*, Costa) et ses conséquences inattendues’, *Revue d’Histoire Naturelle*, **10**, 5 (1929): 160–173; Edmund François, ‘De l’emploi de l’Herbe Kikuyu à Madagascar’, *Revue de Botanique appliquée* **105** (1930): 287–292; Henri Perrier de la Bâthie, ‘Les famines du Sud-Ouest de Madagascar, causes et remèdes’, *Revue de Botanique appliquée*, **14**, 151 (1934): 173–186; and, on the pro-Malagasy Cactus side, Raymond Decary, ‘La question des raiketa dans l’Extrême-Sud de Madagascar’, *Bulletin Économique de Madagascar* **1** (1927): 92–96; ‘À propos de l’Opuntia épineux de Madagascar’, *Revue de Botanique appliquée* **8**, 77 (1928): 43–46. An account of these positions is given in Karen Middleton, ‘Who Killed “Malagasy Cactus”? Science, Environment and Colonialism in Southern Madagascar (1924–1930)’, *Journal of Southern African Studies* **25** (1999): 215–248.
 16. See e.g. Middleton, ‘“Who Killed “Malagasy Cactus”?’; Jeffrey Kaufmann, ‘Forget the Numbers: The Case of a Madagascar Famine’, *History in Africa* **27** (2000): 143–157; Pierre Bingelli, ‘Cactaceae, *Opuntia* spp., Prickly Pear. *Raiketa*, *Rakaita*, *Raketa*’, in S. Goodman and J. Benstead (eds.) *The Natural History of Madagascar* (Chicago: University of Chicago Press, 2004), pp. 335–8.
 17. On ‘spiny dry forest’ see R. Rabesandratana, ‘Flora of the Malagasy Southwest’, in A. Jolly, P. Oberlé and R. Albignac (eds.) *Key Environments: Madagascar* (Oxford: Pergamon Press, 1984), pp. 55–74; Werner Rauh, *Succulent and Xerophytic Plants of Madagascar* (Mill Valley, California: Strawberry Press, 1995 and 1998). On Madagascar’s emergence as a ‘mega[bio]diversity country’, see Christian Kull, ‘The Evolution of Conservation Efforts in Madagascar’, *International Environmental Affairs* **8** (1996): 50–86.

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revisions that local memories of Malagasy Cactus have undergone over these two decades. Secondly, it shows how stories told about the eradication of Malagasy Cactus have become a powerful rhetorical tool in the context of a present-day controversy over another prickly pear. Experience of biological invasion in the present has been reshaping historical memory, while reinterpreted narrative of past biological control is informing current debates. Thirdly, it relates these narrative shifts to broader political and social developments in Madagascar, highlighting the influence of new environmental discourse and new forms of *vazaha* [stranger] experience – in the shape of green governmentality and humanitarian assistance – in mediating historical narrative. Altogether these data *seem* to support a view of memory as cultural production of present time and as a less than reliable source for verifying the past. And yet, by exploring the complexity of memory production, including the interplay between personally acquired autobiographical memory and socially transmitted memory, the article also points to the possibility of a more nuanced approach to local knowledge of the past.

CONTEXT OF STUDY

The interview data reported in this essay were collected in the Karembola region of dryland Madagascar (Tsihombe and Beloha Districts) in 1981–1983 and in 2002–2003. The first data set was collected almost incidentally during extended fieldwork for a doctorate in social anthropology. The second data set – a more diverse set of narratives – was collected twenty years later in the course of environmental history research. From the perspective of studying memory, it is important to register not only the twenty years that had elapsed between the two field studies but also the fact that both sets of interview data relate to an event that took place in the late 1920s – that is, several decades before. Thus, even in the first study in the early 1980s ‘eyewitness’ informants were already drawing on distant memories of Malagasy Cactus and its eradication while younger informants were ‘remembering’ events they had not themselves seen.¹⁸ Secondly, it should be noted that narrators in the second study (2002–2003) did not have the benefit of written materials and tape-recordings I had made in the early 1980s and so were generally unaware of the ways in which local narrative, including their own narrative, had changed over the intervening years. In a non-literate society such as rural Karembola, where transmitted memory is oral rather than inscribed, important narrational shifts can occur without the narrators themselves being necessarily conscious of the fact. Thirdly, it is relevant to note that, in addition to collecting oral histories, as a social anthropologist I have always employed participant-observation techniques aimed at eliciting

18. Unfortunately it is not possible to compare these interview data with earlier memory because local Malagasy opinion was not recorded in any detail at the time.

in-depth qualitative understandings of local knowledge and practice and that in both field studies this approach enabled me to go beyond formal interview data to explore the ways in which Malagasy Cactus narration was used in everyday life. Fourthly, it is worth recording that, while I draw occasionally on archival research to comment on interview material in this article, detailed discussion of the written records through confrontation of multiple data sources for the purposes of historical reconstruction is not my objective here.

Turning to the broader economic and political contexts of the comparative study, in some respects rural Karembola changed little between the early 1980s and the early 2000s. In both fieldwork periods almost all villagers were subsistence farmers, cropping manioc, maize, sweet potatoes, millet, pumpkins, melons, squash and various legumes, with restricted market participation. With harvests entirely dependent on hand hoe technology and low, poorly distributed and unreliable rainfall, agricultural productivity was low. Many households also reared zebu cattle and small ruminants that they sold to buy in food when field crops failed. However, wealth in livestock was very unequally distributed and in both periods there were households in all communities with inadequate holdings to meet their economic needs. Some cash was derived from selling extractive plant products (ricin, periwinkle) and lobster via middlemen to global markets or from trading fish and contraband tobacco. But local opportunities for income diversification were limited and in many households cultivated foods were necessarily supplemented in the dry season and extended droughts by trapped and gathered foods. Some Karembola migrated to other regions of Madagascar where they typically found work as agricultural labourers, night watchmen and rickshaw pullers.

In the early 1980s, as in the early twenty-first century, prickly pears made a crucial contribution to local food security, enabling farmers to bridge food and fodder shortfalls. The fruits and cladodes (leaf pads) have been harvested for human consumption, the succulent cladodes exploited to feed and water livestock, and the spinier varieties used to make stout hedging for vegetable gardens and cattle pens.¹⁹ It might even be the case that prickly pears became more important during the 1990s as the introduction of free market economics and the growing appropriation of land for nature conservation, coupled possibly with environmental change, contributed to the growing pauperisation of many households in this already disadvantaged region. Indeed, while Karembola to date has been less affected by external mining and conservation interventions than districts further east, the experiences of economic liberalisation, green

19. On the utility of prickly pears in semi-arid zones see G. Barbera, P. Inglese and E. Pimienta-Barrios (eds.) *Agro-Ecology, Cultivation and Uses of Cactus Pear* (Rome: FAO, 1995); Henri Le Houérou, 'The Role of Cacti (*Opuntia* spp.) in Erosion Control, Land Reclamation, Rehabilitation and Agricultural Development in the Mediterranean Basin', *Journal of Arid Environments* 33 (1996): 135–59.

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governmentality, and humanitarian assistance have all reshaped Malagasy Cactus narrative in significant ways.

MALAGASY CACTUS: THE 'NATIONALIST' NARRATIVE

In the early 1980s, when I first conducted fieldwork in Karembola, there was a shared narrative about Malagasy Cactus. Briefly, the story went like this: Malagasy Cactus was a plant native to Karembola, a plant the ancestors found growing in profusion when they came into the land. Its fruit and leaf pads became staples for the ancestors and their cattle, bringing them prosperity in an otherwise thirsty land. The French colonial administration, however, hated Malagasy Cactus because people hid among the thickets and survived on the fruit. The plant made it difficult to pacify the region, to recruit labour for public works and settler plantations and to get the taxes in. So the *vazaha* introduced an insect to kill the plant. The consequences were devastating as people and cattle, suddenly deprived of food and water, either died in vast numbers or fled the region for other parts of the colony, many never to return. 'The time of the ancestors' was over, and 'foreign time' began. Karembola was left a 'broken land' where 'people could only nod their heads in agreement whenever *vazaha* spoke'.²⁰

For present purposes, I shall dub this the 'nationalist' version of Malagasy Cactus history because it overlaps with narrative that appeared in the Malagasy nationalist press soon after the event. (The most obvious difference between the two versions is that while the nationalist press in the early 1930s offered an essentially secular account of the colonial intervention, my informants embedded it in a more 'religious' account.)

In the early 1980s this narrative was a communal narrative in the sense that it was known and reproduced by all Karembola I met. In fact, the story formed a normative component of our encounter, following shortly on after the greeting 'Hail *vazaha*! What brings you to this thirsty land?' A defining statement of the *gasy-vazaha* relationship, narrative around 'the moment the cactus died' at this time provided the foundational myth of Karembola society and the cornerstone of Karembola identity.

That the demise of Malagasy Cactus had led to such a strong and consistent nationalist narrative can, I think, be taken as indicative of the plant's erstwhile importance to Karembola culture and economy. It would be wrong to suppose, however, that narrators were solely concerned to remember the defining moment in Karembola history.

Another reason why rural Karembola in the 1980s continued to renarrate the decades-old tragedy was because Malagasy Cactus narrative offered an

20. Cf. Karen Middleton, 'Circumcision, Death, and Strangers', *Journal of Religion in Africa*, 27 (1997): 341–73.

oblique way of commenting on more recent political developments. Such an interpretation may at first seem counter-intuitive in that the narrative of French complicity, which forms the core of the nationalist narrative, seems wholly in keeping with the anti-imperialist rhetoric of the early Ratsiraka state. Coming to power in the wake of the Malagasy Socialist Revolution, this was a state which actively encouraged its citizens to recover memories of colonial suffering as a way of contrasting itself to its immediate predecessor, Tsiranana's so-called 'neo-colonial' regime (1960–1972).²¹ In fact, by the early 1980s, deteriorating economic conditions and a top-down socialism meant that few Karembola still bought into the idea of a 'second independence'. Rather, they described themselves as living in a land still controlled by *vazaha*, where Karembola could only nod their heads in agreement to whatever *vazaha* proposed. In this context, the master narrative of Malagasy Cactus with its reflections on state power and Karembola impotence remained as apposite a commentary on governance and economy under the Second Republic as it had been under colonial rule.²²

NEW CENTURY, NEW NARRATIVE

I have described the nationalist version of Malagasy Cactus history that was current in early 1980s Karembola. Returning to the subject in the early twenty-first century (2002–03), I was genuinely startled to discover that the communal narrative I had internalised twenty years earlier was now attracting lively, often acrimonious, debate. While every Karembola I spoke to still attributed the death of Malagasy Cactus to *vazaha* intervention, they now disputed almost every other detail of the story: whether Malagasy Cactus had been invasive; whether the French had been right to intervene; whether local people had also desired its eradication; and, perhaps most startling of all, given the evidence, whether any local people had actually died or suffered as a result. While the basic storyline from the 1980s persisted, its meaning, the social and political lessons that individual narrators drew from it, had in many cases been dramatically reworked. In less than a generation, widely shared memory and interpretation had given way to surprisingly diverse narrative about the past.

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21. Cf. Françoise Raison-Jourde, 'Une rébellion en quête de statut: 1947 à Madagascar', *Revue de la Bibliothèque nationale* 34 (1989): 24–32.
 22. Cf. Karen Middleton, 'From Ratsiraka to Ravalomanana: changing narratives of prickly pears in dryland Madagascar', *Études Océan Indien*, 42–43 (2009): 47–83. On Malagasy Socialism see Maureen Covell, *Madagascar: Politics, Economics and Society* (London and New York: Frances Pinter, 1987). On popular memory as a privileged domain of resistance to hegemonic narratives see Rubie Watson (ed.) *Memory, History and Opposition under State Socialism* (Santa Fe: School of American Research Press, 1994); Gerald Sider and Gavin Smith (eds.) *Between History and Histories: the Making of Silences and Commemorations* (Toronto Buffalo London: University of Toronto Press, 1997).

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In some quarters local narrative had become sympathetic to the French colonial administration. While the motives ascribed to the intervention had remained constant, viz., to pacify the region, to secure labour for settlers in more fertile parts of the colony by creating famine and to facilitate tax collection, for many narrators these were now the perfectly justified motives of a ‘civilising’ state.

I first became aware of significant disparity between narrative versions when informants described the method by which Malagasy Cactus was killed. In the 1980s Karembola had been unanimous in stating that ‘Malagasy Cactus had been eaten (predated) by insects (*biby*)’, an opinion that was consistent with the scientific facts.²³ By 2002–03 there was widespread disagreement among narrators on whether the French had conducted chemical or biological warfare (or both) against the plant. To be sure, the narrative of biological control still had many adherents, especially among surviving eyewitnesses. In the following, for example, an elderly speaker recalls how

The *posy* that killed it [Malagasy Cactus] was very red, white outside, red when dead [...]. We were afraid of the blood, there was blood. ‘What’s this *biby*?’ we wondered. We didn’t eat it because we thought it might kill [us too].²⁴

But many informants now had in mind some form of chemical warfare, stating explicitly that ‘It was the French from Tuléar who killed it, with *poizy* ... the plant was killed by *poizy*, not insects’ (*poizy, tsy biby*).²⁵ Some elaborated this distinction by comparing the agent deployed against Malagasy Cactus with the chemical products that the government uses to control pests such as locusts, cockroaches and rats.²⁶

The idea of a *double* killing, a combined package of targeted measures, involving both chemical and insect agents, staggered over an extended period of time to ensure full control of the plant, had also become popular. Most com-

23. Almost all published accounts, whatever their other antagonisms, concur that Malagasy Cactus was killed by a cochineal insect or *Dactylopius* species (see e.g. Henri Perrier de la Bâthie, ‘Introduction à Tananarive du *Coccus cacti* ou Cochenille du Figuier d’Inde’, *Bulletin économique de Madagascar et dépendances* 21, 3–4 (1924): 222; Petit, ‘Introduction à Madagascar’: 163; Cl. Frappa, ‘Sur *Dactylopius tomentosus* Lam. et son acclimatement à Madagascar’, *Revue de pathologie végétale et d’entomologie agricole* 19 (1932): 48–55; J. Mann, ‘Cactus-Feeding Insects and Mites’, *Bulletin (U.S. National Museum)* 256 (1969): 139; Raymond Decary, *L’Androy (Extrême Sud de Madagascar). Essai de monographie régionale*, Vol. II (Paris: Société d’Editions Géographiques, Maritimes et Coloniales, 1933), pp. v–vi).

24. Vontana, Tranovaho, 15/1/2003.

25. Sambo, Marobey, 5/12/2002.

26. There is significant semantic instability around key vernacular in these narratives, with some speakers using the terms *biby* and *posy/poizy* as synonyms for ‘insect’ (as for example when a speaker glossed *posy* as ‘*biby*, living creatures’) while others drew a clear distinction between *biby* meaning ‘insect’ and *posy/poizy* meaning ‘chemicals’ (as when they likened ‘this *posy*’ to ‘medicines used against cockroaches’ (*fanafoly bararaoke*)). These open-ended meanings seem to be both related to and productive of the now widespread confusion over the agent of control.

monly, the French were described as deploying chemicals in the first instance to drive people from the thickets before turning to living predators to finish the job

What killed Malagasy Cactus? When the French arrived, they couldn't see the population ... So they applied *poizy*, applied a medicine (*isiañe fanafoly*), Malagasy Cactus died, and everybody left the woods. Then [there was] a creature, a living thing (*biby, raha veloñe*) which ate [the plant]. You can still see the insect on surviving stands. But actually I'm not sure who killed it and how because it's only what I've been told. The population went hungry, the cattle too. Everything perished. After which this land became dark.²⁷

Another distinctive feature of early twenty-first century narrative, and one that seems to be directly correlated to the rising conviction about chemical control, was the frequent references to an airborne campaign. Thus, according to the respondent just quoted, 'plane[s] flew past carrying the *poizy* [chemicals], spraying it, dropping it on the plants, whereupon [Malagasy Cactus] died'.²⁸

In theory, the idea of a two-pronged campaign against Malagasy Cactus could appear plausible. Multiple strategies involving chemical products and various insect species, supplemented in some instances by mechanical measures such as felling, stacking and burning the plants, were deployed in parallel campaigns against *Opuntia* in South Africa and Australia (though never to my knowledge planes). The aim almost invariably was to improve efficacy when the application of single measures failed to achieve desired levels of control.²⁹ There is no

27. Betaimboroke, 15/12/2003.

28. Betaimboroke, 15/12/2003. 'Memory' of an airborne chemical campaign is not a wholly recent production. Though I recorded no such narrative in Karembola in the 1980s, there is newspaper evidence that such stories were already circulating in the 1960s, at least amongst Tandroy emigrées in Anosy (D.R. 'A l'écoute d'un migrant antandroy', *Lumière* 1821, 11/4/1971). More recently, Kaufmann reports a narrative from Androka, Mahafale that has aeroplanes dropping *cochineal-infested cladodes*, rather than chemical products, on Malagasy Cactus (Jeffrey Kaufmann, 'Cactus Pastoralism on Madagascar', Ph.D dissertation, University of Wisconsin-Madison, 2001, p. 205). Given the polysemy and ambiguity of terms such as *poizy/posy* noted in note 26, it would have been useful to have this testimony as original, unredacted text. In any case, the narrator is a gendarme 'whose homeland was several hundred kilometers north'. It is interesting that the two earliest modernising narratives on record involve narrators who are not only 'outsiders' to local society but also in their different ways 'progressive', civilising agents in the south: the gendarme because he is educated and closely associated with state power; the narrator of the text published by *Lumière* because he has left his native Androy to become a rice farmer elsewhere. While external narrative of this kind may have been a source for Karembola retellings, neither the gendarme nor the emigrant, it should be noted, posits the double-sequenced hit involving chemicals and insects that characterised many peasant narratives in 2002–2003.

29. See e.g. for South Africa D. P. Annecke and V. C. Moran, 'Critical Reviews of Biological Pest Control in South Africa. 2. The Prickly Pear, *Opuntia ficus-indica* (L.) Miller', *Journal of the Entomological Society of Southern Africa* 41 (1978): 161–188; W. Pettey, 'The Biological Control of Prickly Pears in South Africa', *Scientific Bulletin of the Department of Agriculture and Forestry Union of South Africa* 271 (1947–48): 1–163. And for Australia

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evidence, however, that chemicals (let alone planes) were used against Malagasy Cactus. Cochineal predation on this plant was too rapid to require such help.

Another, to my mind particularly disconcerting, narrative development was that, by 2002–03, famine denial had become rife. The very core of 1980s narrative had been that the loss of Malagasy Cactus had resulted in a killing famine that decimated the cattle herds, left large numbers of Karembola dead and drove a mass exodus of survivors from the land. This in turn had fractured the social fabric, depriving Karembola of its spiritual and political leadership, leaving only ‘children’ behind.

By 2002–03 famine narrative, while evidently still current, no longer monopolised the imagination because significant numbers of Karembola now insisted that food had not been a problem when Malagasy Cactus died. Some claimed that the fruit had only ever been a mainstay for vagabonds, slaves and bandits, people living on the margins of Karembola society. The implication was not only that eradication had fairly restricted economic impacts but that indolent, quasi-criminal elements got their just deserts. Others still portrayed Malagasy Cactus as the ancestral tree of providence that ‘made all things flourish in this thirsty land’, but undermined this received wisdom by claiming either that ‘people fell back on wild food (*tindroke*), they found *sonjo*, *bazaha* [other cacti], when Malagasy Cactus died’, or that people had made an immediate transition from Malagasy Cactus dependency to agriculture by taking up hoes and cropping the now vacant land. These early twenty-first century renarrations departed dramatically from popular memory of twenty years earlier but resonated powerfully with narratives produced by colonial protagonists of eradication seventy odd years before. Following a visit to the neighbouring Mahafale region in 1929, for instance, Georges Petit related how he had observed its residents eagerly planting manioc and maize in land liberated from prickly pear.³⁰ He and like-minded commentators also insisted that Malagasy Cactus fruit had never been a human staple and that the spineless cactus (*raketambazaha*) would provide a superior fodder plant.³¹ Such views would have been heretical in 1980s Karembola. Famine narrative was deeply entrenched.

Initially I was inclined to attribute these representational shifts to generation and the passage of time. I reasoned that, in the early 1980s, many Karembola who had witnessed Malagasy Cactus were still alive. They had eaten the fruit, they had lived its landscapes and they had witnessed its death. Perhaps more importantly, at the time of that first fieldwork, Malagasy Cactus survivors monopolised leadership positions in Karembola communities. As village elders,

J. Mann, *Cacti Naturalized in Australia and their Control* (Brisbane: Government Printer, 1970).

30. Petit, ‘Introduction à Madagascar’: 168.

31. Perrier de la Bâthie, ‘Les famines du Sud-Ouest’; François, ‘De l’emploi’. Critics argued that nowhere near enough of this variety had been planted or that neither humans nor livestock wanted to eat it. *Saonjo* is a later introduction.

priests, orators and family heads they were in a position to approve and propagate their ‘eyewitness’ version of events. In those arguably more deferential days, it was predominantly their discourse that shaped public discourse. By 2002 surviving eyewitnesses were naturally far fewer and most had been little more than young children at the time Malagasy Cactus died. Moreover, given their advanced age, they no longer controlled public memory: effective power had passed to men of middle age.

I intuitively supposed that younger generations, who had only heard about Malagasy Cactus third- or fourth-hand, might be more likely to map current perceptions of *vazaha* practice upon ‘memories’ of the past. Take, for instance, the confusion over chemical control. Although to my knowledge chemicals have *never* been deployed against *Opuntia* in Madagascar, their routine use to control all manner of other pests and disease in the island, including, most notably, the widespread application of DDT in the 1950s, had made chemical control more familiar to most Karembola by the late twentieth century than biological control.³² As for revisionist narrative of an airborne attack on Malagasy Cactus, its most likely inspiration was the Locust Control Service, which for decades has conducted flights in the Malagasy Deep South.³³ Other possible sources for misremembered history, which may have been compounded to make aerial bombardment a symbol of *vazaha* power, include wartime bombing by British planes during the campaign to take Madagascar from Vichy France; flights in the 1950s aimed at seeding artificial rain; and, further afield, aerial bombardment of East Coast Madagascar during the repression of the 1947–1948 anti-colonial rebellion.

On closer inspection, age-related explanation proved too simple, in that the production of anachronistic narrative was by no means confined to younger generations. In some instances even those who had witnessed the original event had changed their story, become less certain of the details, over twenty years past. One elderly woman whom I shall name Nirisoa narrated how the French had brought chemical-spraying planes from Tuléar, but readily admitted when questioned that she ‘didn’t actually see the plane[s] [but] only saw Malagasy Cactus die’. She went on to describe a ‘*biby* [that] was white, white but red inside when cut. The red got on your clothes’, unmistakable eyewitness

32. Although a Laboratory of Agricultural Entomology was created in 1931, chemical interventions remained the preferred government option in Madagascar until at least the 1970s. Cf. J. Appert, M. Betbeder-Matibet and H. Ranaivosoa, ‘Vingt années de lutte biologique à Madagascar – Twenty years of biological control in Madagascar’, *L’Agronomie Tropicale* 24 (1969): 555–85.

33. Although this service was created in 1928, its deployment of planes in the Malagasy Deep South began much later. Indeed, the first aircraft of any kind to fly over the region are said to date to 1931 (Decary, *L’Androy*, p. 246). For the record, the cochineal had reached Karembola by 1928.

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description of the cochineal insect.³⁴ In this instance, we appear to be dealing with quite complicated layers of disjunctive memory, where a detail held for decades in autobiographical memory now sat alongside a ‘false’ or distorted memory. This is by no means unusual. Studies have repeatedly demonstrated that so-called ‘eye witness’ testimony is often composed of ocular evidence combined with, and reinterpreted in the light of, narrative heard from others, at the time or subsequently.³⁵

It might be useful in this instance to adopt an intersubjective approach to memory (narrative) production. Lambek and Antze, for example, propose to distinguish among author, narrator, character, reader, elicitor and censor when analysing narrative change.³⁶ While there is not the scope to pursue such a fine-grained approach in this article, it is tempting to speculate that Nirisoa’s narrative represents an attempt to combine her *personal* experience of insects that stained one’s clothing red (what we might term local knowledge grounded in empirical observation) with other narrative versions of the same history she had heard. It may even be that ‘memory’ of a two-pronged attack on Malagasy Cactus has become popular in Karembola partly as a way of reconciling competing versions authored by persons with competency and authority in different domains. Many elderly narrators appeared to lack the confidence to assert the veracity of their childhood memory. Although they could have documented their narrative of biological control by visual inspection of surviving stands of Malagasy Cactus, they seemed vulnerable to suggestion, if not outright censorship, by younger audiences more familiar with *vazaha* technology and to whom a modernising, albeit secondhand, narrative perhaps originating beyond Karembola offered a seemingly more credible explanation of the event. By combining both narratives

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34. Nirisoa, Befeha, 3/12/2002. Not that plane narrative is necessarily incompatible, imaginatively speaking, with biological control (see note 28) but none of my narrators made such a link.
35. On suggestion/post-event misinformation and false memory see especially the pioneering studies by Elizabeth Loftus and colleagues (Elizabeth F. Loftus and J. E. Palmer, ‘Reconstruction of automobile destruction: an example of the interaction between language and memory’, *Journal of Verbal Learning and Verbal Behavior* **13** (1974): 585–9; Elizabeth F. Loftus, D. G. Miller and H. J. Burns, ‘Semantic integration of verbal information into a visual memory’, *Journal of Experimental Psychology: Human Learning and Memory* **4** (1978): 19–31; Elizabeth F. Loftus, ‘Leading questions and the eyewitness report’, *Cognitive Psychology* **7** (1975): 560–72; Daniel L. Schacter (ed.) *Memory Distortion* (Cambridge, Mass. and London: Harvard University Press, 1995). For more critical positions see D. A. Bekerian and J. M. Bowers, ‘Eyewitness testimony: were we misled?’ *Journal of Experimental Psychology: Learning, Memory and Cognition* **9** (1983): 139–45; R.E. Christiaansen and K. Ochalek, ‘Editing misleading information from memory: evidence for the coexistence of original and postevent information’, *Memory and Cognition* **11** (1983): 467–75; Michael McCloskey and Maria Zaragoza, ‘Misleading postevent information and memory for events; arguments and evidence against memory impairment hypotheses’, *Journal of Experimental Psychology: General* **117**, 1 (1985): 1–16.
36. Michael Lambek and Paul Antze, ‘Introduction’, in Antze and Lambek (eds.) *Tense Past*, p. xviii.

into a two-part temporal sequence, the narrator (young or old) avoids having to make a judgment on which version is correct.

RAKETAMENA AS CONTEXT OF RENARRATION

I have made some preliminary suggestions for analysing certain imaginative retellings of Malagasy Cactus narrative using an intersubjective model that pays attention to the way memory is informed by interactions between various actors accessing both external and local knowledge, including the ideas Karembola themselves hold about generation and authority. A more immediate context for Malagasy Cactus renarration in the early 2000s, however, was the controversy that had erupted over a contemporary prickly pear.

Raketamena or ‘red prickly pear’ (so-named on account of the colour of its fruit) is a fairly recent arrival in Karembola that has been spreading aggressively since (at least) the 1970s and has now claimed vast tracts of land. Some reports describe it as *Opuntia stricta* or *Opuntia stricta* (Haw.),³⁷ a species ranked among ‘One Hundred of the World’s Worst Invasive Alien Species’.³⁸

Despite the growing ascendancy of biodiversity discourse during the latter years of Ratsiraka’s Second Republic, environmental reviews published in the 1980s had tended to gloss over the issues raised by naturalised *Opuntia* in the Malagasy Deep South.³⁹ Informally, I was told that conservationists were very much against the introductions but were keeping quiet because they knew that local peoples relied upon the plants. However, the Rio Earth Summit in 1992 and the subsequent Convention on Biological Diversity (CBD), to which Madagascar became a signatory, had changed public discourse by defining invasion by alien species as the most serious threat to global indigenous biodiversity after habitat destruction. Directing signatories to take practical action to ‘prevent the introduction of, control or eradicate those alien species which threaten ecosystems,

37. ANGAP-FOFIFA-WWF (n.d.) ‘Rapport de Mission à Cap Ste Marie (du 03 au 06 mai 2001) et Propositions des Actions Futures’, Unpublished Report; J. A. Randriamampianina, Solosieva, and J. Rajaonarison, ‘Rapport de Mission dans le Sud (synthèse) (du 26 novembre au 6 décembre 2001 et du 21 août au 4 septembre 2002)’, FOFIFA DRA Antananarivo/FOFIFA centre régional du Sud et Sud-Ouest Toliara/WWF Fort Dauphin/ANGAP Direction Régionale de Toliara, September 2002. Without actually rejecting these identifications, I indicate certain inconsistencies elsewhere (Karen Middleton, ‘Red Prickly Pear and the World Wide Fund for Nature: Rural Poverty and Invasive Species in Dryland Madagascar’, unpublished report, 2003).

38. Global Invasive Species Database, 2011. *Opuntia stricta* (<http://www.issg.org/database/species/ecology.asp?si=19&fr=1&sts=sss>). Accessed 20/1/2011.

39. M. Jenkins (ed.) *Madagascar, an Environmental Profile* (Gland and Cambridge: IUCN/UNEP/WWF, 1987); M. Nicoll and O. Langrand, *Madagascar: Revue de la Conservation et des aires protégées* (Gland: World Wide Fund for Nature, 1989), p. 124, 178; Jean-Louis Guillaumet, ‘The vegetation; an extraordinary diversity’, in A. Jolly, P. Oberlé and R. Albignac (eds.) *Madagascar: Key Environments* (Oxford: Pergamon Press, 1984), pp. 32–3.

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habitats or species', this Convention emboldened conservationists to articulate their opposition to *Opuntia* in southern Madagascar on the grounds of their alleged impacts on the highly specialised '*Didiereaceae-Euphorbia* bush'.⁴⁰

By the turn of the century the World Wide Fund for Nature (WWF), increasingly active in the 'Spiny Forest Androy Sub-Region' of its recently designated 'Dry Forest Ecoregion' had become involved. However, rather than publish indiscriminate critiques of all *Opuntia* introductions, WWF was targeting *raketamena* – a focus which benefited from some local community support. Two WWF-commissioned reports had described the negative impacts of *raketamena* infestations on biodiversity and subsistence farming in Marovato and Tranovaho Communes (Tsihombe and Beloha Sub-Prefectures) and claimed that there was a consensus within local communities on the need for eradication.⁴¹

Following extended criticism of an approach that was overly focused on the conservation of plants and animals to the detriment of local people's needs, WWF, like other key stakeholders in Madagascar, had reformulated its policy in the late 1980s to embrace a rhetoric that stressed the need to integrate development and environmental concerns. In so far as there was, or at least appeared to be, a coincidence between its biodiversity objectives and local socio-economic interests, a campaign against *raketamena* appeared to promise WWF a project that would deliver on this rhetoric. Identifying such projects had become pressing following the 2002 elections. Pro-capitalist Marc Ravalomanana, the newly elected President of Madagascar, was underscoring his expectation that environmental organisations would make an important contribution, alongside foreign investment and the private sector, to achieving millennium goals of poverty eradication and economic growth.

The WWF-sponsored reports had overstated the matter, however, in claiming that an initiative against *raketamena* had unanimous local support. Certainly all the Karembola I interviewed in Marovato and Tranovaho Communes in 2002–03 viewed *raketamena* as a prolific spreader that was infesting fields and grazing lands. However, local opinion was deeply divided over what should happen to the plant. Many villagers did call for its swift and total eradication. But others protested vehemently that the fruit was keeping them alive and that without *raketamena* they and their families would die. In effect, *raketamena* had differential cost–benefits for individual households according to their resource endowments. No one suggested that *raketamena* was an ideal food or made light of its impacts on agro-pastoral productivity; but for poorer community members,

40. Rauh, *Succulent and Xerophytic Plants* [1995], pp. 55, 68; [1998], pp. xi, 66; V. Soarimalala and M. Raheirilalao, 'Pression et menaces dans la région forestière sèche malgache', *Malagasy Nature* 1 (2008): 159.

41. ANGAP-FOFIFA-WWF, 'Rapport'; Randriamampianina et al. 'Rapport'. ANGAP (Association Nationale pour la Gestion des Aires Protégées) was a parastatal agency charged with managing natural parks and reserves in Madagascar while FOFIFA (*Foibe Fikarohana momban'y Famboleana*) is a government department concerned with agronomic research.

struggling to survive a series of bad harvests without the resources to access food at market, its value as a famine food outweighed its costs. By contrast, wealthier families (in 2002–03) not only had little need for *raketamena* – those short of food were raising cash by selling cows and goats at market – but many blamed staggering livestock losses on the plant.⁴² Critically, *raketamena* spread was viewed as undermining elite power, which depends on producing food and livestock surpluses for use in patronage and exchange networks.

These different valuations of *raketamena* would probably have remained a source of grievance within local communities had external agencies not become involved. A meeting during which ‘community leaders’ had discussed *raketamena* with *vazaha* (the term *vazaha* here designates a mixture of expatriates and Malagasy nationals, notably government agronomists and WWF personnel) had greatly inflamed the issue when, or so it was widely reported, these *vazaha* had promised to introduce insects to eradicate the plant. By November 2002, when I arrived in the field, popular belief in the imminent prospect of eradication had ratcheted up emotions and focused everybody’s attention on the *raketamena* debate.

This controversy over *raketamena* had had discernable impacts on Malagasy Cactus narrative. First and most obviously, by 2002–03 it had become almost impossible for Karembola to narrate the story of Malagasy Cactus without working in an extended metacommentary on *raketamena*. This involved comparing or contrasting the two species on a host of characteristics from the botanical (spininess, modes of reproduction and propensity to invasiveness) to the utilitarian (comparative cost-benefits as hedging, fodder and human food). Comparative exercises extended to what might be predicted about the consequences of *raketamena* eradication for livelihoods and food security on the basis of what happened when Malagasy Cactus died. Even the very elderly who had experienced Malagasy Cactus in person had revised their narration in the light of contemporary debates. Recent experience of *raketamena* was reshaping ‘memories’ of Malagasy Cactus for all informants regardless of age.

Consider, for instance, Zomana, a sprightly septuagenarian who had eaten Malagasy Cactus as a small boy. In 1981, when I first made his acquaintance, he had subscribed apparently without reservation to the nationalist narrative of the death of Malagasy Cactus as the event that put an end to *gasy* times. Twenty years later, he had reoriented his narration to address the issue of *raketamena*, a plant that was visibly encroaching on land all about his house. According to Zomana now, Malagasy Cactus had

spread exactly like *raketamena*. If its fruits dropped, they all rooted too. [Malagasy Cactus] just grew without being planted. Nowadays [people] are enlightened,

42. Further detail on stakeholder perceptions and livelihood strategies is given in Middleton, ‘Red Prickly Pear’. Because the *raketamena* issue was so controversial in Karembola villages, the names of informants mentioned in this article have been changed.

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were people in those days wise? *Raketamena* is giving us a hard time, it's changing the land.⁴³

Reflecting on *raketamena* in the present, Zomana here recovers a 'memory' of Malagasy Cactus invasiveness he had never articulated in my presence before. We know that landscape often presents deeply evocative cues for remembrance.⁴⁴ Yet the central event in Karembola history – the landscape transformation of the 1920s – had always been invisible precisely because Malagasy Cactus had disappeared. Indeed, the endless retellings of the story in the early 1980s were driven partly by the desire to reveal Malagasy Cactus as a latent presence in the contemporary landscape, to make explicit a concealed history. Now in the early twenty-first century, seventy odd years after the event, the sight of the *raketamena* infestations seemed to be awakening dormant memories, acting as a prompt to surviving eyewitnesses to look beyond communal narrative and remember how things really were.

Zomana here not only articulates memories of plant invasiveness he had not mentioned in the 1980s. He also pushes the analogy between Malagasy Cactus and *raketamena* to the point of appearing to question the wisdom of the ancestors. 'Nowadays [people] are enlightened', he says; 'Were people back then wise?' Zomana's temporal scales have also shifted: it is the incursion of *raketamena* and the suffering it is causing, rather than the death of Malagasy Cactus, that he now highlights as the sign of altered, more difficult times. At the very least, experience of *raketamena* in the present has prompted Zomana to produce historical narrative of greater ambiguity than before. Nonetheless, unlike many younger, non-eyewitness narrators, Zomana holds back from portraying the eradication of Malagasy Cactus as progress. Despite its putative invasiveness, he still insists, as in the 1980s, on the excellence of Malagasy Cactus as a food. 'It was one of the *Opuntia* that truly nourish', he says, 'a proper meal, people's true food'.⁴⁵

It is clear that, with the WWF seeking to push forward a programme of *raketamena* eradication or control, the Malagasy Cactus story had acquired critical meaning in the context of contemporary debates. *Raketamena* was presenting serious existential choices for rural Karembola and renarrated Malagasy Cactus history offered villagers on all sides of the debate an opportunity to voice situated commentaries on the benefits and the risks.

43. Zomana, Tranovaho, 8/1/2003.

44. See eg Simon Schama, *Landscape and Memory* (New York: A.A. Knopf/Random House, 1995); David Lowenthal, *The Past is a Foreign Country* (Cambridge: Cambridge University Press, 1985); Edward Casey, *Remembering: A Phenomenological Study* (Bloomington: Indiana University Press, 1987); Renato Rosaldo, *Olongot Headhunting* (Palo Alto: Stanford University Press, 1980); Stephen Feld and Keith Basso, *Senses of Place* (Santa Fe, N.M.: School of American Research, 1996).

45. Zomana, Tranovaho, 8/1/2003.

As a general rule, poorer Karembola, those for whom *raketamena* is a vital resource and who feared for their own survival in the event of its eradication, tended to reproduce the long-standing narrative of the great famine when Malagasy Cactus died. They found deep parallels between their own dependency on *raketamena* at times of hardship and the erstwhile importance of Malagasy Cactus as a food. By emphasising how intensely the ancestors had suffered when *their* staple was taken from them, they hoped to underscore the food security risks that *raketamena* eradication would pose. Listen, for instance, to Celestine, one of *raketamena*'s most impassioned defenders. She had heard, she told me, that *vazaha* were planning to kill *raketamena* and wanted to 'notify' them that

We, the poor [*ondate tsy manan-draha*, lit. 'people who have nothing'], we don't want *raketamena* killed. We don't have cattle, goats, sheep to sell to buy food. ... We don't have poultry ... [*Raketamena*] is our food from dawn to dusk ... We couldn't manage to hoe [our fields] if we didn't have *raketamena* to eat.

Without prompting, Celestine proceeded to draw analogies between the fate that awaited her family and other needy households were *raketamena* to be eradicated and what happened when Malagasy Cactus died:

They went hungry. It was their only food. So when the *vazaha* killed it, everybody fled, died on the way. That's how the many came to go north ... If you killed *raketamena*, we couldn't even go north; we don't have the fare. We'd just die on the way. When *raketamena* dies, we die [too]. Only those with money made it [when Malagasy Cactus died].⁴⁶

From this, one might suppose that it was generally more affluent Karembola who were producing and promoting new, historically problematic, readings of the story (notably, famine denial) in support of a pro-eradication stance. Certainly, many supporters of *raketamena* eradication did make light of the possible consequences by denying that anyone had gone hungry when Malagasy Cactus died. Just as *gasy* in the 1930s had turned to other wild foods or set to work with hoes, so, they argued, people would do the same if *raketamena* were killed. Similarly, those who transposed the memory of recent food relief back onto Malagasy Cactus history now projected this memory forward onto *raketamena* eradication, insisting that

Of course hunger is to be feared [if *raketamena* were to die] but you *vazaha* have always taken care of us when we've been hungry since ancestral times ... For two years [1992–3] we received rations (*hanem-bode*, lit. 'orphan's food')

46. Celestine, Befeha, 12/12/2002. In fact, some were transported by labour recruiters while many more walked a thousand kilometres and more to find work. Poor people such as Celestine did not necessarily reproduce the nationalist storyline unadulterated. It was quite possible for them to introduce anachronistic narrative (airborne chemical campaigns) and even new views of *vazaha* power (see below) while retaining the core element of the great famine that rang so true with their own experience and fears.

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because we couldn't plant crops. Butter-beans, maize, you gave food. If *vazaha* do kill *raketamena*, we shan't go without.⁴⁷

Others, taking a more robust line, argued that, just as only good-for-nothings had relied on Malagasy Cactus, so too only the feckless relied on *raketamena* today. And, since these *raketamena* eaters elected not to work, unlike 'worthy' villagers, it would be entirely 'their own fault if they suffered, starved when *raketamena* dies'.⁴⁸

Generally, however, the use of Malagasy Cactus narrative was less homogeneous on the pro-eradication side. Not everyone who wanted action to rid 'Madagasikara' of *raketamena* automatically engaged in famine denial, cited Malagasy Cactus as a precedent, portrayed it as invasive or thought its eradication had been good. Many informants, especially but not exclusively the elderly, argued the case against *raketamena* by highlighting all the ways in which modern pest differed from ancestral plant. Thus, Vontana, an elderly man who had known the pre-cochineal landscapes around Tranovaho and hated *raketamena* with a vengeance, noted that Malagasy Cactus and *raketamena* were rather similar in that neither plant 'stops fruiting all year round' (in contrast to the shorter seasons of other locally present *Opuntia* varieties) but that otherwise their fruit bore no comparison as a food. He remembered Malagasy Cactus as

A splendid food, rather tart but it fattened you up, a superb food, nourished people, cattle, goats. ... whereas *raketamena* is a bad food, nothing but bones and skin. It's killing people, livestock, killing the land.⁴⁹

This style of argument was particularly common among the powerful and the wealthy. These men and their wives had both the most at risk from *raketamena* invasion and the most invested in tradition. They owed their power and authority partly to their ability to deliver above-average levels of agro-pastoral productivity and partly to their manipulation of ancestor-focused rhetoric, of which conventional Malagasy Cactus history constituted a key component. Such people generally condemned *raketamena* and upheld traditional Malagasy Cactus narrative by enumerating a series of botanical and economic contrasts between the two plants:

Malagasy Cactus was awaiting the arrival of people. People found Malagasy Cactus when they came into the land. But this [*raketamena*] is a modern thing. ... *Raketamena* didn't nourish people in this land in ancestral times ... When *vazaha* obliterated Malagasy Cactus, we were annihilated because [we] ate it. But if *raketamena* died, we'd [be able to] cultivate our fields.⁵⁰

47. Lahibe, Bevazoa, 4/12/2002.

48. *Komitim-pokontany*; Marobey, 5/12/2002

49. Vontana, Tranovaho, 15/1/2003.

50. President, Soamañitse, interviewed Barabay, 23/1/2003.

Community leaders were generally reluctant to deny the great famine because it meant contradicting the core assumption of the nationalist story, namely, that Malagasy Cactus had been the ancestors' food. They preferred to deny the relevance of history to current policy decisions by invoking critical contrasts between then and now. Thus, they generally argued that *raketamena* eradication would not have the same terrible consequences for Karembola society because 'in those days there were no markets whereas nowadays markets at Soamanitse and Marovato mean you can buy food, there's money, and oxen carts to bring in food'.

In short, it was not possible to generalise about uses of Malagasy Cactus narrative in the context of contemporary struggles over *raketamena*. While many Karembola did make use of a re-narrated memory of Malagasy Cactus to argue the case for *raketamena* eradication, there was no necessary correlation between the position an individual took on *raketamena* and the type of Malagasy Cactus narrative he or she produced. Only in the broadest sense could one say that the Malagasy Cactus story had been appropriated and re-narrated to serve the conflicting interests of rich and poor.

STORYTELLING IN A 'GOVERNANCE STATE'

To analyse Malagasy Cactus narrative as argument embedded in present-day conflict over *raketamena* implies a certain instrumentality to the storytelling. It suggests that people were tailoring the story they told about the past in order to defend their interests in the present. Or as one theorist of memory puts it, 'people turn to the past to find what they need to support present interests; they find the past they want'. Instrumentality was certainly an important aspect of the 2002–03 renarrations. One reason why recollections of Malagasy Cactus came spilling unprompted into everyday conversation was because as a *vazaha* I was perceived by many Karembola as someone who might carry influence with the authorities if I could be persuaded to put their side in the *raketamena* debate. But renarration was also more complex.⁵¹ While the *raketamena* controversy had undoubtedly stimulated interest in and appropriation of Malagasy Cactus narrative, not all the narrative shifts reported in this paper can be explained in such terms. Rhetorical uses of the past were also informed by broader cultural and intellectual developments in Madagascar. These included the influence of new environmental knowledge seeping into rural communities (and memory created through this).

Take, for instance, discourse on prickly pear invasiveness, an issue that was conspicuously absent from 1980s commentary but had become pivotal to twenty-

51. On the limitations to interest-based models of memory cf. Carolyn Hamilton, *Terrific Majesty: The Powers of Shaka Zulu and the Limits of Historical Invention* (Cambridge: Harvard University Press, 1998).

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first century renarrated pasts. All Karembola interviewed in 2002–03, whether they were for or against its eradication, described *raketamena* as invasive.⁵² But while all villagers (regardless of eyewitness status) conjured up imagery of an ancestral landscape populated by Malagasy Cactus thickets, only some believed that it had been invasive too. For many informants the very idea of a Malagasy Cactus infestation was a symbolic contradiction because it implied disorder in the ancestral landscape, and the basic tenet of conventional local history was that Malagasy Cactus had been a ‘good’, ‘ancestral’ thing. Viewed as a native plant, its remembered profligacy was more often attributed by such informants to natural distribution. It was an aspect of the bounty the ancestors enjoyed. Divine Providence had created Karembola as a dryland but had endowed it with plenty of cactus to ensure that everything thrived. Consequently, where conservationists might be inclined to draw analogies between two weed species, many Karembola insisted on profoundly different interpretations of Malagasy Cactus proliferation and *raketamena* spread:

Malagasy Cactus was awaiting the arrival of people. People found Malagasy Cactus when they came into the land. ... This newcomer is different. Malagasy Cactus was there from the beginning, growing. It wasn't invasive; it was something good, there from the start. There's land where it grows, land it liked, unlike *raketamena* which spreads ...⁵³

It should be noted that when informants said that Malagasy Cactus ‘wasn't planted but simply grew’ (*tsy amboleañe fa nitiry avao*), they were not necessarily vocalising the idea that Malagasy Cactus had been a weed. In so far as informants saw Malagasy Cactus as a native species, they could hold the idea of a luxuriant monospecies *raketa* forest growing spontaneously in favoured habitats, much as a British naturalist might extoll the beech woods of the Chilterns.⁵⁴

But it was equally clear that other Karembola now ‘remembered’ Malagasy Cactus as an indigenous weed, a plant that spread without human assistance, a plant that in its day had been as troublesome as *raketamena* now was

52. The Karembola verb I translate as ‘to be invasive’ is *mandakake*. It means ‘to spread’, ‘to cover ground’ and in some contexts the English gloss ‘invasive’ might be overstated. But such a gloss is fully justified when, as with respect to *raketamena*, informants deploy the verb coupled with other descriptive terms that convey the idea of a plant with ‘bad habits’ (*fomba raty*), ‘a pest’ (*biby manahirañe*) they ‘can't remove’ (*tsy afake*). I have no record of any instance from the 1980s in which such vocabulary was applied to Malagasy Cactus.

53. President, Soamañitse, interviewed Barabay, 23/1/2003.

54. Published interpretations of Malagasy Cactus spread range from broadly biological models that see the plant as an aggressive invader (Perrier de la Bâthie, ‘Introduction à Tananarive’) to a ‘social planting’ thesis at the other extreme (Kaufmann, ‘Cactus Pastoralism’), with certain authors arguing for a more complex model that recognises the interplay of natural and social factors in plant spread. Karembola narrative offers a third interpretation: Malagasy Cactus was neither spread by people nor self-propagating alien but a divinely-appointed cornucopia in an otherwise thirsty land.

I don't know where Malagasy Cactus originated. It was something the ancestors found here. It killed the land just like *raketamena*. There's none today; it's all gone. If it [starts to] grow, it soon dies. But in the old days it was invasive, a disaster, without parallel.⁵⁵

Again, there was no necessary correlation between the position an individual took on *raketamena* and the type of Malagasy Cactus narrative he or she produced. While some informants made use of a re-narrated memory of Malagasy Cactus invasiveness to bolster arguments against *raketamena*, advocates of *raketamena* eradication could equally well contrast their patterns of spread.

Whatever the narrator's position, Malagasy Cactus retellings had been impacted by exposure to conservationist discourse. For instance, where informants in the early 1980s would have simply asserted that Malagasy Cactus had 'accompanied the ancestors from time immemorial', many now volunteered to detail the natural econiches (*toerana*) they imagined it had once preferred, much as they described typical econiches for other (truly) indigenous species of the southern bush such as *fantiolotse* (*Alluaudia procera*) or the various Euphorbia (such as *famata* and *amitse*). Constantly pressed by western or western-trained botanists for this kind of local knowledge regarding key 'hotspot' native plants, Karembola appear to have responded by incorporating the language into a traditional belief system that remembers Malagasy Cactus as a dominant member of an *ur*-form botanical Karembola.

In substituting a nominally more 'scientific' discourse for the mythic language that inflected previous renarrations, some informants portrayed Malagasy Cactus as what in equilibrium biology would be termed an old-fashioned 'climax vegetation' – that is, a vegetation that has evolved naturally for certain Karembola habitats. Listen again to Vontana:

Malagasy Cactus was only plentiful in the places where it grew. It just grew; it wasn't planted. There was lots of it, but it didn't spread. It was only found where it was found. It wasn't invasive, though there was certain terrain where it abounded, particular spots where it was plentiful.⁵⁶

There was something double-edged about these seeming borrowings from equilibrium biology. Hybridised modes of discourse could be both simultaneously supportive and subversive of conservationist positions. While renarrated memory of Malagasy Cactus as a *raketamena*-like invader endorsed conservationist discourse on the dangers of alien species (in effect conceding two instances of dramatic invasion of Karembola by prickly pears), the misappropriation of other typically conservationist idioms of econiches and balance-of-nature paradigms to sustain memory of Malagasy Cactus indigeneity was more subversive in that it placed a globally ubiquitous exotic on a par with rare, highly valued endemic

55. Tsyambone, Ngarata, 5/12/2003.

56. Vontana, Tranovaho, 15/1/2003.

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species. One might almost suspect such informants of parodying the biological nativism still favoured by conservationists in Madagascar from a non-equilibrium or 'New Ecology' perspective, were they not so obviously convinced that Malagasy Cactus had been an ancient native plant. While WWF had found local allies over its plans for *raketamena* eradication, those allies did not always deploy the potential of Malagasy Cactus history as it would.⁵⁷

It will be apparent that a social history of Malagasy Cactus remembering in Karembola between the early 1980s and the early 2000s cannot be undertaken without reference to the growing interactions that took place between local people and conservationists over these years. Karembola were not only producing diverse renarrated pasts partly in response to rumours of a pending *vazaha* intervention against *raketamena*; environmental discourse was also hybridising with local knowledge more generally to produce new language about the natural world. In this respect, the approach to knowledge advanced in this article departs fundamentally from the stark dichotomisations that currently predominate in studies of interactions between conservationists and local peoples in Madagascar. Existing approaches emphasise conflict and opposition, whereas in the case I am describing local people have also been adopting, adapting and subverting transnational environmental rhetoric, thereby lending new cadences to remembrance of Malagasy Cactus and to commentary on *raketamena*. This 'rhetorical traffic' was particularly marked in villages located on the periphery of Cap Sainte Marie Special Reserve but was evident throughout Karembola, where conservationist discourse had been disseminated into the remotest village by radio, government directives and, to a lesser extent, primary schools.⁵⁸ Nor was this a one-way process. There is evidence that WWF in 2002 was partly inhibited in its discourse on *raketamena* (at least in local contexts) by the continuing authority of traditional Malagasy Cactus narrative (see below).⁵⁹

57. For some key critiques of Clementsian climax from 'New Ecology' perspectives see R. McIntosh, 'Pluralism in Ecology', *Annual Review of Ecological Systematics* 18 (1987): 321–41; D. Botkin, *Discordant Harmonies: A 'New Ecology' for the Twenty-First Century* (New York: Oxford University Press, 1990); D. Sprugel, 'Disturbance, Equilibrium, and Environmental Variability: What is "Natural" Vegetation in a Changing Environment?', *Biological Conservation* 58 (1991): 1–18. On nativist trends in conservationist biology, see Jonah H. Peretti, 'Nativism and Nature: Rethinking Biological Invasion', *Environmental Values* 7 (1998): 183–92.

58. Although in recent decades conservation of Madagascar's unique biodiversity had figured prominently in state education, exposing younger Karembola to new ideas, school attendance and adult literacy in Karembola remained low. Wealthier rural Karembola were not necessarily more educated or better travelled: they were more likely to have appropriated conservationist discourse through the radio and their dealings with government and agency personnel than through formal schooling. The term 'elite' is probably a misnomer in the Karembola context if it leads reader to think of an educated, transnational elite such as is found in other parts of Madagascar.

59. The dichotomising perspective is pervasive in anthropological studies of conservation in Madagascar but some recent examples include Lisa L. Gezon, *Global Visions, Local Landscapes. A Political Ecology of Conservation, Conflict, and Control*

WWF was not, however, the only or even the most significant international organisation active in Karembola in 2002–03. Madagascar's transition from state socialism to neo-liberalism from the mid-1980s through the 1990s had seen the island become increasingly subject to governance by external actors (for example, World Bank and IMF), while a grave famine in 1991–92 brought international humanitarian assistance to the Malagasy Deep South on an unprecedented scale. As a result, WWF's 'Spiny Forest Androy Sub-Region' overlapped with a 'Zone of Food Insecurity' claimed by the United Nations World Food Programme (WFP). Despite a shared rhetoric on needing to integrate environment and development, these two agencies conceptualised the region and its problems in very different ways. In 2002–03 such differences spilled over into attitudes to prickly pears.⁶⁰

In contrast to WWF personnel, personnel of agencies broadly concerned with humanitarian assistance were opposed to *raketamena* eradication on account of the plant's importance in local livelihoods as an emergency resource.⁶¹ This was unsurprising since prickly pear consumption was among the multiple indicators of food security that Projet SAP reporters (*Système Alerte Précoce*/ Early Warning System) were expected to monitor on the ground. Secondly, and less predictably, such personnel were also committed to the nationalist narrative about the past. Interviewed on 29 November 2002, when he was busy organising

in *Northern Madagascar* (Plymouth, UK: AltaMira Press, 2006); Janice Harper, 'Memories of Ancestry in the Forests of Madagascar', in P. Stewart and A. Strathern (eds.) *Landscape, Memory and History: Anthropological Perspectives* (London, Pluto, 2003), pp. 89–107; Eva Keller, 'The Banana Plant and the Moon: Conservation and the Malagasy Ethos of Life in Masoala, Madagascar', *American Ethnologist* 35 (2008): 650–64. For some recent non-Madagascar ethnographies that seek to get grips with the complexity of knowledge interfaces between conservationists and local people, see James G. Carrier, 'Biography, Ecology, Political Economy: Seascape and Conflict in Jamaica', in Stewart and Strathern (eds.) *Landscape, Memory and History*, pp. 210–28; Dan Brockington, 'The Politics and Ethnography of Environmentalisms in Tanzania', *African Affairs* 105, 418 (2006): 97–116; Anna Tsing, *Friction: an Ethnography of Global Connection* (Princeton, NJ: Princeton University Press, 2005); and J. Peter Brosius, 'Endangered Forest, Endangered People: Environmentalist Representations of Indigenous Knowledge', *Human Ecology* 25 (1997): 47–69, from whom the expression 'rhetorical traffic' is borrowed.

60. On 'governance states' and the rise of what have become known as BINGOs (Big International Non-Government Organisations) see Graham Harrison, *The World Bank and Africa: the Construction of Governance States* (London: Routledge, 2004); J. Boli and G. Thomas (eds.) *Constructing World Culture: International Nongovernmental Organisations since 1875* (Stanford: Stanford UP, 1999); Paige West, *Conservation is Our Government Now: The Politics of Ecology in Papua New Guinea* (Durham and London: Duke University Press, 2006).
61. This article reports on statements made by individual staff-members at FAO, WFP, and SAP and interviewed by the author in Beloha, Ambovombe, Fort Dauphin and Antananarivo in 2002/2003. I cannot comment on official or emerging policy regarding *raketamena* within these organisations as I had no access to internally circulated reports.

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urgent supplies for thirteen communes in difficulty, Randranjafizanaka Achilson of WFP-Fort Dauphin explained how

We [WFP and WWF] once met at Tsihombe [a small town some 40 kilometres northeast of Cap Sainte Marie and administrative centre for Tsihombe District], because we were all staying at *Hotel Paradis du Sud*. They [WWF] approached us, not officially but informally, they approached WFP informally, as lead donor, about the possibility of a project for the management of *raketamena* in the context of our 'Food-for-Work' schemes. ... But WFP doesn't want to get involved in *raketa* eradication because people eat *raketa*. *Raketa* are beneficial. We knew the history of the cochineal, how people didn't want to work in plantations, how the French introduced the cochineal to destroy and kill the plant. ... how it ended in famine.⁶²

There was a marked asymmetry in the use agency personnel made of history. In their conversations about *raketamena*, staff of agencies concerned with humanitarian assistance made explicit and unprompted reference to the great famine that followed the eradication of Malagasy Cactus. Personnel of conservationist agencies, by contrast, seldom mentioned the event. It was not (as far as I could judge from my interactions with them) that the latter actively disavowed public memory of the great famine. It was rather that their narrations focused on *raketamena* in the present and made limited use of narrative around Malagasy Cactus as a context for or evidence in the *raketamena* debate. It may be that they felt unable to develop a historiography powerful enough to challenge narrative of the killing famine, a narrative to which so many local gatekeepers still subscribed. Similarly, they may have ventured to deploy renarrated memory of Malagasy Cactus invasiveness to comment on *raketamena* only to encounter the same fierce rebuttals as I faced whenever I questioned memorialisation of Malagasy Cactus as a native plant. In such circumstances, conservationists may have decided that their case against *raketamena* was better served (at least when engaging with Karembola villagers) by avoiding historical analogies altogether rather than risking alienating key local allies. To this extent, local memory of Malagasy Cactus had shaped WWF discourse on invasive species just as conservationist discourse had shaped local discourse.

WWF had, however, underestimated both the extent to which the nationalist narrative of Malagasy Cactus also existed as public memory within parallel institutions (governmental and non-governmental) where it appears to circulate largely without texts, and the degree to which these parallel bodies would use story-telling around Malagasy Cactus as a rhetorical tool in policy debates. Thus, at the United Nations Food and Agricultural Organisation (FAO) offices in Antananarivo (the capital of Madagascar), I was given to understand that the deeply entrenched association between *raketa* eradication and famine (which

62. Randranjafizanaka Achilson, Assistant de Programme PAM [WFP], interviewed at WFP regional office Fort Dauphin, 29/11/2002.

retellings of the nationalist story reproduce again and again) would probably act as a brake on its approving a funding application for action against *raketamena* that WWF had recently submitted to FAO.⁶³ ‘We know that people eat cactus at Fort Dauphin’, one Malagasy staff member commented, ‘Yes we know, we know all about Malagasy Cactus ...’⁶⁴ She cited the WWF submission on *raketamena* as an example of how ‘researchers from outside Madagascar submit proposals and make arguments that we Malagasy just know are erroneous without needing to do any research’.⁶⁵

It would be mistaken to suppose from this asymmetry in storytelling that an alliance between WWF and rural elites was balanced by an alliance between WFP and the rural poor. Certainly, in terms of formal procedures, WFP was more sensitive to the need to consult all sections of local communities than were conservationist agencies at this time. But in practice the delivery of food aid to Karembola villages in 2002–03 was deeply embedded in local power structures. Not only did many Projet SAP reporters charged with collecting primary socio-economic data find it quicker and easier to consult community leaders than to conduct house-to-house enquiries, but community leaders subsequently controlled local participation in (and benefit from) Food-for-Work programmes. In a region where state infrastructure has declined sharply and private enterprise has not filled the gap, WWF and WFP and their respective satellite agencies offered valuable resources to community leaders, a means of building followers and of advancing their own political and economic interests over those of the poor.

One outcome of the different positions WFP and WWF personnel took on *raketamena* and their failure to agree a version of the past was that local élites were left relative autonomy in the history they produced.

Production of evolutionary narrative

I have suggested that by 2002–03 commentary on the present as well as memory of the past had become imbricated in encounters between local communities and new external agents of change. Just as local discourse on Malagasy Cactus had incorporated idioms from green governmentality, so too it had drawn on experience of food aid. Traditional Malagasy Cactus narrative had bled into WFP policy on *raketamena* while the experience of humanitarian assistance had led some Karembola to revise their Malagasy Cactus history.⁶⁶

63. Mark Fenn and Namie Ratsifandihamanana, ‘Impacts sociaux et écologiques de l’expansion de la plante envahissante *Opuntia stricta* ou *Raketamena* dans le Sud. Demande financement’, n.d. [2002].

64. Interview, FAO Headquarters, Antananarivo, 7/2/2003.

65. The WWF application had been forwarded to FAO HQ in Rome, where local history (even if it was known) was unlikely to carry influence with an organisation already favourably disposed to biological control.

66. This paper reports the situation in 2003. WFP more recently has been sponsoring *Opuntia* control in the south (pers. comm. Dorothee Klaus, Director UNICEF-Madagascar

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One of the most striking developments was the greater number of Karembola who produced evolutionary narrative that represented the eradication of Malagasy Cactus as a civilising event that transformed primitive, anarchic forest-dwellers, ignorant of money and agriculture, into clean, industrious farmers settled in an open, domesticated landscape. Incorporating basic colonial tropes and metaphors about the perfectibility of Malagasy people and the improvement of Malagasy landscapes, these linear narratives, with their implicit acceptance of the ‘civilising’ mission of French colonialism, were deeply reminiscent of the modernising discourse that had inspired the original 1920s campaign against Malagasy Cactus. Not that I should like to draw an over-neat dichotomy between 1980s and early twenty-first century narrative. Even in the 1980s Malagasy Cactus had been embedded in a transformative discourse on the ancestors.⁶⁷ But no one in that first study had ventured the opinion that its eradication had been a wholly positive event.

Important political and economic changes in the intervening years had transformed Karembola discourse on economy and personhood. I was particularly struck by the way conflicting Malagasy Cactus renarrations resonated with the kind of debates over state socialism and free market solutions that figured in the elections that had brought Ravalomanana to power earlier in the year.⁶⁸ A continuing electoral process kept such debates topical during fieldwork. That narrative around Malagasy Cactus should be a popular idiom for such reflections in Karembola is perhaps hardly surprising, given the way alternative visions of economy and development – progressive and traditional – had fired 1920s colonial debates.⁶⁹

From this perspective it is interesting to compare narrational positions on *vazaha* over time. I indicated that the way *vazaha* figured in early 1980s narrative was quite complex. A story, which appeared to chime with the isolationism of the socialist era, had been an oblique way of critiquing the Antananarivo-based Marxist regime. By contrast, early twenty-first century rhetoric seemed to be more about co-opting *vazaha* than expelling, hating or blaming them, the term *vazaha* here designating the myriad international para-statal bodies that had descended on the Malagasy Deep South. New, generally more positive, attitudes to foreigners and to foreign interventions were another factor that had made the nationalist narrative of Malagasy Cactus less appealing to many Karembola than before. Yet informants were by no means agreed on what greater *vazaha* involvement meant. Some affirmed their faith in the power of a market economy and foreign investment coupled with a (largely imagined) indigenous Karembola

25/11/2010). It is indicative of WFP sensitivity about these projects that repeated requests for further information have met with no response.

67. On the multilayered symbolism of Malagasy Cactus see Middleton, ‘From Ratsiraka to Ravalomanana’.

68. Cf. Middleton, ‘From Ratsiraka to Ravalomanana’.

69. Middleton, ‘Who Killed Malagasy Cactus?’

capitalism to enrich local people and redress food insecurity. Others saw *vazaha* more as kindly providers of food aid. Reinterpreted Malagasy Cactus narrative could be made to resonate with either position, if ambivalently.

All these elements of Malagasy Cactus renarration interacted with commentary on *raketamena* but were by no means reducible to it. Or, to put it another way, the *raketamena* question, as a particular dilemma requiring choices to be made, often tapped into other great issues of the day but did not explain these broader existential concerns.

CONCLUSION

I began this paper by noting sharply contrasting opinions within the academic community on the value of oral memory as a historical resource. With respect to Malagasy Cactus, I have shown how, in contrast to the homogenous, totalising narrative I collected in the 1980s, Karembola in the early 2000s were producing a range of diverse texts. I have attributed these developments to changing political contexts, to a new invasive prickly pear, to internal social differentiation, to the spread of external agencies and conservationist discourses and to reconceptualisations of *vazaha* and the past. I have suggested that Malagasy Cactus renarrations are to be understood in terms of complex influences, working to different time scales, deploying varying narrative styles. In particular, while contemporary interest led people to remember differently, narrative was far from tailored neatly to suit present needs and certain renarrations were problematic for conservationists seeking local support.

One question might be whether differing research interests and styles of fieldwork between the early 1980s and the early 2000s affected these findings. In the first study, I relied on participant-observation to research Karembola kinship and ritual. Malagasy Cactus history was not something I actively elicited; it was narrative that everybody produced. At the time I did not probe this narrative, partly because I met no dissenters, partly because many of those recounting the story had witnessed the events it purported to describe and partly because their version was consistent with ethnography I had read before coming to the field. Moreover, the story seemed persuasive. After all Karembola is a dryland and we were eating lots of prickly pear. In 2002–03, a shorter time in the field and a more narrowly focused research topic necessarily brought greater reliance on semi-structured interviews. More pertinently, as my research interests shifted to environmental issues and my knowledge of invasive species expanded, I asked questions that would not have occurred to me before. It is therefore very possible that my questioning may have contributed to subjects remembering differently. On the other hand, many of the renarrations cited in this article were voiced spontaneously by villagers and can be seen as expressing their own agenda and concerns. My own sense is that, while interactivity is a fundamental and

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intractable dimension of fieldwork, the key point is that, owing to the temporal coincidence between the spread of raketamena in Karembole and the highlighting of invasive species in global discourse, both I and my informants had new ideas and experiences to work with.

Here precisely the data point to an interesting question. Does the adoption of new knowledge, or new ways of framing old knowledge to address new interests, make memory *less* reliable (because the past is renarrated or ‘distorted’ in the light of current concerns) or *more* reliable (because serious contemporary challenges stimulate narrators to look more critically at ‘official’ narrative they have inherited from the past)?

The temptation when faced with patently ongoing revisions of popular narrative of the kind documented in this article is to fall back on well-worn clichés about remembering and forgetting being ‘thus locked together in a complicated web’ as one version of the past competes with another⁷⁰, or about memory telling us more about people’s values and objectives in the present than anything useful about the past.

I would take a different position. I agree that variable and discordant stories of Malagasy Cactus need to be located within social histories of remembering. Indeed, I hope I have shown how memories of Malagasy Cactus have been (partly) shaped by politico-economic interests in the present and why it is important to ask how people use particular views of the past in interactions today. But it also seems to me possible to recognise the reconstructive nature of memory without either reducing memory to current use or accepting the modern dictum that all versions of the past are or should be seen as equally valid retellings of a complex event.

‘Truth’ is of course a difficult word that carries highly moral connotations. Something may be ‘true’ in many senses, even if the details reported do not correspond exactly with all of the facts. There is much to be gained by following the approach adopted, for instance, by Luise White who, in her book *Speaking with Vampires*, argues that seemingly fanciful memories about vampires can in fact be more truthful than academic histories because they tell us about how Africans themselves perceived colonialism. She suggests further that such beliefs became factually critical in that they impacted materially on colonialism.⁷¹ Proceeding along similar lines, I suggested that anachronistic stories about chemical-spraying planes express truths about Karembole perceptions of *vazaha*. (In a region where a ploughed field is still a rare sight and where many households rely for at least part of the year on small cavities in the limestone rock for their water supply, planes remain even now iconic of *vazaha* modernity, a subject of endless speculation in the field.) We can also see these imaginative retellings as capturing something of the scale of devastation, the extraordinary

70. Rubie S. Watson, ‘Introduction’, *Memory, History and Opposition*, p. 18.

71. Luise White, *Speaking with Vampires: Rumor and History in Colonial Africa* (Berkeley: University of California Press, 2000).

nature of the event, the overwhelming sense of colonial power Karembola felt at this onslaught on their traditional way of life. Better understandings of past subjectivities can in turn inform current debates on invasive species by giving some sense of what it feels to be an ordinary person whose familiar landscape is transformed by chemical or biological control. But the fact remains that, as a report of the method deployed to eradicate Malagasy Cactus, this narrative element is factually incorrect.

What is clear is that one cannot say that overall that one or other version bears a closer relation to what, after Janice Haaken, we might term 'the concrete facticity of events'.⁷² On some points the earlier 1980s narrative is more reliable. Malagasy Cactus *was* predated by an insect. Chemicals and planes were not involved. A serious famine in Karembola *did* follow shortly after its eradication, though – revisionists have a point – it is possible to argue that the loss of Malagasy Cactus was by no means its only cause.⁷³ On other points, the early twenty-first century renarrations offer fresh and important insights. They open up prickly pear invasiveness for popular debate within local communities. They also disclose the fact of Malagasy Cactus survival (at infinitely reduced levels), bringing the case study into line with scientific models of biological invasion. Both these issues remained screened off in 1980s narrative.⁷⁴

At the same time there are issues in Malagasy Cactus historiography that neither the traditional 'nationalist' narrative nor the revisionist narratives address. Most obviously, the 1980s narrative glosses over important social differentiation in how Karembola in the 1920s and 1930s experienced the death of Malagasy Cactus by narrating it as a collective trauma. While it is beyond the scope of this present essay to report the archival evidence, it is clear that the plant's eradication had uneven impacts both within communities and between communities, depending partly on access to other resources, itself a function of locality, rank, gender and age. This is not to say that the narrative of flight, death and pauperisation I collected in the 1980s was 'false' memory. Archival records confirm the historical authenticity of such narrative as *generic* statements. But the idea of a *collective* trauma, in the sense that all Karembola suffered and suffered in equal measure, *is* open to challenge. If differential impacts were not revealed in narrative produced in the early 1980s, it was partly because the narrators were the survivors (or their descendants) or, more precisely, since those who escaped to more fertile parts of the island were also survivors, those who survived and subsequently prospered in their homeland. We might say that, by

72. Janice Haaken, *Pillar of Salt: Gender, Memory, and the Perils of Looking Back* (London: Free Association, 1998), p. 118.

73. See e.g. Georges Petit, 'Quelques aspects de la géographie végétale et des cultures à Madagascar', *Bulletin Association Géographes Français* 77 (1934): 37–9.

74. Informants in the 1980s so invariably described Malagasy Cactus as 'dead' (*mate*) that I had believed the plant to be extinct, a misconception that much scientific literature does little to correct: see e.g. M. Julien and M. Griffiths, *Biological Control of Weeds. A World Catalogue of Agents and Their Target Weeds* (Wallingford: CAB International, 1999), p. 49.

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the early 1980s, Karembola had forged a collective identity around a partly appropriated and essentially depersonalised trauma.⁷⁵ Those who died or who ‘went away, never to return’ were mostly nameless. The story had few individuated characters. It was organised around a collective ‘we’ in which Karembola past and present were merged.

Early twenty-first century narrative does little to address this lacuna. While discord around *raketamena* in the present seems to have opened up the intellectual space to question the long-standing idea of the death of Malagasy Cactus as a collective trauma, and to speculate on the kind of intracommunity struggles that might (but only might) have once attended Malagasy Cactus, there was still a striking lack of personal detail in the accounts. Even narrators like Celestine who expressed their fears by drawing links between their present reliance on *raketamena* and what happened when Malagasy Cactus died, spoke in broad historical sweeps and were unable to provide particularised histories for named victims of the famine. They may be the destitute of Karembola society now but they too are the descendants of those who survived then.

Some of the data suggest interesting connections between individual autobiographical memory and collective memory. Anthropologist Benedict Anderson proposes that the presence of a narrative is an index of people having forgotten the original formative experience. Having to ‘have already forgotten’ tragedies of which one needs unceasingly to be ‘reminded’, he argues, is a characteristic device in the construction of nationalism.⁷⁶ Looking at communal narrative about Malagasy Cactus from the 1980s, the highly impersonal narration is suggestive of Anderson’s argument. This really was a stylised, homogenised, dare I say fossilised, social or collective memory that had lost the immediacy of original experience. Yet the extremely diverse and highly individualistic memory of twenty years later suggests a more complicated trajectory between memory and narrative than that Anderson outlines, as narrators like Zomana zigzagged back from communal narrative to recover original experience, finding all kinds of fresh connections between the present and the past. It is now possible to see that, while collective storytelling may have dominated public narrative in the 1980s, individual autobiographical memory of original experience survived, latent, private, unvoiced. As anthropologist Maurice Bloch has argued, it is important not to overlook the distinction between collective or social memory and individual autobiographical memory. The latter may retain elements that collective memory has ‘forgotten’, making them available decades later as a resource for local knowledge to ‘recover and reuse’.⁷⁷

75. On the homogenising processes involved in the construction of an ‘imagined community, imagined self’, see Lambek and Antze, ‘Introduction’, p. xx.

76. Benedict Anderson, *Imagined Communities: reflections on the origins and spread of nationalism* (London: Verso, 1991), p. 203.

77. Maurice Bloch, ‘Autobiographical memory and the historical memory of the more distant past’, *How We Think They Think: Anthropological Approaches to Cognition, Memory, and Literacy* (Boulder, Colorado: Westview Press, 1998), pp. 114–27.

I suggested that the sight of *raketamena* prompted Zomana to remember (articulate) things about Malagasy Cactus he had never articulated before. Another instant of active re-remembering occurred when Vontana, reminiscing in his little timber house, observed:

You know, there was something unusual about Malagasy Cactus. The fruits grew one on top of the other, at times leaves also appeared in the chains.⁷⁸

Eighteen months earlier, while working in the Paris Muséum National d'Histoire Naturelle, I had found an unpublished sketch of Malagasy Cactus recording precisely this pattern of growth. Made by colonial botanist Perrier de la Bâthie, an accompanying note in his hand describes how these curious multi-headed chains eventually grew so heavy that they caused the branch to droop.⁷⁹ This example (where a detail retained by individual memory is corroborated by independent evidence) suggests that by careful triangulation it might be possible to move beyond a view that draws on memory to explore contested values and contested places to one that asks objective questions about plant biology and landscape history.⁸⁰

Such a methodology stands in stark opposition to approaches which advocate the collection of oral memory primarily to gain insights into sociocultural perceptions and values, a 'sense', a 'feel', a 'flavour' of what events meant to the people involved. Historian Pier Larson expressly warns that 'mining social memory for nuggets of evidentiary "raw material", once proposed as the proper treatment of oral tradition, is fraught with problems and contradictions'.⁸¹ Of course social memory embodies its own interpretations and meanings that historians must take seriously in their professional reconstructions. But there is equal danger in an overly holistic approach. Evidence presented here suggests that it is precisely the odd detail that has *not* been integrated into coherent narrative that may be more reliable whereas the 'feel', the 'sense' to the story – precisely because it is a *story* – may be the least reliable.

In a context where more powerful actors are beginning to use Malagasy Cactus history with a view to framing conservationist policy for practical interventions in alien species in Madagascar, it would be particularly untimely to pass over local oral evidence in favour of written documents.⁸² The challenge rather is to

78. Vontana, Tranovaho, 15/1/2003.

79. Herbarium, Muséum national d'histoire naturelle, Paris, Madagascar *Opuntia* 2714.

80. See e.g. Fairhead and Leach, *Misreading the African Landscape*.

81. Pier Larson, *History and Memory in the Age of Enslavement, Becoming Merina in Highland Madagascar, 1770–1822* (Oxford: James Currey, 2000), p. 287. For similar strictures, see Mark Hobart (ed.) *An Anthropological Critique of Development: the Growth of Ignorance* (London: Routledge, 1993); Roy Ellen and Holly Harris, 'Introduction', in R. Ellen, P. Parkes and A. Bicker (eds.) *Indigenous Environmental Knowledge and its Transformations. Critical Anthropological Perspectives* (London & New York: Routledge, 2000), pp. 1–33.

82. See e.g. Bingelli, 'Cactaceae', which attempts to develop a Malagasy Cactus historiography for conservationist use from a limited number of secondary sources of varying quality.

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elaborate the relationship between history and memory by developing critical methodologies that allow a systematic inclusion of oral memory (and forgetting) as a source for the past.⁸³ This means placing memory in relation to present contexts and to the culturally determined forms in which narrative is expressed, including local ideas about testimony and truth. It also means paying closer attention to the articulation of social and individual memory than historians and anthropologists are generally minded to pay.

ACKNOWLEDGEMENTS.

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83. A. Appadurai, 'The past as a scarce resource', *Man* 6, 2 (1981): 10–19; Philippe Joutard, *Ces voix qui nous viennent du passé* (Paris: Hachette, 1983); Luisa Passerini, *Fascism in Popular Memory: the Cultural Experience of the Turin Working Class* (Cambridge: Cambridge University Press, 1987).



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The Aesthetics of the Volga and National Narratives in Russia

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ABSTRACT

Simon Schama's provocative work, *Landscape and Memory*, reveals the role that nature has historically played in shaping culture. Although much of Schama's focus predates the twentieth century, this essay on the historical development of the Volga River extends up to the present. The thesis, however, of demonstrating the continuity of earlier nature myths with the present, is an ongoing theme in this recounting of the effects of modernisation on the Volga while a nationalist rhetoric touts its aesthetic qualities. These aesthetics – symbolised through literary and artistic representations of Mother Volga – contributed to an emerging national narrative in Russia in the nineteenth century. This national identity is articulated through a rich visual culture that includes the work of Russian artists such as Isaac Levitan and Ilya Repin with their landscape portrayals of the Volga.

As a result, the river assumed an iconic status which enhanced the story of its transformation. By the 1930s, the Volga underwent a major engineering project that rerouted part of the river into the Moscow Volga Canal. Construction of the project took four years, during which an array of journals, photographic essays and newspaper articles chronicled progress, celebrating this symbolic foray into the modern nation-state. Overlooking the beginning of the project were two towering statues of Lenin and Stalin, reinforcing the nationalist attributes of the project.

In the 1930s Soviet Union, literature is rife with references to the conquest of nature in service of socialism. Harnessing rivers was especially attractive to Stalin in his push to modernise. But the Moscow Volga Canal was not just a showpiece – although in some instances the architecture rivaled the newly built metro stations – as it connected Moscow to the Caspian Sea, provided hydropower and supplied drinking water to Moscow.

In conclusion, this essay will expand on nature's integral role in shaping culture with twentieth-century examples of how the Volga River continued to serve a nationalist discourse for a country in the throes of modernisation. The

story of the Moscow Volga Canal is also a reminder that nature is often the repository to which nations look when crafting their identity.

KEYWORDS

River studies, nationalism, national identity, art

So threatening was her mien, that Vazuza was frightened, declared
herself to be Volga's younger sister, and besought Volga to take
her in her arms and bear her to the Caspian Sea

'Vazuza and Volga', Russian Fairy tale.

Oh, Volga! After so many years
I greet you again!
I've changed a lot, but you are the same.
So light, so majestic, as you used to be.

Nekrasov, 19th century.

She [Volga] is beautiful, like the sea
Full of water
As Motherland, free, wide, deep, strong

Vasily Lebedev-Kumach, 1937

Immortalised in Russian folktales, poetry, song and art, the Volga River has been personified and deified, contributing to a rich mythology that has shaped Russian culture. Dating back to medieval times, chroniclers characterised the Volga as an early actor in the Russian landscape, carving a path to the Caspian Sea. By the time of Ivan IV in the 1500s, the Volga was a force to be subdued in the retelling of Ivan's final victory over the Mongols. The river remained a constant in the Russian narrative as the Don Cossack Stenka Rezin paid homage to the river for his early successes against the Muscovite state. Adding to the mythology surrounding the river were groups such as the *burlaki* or Russian bargehaulers. As their lives intersected with the river, the Volga represented both freedom and oppression for this marginalised class, contributing to the social construct of an identity that was at times celebrated, lamented and feared. Building on a rich repository of folklore, mythology and prose the Volga entered into a new discourse from the nineteenth century. Part of the broader phenomenon of nationalism, the valorisation and idealisation of the Volga and the surrounding Russian landscape began to inform an emerging

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national narrative and the earlier rich symbolism of the ‘Mother Volga’ was associated with a new-found national identity. Integral to a growing national ethos, Volga imagery, whether in visual or print culture, persisted up to the twentieth century when the Bolsheviks assumed power. Within the confines of the Soviet Union, representations of ‘Mother Volga’ were appropriated as the Soviets sought to conquer nature whilst modernising the nation. As dams were built and canals dug, earlier images of the river’s strength were captured as evidence of the Soviets’ mastery over nature. At the same time, the Soviets enlisted the Volga’s iconic status in that its properties – free, wide, deep and strong – mirrored the nation. Still, for the Volga, the twentieth century marked a turning point as the river was dammed, rerouted and exploited for hydro-power – all in the drive to modernise and overcome a ‘backward past’.¹

Despite the changes, earlier mythologies endured as part of the collective social memory, influencing an identity that transcended the local, whether during the eras of Imperial Russia or the Soviet Union. Nature myths, in particular, persisted in the historical memory although their role had changed. For example, with modernization, the Soviet Union manipulated this memory through the language of conquest. In earlier times, the Volga was celebrated for both its aesthetics and utilitarian value; the two portrayals often existed simultaneously. With the advent of modernity, the tension between aesthetics and use widened as grand sweeping projects to generate power and improve navigation, such as the Moscow-Volga Canal, were launched. Still, the memory of the river’s beneficence and magnitude remained as the rhetoric of Stalinism, exhorting the country to modernise, depended on the conquest of resources such as the Volga River. Even after the perceived ‘conquest’ the Volga River still contributed to a historical Russian ideal of nature captured in Socialist Realist art and other portrayals of the Russian affinity with nature. While the engineered river – a product of modernisation – no longer possessed earlier attributes that evoked fear and an admiration born of awe, the Volga remained central to the ongoing dialogue and negotiation between memory and identity.²

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1. Scholarship in the study of memory and the reciprocal relationship between nature and memory is growing, including works by Simon Schama, *Landscape and Memory* (New York: Alfred A. Knopf, 1995); Denis Cosgrove, *Social Formation and Symbolic Landscape* (Madison: University of Wisconsin Press, 1984, 1998) p. 11; Martin Warnke, *Political Landscape: The Art History of Nature* (London: Reaktion Books, 1994); Kenneth Robert Olwig, *Landscape Nature and the Body Politic: From Britain’s Renaissance to America’s New World* (Madison: University of Wisconsin Press, 2002); Gina Crandell, *Nature Pictorialized* (Baltimore: Johns Hopkins University, 1993). For a groundbreaking work on Russian attitudes toward their native landscape, see Christopher Ely, *This Meager Nature: Landscape and National Identity in Imperial Russia* (DeKalb: University of Illinois Press, 2002).
 2. Several general histories of the Soviets’ early efforts to industrialise and modernise include Sheila Fitzpatrick, *The Russian Revolution*, (Oxford: Oxford University Press, 1982; 2nd ed. 1994); Moshe Lewin, *The Soviet Century* (London: Verso, 2005); Stephen Kotkin, *Magnetic Mountain: Stalinism as a Civilization* (Berkeley: University of California Press, 1995).

The following discussion will examine the role of the Volga River in shaping a national narrative in Russia and, later, the Soviet Union. Beginning in the medieval period the Volga's role in Russian folklore, stories of conquest and oppression will be explored. That the river continued to influence identity in the nineteenth century through the growth of nationalism and an emergent Russian national consciousness is evidenced through a survey of art, poetry and prose. When the Bolsheviks assumed power in the twentieth century, the mission became one of modernisation and the Volga was a resource to be mastered. The following case study of the Moscow-Volga Canal illuminates this predilection. The discussion concludes that, despite the Soviet belief in modernisation and the concomitant exploitation of resources, the Volga as national icon was integral to Soviet discourse – enhancing their achievements while offering a unique Russian imagery to celebrate in the ongoing effort to craft identity.

As Russia's major waterway and the largest river in Europe, with a length of 3,700 kilometres, the Volga will persist in the collective memory as it courses through an area extending from its headwaters in the Valday Hills (located northwest of Moscow) and empties near Astrakhan. Located completely within Russia's present-day borders, the river runs through various landscapes – from boreal forests to desert basins – reflecting the diversity of the country itself. With 151,000 rivers, brooks and streams emptying into the Volga River, the watershed covers an area of 1,450 million square kilometres or eight per cent of the country's territory. Of the 2,600 rivers to flow into the Volga, the principal tributaries include the Kama, Samara, Oka and Vetluga Rivers. The terrain of the river basin ranges from a forested zone of southern taiga in the north to forest-steppe to the arid Delta area in the south. Similar to the Mississippi, the habitat supported by the river includes 74 species of fish that contribute to a large commercial fishing industry. The Volga is also divided into three parts; the upper, middle and lower. The Upper Volga begins at the source near the village of Volgaverkhovye in the Valday Hills and continues to the Rybinsk Dam, specifically at the confluence of the Sheksna River. Below the Rybinsk Dam, the Middle Volga flows to the site of the dam that created the Kuibyshev reservoir where the Lower Volga begins and subsequently empties into the Caspian Sea.

Because of the river's centrality, references to it can be found as early as the medieval period. In *The Primary Chronicle* called by its authors *The Tale of Bygone Years*, a semi-historical text written around 1040 to 1118 CE, folklore about the river included stories such as the tale of the river sisters, Vazuza and Volga and their rivalry in reaching the Caspian Sea first. Still another one, 'The Metamorphosis of the Dnieper, the Volga, and the Dvina', explains how the three transformed from earlier human forms to rivers. The Volga becomes further etched in the historical memory as local legends about Ivan IV (the Terrible)'s victories over the Tatar Khanates of Kazan and Astrakhan, on the

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middle and lower Volga in the 1550s, declared that he whipped the Volga into submission as his men almost drowned trying to cross the river. According to the story, Ivan called out to the river,

‘Don’t be stupid, river, calm down, or it’ll be worse for you!’ The Volga did not abate, but raged worse than before. ‘Send the executioner here!’ yelled the tsar, ‘I’ll teach you a lesson!’ The executioner arrived, a mighty man – and the tsar ordered him to whip the river with his knout, to teach it not to rebel against the tsar and his army. The executioner took his knout, rolled up the sleeves of his red shirt, took a run and, as he whipped the Volga, the blood sprayed upwards a yard in height and a bloody wound appeared in the water, as thick as a finger. The waves in the river went calmer, but the tsar yelled, ‘Show no mercy, strike harder!’³

After one more flogging, the river was subdued and all Ivan’s men successfully crossed the Volga. But the legend does not end here as the river is remembered further.

And now, they say, at the spot where the crossing took place, you can see three bloody wounds on the Volga, especially on a summer evening, if you look into the sun when it is setting behind the hills.⁴

After the Mongols were routed, the Volga continued to play a role, with ballads such as the popular ‘Stenka Razin’ which popularised the story of the Don Cossack who led insurgents from 1667 to 1669. In the ballad, written by Dmitri Sadovnikov in the late nineteenth century, Stenka Razin is immortalised through his gift to the Volga in throwing his beautiful Persian bride in the river. The ballad contains the following well-known verse in which he makes-reference to Mother Volga; an epithet that persists into the twenty-first century

Volga, Volga, Mother Volga
Wide and deep beneath the sun,
You have never seen such a present
From the Cossacks of the Don.⁵

By the late nineteenth century, the Volga, often depicted with other tangible and intangible symbols such as the Russian Orthodox Church, the Russian village and a spaciousness reflecting the boundlessness of the steppes, was celebrated as part of an emerging national narrative. Prior to the nineteenth

3. *The Russian Primary Chronicle*, Laurentian text, trans. Samuel Hazzard Cross and Olgerd P. Sherbowitz-Wetzor (Cambridge: The Mediaeval Academy of America, 1953). For a classic on Russian folklore, see W.R.S. Ralston, *Russian Folk-Tales* (London: Smith, Elder & Co, 1873). 2002) p. 82; N.Ya. Aristov’s Tales, ‘The Punishment of the Volga’, in Maureen Perrie, *The Image of Ivan the Terrible in Russian Folklore* (Cambridge: Cambridge University Press, 1987) p. 177.

4. *Ibid.* pp. 177–178.

5. Ralston, *Russian Folk-Tales*, p. 213.

century, Russians associated a landscape aesthetic with Western European vistas, especially Italy and the Alps. Their own landscapes, such as the Volga River winding through the unbroken steppe country, were considered inferior. Others outside Russia shared the sentiment: an 1874 travel booklet, *A Trip Up the Volga to the Fair of Nijni-Novgorod*, by a British tourist comments upon the diversity of the Russian population, which he calls ‘picturesque’, in contrast to the landscape. In his words,

Russia is in this respect the most picturesque of countries – picturesque not certainly in its natural scenery, which consists for the most part of monotonous and endless plains, but in the races which people them.⁶

The supposed lack of a landscape aesthetic paralleled the absence of a nationalism of the sort that was emerging throughout Western Europe. European intellectuals iterated this view, while other critics prompted Russian artists to examine their own surroundings as art in Russia became ‘an integral component of national culture’.⁷

So change was occurring. In the Russian Imperial Academy of Arts in St. Petersburg, the premier institution for established and budding artists, a revolt was staged when a small group of art students left the Academy in the early 1860s and formed their own group called the Society of Wandering Exhibitions. Members of the group were called the *peredvizhniki* or the Wanderers. Known for their emphasis on Russian life, ‘they [the Wanderers] intended to reconnect their art with their homeland’ through portrayals of the Russian people, Russian landscapes, and Russian history. The Wanderers, however, were only the beginning, as Russian intellectuals and artists throughout the nineteenth century debated the place of art in an emergent national culture. Many, such as Ivan Kramskoy and Vladimir Stasov urged artists to serve the larger society. The Volga was part of the national awakening, as artists that were products of the break with the Imperial Academy, such as Isaak Levitan and Ilya Repin, portrayed the river in scenes illustrating Russian everyday life. Levitan, a contemporary of Anton Chekhov, is considered by many Russians to be the greatest landscape artist of his time. To Chekhov, his work showed a spiritual response to the natural world. During Soviet times, critics were divided over Levitan’s legacy. Some, such as Fedorov-Davydov, upheld Levitan’s landscapes for their ‘lyricism and boundless love for one’s native land’ while others during Stalin’s

6. See Ely, *This Meager Nature*; H.A. Munhro-Butler-Johnstone, *A Trip Up the Volga to the Fair of Nijni-Novgorod* (Philadelphia: Porter & Coates, 1875) p. 14.

7. According to the Russian historian, Geoffrey Hosking, ‘neither the imperial state nor Orthodox Church had succeeded in projecting an image of Russianness or generating a narrative of Russia’s history and traditions which was capable of appealing to Russians across a wide spectrum’. *Russia and the Russians: A History* (Cambridge: Belknap Press, 2001) p. 344. Elizabeth Kridl Valkenier, *Ilya Repin and the World of Russian Art* (New York: Columbia University Press, 1990) p. 103.

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era dismissed the imagery in his art as ‘nationalistic trifles’. But both critics and fans recognised the nationalist element in his art.⁸

Levitan contributed to the evolving culture of national landscape painting through several works featuring the Volga. His paintings were made in the 1880s while he summered on the banks of the Volga in the village of Plyoss, located along the Middle Volga. The town, known locally as the ‘pearl of the Volga’, lies at the centre of the Golden Ring, about seventy kilometers north-east of Ivanovo. In one of Levitan’s works, ‘Golden Evening’ (1889), he portrays the village of Plyoss with the symbolic onion-shaped dome of the Russian Orthodox Church overseeing a terrain of trees broken by bush vegetation, all on the banks of the Volga. The river is the main actor in the painting as it conveys a sense of boundlessness and immense space; a spaciousness that would be associated with a unique Russian identity as an increasing number of scholars have acknowledged. The placement of the Russian Orthodox Church in the painting, perched above the Volga, succeeds in capturing two national icons as Levitan evokes the spiritual response that Chekhov recognised. Complementing the spiritual response is a sense of timelessness and the quietude associated with village life, prompting one critic to remark, ‘Do not the slow, tranquil flow of the big river and the sunset haze of a summer day conjure up another image, the image of a country blessed with peace, happiness and plenty?’⁹

But Levitan did more than master the pastoral idyll; he was also a master at unifying what were often conflicting themes, as seen in his 1889 work, ‘After

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8. Elena Duzs, ‘Russian Art in Search of Identity’, in *Russia and Western Civilization: Cultural and Historical Encounters* (Armonk: M.E. Sharpe, 2003) pp. 177–210, p. 182; Valkenier, *Ilya Repin*; *Mastera iskusstv ob iskusstve*, vol. 7, (Moscow, 1970) as quoted in *Levitan* (Leningrad: Aurora Art Publishers, 1981). For a standard text on Russian landscape aesthetics and national identity, see Ely, *This Meager Nature* while another addition to the field is Tricia Cusack, *Riverscapes and National Identities* (Syracuse: Syracuse University Press, 2010). For a general discussion of Russian art, I consulted George Heard Hamilton, *The Art and Architecture of Russia* (New Haven: Yale University Press, 1954; 3rd ed. 1983); Orlando Figes, *Natasha’s Dance: A Cultural History of Russia* (New York: Henry Holt and Company, 2002); Rosalind P. Blakesley and Susan E. Reid, eds. *Russian Art and the West: A Century of Dialogue in Painting, Architecture and the Decorative Arts* (DeKalb: Northern Illinois Press University Press, 2007). In addition, several visits were made to many Russian art galleries and museums including the Tretyakov Gallery in Moscow, the Hermitage and State Museum in St. Petersburg. All three include works by Levitan, Savrasov and Repin.
 9. The literature on the characterisation of space in Russian landscape painting includes Jeremy Smith, ed. *Beyond the Limits: The Concept of Space in Russian History and Culture* (Helsinki: Studia Historica, 1999); Katharina Hansen Love, *The Evolution of Space in Russian Literature: A Spatial Reading of 19th and 20th Century Narrative Literature* (Amsterdam: Rodopi, 1994); Evengy Dobrenko and Eric Naiman, eds. *The Landscape of Stalinism: The Art and Ideology of Soviet Space* (Seattle: University of Washington Press, 2003); and Jane Burbank, ed. *Russian Empire: Space, People, Power, 1700–1930* (Bloomington: Indiana University Press, 2007). *Levitan*, 13. In recent years, the village of Plyoss has become an upscale tourist spot often frequented by Prime Minister Dmitry Medvedev, *The Moscow Times*, 21 October 2012.

the Rain'. In this painting, he again shows the sleepy village of Plyoss on the banks of the Volga but this time with fishing boats and a distant steamship on the river. While Levitan continues to display spaciousness, the Volga in this painting is a working river; its utilitarian value, whether through transportation or as a resource provider, is the predominant theme. The Volga as highway is even more pronounced in his 1891 painting, 'Fresh Wind Volga' in which barge ships are centrally represented. In most of Levitan's paintings, however, the balance between the river's aesthetics and utilitarian use is more even. For example, in 'Evening on the Volga', (1888) three fishing boats are visible on the shore but they are dwarfed by the river's grandeur, illustrated through its width in conjunction with an endless sky and the steppes that are seen on the other side. The colours in combination with a peaceful evening setting all contribute to an image that is serene and peaceful; an association with the Russian village and countryside.

Another well-known Russian artist who painted scenes of Russian village life and the Volga is Alexski Savrasov. Claimed by many as Russia's greatest landscape painter, Savrasov is best known for his work, 'The Rooks Have Returned', painted in 1871 during his years living by the Volga River, first in Yaroslavl on the Upper Volga and later in Nizhny Novgorod on the Middle Volga. The location, however, of this specific painting is by the Ipatiev Monastery in Kostroma, another city that is part of the Golden Ring, located by the confluence of the Volga and Kostroma Rivers, near the boundary between the Upper and Middle Volga and approximately 290 kilometres north-east of Moscow. In this classic work, Savrasov's mastery at capturing the everyday in Russian life without diminishing its significance is evident as he places the rooks in detail at the forefront with images of a Russian village in the background. In his painting, 'End of Summer on the Volga River' (1873), Savrasov presents an agricultural scene with threshed piles of grain dotting a farm field. The Volga and an immense sky are off in the distance. The painting offers a sense of space alongside a rural setting that, taken together, provide a coherent image of the Russian landscape, while the Volga serves as the unifying theme in this national narrative. The agricultural idyll that Savrasov depicts will be celebrated again in Socialist Realist art.

All of the Russian artwork discussed thus far was produced during the last half of the nineteenth century. Contributing to a coherent image of the Russian landscape, these landscape portraits were always part of the narrative regarding identity and one of the unifying themes in this narrative was the Volga River. In the works of Levitan and Savrasov, the Volga's role is two-fold. The river as highway contributes to commerce while its beauty and immensity offer sustenance for the Russian soul. A departure from the celebratory and traditional riverscapes, however, is another Russian painting where the Volga is a major actor but in a very different sense. In the provocative work of Ilya Repin, 'The Volga Barge Haulers', (1873), the Volga is part oppressor. Interestingly, this

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work was painted in a very different landscape in the Lower Volga Basin, near the village of Shiriaev Burak, with the closest city being Stavropol. Repin's painting is considered a classic in the pantheon of Russian art and, as one of the leading works of the *peredvizhniki*, is credited by many as the inaugural work of the realist school in Russia. In the painting, which is studied primarily for its realist depiction of nineteenth century Russian life, the river is seen as an oppressor in the lives of the eight *burlaki*, who with leather harnesses strapped across their chests, struggle to pull a barge, full of goods, upstream. In large part a social and political statement, as the *burlaki* were often depicted in a different light – one that emphasised a life of banditry and dissoluteness – the painting captures the oppression and despair of the *burlaki*. This group of labourers, already known in Russian folklore, assumed further status with Repin's portrayal. Repin took two years to complete the masterpiece, in which critics often comment upon the quiet dignity of the men's faces despite the appearance of a barely subsistence existence. The river in this painting is immense and Repin's use of light, in which he 'caught the broad white light of the Volga region', communicates the spaciousness of the steppe, so the river, steppe and sky appear as one. While the vista in the painting is never-ending, the portrayal of the *burlaki* gives the work a bleakness also overlaid on the landscape. The river, or nature, is viewed here as overpowering, while later depictions of Russian resources in the Soviet era revisit the theme of nature's power but with the Soviet goal of taming and 'bridling' their river. Further, during the Soviet era, the worker's face is depicted as contented as he is 'joyful' in his labour. One of the first posters to present the worker in this light resulted from work on the Dnieper River project, showing a smiling labourer, with arm raised, standing in front of the river and dam – a stark contrast to the wretched lives of the *burlaki*.¹⁰

Paralleling the art work of the mid- to late-nineteenth century, were folksongs and literary works memorialising the Russian landscape and the Volga River. The classic folksong, 'Volga Boatman', reached a larger audience after Milyi Balakinev's trip down the Volga River. He was one of several Russian musicians seeking to learn more about Russian folk music – all part of the drive to reveal Russian national identity. Complementing these efforts was the work of well-known poet, N.A. Nekrasov, who grew up in a village near the Volga and remembered the river with these lines:

10. Valkenier, *Ilya Repin*, p. 39; Sternin, *Ily Repin*. For a discussion of landscape art in socialist realist art, see Mark Bassin, 'The Greening of Utopia: Nature, Social Vision, and Landscape Art in Stalinist Russia', in *Architectures of Russian Identity: 1500 to the Present*, James Cracraft and Daniel Rowland, eds. (Ithaca: Cornell University Press, 2003) pp. 150–172. Hamilton, *Art and Architecture of Russia*, p. 383. Alexei Savrasov also depicted the *burlaki* in his work, 'Burlaki on the Volga' (1873). For a discussion of Soviet portrayals of workers and the Dnieper River project poster, see Victoria E. Bonnell, *Iconography of Power: Soviet Political Posters under Lenin and Stalin* (Berkeley: University of California Press, 1997) Plate I.14.

Oh, Volga! ... My cradle!
 I wonder if anybody loved you as much as I do.
 Alone, at early dawn,
 When everything in this world was sleeping
 And scarlet shine was gliding on the dark-blue waves,
 I ran away to the native river.

But then Nekrasov recalled the burlaki and their harsh lives on the river:

Go out to the bank of the Volga: whose moan
 Is heard above the greatest Russian river?
 This groan we call a 'song'-
 Barge-haulers go by tow-path!
 Oh Volga, Volga! Even in full-watered spring
 You water the field not as much as
 Great national grief overfilled our land.
 Where there's a nation – there is a groan.

To Nekrasov, the Volga is nurturing, sustaining the imagery of 'Mother Volga', but also part of the tyranny associated with Imperial Russia. Whether nurturer or tyrant, pastoral or utilitarian, however, the river remained integral to an emergent national consciousness.¹¹

Adding to the new-found appreciation of the Russian landscape, the Volga River was giving rise to another activity – tourism. By the 1870s, around 500 steamboats travelled up and down the river and the steamships that provided cargo were also beginning to serve tourists. Earlier perceptions of the river as being unsafe and a haven for bandits changed with the increasing commonness of river travel by the mid-nineteenth century. Excursions on the river offered a respite from city life for many of Russia's emerging middle-class and, like excursions on rivers such as the Mississippi, the experience cultivated a growing national identity. In travel brochures promoting Volga River cruises, comparisons were made with other major rivers of the world, such as the Rhine, Nile and Jordan. This phenomenon was not unique to the Volga, as numerous travel brochures on the Mississippi and Rhine, in particular, celebrated the uniqueness of their rivers, evincing a national pride. The Rhine River, however, was often the standard to which Russian promoters compared their river. In the Volga travel brochures, often written by French authors, the Volga was pronounced more serene than its German counterpart.¹²

Thus, when Russia entered the twentieth century, the Volga, as part of the larger Russian landscape, contributed to an emergent national narrative that

11. Hosking, *Russia and the Russians*, pp. 345–6; Nikolai Nekrasov, *Lyric Poetry* (Moscow: Detskaia Literature, 1976) pp. 81–89.

12. Guido Hausmann, 'Historic Memory and Culture in the Russian Empire and Soviet Union', International Colloquium, June 25–28, 2007; Thomas W. Knox, *The Boy Travellers in the Russian Empire* (New York: Harper & Brothers, 1887) p. 284; Christopher Ely, 'The Origins of Russian Scenery: Volga River Tourism and Russian Landscape Aesthetics', *Slavic Review*, 62 (2003): 666–682.

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established Russia as unique and distinct from other nations; possessing a charm that was at least equal to the country's European neighbors. Crossing multiple landscapes, integrating habitat from boreal forest to semi-desert to desert, the Volga unified differing populations as the river facilitated transcendence of local identities to the national. The cultural production of art, song, poetry and prose valorising the Volga are evidence of this transcendence through a pride of place and singularity articulated in the emergent national narrative. This narrative and its inherent assumptions remained in place throughout the twentieth century despite a language shift that incorporated the communist preoccupation with struggle and conquest instead of awe. Indeed, the awe now resulted from conquest. (Later Socialist Realist portraits of the landscape revisited the themes of Russian pastoralism.) Once entrenched, the Bolsheviks through Trotsky, Lenin, Gorky, Lunarchsky and others saw Russian nature and its conquest as a continuation of the old narrative. Conquest was achieved through the construction of massive hydroelectric and navigation projects, collective farms and, eventually, space programmes. But before the conquest occurred, Trotsky and others articulated this new relationship with nature in which the machine and the subsequent modernisation of Russia would replace the 'backwardness' abhorred by the Communist leaders. Projects, such as the construction of the Moscow-Volga Canal, would be products and examples of this new national narrative.¹³

In 1924, Trotsky's writings on *Literature and Revolution* were published, discussing the place of art during the revolutionary period and what he perceived as the changed relation between art and nature. According to Trotsky, 'nature will become more "artificial"'. He predicts a world where

Man will occupy himself with re-registering mountains and rivers, and will earnestly and repeatedly make improvements in nature. In the end, he will have rebuilt the earth ...

Through the machine, man in Socialist society will command nature in its entirety, with its grouse and sturgeons ... He will change the course of the rivers, and he will lay down rules for the oceans.¹⁴

In his concluding paragraphs, he goes further in his assessment of nature, speculating, 'The effort to conquer poverty, hunger, want in all its forms, that is, to conquer nature, will be the dominant tendency for decades to come.'¹⁵

13. Similar arguments regarding an emergent nationalist ethos can be found for example in Alan Confino's work, *The Nation as a Local Metaphor: Heimat, National Memory and the German Empire, 1871–1918* (Chapel Hill: University of North Carolina Press, 1997) in which he convincingly argues that only through the symbol of the *heimat*, roughly translated as homeland, and its integration of certain aspects of German nature, was a common identity for the German Empire solidified.

14. Leon Trotsky, *Literature and Revolution* (New York: Russell & Russell, 1957, first published 1924) pp. 251–252

15. *Ibid.* p. 153.

In these writings, Trotsky set the stage for a new perspective on nature and, ultimately, rivers that dominated Soviet thinking. His ideas influenced others such as Maxim Gorky who, in a letter to students in Irkutsk, reminded them:

We must cultivate our whole land like a garden, drain swamps, bring water to arid deserts, straighten and deepen rivers, lay millions of kilometers of road, and clean out our huge forests, the work is awaiting us, and it demands extensive scientific knowledge.¹⁶

In further support of Trotsky's ideas, Gorky writes in *At the End of the Earth*, 'everywhere you see how the cunning hand of man creates order on earth ...'¹⁷

Implicit in Trotsky's and Gorky's writings is the role of science and reason in achieving the new order where nature is an actor to be conquered. Prompting the drive to modernise was a blind faith and utopian idealism about the potential of reason and science to improve the world. Initially in the 1920s, the decade immediately following the revolution, the belief in science was paired with a willingness to experiment in various utopian ideals. By the 1930s, however, with Stalin firmly in power, the overarching goal was to industrialise as quickly as possible in order to catch up with the West. The belief in science and technology was still behind the goal of industrialisation but the willingness to explore different approaches to modernity was gone. Stalin's five-year plans were the blueprints for industrialisation and in the 1930s the world looked favourably upon the Soviet Union as the country enjoyed immense success. According to one scholar, the 'Soviet model became a civilizational mirage'. Even if critics dismissed the bloated statistics of the Soviets who claimed production output in some areas reached 157 per cent and 'river-borne freight' went from 9.3 million tons in 1924 to 69.9 million tons in 1936, the country was industrialising quickly. But regardless of whether Lenin's openness to experiment or Stalin's single-minded five-year plans prevailed, the rhetoric of conquest and struggle governed discussions of nature.¹⁸

Offering a glimpse of the changed discourse about nature and the role of rivers in Soviet iconography was the hydroelectric project of Dneprostroi. One of the first and largest major projects to be attempted in the first five-year plan, Dneprostroi included a hydroelectric station, dam and factories on the Dnieper River. With the dam, the project also improved navigation, something that various tsars since Catherine the Great had tried unsuccessfully to do.

16. *USSR in Construction*, No. 4, 1937, n.p.

17. As quoted in *USSR in Construction*, No. 4, 1937, n.p.

18. Alexander Chubarov, *Russia's Bitter Path to Modernity: A History of the Soviet and Post-Soviet Eras* (New York: Continuum, 2001) p. 103; Johann P. Arnason, 'Communism and Modernity', in *Multiple Modernities*, Shmuel N. Eisenstadt, ed. (New Brunswick: Transaction Publishers, 2002) p. 81; *USSR in Construction*, No. 9, 1937, n.p.; Fitzpatrick, *The Russian Revolution*, p. 151. For an in-depth discussion on the favourable views Americans held regarding Russian industrialisation in the 1930s, see David C. Engerman, 'Modernization from the Other Shore: American Observers and the Costs of Soviet Economic Development', *American Historical Review* 105/2 (April 2000): 383–416.

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In constructing Dneprostroi, the rhetoric became a benchmark for later hydro-projects as well as offering insights into the 1930s mentality regarding nature. Several themes were included in the rhetoric including the promise of the machine to transform nature, as seen in the achievement of electrification, one of Lenin's most cherished goals; the delivery of the historical goal of navigation; and the speed of the undertaking. Another similarity between Dneprostroi and the Moscow-Volga Canal was that earlier efforts by the tsars to undertake the projects had failed. Soviet rhetoric emphasised their success in light of earlier tsars' failures. In the Soviet Union's promotional publication, *USSR in Construction*, a 1934 issue was devoted to the success of Dneprostroi. Within the article, the authors touted the dam by saying, 'The waters of the Dnieper have been bridled by a giant dam, amazing in its beauty and magnificence.' Stalin called the project, 'the great historical construction'.¹⁹

Dneprostroi also attracted world-wide attention and Margaret Bourke-White, the first American photographer to be allowed in the country after Stalin's rise, recorded the construction in 1931. Her work, *Eyes on Russia*, includes photographs touting the machine aesthetic and the submission of the river. While she credits American engineers with this victory, she contributes to the mythology of conquest when she comments,

The granite banks of the Dnieper are the scene of a mighty struggle between man and the majestic passage to the sea. Even in the low-water period the angry turbulence of the river is prophetic of the raging torrents which burst out in time of flood, and a constant warning to the engineers who seek to harness the gigantic force of the waters ...

Thus, despite very different political ideologies, the belief in modernisation, the faith in science and technology and the subsequent transformation of nature, was shared by American and Soviet leaders. The result, the language of conquest when referring to rivers, was universally shared by nations committed to industrialisation and modernisation.²⁰

The construction of large-scale projects, whether hydropower or collective farms, was also supported by the constitution of the Soviet Union, specifically Article Six, which stated: 'The land, mineral deposits, waters, forests, mills, factories, mines, railways, water and air transport ... are state property, that is, the property of the whole people.' Russia's natural resources became an intrinsic part of the new socialist order as the notion of communalism extended

19. *USSR in Construction*, No. 3, 1934, n.p. There are also several general works that discuss Dneprostroi, including Anne D. Rassweiler, *The Generation of Power: The History of Dneprostroi* (New York: Oxford University Press, 1988); and Paul R. Josephson, *Industrialized Nature: Brute Force Technology and the Transformation of the Natural World* (Washington: Island Press, 2002). The descriptions of Dneprostroi echo American sentiments when praising American engineering accomplishments. See David Nye, *American Technological Sublime* (Cambridge: Massachusetts Institute of Technology Press, 1996).

20. Margaret Bourke-White, *Eyes on Russia* (New York: Simon and Schuster, 1931) p. 85.

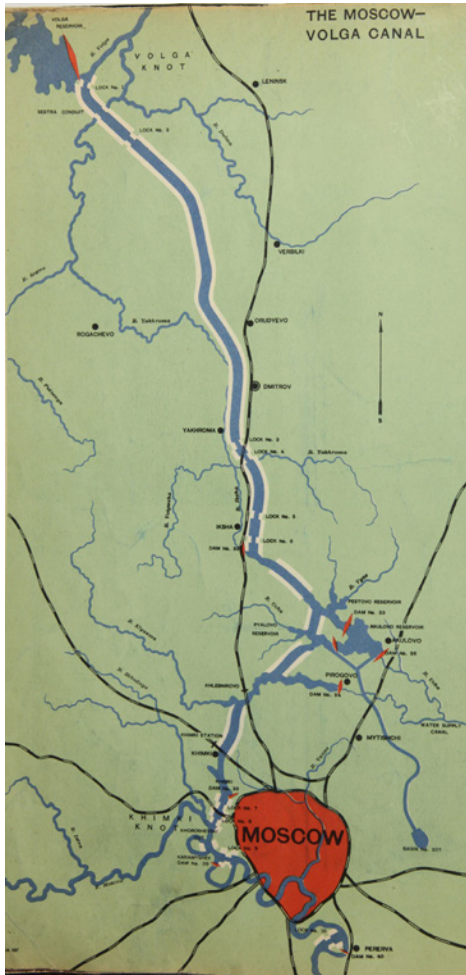


Figure 1. Route of the Moscow–Volga Canal. *USSR in Construction* Feb. 1938, p. 2. University of Saskatchewan Archives and Special Collections.

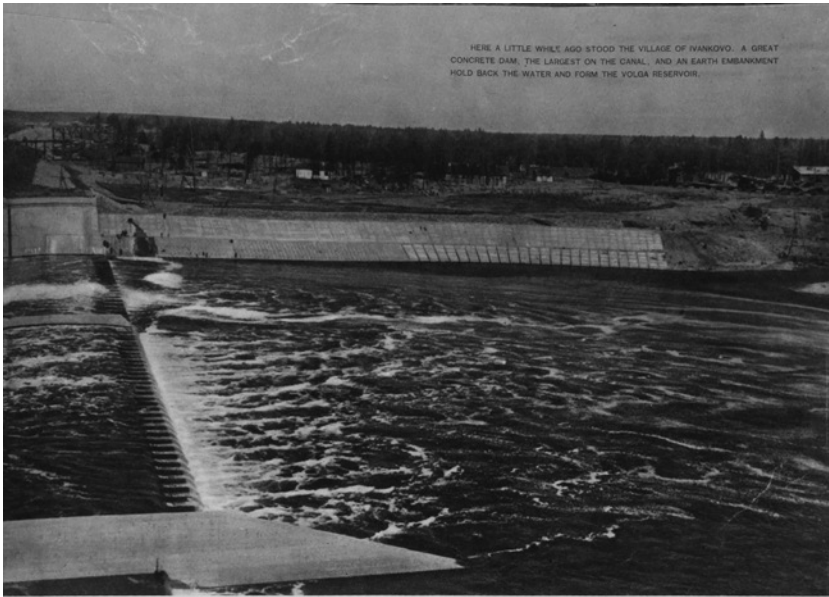
outward. The idea of communal ownership of the country's natural resources was a radical departure from the imperial government. In a 1937 issue of the *USSR in Construction*, commemorating the twentieth anniversary of the Soviet Union, the articles discuss the success of scientific socialism including numerous references to the country's abundant natural resources. One section, entitled 'Waters of the USSR', boasts of the country's vast river resources with 'twice the length of navigable riverways as in the U.S.' and goes on to cite the Moscow–Volga Canal when informing readers that the Soviets 'are covering our immense country by a network of new roads and canals'. Accompanying the self-congratulatory text are pictures and statistics about the new canals with claims to have doubled the length of navigable routes; and the familiar military references include statements that the government has 'tamed and peopled the wide stretches of their country'. Harnessing the waterways, under the auspices of Article Six, embodied Stalin's declaration that the 'country has been transformed from an agrar-

ian into an industrial country'.²¹

Building upon the success of Dneprstroï and the ongoing transformation into an industrial nation, Stalin included the construction of the Moscow–Volga

21. *USSR in Construction*, No. 9, 1937. Communal ownership of resources came under attack with Marshall Goldman's work, *Environmental Pollution in the Soviet Union: The Spoils of Progress* (Cambridge: MIT Press, 1972). He was one of the first to question the environmental costs of state ownership of resources.

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HERE A LITTLE WHILE AGO STOOD THE VILLAGE OF IVANKOVO. A GREAT CONCRETE DAM, THE LARGEST ON THE CANAL, AND AN EARTH EMBANKMENT HOLD BACK THE WATER AND FORM THE VOLGA RESERVOIR.

HERE THE FOAMING VOLGA MAKES A FALL OF 17.8 METRES.

THE VOLGA WATER KEEPS THROUGH THE SLICES, FORMING AND HISsing AS IT FALLS AND GLEAMING IN THE SUN WITH ALL THE COLOURS OF THE RAINBOW.
THE VOLGA HERE FLOWS IN A NEW CHANNEL. IT WAS BUILT ON DRY LAND, AS WAS THE DAM ON WHICH WE NOW STAND WATCHING THE MAGNIFICENT FALL OF THE WATER. THE RIVER WAS THEN DIVERTED INTO THE NEW CHANNEL.
TWO TWIN CRANES PERCHED ON THE DAM RAISE AND LOWER THE STEEL GATES OF THE SLICES. THE CONCRETE DAM IS CONTINUED BY THE EARTH EMBANKMENT WHICH STRETCHES A DISTANCE OF OVER EIGHT KILOMETRES.

AN ELECTRIC POWER STATION WITH A CAPACITY OF 35,000 KW., USING THE ARTIFICIAL FALL OF THE WATER, IS SINGLY CONCEALED WITHIN THE CONCRETE DAM LIKE A SNAIL IN ITS SHELL.
OUR BOAT CASTS OFF, THE PASSENGERS CROWD THE DECK. WE ARE ABOUT TO ENTER THE CANAL....

HIGH-VOLTAGE TRANSFORMING STATION.



Figure 2. Reservoir and generating station at Ivankovo. *USSR in Construction* Feb. 1938, p. 7. University of Saskatchewan Archives and Special Collections.

Canal in his second five-year plan, from 1933 to 1937. The canal – a long-standing dream of past tsars – had been considered since the reign of Peter the Great, who wanted to connect Moscow to the Volga by a waterway allowing shipping from Moscow to the mouth of the Volga River. After Peter's death, although smaller projects to improve navigation were started under Nicholas I, the initial plan was not raised again until the late 1920s under Joseph Stalin. Under Stalin, the canal served two purposes: first, to supply domestic and industrial water to a growing Moscow population; and second, to accommodate shipping from Moscow to the Volga. But more importantly, the canal, along with other signature projects, such as the Moscow Metro system, became a symbol of Soviet ambition and promise. Marked by a frenetic pace to catch up with the West, these years saw nature and landscapes transformed, as projects such as the White Sea-Baltic Sea Canal (Belomorkanal), Magnitogorsk and, of course, Dneprostroi ushered the Soviet Union into modernity. But the historical memory of nature's greatness was always invoked, as when, upon completion of the canal, journalists boasted they had 'constrained Mother Volga'.²²

By the 1930s, the need to supply drinking water to Moscow's burgeoning population was critical. The available sources of drinking water were limited and yet, during the first five-year plan, the Moscow region population increased by 3.5 million. It was a dire situation: one Soviet source claimed that only 42 per cent of the houses in Moscow were connected to running water. Along with the need for drinking water was the growing demand for water to supply factories in the Moscow region. Underlying these obvious reasons, however, were other considerations. In discussions during the plenary meeting of the Central Committee of the Communist Party in January 1931, party leaders cited the necessity to serve the population in accordance with Socialist ideas of development. Drawing comparisons between the capitalistic city and its lack of planning, resulting in squalid conditions for the workers, Soviet leaders touted the Socialist city – a planned city with an adequate water supply. Central Committee members, in considering Moscow's growth, demanded 'more organisation to develop a serious and scientifically proven plan for the

22. A. Komarovskiy, *The Moscow-Volga Canal* (Moscow: Foreign Languages Publishing House, 1939) p. 6; *USSR in Construction*, No. 2, 1938, n.p.; Richard Stites, *Revolutionary Dreams: Utopian Vision and Experimental Life in the Russian Revolution* (New York: Oxford University Press, 1989) p. 244; Chubarov, *Russia's Bitter Path to Modernity*, p. 104. For general histories of the canal, I have relied upon a number of sources including archival material at the Dmitrov History and Regional Studies Museum, Museum of the Canal Called Moscow, oral history interviews, newspaper clippings from *Pravda*, *USSR in Construction*, *Ploshchad Mira* and *Vesti Dubny* and publications that include N. Fedorov, *Byla li tachka u Ministra?* (Dmitrov: SPAS, 1997). For general histories of the Stalin era that include the Moscow Volga Canal, see Timothy J. Colton, *Moscow: Governing the Socialist Metropolis* (Cambridge: Harvard University Press, 1995); Nobu Shimotomai, *Moscow Under Stalinist Rule, 1931–34* (New York: St. Martin's Press, 1991); Paul R. Josephson, *Industrialized Nature: Brute Force Technology and the Transformation of the Natural World* (Washington, D.C.: Island Press, 2002); and Karl Schlogel, *Moscow, 1937* (Cambridge: Polity Press, 2012).

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enlargement and construction in Moscow'. Holistic planners, guided by their vision of a Socialist future, they also emphasised the importance of parks and adequate roads within the growing city. During the same meeting, the Central Committee charged Moscow organisers to start the design of the canal at once, as the immediate goal was for Moscow residents to have twice the amount of water available for consumption by 1935. This was in keeping with plans for Moscow's continued growth, with an expanded water supply paramount for factories as well as residents.²³

But the Moscow-Volga Canal also addressed a problem that became more evident during the first five-year plan. As the Soviet planners sought to industrialise, they identified infrastructure weaknesses, with the need for additional transportation routes becoming more pronounced. Upon completion of the Moscow-Volga Canal, and later the Volga-Don Canal, Moscow would become a port with access to five seas – Caspian, Black, Azov, Baltic and White. Thus, in 1932 when Stalin began construction of the Moscow-Volga Canal, sufficient rail capacity did not exist to meet the needs of what would be a major industrialised nation. Thus the canal was built to supplement the railroads and also provide a cheaper form of transportation.²⁴

But the Moscow-Volga Canal did more than increase Moscow's water supply and improve transportation; it fed Stalin's appetite for grandiosity. Prior to the Moscow-Volga project, Stalin's first major water project was the Belomorkanal, also known as the White Sea Canal, which connected the White Sea to Baltic ports. To Stalin and other leaders of the industrialised world, damming rivers and building canals spoke well of leadership and ability. For the Soviet Union, the achievement was even more significant when the projects were ones at which the tsars had failed. According to one source, the canal was an opportunity for Stalin to promote himself and demonstrate that there 'was nothing that communism could not do'. Canals in general interested Stalin as they 'seized his imagination ... and it sometimes seemed as if he wanted to dig them almost indiscriminately'.²⁵ But canals were also part

23. *Pravda*, 17 June 1931, p. 3; Communist Party of the Soviet Union in Resolutions and Decisions of the Congresses, Conference and Plenum of the Central Committee (1898–1953). Vol. 2 (1925–1953), 7th Ed. (M: Gospolitizdat, 1953). (This work includes the Plenum of the Central Committee of Communist Party, June 11–15, 1931, pp. 637–69.) In a 1934 Russian promotional piece, the author cites the Plenum discussions and the five-year plans, in which he contrasts the inadequate water and sewage facilities allowed for the workers under the tsarist system and, in discussing the expected improved Moscow water supply, states: 'The standard of living in any city can be conveniently measured by the amount of water consumed.' M.I. Levidov, *Moscow: Past, Present, Future* (Moscow: Vneshtorgisdat, 1934) p. 92.

24. Fedorov, *Byla li tachka u Ministra?; USSR in Construction?*, Interview with Curator Galina Ivanovna Yurchenko, Muzei Kanala imeni Moskv, March 15, 2011; *USSR in Construction*, 1937, No. 7, n.p.

25. Ann Applebaum, *GULAG: A History* (New York: Anchor Books, 2003) pp. 55–56. For an excellent discussion of the Belomorkanal, see Cynthia Ruder, *Making History for Stalin: The*



Figure 3. Heroic statues line the canal. *USSR in Construction* Feb. 1938, pp. 36 and 15. University of Saskatchewan Archives and Special Collections.

of the Stalinist landscape, with its monumental structures often interspersed with neo-classic architecture. Breaking with the tradition of functional design, the Moscow-Volga Canal would later boast locks and dams that ‘were so architecturally designed as to serve as a fitting monument that would tell future generations of the heroic work of the tens of thousands of workers engaged in its construction’. At this time, architecture, in keeping with the utopian Socialist vision, was to deliver Stalin’s promise of a ‘*svetloe budushchee*’ or radiant future. For example, one lock has a replica of one of Christopher Columbus’ ships, while another is modelled after the design of a diesel ship. In the case of Columbus’ ship, the reproduction symbolised the Soviet entry into a new world, akin to Columbus’ journey five centuries earlier. Other statues line the canal with names like ‘ship and human body’ or ‘water and health’.

Story of the Belomar Canal (Gainesville: University Press of Florida, 1998).

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Complementing the canal construction, waterfront space in Moscow and along the Volga was improved and later Soviet promotional brochures show beaches, excursions and other recreational activities in this space – realising the ambitions of the 1931 plenary meeting. In a further tribute to the Socialist zeal that prompted the project, two colossal statues of Stalin and Lenin were built and placed on the banks of the Sea of Moscow where the canal begins. The statues were reported to be the third largest in the Soviet Union, although today only Lenin's statue remains. (Under Khrushchev's tenure, Stalin's statue was removed.) These innovations – canal aesthetics and recreational opportunities – coupled with the actual work of rerouting the river, all lent an unprecedented scale and complexity to the project which, in the words of one scholar, 'received even more accolades if they seemed to flout nature'. The ability to manipulate the river, which was the core of the project, became especially significant given the earlier doomed efforts by the imperial government.²⁶

In tandem with the monumentalism seen in the built environment, new ways to describe the undertaking arose. Like Dneprstroï (as well as U.S. projects in the 1930s) military references were used to underline the project's enormity. For example, one party official described hydraulic success by saying, 'The water does not want to go into the Moskva River, so we have to force it to go. As we know, there are no fortresses Bolsheviks cannot storm.' The overseer of the project, Genrikh Yagoda, who was also head of the People's Commissariat of Internal Affairs (NKVD), remarked that 'an engineer on the construction is a commander who holds full responsibility for his front'. Statistical measurements also dominated published accounts about the canal. For example, in a 1938 issue of *The USSR in Construction* devoted to the Moscow-Volga Canal, one page quantified the project by instancing the use of '37 times the amount of concrete required at the Dnieper hydroelectric plant for a project that included 11 locks, 3 concrete dams, 8 earth dams, 7 spillways, 6 bottom outlets, 5 pumping stations, 8 hydroelectric stations, 7 railway bridges, 12 viaducts or in all 240 "magnificent engineering works"'. One Soviet engineer in his account of the project said that, 'In order to make the waters of the Volga flow into the Moscow River, it was necessary to excavate approximately 262,000,000 cu. yards of earth and pour about 7,000,000 tons of concrete'. In his litany of statistics, he even cited the number of railroad cars, tractors, trucks, steam shovels, telephone and telegraph lines that were used. Another testimony to

26. Catherine Cooke, 'Beauty as Route to the "Radiant Future": Responses of Soviet Architecture', *Journal of Design History*, 10/2, *Design, Stalin and the Thaw* (1997): 137–140, published by Oxford University Press on behalf of *Design History*. In this article, Cooke challenges the prevailing critical view of Soviet architects by many U.S. academics. She challenges Colton and others by looking past the judgment of 'superficial and dismissive historians' and studying the periodicals of the time. Her criticism of these scholars includes their lack of knowledge of architecture. A. Komarovsky, *The Moscow-Volga Canal*, p. 18; Colton, *Moscow*, p. 326. Another discussion of the canal architecture can be found in Schlogel, *Moscow, 1937*.

the project's accomplishments, one shared with Dneprstroi, was the speed with which the canal was built. Numerous publications emphasised the completion of a project of this magnitude in record time. The herculean task of industrialising Russia and overcoming the remnants of a 'backward' nation could not happen quickly enough.²⁷

Thus, in response to the need for an improved domestic and industrial water supply and transportation of goods from the Caspian Sea to Moscow, the construction of the Moscow-Volga Canal commenced in 1932. The canal was to extend from Moscow to Dubna for 128 kilometres. To place the canal in the larger context of Soviet society during this period, Soviet planners, working closely with Stalin, were also beginning the Moscow metro system – another 'national' achievement in Stalin's five-year plans – and planning the never-completed Palace of Soviets. All three initiatives illustrate the temper of the times, when projects seemed out of proportion to everyday life. The goals of industrialisation and subsequent modernisation were occurring at an accelerated pace, heightening the sense of achievement. In Nikita Krushchev's memoirs, he recalls,

It was a period of feverish activity, and stupendous progress was made in short time. A hundred important projects seemed to be proceeding all at once: the construction of a ball-bearing factory, the enlargement of the Dux Number One aviation factory, the installation of oil, gas and electricity plants, the excavation of the Moscow-Volga Canal, to name just a few.

Or in the words of one Russian novelist,

Moscow, highly strung in every respect, to the extent of convulsions, like all the U.S.S.R., kept up a soldier's pace in the military march to socialism, in order to conquer. History in those years was not flowing, but was being constructed, even as Russia was being constructed.

In the midst of all this activity, rivers and their reconstruction were some of the most noteworthy projects, as novelists penned works such as *The Volga Falls to the Caspian Sea*. Under the tutelage of Maxim Gorky, authors produced a 'waterworks library' valorising this chapter in Soviet history. The Moscow-Volga Canal, once again drafting the Volga into service, exemplified this spirit. In planning the Moscow-Volga Canal, contemporary accounts reveal that engineers initially considered several routes and, when the earlier-mentioned plenary session of the Central Committee resolved to build the canal on 15 June 1931, the route had still not been determined.²⁸

27. Colton, *Moscow*, pp. 326–27; Yagoda, *Na SHTURM Trassy*, n.p., Dmitrov History and Regional Studies Museum; *USSR in Construction*, No. 2, 1938, n.p.; Komarovskiy, *Moscow-Volga Canal*, pp. 11–14.

28. Chubarov, *Russia's Bitter Path to Modernity*, p. 106. Nikita Khrushchev, *Khrushchev Remembers* (New York: Bantam Books, 1970) p. 60; Boris Pilnyak, *The Volga Falls to the Caspian Sea* (New York: Cosmopolitan Book Corporation, 1931) p. 21; Frank Westerman, *Engineers of the Soul: The Grandiose Propaganda of Stalin's Russia* (New York: The

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After deciding a route in 1932, Stalin and his advisers relied on the labour of thousands of prisoners to build the canal. The prisoners were housed in Dmitlag, a camp located in Dmitrov, an old Russian city part way between Moscow and present-day Dubna. Depending upon prison labour was not new: prisoners constructed the Belomorkanal Canal, overseen by many of the same Soviet leaders involved in the construction of the Moscow-Volga Canal. In both instances the official goal was ‘reforging’ or ‘remaking’ the convicts with the end result of a new Soviet citizen or *sozidayustchee chelovek*. The reality, however, revealed in archival sources, shows countless abuses in the inhumane use of forced labour.²⁹ The stories surrounding the construction of the Moscow-Volga Canal, which officially began in 1932, are legend to many Russians, as the prisoners who actually built the canal had often been imprisoned for minor ‘political crimes’ such as the telling of an anecdote. (The majority of prisoners were men and women who committed minor crimes.) Nevertheless, these prisoners worked at breakneck speed, often with wheelbarrows and shovels, to finish the canal and completed it in four years and eight months. Large numbers of workers were required to complete the project so quickly. In this part of the history of the canal – despite Soviet efforts to distinguish the two – workers resembled Repin’s burlaki, with the river as oppressor. One famous story recounts workers being ordered to take wheelbarrows filled with dirt into the icy waters of the Volga as one of the coffer dams had broken; not surprisingly none of the workers survived. Yet more labourers always seemed to be available and in a 1934 letter, the NKVD head Genrikh Yagoda, requested 15,000 to 20,000 prisoners, saying they ‘were needed urgently in order to finish the Moscow-Volga Canal’. In a 1935 account of the project and its labour force, Firin noted that shovel operators alone included 10,000 former criminals. Despite high

Overlook Press, 2011) p. 129; Plenum of the Central Committee of Communist Party, June 11–15, 1931, 637–69.

29. Sheila Fitzpatrick in one of her classical works, *Everyday Stalinism*, makes the argument that some prisoners actually were inspired by the rhetoric of work’s potential to redeem the individual, although she does not dismiss the brutishness of the camps. See *Everyday Stalinism, Ordinary Life in Extraordinary times: Soviet Russia in the 1930s* (Oxford: Oxford University Press, 1999) pp. 23, 75–95. Applebaum’s earlier cited work, *GULAG*, offers a thorough overview of the use of forced labour throughout Stalin’s tenure and compares the gulags with the forced labour during the German Nazi regime. A different perspective comes from Curator Galina Yurchenko who recounted one famous story retold by Russians regarding Stalin’s treatment of the workers, whereby once, when Stalin was visiting the canal and saw one of the workers in boots unfit to wear, Stalin ordered the supervisor to have new boots on the worker within a few hours or the supervisor would lose his job. The story ends with the worker receiving new boots. Yurchenko Oral Interview, March 15, 2011. Sergei Golitsyn’s, *Memoirs of a Survivor: The Golitsyn Family in Stalin’s Russia* (London: Reportage Press, 2008) pp. 503–504 recalls that, when working on the Moscow-Volga canal, Dmitlag was better than other camps because of its proximity to Moscow. See Golitsyn, *Memoirs of a Survivor*, p. 509.

mortality rates, with the steady influx of labour the first ships travelled up the canal to Moscow in 1937.³⁰

During construction, project leaders produced a dense visual and print culture for internal and external audiences, with the two often overlapping. Internally, workers were inundated with posters, newsletters and in-house cultural events as a means to encourage production and ‘redeem’ labour. Externally the work was publicised through journals, books and newsletters, to develop a sense of nationalism, all under the auspices of building world socialism. Touting an undertaking this large crystallised the citizenry’s sense of belonging to a great experiment and, ultimately, a great nation. In the words of one historian, ‘In the 1930s, the people of the USSR were engaged in a grand historical endeavor called building socialism’. The visual culture contributed to this sense of belonging. Artists were drafted into service to promote the Moscow-Volga Canal and the many images they produced included representations of the merits of industrialisation, portrayals of the nobility and dignity of the worker and drawings of well-known political figures. The person responsible for most of this was Syemyen Firin, the chief administrator of the prison camp, Dmitlag. Credit is due to Firin, who followed up on Maxim Gorky’s discovery of Gleb Kun, noticed by Gorky when the artist worked on the Belomorkanal. According to Firin, Gorky became involved with the construction of the Belomorkanal as he advocated art as being one of the main tools for ‘reforging’ man or *perekovka*. As a result, Kun later became the principal artist of the Moscow-Volga Canal and the head of the Dmitlag Artists’ Studio, which existed for three years.³¹

As chief artist, Kun produced many works – in traditional Soviet style – celebrating the Moscow-Volga Canal with sketches of women and men labourers as well as drawings of the dams and actual construction. His work personalised and dignified the work of the labourer while depicting moments in the construction of the canal. Further, in 1937 when the first ships went up the canal, all along the banks were Kun’s portraits of Soviet leaders. Despite

30. *Belomorstoi*, 1936, Dmitrov History and Regional Studies Museum. Wheelbarrows used by the labourers (also known as *zeks*) are on display at the Muzei Kanala imeni Moskvyy, as are other tools considered obsolete even by 1930s standards. Another excellent introduction to the gulag system and its evolution under Stalin’s tenure can be found in Moscow’s Muzei Gulaga. The museum hosts an excellent collection of historical maps, political posters, news clippings, camp artefacts and artwork from camp survivors. American journalists also reported on the issue of forced labour: William Henry Chamberlain, journalist for the *Christian Science Monitor*, commented that the canal was being built by ‘class enemies’, of which he suspected there would always be plenty as long as canals needed building. See William Henry Chamberlain, *Russia’s Iron Age* (Boston: Little, Brown and Company, 1934) p. 64.

31. Stephen Kotkin, *Magnetic Mountain: Stalinism as a Civilization* (Berkeley: University of California Press, 1995) p. 355; Gorky expressed many of his views regarding his Belomorkanal experience in *Belomar: An Account of the Construction of the New Canal between the White Sea and the Baltic Sea* (New York, 1935); Fedorov, *Byla li Tachka u Ministra?* p. 51.

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his talent and contributions, Kun and many of his colleagues were executed later that same year while many other workers were released. The official reason for the executions was their role in a proposed plot to assassinate Nikolai Yezhov, the head of the NKVD, succeeding Yagoda, who was also purged during this period. The reality was probably the expense of moving many of the workers to the next site.³²

Complementing the artwork of the canal, Firin also established a professional theatre and orchestra and organised a committee of talented journalists, writers and poets. In the arena of journalism, the accomplished Roman Tihomirov and several of his colleagues published the journal, *Na Shtyrm trassy*, with Firin as the editor. The publication included photographs and testimonials from visitors to the site. In one issue, there were pictures of the orchestra playing while the men and women are involved in different tasks. The caption says, 'The orchestra is helping the workers build fast and joyfully', an ongoing theme in the visual and print culture. The promotion of the heroic labourer, remembered in the image of the stakhanovite, was another facet in the five-year plan projects and there was data to support claims about workers' output. As with other project accolades, statistics were employed to illustrate the productivity of individual workers and their units. For example, one bricklayer on the canal laid 40,578 bricks or the equivalent of eight railroad cars of bricks during one shift. In the canal publications, such as *Moskva-Volgastroi*, articles appeared regularly featuring the quotas exceeded by units in tasks such as laying concrete and excavations, for example. Various posters decorated the halls where the workers ate and slept, with slogans celebrating work and individual work productivity. For example, at Dmitlag, one poster has a picture of Stalin with his arm upraised, exhorting, 'By Stalin's Glue – Life has Become More Joyful and When you Live with Joy, Work is Quicker and Easier.' Below this banner, the worker is prompted, 'Stalinska – like the Stakhanovite workers let's widen the front of the Stakhanovite Movement.' The imagery of the heroic worker fused with military references gave the sense of waging a war in the cause of

32. While news of the executions was published in a number of places, the American magazine, *Time*, also reported on Yagoda's demise and the release of 55,000 'sinners' or workers who had been 'sent to the purgatory of digging immense canals under the lash of OGPU overseers'. The freed workers received a ticket home, a bonus ranging from 100 to 500 rubles, and 'an honorary badge proclaiming the redemption'. The workers had laboured on the Moscow-Volga Canal and the Baltic-White Sea canal. *Time*, 26 July 1937. Yagoda's fate is recounted by Aleksandr I. Solzhenitsyn, with Yagoda begging Stalin for mercy and exclaiming, 'I appeal to you! For you I built two great canals!' See Solzhenitsyn, *The Gulag Archipelago, 1918–1956* (New York: Harper & Row, 1973) p. 411. Yagoda's replacement, Nikolai Yezhov, would be also be executed two years later and photographs of him walking with Stalin along the Moscow Volga Canal erased from history. See David King, *The Falsification of Photography and Art in Stalin's Russia* (New York: Metropolitan Books, 1997) p. 163.

Socialism. Other posters referred to work as the ‘ticket out’, a common Soviet expression in the 1930s.³³

One particularly interesting example of canal promotion that integrates several Soviet goals can be found in three publicised songs about the Volga written by non-native workers on the canal. The labourers are from Central Asia and, along with lyrics celebrating the five-year plan, one song specifically glorifies the Volga. While the songs were publicised to demonstrate the Soviet Union’s success and the universality of socialism with the inclusion of Central Asian labour, the predominant Volga River theme in the songs revealed again the significance of the Volga in Russian history. Drawing upon Russian attitudes toward the Volga, one song begins with the following:

For centuries the celebrated Volga
 Rough beauty of mine
 In a blue dress, her path is long

Another song honours Stalin’s plan and uses a military analogy to describe work on the Volga. Lyrics include

We are fighting on track in favour of the plan
 Reborn in the work order.³⁴

The dignity of labour, whether Russian or Central Asian, enlisted in the cause of socialism was a constant refrain, particularly in contrast to the miserable, harsh lives of earlier labourers such as the burlaki. Under the Soviet system, labour was not only a means of reeducating political prisoners at the camp but also contributed to a greater cause that benefited all, while under the tsar labour only benefited one class. Though the reality was far different from these ideological claims – everyday life in the camps was brutal and the workers saw reduced rations if the day’s work quota was not filled – there were those who were heartened by the promise of hard work. Further, those whose output was greater than their quotas required were celebrated and rewarded.

Yet according to the journal, *Na Shtyrm trassy*, work at Dmitlag had other advantages, as it gave the workers exposure to a Soviet education – another opportunity to overcome a backward past, in this instance the illiterate Russian village. Numerous publications boasted of the educational opportunities afforded to the canal labourers. One work, entitled, *Ot prestupleniia k truda*, a propaganda piece by camp commander Yagoda’s wife, I.L. Averbakh, touts

33. *Na SHTURM Trassy*, June 1936, n.p.; Roman Tikhomirov, ‘Puteshestvie po kanaly’, *Texnika-molodyozhi* 11–12 (1936): 58–65, Dmitrov History and Regional Studies Museum; Fedorov, *Byla li Tachka u Ministra?*; *Moskva-Volgostroi*, 1 September 1936, No. 99, n.p., Dmitrov History and Regional Studies Museum; *Kanal imeni Moskvyy, 70 let* (Moscow: 000Prazdnik, 2007): 50; in the Muzei kanala imeni Moskvyy, numerous artefacts from the canal’s construction are on display. In addition to posters, curators have kept some of the actual tools, correspondence and photographs.

34. *Volga*, Muzykalnia Biblioteka ‘Perekovki’ December 1936, 7–8, Dmitrov History and Regional Studies Museum.

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the camp's secondary agenda of turning people into useful citizens. She mentions that the majority of labourers are criminals convicted under Article 35 for minor crimes like stealing or mugging. Once they arrive at the camp, they are given the chance to learn to read and write. Unlike other works promoting the Soviet's emphasis on education, she provides data and admits to difficulties. For example, in her words women were more difficult to teach. In an overview of all the labourers arriving in Dmitlag in 1933, 2,200 were illiterate and only 1,500 were interested in school. Out of the 1,500, only 251 completed their schooling and, while she cites a possible loss of interest or poor teachers for the low success rate, a number of additional reasons beginning with ill health or fatigue are feasible, given the camp's work conditions. Like other contemporary journals, she remarks upon the cultural life afforded the labourers, with radio and a number of periodicals. National papers, such as *Pravda*, were also available, with one copy for 25 people. All the cultural initiatives are deemed a means of raising the level of the worker, which in turn will raise productivity. She gives an example of how, in 1934, a Soviet party propaganda group visited the camp and gave a concert during the lunch hour. After the concert, the mood changed and the people worked harder. Numerous camp posters reiterated this theme: work would set the labourers free or, in Russian slang, work was the 'ticket out'. Various clubs, whether sports, music or reading, also contributed to an improved cultural environment at the camp. Even nature is drafted into the transformation, as Averbakh remarks later in the text: 'In our camps, the deepest thesis of Marxist-Leninist philosophy has come true. Man remaking nature remakes himself.'³⁵

But not only was the worker transformed. Soviet art also promoted the canal by projecting the image of sleepy rural villages being changed by industrialisation. For example, in one work by the Soviet artist, Gleb Kun, entitled *Dva Dmitrova*, there are two images of the town, one showing the old church with its surrounding kremlin juxtaposed with one of a young man driving a truck with a steam shovel in the background. Since the town of Dmitrov was an old Russian town located on the canal route, the visual representation of progress and modernity illustrates its bright future upon completion of the canal. During Stalinist Russia, the 'liquidation of backwardness', particularly the Russian village, pervaded Russian society and the Moscow-Volga Canal and all the activities associated with it were another means to modernisation. (The idea that Stalin's five-year plan transformed rural Russia was not only supported in the 1930s and 1940s but still has believers today, as contemporary historians indicate.)³⁶

35. I.L. Averbakh, *Ot prestupleniia k truda*, ed. A. La. Vyshinskogo, OGIZ (ob'ezhennost gosudarstvennykh knizhno-zhurnal'nykh izdatel'stv), 1936.

36. Fedorov, *Byla li Tachka u Ministra?*; Fitzpatrick, *Everyday Stalinism*, p. 9. In interviews with two historians and a number of Russians beyond academics, there is still a tendency by many to view the Stalin years in a positive light. In one interview with Nikolai Prislonov, historian and journalist, he discussed his own personal history, in that his parents were from

Thus, the construction of the canal was multi-faceted: the canal itself helped the Soviet Union in its war to industrialise quickly while workers, again resorting to military references, were called soldiers of the canal army and waged their own battles against a backward past. In a special issue of *Na Shturm trassy*, testimonials from foreign observers supported the canal with glowing praise: its being 'Built with Soviet made equipment and labour refutes the old capitalist lies of the proletariat being incapable of doing anything ...', while others wrote of the great success of socialism. References to Soviet-made equipment were a persistent theme in recounting five-year plan projects.³⁷ Other issues of the journal included poems and songs that portrayed an endeavour uniting the workers with the historical dreams of past and present governments:

We unloaded trucks,
That had brought us concrete, and then pressed it
To make a dream that had appeared long ago true.
And the town [Moscow] – majestic as a mountain,
Beckoned us to the wonderful far.
And the song, and the love [to the Motherland], and the flag
United us in friendship and we were pushing tons of concrete and ground
To bury at the canal bottom all the evil we had had before.³⁸

In addition to Firin's promotional activities, news about the canal came from other printed materials such as the journal, *Technics of the Youth* and radio programmes. As scientists were often unwillingly drafted into service, their technical works on the project appeared. An example of a well-known professional working on the canal is the case of soil scientist, Valery Krutizovsky, who had been sent to prison for refusing to follow an order for an early sowing of crops. For this crime – translated into an act of treason and sabotage – he was initially sentenced to death in 1933. Due to the efforts of his colleagues and family the sentence was reduced to prison time, which is how he became a labourer on the canal. Once Firin learned of his profession, he assigned him the problem of stopping the erosion of the canal banks. Unlike Kun, Krutizovsky was allowed to continue his work as a scientist after the canal was completed. Thus journals devoted to canal-building, such as *Belomarstroj*, discussed the evolution of technology or, in contemporary language, 'science.' For example, when engineers built the first gate of the canal, they used wheelbarrows but by the end of construction machines were employed. Another example cited was

a village and their lives were transformed by the opportunities available during Stalin's tenure. Prislonov Interview 23 September 2003; Ivan Yaroslavovich Shimon Interview, 5 April 2010.

37. *Na SHTURM Trassy*, June 1936, n.p.; *Ibid.* June 1935, n.p. Dmitrov History and Regional Studies Museum. Still a source of pride: while interviewing the curator of the Muzei Kanala imeni Moskvyy, Galina Yurchenko, who had worked at the museum for 57 years, she emphasised on several occasions how the equipment used to build the canal was Soviet-made.
38. *Na SHTURM Trassy*, June 1936, n.p. Dmitrov History and Regional Studies Museum; *USSR in Construction*, No. 2, 1938, n.p.

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the practice of pouring concrete and how that was perfected over the four-year period.³⁹

After completion in 1937, in record-breaking time and amidst great fanfare, the Moscow-Volga Canal became one of the signature projects of Stalin's second five-year plan. In a 1937 *Pravda* article, the canal was referred to as 'the pride of Stalin's Second Five-Year Plan'. In a tribute to socialism, the article emphasised how the canal provided drinking water to seven million people in Moscow and how its construction contrasted with capitalism's treatment of citizens. According to the article, Soviet man did not accept squalor and poverty. The canal became a symbol of Moscow's success as a socialist city and not just a success because of technology or expertise. Instead, the canal was a symbol of the virtues of central planning in the service of a nation's citizens. The article went so far as to give an example where an irrigation project on the Platte River in Nebraska was stopped, something that would not have happened in the Soviet Union with its ability to plan centrally and overrule special interests.⁴⁰

But the canal also represented Stalin's attempts in the 1930s not only to industrialise the Soviet Union but to leave his imprint – harnessing the Volga River testified to the success of this new government. In one account, Stalin's 'persistence' in building the canal was praised since it would benefit the Soviet people for thousands of years as the 'Volga's water flowed obediently to Moscow'. The imagery here is of conquest and testifies to the strength of Stalin's regime. Aware of the historical significance of the canal, Soviet journalists when publicising the project's completion boasted that,

the Bolsheviks nevertheless constrained Mother Volga to change her course. In four years they dammed up the Volga, created an enormous reservoir known as the Moscow Sea and built a canal joining the Volga with the R. Moscow. The ancient walls of the Kremlin are now washed by the waters of the Volga.

In the same commemorative issue devoted to the canal, journalists reiterated earlier efforts by the tsars to accomplish what Stalin had done in less than five years. Again, the memory of earlier attempts to constrain the Volga was ever-present – elevating the accomplishment.⁴¹

Although five-year plan projects such as the metro in Moscow came to overshadow the Moscow-Volga Canal, in the mid-1930s the canal was touted as 'the greatest construction of the Stalin Epoch'. To Soviet journalists, the canal even deserved a place on the world stage as it overshadowed all other canals – such as the well-known Suez – with the exception of the Panama Canal. So many elements converged in the construction of the canal, and its

39. *Texnika-molodyozhi*, Dmitrov History and Regional Studies Museum; Fedorov, *Byla li Tachka u Ministra?*; *USSR in Construction*, No. 2, 1938, n.p.; *Belomorstroi*, 1936, Dmitrov History and Regional Studies Museum.

40. *Pravda*, 14 July 1937.

41. *Ibid.*; *USSR in Construction*, No. 2, 1938, n.p.

importance was such, that Soviet youth were told to learn its history and the lessons it imparted. These included the Bolshevik remaking of people, Soviet achievements in technology, the acquisition of complex modern machinery and, perhaps most importantly, the canal served as an example of the subordination of nature's power to the will of creative man. In more colourful prose, 'the stern hands of the Bolsheviks are turning the Volga and are making a new route for it'. The Volga, always noted for its calm waters, now flowed obediently to Moscow.⁴²

Still, the environmental and social costs were high as seen in the number of towns that were inundated. A total of 110 towns were relocated. One of the better-known towns was Korcheva, built by Catherine II and still remembered today. Still, the most lasting impressions of the canal are the accounts of the workers and prisoners. In the area around Dubna, there are several commemorative sites and museums for those who lost their lives building the canal. An official Russian count places the number of lives lost at over 28,000. Further, current scholarship in Russia and the United States continues to uncover what Douglas Wiener called 'the darker legacy' of the canal.⁴³

Not to diminish the human costs, the canal was nonetheless successful in increasing Moscow's water supply, substantially improving barge traffic and generating electricity. (Today, the hydroelectric station at Dubna is still a power source for the well-known Joint Institute for Nuclear Research.) Other reasons the canal was deemed a success by many supporters include the following: first, by establishing a trade route from Moscow to the mouth of the Volga, many Russian villages were remade into bustling trade cities; second, the canal provided an additional water supply to Moscow's residents, although Soviet claims that after construction Moscow's water supply was greater than that of any other capital city in the world are suspect; third, all the work on the canal was completed with homemade Soviet equipment – a source of pride for many. For example, the pumps used at construction sites were built at fifty

42. *Belomorstroï*, 1936; A. Kosarev, 'Velichaishee sooruzhenie stalinskoi epokhi', *Texnikamolodyozhi* 11–12 (1936): 5, Dmitrov History and Regional Studies Museum. The scale of the undertaking of the Moscow-Volga Canal still impresses Russians: one local Dubna resident informed me that if the amount of earth that was dug was loaded into railroad cars, these cars would circle the globe, via the equator, 5.5 times – proving that the volume of work was much larger than that needed for the Suez or Panama Canals. Oral history interview with Sergei Pipenko, 23 December 2011.

43. Douglas Wiener, *A Little Corner of Freedom: Russian Nature Protection from Stalin to Gorbachev* (Berkeley: University of California Press, 1999) p. 355; Yurchenko Oral Interview, 15 March 2011; Schlogel, *Moscow, 1937*, p. 284. The history of the canal and its consequences has undergone varying interpretations and emphases since Perestroika. When first studying the canal in the early 2000s, local newspapers such as *Ploshchad Mira* focussed on the loss of lives and the brutality inflicted while constructing the project. In recent years, while not diminishing the human costs, there is an acknowledgement in some quarters of the benefits of the canal. For example, publications from the Muzei Kanala imeni Moskvyy and the museum's exhibits include the use of forced labour while also illustrating the canal's contributions.

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plants in the biggest cities of the Soviet Union, while engineers designed a new type of riverboat and special Soviet-built 150-ton cranes were also used.

For the Soviet Union, the canal was only the beginning of the Volga's transformation. By 1950, the Volga River supported two thirds of all river traffic throughout the Soviet Union. In the 1950s, the 'Great Volga Scheme' began and more activity occurred in the Middle Volga region. One of the largest undertakings was the completion of the Volga-Don Canal in 1952. The 63-mile navigation canal now connected Russia to the Sea of Azov in one single system with access to five seas. Although a greater engineering challenge, the Volga-Don Canal shared similarities with the Moscow-Volga Canal as it was another project with historical antecedents. As far back as the fifteenth century, the Ottoman Empire sought to connect the Volga and Don Rivers. Later Peter the Great, in his attempt to gain access to the Sea of Azov, tried to connect tributaries of the Volga and Don but later had to abandon the effort. But reflecting the history of the Moscow-Volga Canal, it required the Soviet wherewithal to realise the dream of earlier dynasties. In addition to improved navigation and access, hydro-power was always a goal and today there are eleven hydro-power stations on the Volga and its major tributary, the Kama River. In the broader Volga River Basin, 716 water reservoirs have been built, which supply 13 per cent of the basins' power facilities. Two of the largest projects are the Rybinsk and Kuibyshev dams built in the 1950s. As a result of these power sources, 45 per cent of Russia's industry and 50 per cent of its agriculture are located in the Volga Basin. Predictably, one consequence of increased industry and agricultural activity is a threatened ecosystem where scientists are becoming alarmed about the poor water quality as a result of unregulated dumping of industrial waste. Another major source of pollution is agricultural by-products. Further, the hydro-power stations that block their passage to upstream spawning grounds also threaten the fish population.⁴⁴

Thus, the twentieth century ushered in a new era for the Volga River. The images enlisted in the new wave of nation-building were reminiscent of past legends, as 'Mother Volga' was constrained by the Bolsheviks. Harnessing a river as great as the Volga, however, enhanced the transformation into a modern nation. The national narrative at the beginning of the century was laced with militaristic words, such as struggle, conquest and bridle. Awe and reverence were still present but now resulted from the Socialists' perceived superiority over nature, rival nations and earlier governments, to name a few. But the Soviet experience was not unique, as large-scale and multipurpose river projects became the standard bearers for modernisation for other nation

44. Holland Hunter, *Soviet Transportation Policy* (Cambridge: Harvard University Press, 1957) p. 148; David J.M. Hooson, 'The Middle Volga: An Emerging Focal Region in the Soviet Union', *The Geographical Journal* 26/2 (June 1960): 181; P.A. Warneck, 'The Volga-Don Navigation Canal', *Russian Review* 13/4 (October 1954): 285–290; *The Volga Vision*, UNESCO's Interdisciplinary Initiative for the Sustainable Development of the Volga-Caspian Basin (Paris: UNESCO, 2004).

states throughout the 1930s. This messianic faith in modernisation changed the dynamic between nature and humans. Yet, the historical memory of nature remains. In the case of the Soviet Union, the beneficence and magnitude of the Volga legitimated Stalin's rhetoric of Soviet greatness realised through the manipulation of the river. It was probably no coincidence that Stalin's favourite movie was the 1937 comedy, *Volga, Volga*, a film that, in illustrating the growth of the country, included a scene with the statues of Lenin and Stalin at the beginning of the Moscow-Volga Canal. The lyrics to the popular song from the film provided further testimony to the Volga's place in Soviet culture; the aesthetics of the Volga continued to be celebrated as in the past. Thus the 'Song of the Volga' by Vasily Lebedev-Kumach, which every Soviet school child knew, praised the Volga as 'beautiful, like the sea' and like 'the Motherland, free, wide, deep, strong'. Immersed in the throes of modernisation, the Soviet Union still looked to the Volga River when crafting national identity.⁴⁵

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45. Supposedly after Khrushchev came to power, the scene in *Volga, Volga* showing the statues of Lenin and Stalin overlooking the beginning of the canal was removed from the film. In 2011, a new irreverent version of *Volga, Volga* was staged in Moscow. In this production, Soviet boasts of Moscow as a port to five seas were satirised. See *The Moscow Times*, 10 March 2011.

Borderland, No-Man's Land, Nature's Wonderland: Troubled Humanity and Untroubled Earth

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ABSTRACT

Building on an interest in the presence of biodiversity where we do not expect to find it, this essay ponders the irony that human strife can be beneficial for the rest of nature by investigating the coexistence of troubled humanity and untroubled nature at various places around the world. It also looks at efforts to formalise the protection inadvertently provided in conflict and no-go zones after human tensions have abated. Focusing on borderlands, militarised landscapes, shatter zones, forbidden zones and other sites of upheaval and trauma, mostly in post-1945 Korea, Germany, Eastern Europe and Cyprus (but beginning with the nineteenth-century American West), I investigate the notion of the serendipitous survival of other-than-human nature and the 'threat' of demilitarisation and normalisation in places such as the Iron Curtain zone, where civilian activities may be more invasive and disruptive than military practices and other forms of restricted access. A related subject is the more recent, post-Cold War tale of nature's preservation, de facto and formal, in former environments of strife that also functioned involuntarily as shelter zones. This involves engagement with a particular manifestation of the deep-seated belief in nature's therapeutic value. The theme of the natural world's reconciliatory properties is pursued with reference to peace parks and other forms of transboundary conservation. I conclude with a discussion of the relationship between the narrative of nature and the narrative of history, specifically the belief that they are mutually exclusive and that the new emphasis on the 'return to nature' involves an act of erasure.

KEYWORDS

Warfare, borderlands, militarised landscapes, transboundary conservation, Korean DMZ, European Green Belt, Chernobyl, Green Line, West Polesie

INTRODUCTION

‘The only winner was nature’¹

Environments of warfare and associated lands (military training areas) where military forces prepare for action (a recent research interest of mine) suggest scenes of material devastation.² A landscape that fits this image of degradation is the ‘No Man’s Land’ of World War One that separated the opposing trenches of the Western Front in northern France and Belgium. This middle ground was literally scoured of vegetation and riddled with shell craters as well as littered with land mines and rotting corpses. The American pilot, James R. McConnell, described the landscape of the battlefield of Verdun that he looked down on in 1916 as ‘a sinister brown belt, a strip of murdered Nature’, whose woods ‘have vanished like chalk wiped from a blackboard’. The shell craters on the front line were so numerous ‘they blend into a confused mass of troubled earth’.³ British war poet Wilfred Owen also struggled to communicate this blighted and other-worldly ground in letters to his mother, written while he was in command of a company trying to hold a dug-out in the midst of No Man’s Land. The physical environment of the Somme was both a scarred and scary landscape: ‘pock-marked like a body of foulest disease and its odour is the breath of cancer ... No Man’s Land under snow is like the face of the moon, uninhabitable, awful’. A few weeks later, Owen wrote of being ‘marooned in a frozen desert. There was not a sign of life ... and a thousand signs of death. Not a blade of grass, not an insect.’⁴

In this particular instance – despite the red poppies that bloomed across the killing fields in summer – No-Man’s Land was also No-Other Species’ Land. Yet other types of no-man’s land, located beyond the battlefield, can work out quite differently for non-human species. Building on my developing interest in the presence of nature in striking form where we do not expect to find it, this essay ponders the irony that human strife can be beneficial for the rest of nature by investigating the coexistence of troubled humanity and untroubled nature,

1. Liana Geidezis and Melanie Kreutz, ‘The Central European Green Belt’, in Andrew Terry, Karin Ullrich, and Uwe Riecken, *The Green Belt of Europe: From Vision to Reality* (Gland, Switzerland: IUCN, 2006) p. 47.
2. Between 2007 and 2010, I was principal investigator for the AHRC project ‘Militarized Landscapes in Twentieth-Century Britain, France and the United States’, funded under AHRC’s ‘Landscape and Environment’ programme. See <http://www.landscape.ac.uk/landscape/research/largergrants/militarizedlandscapes.aspx> (accessed 21 Jul. 2014).
3. James R. McConnell, *Flying for France: With the American Escadrille at Verdun* (New York: Doubleday, 1917) pp. 53–54.
4. Letters dated 16 Jan. and 4 Feb. 1917, at http://www.battlefield-tours.com/archive_wilfred_owen.htm. See also Chris Pearson, *Scarred Landscape: War and Nature in Vichy France* (Houndmills: Palgrave Macmillan, 2008) p. 4; *Mobilizing Nature: The Environmental History of War and Militarization in Modern France* (Manchester: Manchester University Press, 2012) pp. 91–126.

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and the apparent paradox that No Man's Land can also be Many Creatures' Land. It also looks at efforts to formalise the protection inadvertently provided in conflict and no-go zones after human tensions have abated. Focusing on borderlands, militarised landscapes, shatter zones, forbidden zones and other sites of upheaval and trauma, mostly in post-1945 Korea, Germany, Eastern Europe and Cyprus but also touching on and beginning with the nineteenth-century American West, I investigate the notion of the serendipitous survival of other-than-human nature and the 'threat' of demilitarisation and normalisation in places such as the Iron Curtain zone, where civilian activities may be more invasive and disruptive than military practices and other forms of restricted access. A related subject is the more recent, post-Cold War tale of nature's preservation, de facto and formal, in former environments of strife that also functioned involuntarily as shelter zones: in counterintuitive fashion, sinister brown and grey belts have become green belts.

Scrutiny of this particular example of greening also involves engagement with a particular manifestation of the deeply rooted belief in nature's therapeutic value: the growing conviction that the natural world around and beyond us can help us to discover what Abraham Lincoln memorably referred to his in First Inaugural Address (1861) as 'the better angels of our nature'. This theme of nature's reconciliatory and uplifting properties is pursued with reference to peace parks and other forms of transboundary conservation. I conclude with a discussion of the relationship between the narratives of nature and history, specifically the belief that they are mutually exclusive and that the new emphasis on the 'return to nature' involves an act of erasure.

BROWN BELTS, GREY BELTS AND GREEN BELTS

A rather different kind of erasure has been at work in South-east Asia since 1945, where the process of demarcating nation states obliterated and marginalised a transnational upland area once distinguished by strong internal connections. Zomia, the name that Willem van Schendel coined for this region in 2002, covers an area of 2.5 million square kilometres and now finds itself on the peripheries of nine states. As James C. Scott explains, Zomia is home to a hundred million 'minority peoples of truly bewildering ethnic and linguistic variety', an 'out-of-the-way' 'zone of refuge' occupied for centuries by largely unincorporated, 'unruly' and 'state-fleeing' inhabitants displaced by imperial expansion, state-making exercises and slave trading, as well as warfare and 'natural' disasters. In addition, Scott notes that Zomia is distinguished by its rich biological variety, with tribal identities and economies mapping closely onto ecological contours and niches.⁵

5. James C. Scott, *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia* (New Haven: Yale University Press, 2009) pp. ix-xi, 7-8, 24, 326, 158, 261-63. Willem

Scott also characterised Zomia as a 'kind of transnational Appalachia'.⁶ This description is particularly apt from an ecological standpoint and connects with another type of no-man's land – also biologically productive – that was a distinctive feature of the North American frontier lands encountered by the first Euro-American explorers. The rapidly retreating frontier line had crossed the Appalachian mountain chain in the 1760s and, when Thomas Jefferson's presidency began in 1801, what was once the western-most limit of white penetration had already been absorbed into the 'settled' East. Some of the most striking observations in the journal of William Clark, co-leader of the Corps of Discovery that Jefferson despatched across the trans-Mississippian West between the upper Missouri and the mouth of the Columbia River (1804–06), addressed the theme of ecological variety that Scott raised in the context of Zomia: specifically, the abundance of wildlife in zones of contested ownership and uncertain occupation. In inter-tribal war and buffer zones that separated rival indigenous groups, where human settlement was sparse due to the ravages of raiding parties (and introduced viruses that appeared in advance of whites' physical presence), large animals driven out of more settled areas found sanctuary from human predation and their populations flourished ('flight zone', another of Scott's terms, is also a felicitous characterisation of this particular function). For Clark, prolific wildlife numbers correlated directly with 'the country between the nations that are at war with each other'.⁷

Today, a close counterpart to the de facto wildlife refuges that sprang up in the inter-tribal borderlands of frontier North America is the Demilitarized Zone (DMZ) established at the end of the Korean War (1953) to separate Korea's two halves. Given its heavily militarised quality, this four-kilometre-wide strip of land that stretches 248 kilometres across the Korean peninsula – representing two kilometres of buffer zone on each side of the border that initially delineated the US and Soviet-controlled sectors at the end of World War Two and the onset of the Cold War – the DMZ is something of a misnomer ('there ain't no D in the DMZ', as American GIs liked to say). Landmines and

van Schendel, 'Geographies of Knowing, Geographies of Ignorance: Jumping Scale in Southeast Asia', *Environment and Planning D: Society and Space* 20 ((2002): 647–68.

6. Scott, *Art of Not Being Governed*, p. ix.

7. Scott, *Art of Not Being Governed*, pp. 24, 133; William Clark, (16 Sept. 1804), quoted in Paul S. Martin and Christine R. Zuter, 'War Zones and Game Sinks in Lewis and Clark's West', *Conservation Biology* 13/1 (February 1999): 38, 43. See also Andrea S. Laliberte and William J. Ripple, 'Wildlife Encounters by Lewis and Clark: A Spatial Analysis of Interactions between Native Americans and Wildlife', *BioScience* 53/10 (October 2003): 994–95; and H. Hickerson, 'The Virginia Deer and Intertribal Buffer Zones in the Upper Mississippi Valley', in A. Leeds et al. (eds) *Man, Culture and Animals: The Role of Animals in Human Ecological Adjustments* (Washington, DC, 1965) pp. 43–66. French explorer Samuel de Champlain had previously noted the same phenomenon in the depopulated war zone between the Iroquois and Algonquins on the north-east frontier (1609): *The Works of Samuel de Champlain, vol. 2 (1608–1613)*, ed. H. P. Biggar, trans. John Squair (Toronto: The Champlain Society, 1925) p. 90.

booby traps pepper the zone and troops from both Koreas patrol its boundaries. Still, as Julia Thomas points out, if 'reckless human violence has necessitated the evacuation of all human beings ... the unintended result is a border zone left to other species'.

The zone shelters a rare regional example of largely intact temperate forest (impoverished North Koreans have denuded their woodlands for fuelwood; meanwhile, south of the border, deforestation and the conversion of seasonal rice cultivation to expand acreage for export crops such as bell peppers, blueberries and ginseng gathers pace). And so, unwittingly, the DMZ – and the neighbouring Civilian Control Zone (CCZ) that stretches for between four and twelve kilometres into South Korea, constituting, together with the DMZ, what is more accurately referred to as a DMZ region – have become a haven for migratory birds such as the red-crowned crane and white-naped crane and fantastical species like the Amur goral goat. 'Cold animosity', Thomas adds, 'preserves biodiversity ... From the perspective of the goral, internecine human hatred looks a lot like love'.⁸

The DMZ illustrates how a distressing No-Man's Land can also be an enigmatic Many Creatures' Land. From a strictly ecological standpoint, therefore, any normalisation of relations between the two Koreas (which might take the form of zones for inter-Korean economic cooperation) and the possibility of reunification – however remote a prospect the latter scenario may be at present – constitute threats to a status quo of uneasy truce. To secure the accidental benefits of militarisation, moves to formalise protection are afoot. Various international NGOs, together with the North and South Korean environmental ministries (in 2013, the South Korean president added her voice), have begun discussions they hope will lead to designation as a UNESCO biosphere reserve.⁹

The nation to which those spearheading this Korean initiative look for an object lesson is Germany, where wildlife has also made an unscheduled appearance in a former conflict zone.¹⁰ Before the Soviet Union collapsed,

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8. Julia Adeney Thomas, 'The Exquisite Corpses of Nature and History: The Korean DMZ', in Chris Pearson, Peter Coates and Tim Cole (eds) *Militarized Landscapes: From Gettysburg to Salisbury Plain* (London: Continuum, 2010) pp. 151, 161. See also Lisa Brady, 'Life in the DMZ: Turning a Diplomatic Failure into an Environmental Success', *Diplomatic History* 32/4 (September 2008): 585–86; Eleana Kim, 'The Flight of Cranes: Militarized Nature at the North Korea-South Korea Border', in Ursula Münster, Shiho Satsuka and Gunnell Cederlöf (eds) *Asian Environments: Connections across Borders, Landscapes, and Times, Rachel Carson Center Perspectives*, Issue 2014/3, pp. 65–70.
 9. Eleana Kim, 'Making Peace with Nature: The Greening of the Korean Demilitarized Zone', 25 Jun. 2013, Engagement Blog, Anthropology and Environment Society, at <http://www.aaanet.org/sections/ae/index.php/eleanakim/> (accessed 21 Jul. 2014)
 10. 'The DMZ's Ecology and the Peace of the Korean Peninsula', Dongguk University, Seoul, May 2006; Ministry of Environment, Republic of Korea, *Green Korea 2005: Towards the Harmonization of Human and the Nature* (Seoul: International Affairs Office, Ministry of Environment, 2005).

the world's most notorious example of no-man's land was probably the Iron Curtain, which, like the Berlin Wall, is also a misnomer, in that these linear names fail to capture the material reality of an extensive strip of fortified land beyond the wall and metaphorical curtain themselves. The high ecological values investing the German portion of the so-called 'Death Zone' (*Todesstreifen*) that stretched down from the Barents Sea to the Adriatic and Black Sea, thanks to stringent restrictions on civilian access and land use, were evident as early as 1970, when satellite images highlighted a ribbon of old-growth forest along the Finnish-Russian border. Then, in the early 1980s, to their surprise and delight, West German ornithologists monitoring the border zone between the two Germanys with high powered binoculars spotted a variety of rare species.¹¹

Demilitarisation of the Iron Curtain zone at the end of the Cold War imperilled what represented, in the words of Achim Steiner, director general of the International Union for the Conservation of Nature (IUCN), 'the only positive heritage of the Cold War'. Transportation infrastructure knitting the two halves of Europe back together quickly punched holes through the Death Zone. And, in the early 1990s, the old growth boreal forest that had thrived within the Soviet border zone adjacent to Finland attracted the logging industry's attention, prompting an alliance of Finnish and Russian conservationists to lobby for a Green Belt of 'Fennoscandia'. Elsewhere along this former frontier, the initial focus was on the obsolete inner German border; German environmentalists called for its protection within a month of the wall's fall.¹²

The initiative's ultimate vision – for which IUCN assumed overall responsibility in 2004, with former Soviet leader Mikhail Gorbachev as patron – is to install a European Green Belt running all the way from north to south, linking 22 countries (though the Finnish–Russian and Norwegian–Russian borders were not generally referred to as the Iron Curtain). This 8,500-kilometre route traverses various existing protected areas within a 25-kilometre zone on either side of the former border.¹³ Yet it also incorporates long stretches of the more

11. P. Beck and K. Frobel, 'Letzter Zufluchtsort: Der "Todesstreifen"?' , *Vogelschutz: Magazine für Arten- und Biotopschutz* 2 (1981): 24.

12. Terry, Ullrich and Riecken, *The Green Belt of Europe*, pp. ix, 3–5; Astrid M. Eckert, 'No man's landscapes', *The Berlin Journal* 20 (Spring 2011): 33–35; Eckert, 'A Lifeline in the "Death Strip": An Environmental History of the Iron Curtain', Research Colloquium, Rachel Carson Center for Environment and Society, Munich, 22 Jul. 2010.

13. Giorio Andrian, 'Joining Cultural and Natural Heritage Along the Green Belt', in *The Green Belt of Europe*, p. 24; Sonja Weinbuch, 'Nature unites: Peace and conservation in the former Death Zone: The European Green Belt' (2011), Environment & Society Portal, Arcadia Project, Rachel Carson Center for Environment and Society, at <http://www.environmentandsociety.org/print/2755> (accessed 21 Jul. 2014). Another high profile trans-boundary conservation scheme is the Yellowstone to Yukon Initiative (Y2Y), unveiled in 1997, which stretches for 3,200 km along the backbone of the Rocky Mountains from Wyoming to Yukon Territory and involves cooperation between more than 170 organisations. The territory within Y2Y is the last place in North America that contains a full complement of the large mammals present before Euro-American incursion. The integrity of Y2Y habitats faces threats from timber harvesting, oil and gas extraction, and associated road

vulnerable ex-Iron Curtain zone: a green belt replaces a grey barrier whose protective coating has worn thin.

The first section of European Green Belt (September 2004) crossed a national park in Hungary adjacent to the Austrian border – where the curtain was initially breached in 1989.¹⁴ In Germany, a belt of undeveloped land varying between 30 and 1,000 metres in width for its 1,393 kilometre length, with an additional 1.5-kilometre-wide no-go zone to the east, marks the border between the former two Germanys. During the Cold War, a ‘death belt’ for humans represented a welcome ‘lifebelt’ for fauna and flora. Since the border traversed largely fertile flatland, which lent itself to intensive agricultural production, the border usually represented the only surviving patches of unimproved land. Avifaunal species such as heron, otter, black stork, egret and warbler and plants such as lady’s slipper orchid capitalised on the reprieve from farming’s occupation; from their perspective, the non-militarised territory beyond the zone was the ominous brown belt and troubled earth. The Bavarian branch of Friends of the Earth Germany (BUND) conducted a habitat inventory in 2001 (funded by the Federal Agency of Nature Conservation) which indicated that 48.8 per cent of the land within this zone of refuge constituted endangered species habitat; and that 85.2 per cent was unscathed by industrialised agriculture and forestry, and infrastructure such as roads.¹⁵ Nor was it just the absence of apparently innocuous yet highly invasive civilian activities that provided spontaneous lebensraum for other species. New infrastructural presences within the militarised landscape enhanced conditions in this unlikely sanctuary. Rare mosses colonised abandoned concrete blocks that housed machine guns; meanwhile, bats nested in derelict bunkers and watchtowers.

construction, but also recreational pressures. On trans-border conservation (including an in-depth study of Y2Y), see Charles C. Chester, *Conservation across Borders: Biodiversity in an Interdependent World* (Washington, DC: Island Press, 2006). See also Karen Jones, *Wolf Mountains: A History of Wolves Along the Great Divide* (Calgary: University of Alberta Press, 2002) p. 214; Kurk Dorsey, *The Dawn of Conservation Diplomacy: US-Canadian Wildlife Protection Treaties in the Progressive Era* (Seattle: University of Washington Press, 1998); Bram Büscher, *Transforming the Frontier: Peace Parks and the Politics of Neoliberal Conservation in Southern Africa* (Durham, NC: Duke University Press, 2013).

14. Allan Hall, ‘Wildlife Set for Final Victory along the Iron Curtain’, *The Independent*, 23 May 2008; Zoltan Istvan, ‘Cordon Green: A Change has Come to the Iron Curtain Death Zone – and it’s Wild’, *Outside Magazine*, April 2004, at <http://www.outsideonline.com/adventure-travel/europe/Cordon-Green.html>; Barbara Engels et al., *Perspectives of the Green Belt: Chances for an Ecological Network from the Barents Sea to the Adriatic Sea? Proceedings of the International Conference 15th of July 2003 in Bonn on the Occasion of the 10th Anniversary of the German Federal Agency for Nature Conservation (BfN)*. (Bonn/Bad Godesberg: BfN, 2004); Liana Geidezis and Melanie Kreutz, ‘Green Belt Europe: nature knows no boundaries’, *Urbani Izziv* 15 (2004): 135–38; <http://www.europeangreenbelt.org>
15. Uwe Riecken, Karin Ullrich and Liana Geidezis, ‘The Green Belt of Germany: From Death Zone to Lifeline’ (Bonn: Bund Naturschutz in Bayern/Bundesamt für Naturschutz, n.d. [2003?]) p. 1.

A FUNDAMENTAL ANTAGONISM?

Based on admittedly extreme examples such as the Korean DMZ and former Iron Curtain zone, some may be tempted to conclude that there is a basic clash of interests between the human race and other species. The concept of shatter zone (a.k.a. shear cone and pressure cone) is helpful in this regard. A geological term denoting a largely broken up, even wholly disintegrated, portion of rock within a fault zone, it has been adopted by historians of colonial North America who focus on relations between natives and newcomers.¹⁶ The intrusion of Europeans and Euro-Americans with their alien biota, pathogens, economic ideology, trading systems and technologies triggered an intertwined series of processes whose net effect was to eliminate or remove the aboriginal occupants as a prelude to replacement with a new population.¹⁷ And one of those consequences, as already seen, was the temporary increase in wildlife populations.¹⁸

Yet the ultimate shatter zone, I would argue, is a place where human civilisation itself collapses, whether through warfare, so-called natural disaster – such as rising sea levels induced by climate change – or some other fundamental disruption in the biological life support systems required to sustain human existence. ('Shattered ecologies' became a household phrase during the 'age of environmentalism' in the 1960s and 1970s.) The American science fiction author, environmentalist and futurologist, Bruce Sterling, has coined the notion of 'involuntary park' to denote abandoned places gone feral, such as drowned coastal littorals, 'uninsurable' places 'too unstable for settlement or development' where human society literally sinks and the 'natural processes'

16. The two primary virtues of the shatter zone concept that historians identify are its ability to emphasise the role of colonising states in destabilising indigenous political networks and its capacity to capture the colonial period's 'milieu' more effectively than the frontier concept derived from Frederick Jackson Turner that they feel is compromised by its Eurocentric and American exceptionalist nature.

17. Alfred Crosby, *Ecological Imperialism: The Biological Expansion of Europe, 900–1900* (New York: Cambridge University Press, 1986) p. 196; Robbie Ethridge, 'Introduction: Mapping the Mississippian Shatter Zone', in Robbie Ethridge and Sheri M. Shuck-Hall (eds) *Mapping the Mississippian Shatter Zone: The Colonial Indian Slave Trade and Regional Instability in the American South* (Lincoln: University of Nebraska Press, 2009) p. 3; Ethridge, 'Creating the Shatter Zone: The Indian Slave Traders and the Collapse of the Southeast Chiefdoms', in Thomas J. Pluckhahn and Robbie Ethridge (eds) *Light on the Path: The Anthropology and History of the Southeastern Indians* (Tuscaloosa: University of Alabama Press, 2006) pp. 207–18. Another short-hand term for the social dynamics of borderland regions in the Americas is 'crush zone', coined by James Fairgrieve in 1915.

18. Mary Elizabeth Fitts and Charles L. Heath, "'Indians Refusing to Carry Burdens': Understanding the Success of Catawba Political, Military, and Settlement Strategies in Colonial Carolina", in *Mapping the Mississippian Shatter Zone*, p. 159.

of a 'vengeful nature' reassert themselves in areas of 'political and technological collapse'.¹⁹

Nature, the saying goes, abhors a vacuum. Non-human nature certainly rushes in to fill the spaces that the human species vacates when disaster strikes and ushers in technological and societal collapse. The Chernobyl Zone of Alienation is perhaps the most striking contemporary approximation to what Sterling had in mind. Robert Polidori's post-apocalyptic photographs (June 2001) depict (almost devoid of accompanying text) not only the burnt-out and decaying Reactor 4 plant. They record the abandoned apartments, schools and kindergartens and hospital in the towns of Prip'yat (population 50,000, built in the 1970s to house plant workers) and Chernobyl. The photos also show rotting houseboats and barges on the river Prip'yat; the auto graveyard where vehicles employed in the rescue and clean-up operations languish, picked clean for spare parts or still shrouded in lead coverings; and, perhaps most strikingly, they chronicle the encroaching vegetation that engulfs buildings and, less obviously, secretes chemicals that literally consume the concrete and asphalt by softening and crumbling these misleadingly solid and enduring substances.²⁰ By process of attrition, natural processes are slowly converting the company town of Prip'yat into a forest of poplar and birch; an 'accidental wilderness' arises phoenix-like from the shattered asphalt and concrete.²¹

Just two months after Polidori captured his images, the renowned British scientist and environmentalist, James Lovelock, who formulated the 'Gaia hypothesis' in the early 1970s and is a recent convert to the cause of nuclear power, made an outrageous suggestion in a major British national newspaper: 'I have wondered if the small volumes of nuclear waste from power production should be stored in tropical forests and other habitats in need of a reliable guardian against their destruction by greedy developers'.²² In an equally provocative statement, Mary Mycio, a Ukrainian-American journalist who wrote the first book about Chernobyl (*Wormwood Forest* [2005]), pondered whether it is 'correct to call it an environmental disaster because the very absence of people and their disruptions have left the natural environment in peace, allowing it to thrive'. On her first visit to the area on the accident's tenth anniversary

19. Bruce Sterling, 'The World is Becoming Uninsurable, Part 3', Viridian Note 23 [2000], at <http://www.viridiandesign.org/notes/1-25/Note%2000023.txt> (accessed 21 Jul. 2014); Alex Steffen, *Worldchanging: A User's guide to the 21st Century* (New York: Abrams, 2008) p. 84; 'Conflict Conservation: Biodiversity Down the Barrel of a Gun', *The Economist*, 8 Feb. 2010, at <http://www.economist.com/node/15488793/print> (accessed 21 Jul. 2014)

20. Robert Polidori, *Zones of Exclusion: Prip'yat and Chernobyl* (Göttingen: Steidl, 2003).

21. Richard Stone, 'The Long Shadow of Chernobyl: Twenty Years After a Nuclear Reactor Exploded, Blanketing Thousands of Square Miles with Radiation, the Catastrophe Isn'T Over', *National Geographic*, Apr. 2006, at <http://ngm.nationalgeographic.com/2006/04/inside-chernobyl/stone-text>

22. James Lovelock, 'We Need Nuclear Power, Says the Man Who Inspired the Greens', *Daily Telegraph*, 15 Aug. 2001.

(26 April 1996), Mycio was shocked to discover that the Chernobyl area had become Europe's largest wildlife sanctuary, a blossoming – if unearthly and radioactive – wilderness teeming with large animals and a variety of birds, many representing rare and endangered species. Like the forests, fields and swamps they inhabit, the creatures were radioactive, their muscles packed with Cesium-137, while strontium-90 saturates their bones.

In *Wormwood Forest: A Natural History of Chernobyl* (2005), she recorded a unique new ecosystem she discovered on her first visit in 1996, noting the land's 'extraordinary resurrection' in the wake of the explosion on 26 April 1986. As people moved out – 135,000 people were evacuated from the Forbidden Zone during a ten-day period of mandatory evacuation (350,000 in total, in due course, from the affected area) and human activities such as farming, cattle ranching, logging, firewood collection and hunting were proscribed – animals moved in. Species absent for decades, such as the black stork and white-tailed eagle, started to reappear; in 2008, birds were actually nesting inside the sarcophagus (the steel and concrete shield erected over the exploded reactor) and a bear's paw-prints were recorded. Today, there are more wild boar than you can shake the proverbial stick at. Badger, beaver and otter populations are also booming and so is the boar's historic predator, the wolf. Bigger and shyer animals that normally shun humans have to date fared better than the smaller ones (so much for the popular science fiction scenario that cockroaches and rats will inherit the earth post-apocalypse). Plutonium residue abounds – game animals are too radioactive for human consumption – but otherwise they still appear to be healthy. Plutonium has produced DNA mutation but not (yet) affected reproductive ability. More important than the presence of plutonium, at least for now, seems to be the absence of herbicides, pesticides, industrial activity, traffic – and people. 'Human activities', Mycio concludes, 'are far more damaging to nature than radiation – at least the type and amounts of radiation released by Chernobyl'. And her chilling take-home message is: 'Perhaps we are the real environmental disaster'.²³

These instances where places hostile to humans are inviting to other creatures express a disturbing paradox. Hence the National Geographic Society's headline, at a time (June 2000) when tensions between the two Koreas were a shade less strained: 'Peace prospects imperil Korea's wildlife paradise'.²⁴ Note also the title of an article Mycio wrote close to the tenth anniversary of what was generally hailed as the world's worst industrial accident (certainly Europe's most serious nuclear incident): 'Minus humans, wildlife thrives in

23. Interview with Mary Mycio, 'Back to the Wild', *IAEA Bulletin* 47/2 (Feb. 2006): 8–9. IAEA stands for International Atomic Energy Agency.

24. Donald Smith, 'Peace Prospects Imperil Korea's Wildlife Paradise', *National Geographic News*, 23 Jun. 2000, at http://news.nationalgeographic.com/news/2000/06/0623_korea.html (accessed 21 Jul. 2014)

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Chernobyl area'.²⁵ A United Nations report on the health, environmental and socio-economic impacts to mark the accident's twentieth anniversary agreed that 'the Exclusion Zone has paradoxically become a unique sanctuary for biodiversity'.²⁶ That animals may be able to withstand one highly abnormal form of human activity (the accidental release of radioactivity) better than all kinds of regular human activity is a depressing thought. That an area unfit for human habitation is eminently fit as dwelling space for other species is not an encouraging or empowering notion either. To raise the possibility that many other species cannot peacefully coexist with humans brings to mind the dark shades of misanthropy that often lurk at the root of hard line 'deep ecology' (we, the people, are a cancerous growth on the earth).

Is the lesson of Chernobyl that the long-term viability of other-than-human life (aside from 'unwanted organisms' such as rats and invasive species of flora and fauna) requires a wholesale collapse of civilisation? Alternatively, looking on the brighter side, are the buoyant fortunes of flora and fauna in scarred borderland environments a good reason to be cheerful about the future of planetary nature? Is this persuasive evidence that nature does indeed 'bat last' and will inherit the earth after we self-destruct?

In the meantime, it should be emphasised that inter-human strife does not invariably provide breathing space for non-humans. A shatter zone does not always furnish a shelter zone. In fact, the effect can be precisely the opposite. During civil wars, displaced and relocated civilians, paramilitary forces and regular troops all live off the land. The integrity of Virunga National Park in the Democratic Republic of Congo was heavily compromised by the resettlement of refugees in the vicinity during and after the Rwandan Civil War of the mid-1990s. Extensive areas of nominally protected forest were cleared to satisfy demand for fuel-wood and construction materials (both for personal use and for sale in refugee camps) and poaching was rife. In addition, to lessen the risk of ambush, the Rwandan army sliced a 50–100-metre-wide corridor through the bamboo forest that connected the Virunga volcanoes. Parc National des

25. Mary Mycio, 'Minus humans, wildlife thrives in Chernobyl area. Ukraine: A decade after the world's worst nuclear accident, region is no wasteland. It's a new ecological niche', *Los Angeles Times*, 26 Feb. 2006. See also Stephen Mulvey, 'Wildlife Defies Chernobyl Radiation', *BBC News*, 3 Apr. 2008; Robert J. Baker and Ronald K. Chesser, Letter to the Editor, 'The Chernobyl Nuclear Disaster and Subsequent Creation of a Wildlife Preserve', *Environmental Toxicology and Chemistry* 19/5 (2000): 1231–32. For more sceptical views regarding an alleged 'post-apocalyptic Eden', see Mark Kinver, 'Chernobyl "Not a Wildlife Haven"', *BBC News*, 14 Aug. 2007; Henry Fountain, 'At Chernobyl, Hints of Nature'S Adaptation', *New York Times*, 5 May 2014; A.P. Møller and T.A. Mousseau, 'Conservation Consequences of Chernobyl and Other Nuclear Accidents', *Biological Conservation* 144 (2011): 2787–98.

26. UN Chernobyl Forum (2003–05), *Chernobyl's Legacy: Health, Environmental and Socio-Economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine* (Vienna: International Atomic Energy Agency, Division of Public Information, 2nd rev. ed., Apr. 2006 [2005]) p. 30.

Volcans in Rwanda suffered similar impacts through incursion of the forces of the Rwanda Patriotic Front and the Rwandan military, as well as Congolese guerrillas from across the border.²⁷

Moreover, not all walls are being demolished. In fact, a new wall is going up on the other side of the Atlantic that is often explicitly compared to the Berlin Wall. ‘Wild versus Wall’ (2009), a twenty-minute film by Steev Hise, sponsored by the Sierra Club, addresses the uncalculated ecological side-effects of more draconian border enforcement policies in the four US states that border Mexico, notably in the shape of the Department of Homeland Security’s border wall, which already stretches for 649 miles. Though the environmental impacts of illegal immigration on protected units such as Organ Pipe Cactus National Monument (Arizona) are considerable, this is an example of entirely non-beneficial militarisation that violates ecological security wholesale. In defiance of a raft of federal environmental protection laws (a provision in the REAL ID Act of 2005 granted the Secretary of Homeland Security the right to override local, state and federal legislation that impedes wall and road construction along US borders), the barrier slices through various categories of protected area, from fragile and besieged dune lands to wetlands such as Arizona’s San Pedro Riparian National Conservation Area – ecosystems that house federally-listed threatened and endangered species, many of them endemic to these borderlands. The wall obstructs the movement of species such as the jaguar, mountain lion, deer, javelin (collared peccary), pronghorn antelope and various snakes, blocking, not least, their access to the life-sustaining waters of the Rio Grande. The only thing the wall does not prevent, according to local environmentalists on both sides of the border, is human crossings. The wall interrupts northward progress but does not greatly deter, deflecting many resolute migrants deeper into the desert in search of an easier crossing place, exacerbating dangers of dehydration and exposure.²⁸

NATURE’S SOOTHING BALM

Back in Europe, at a former site of attempted flight, the European Green Belt is explicitly designed as a borderless ‘backbone’ for an intricate ecological network (consisting of core areas ringed with protective buffer zones, themselves

27. Emily Harwell, ‘Forests, State Fragility, and Conflict’, in Emily Harwell, Douglas Farah and Arthur G. Blundell (eds) *Forests, Fragility, and Conflict: Overview and Case Studies* (Washington, DC: Program on Forests [PROFOR]/World Bank, Jun. 2011) pp. 33–34; Thor Hanson et al., ‘Warfare in Biodiversity Hotspots’, *Conservation Biology* 23/3 (Jun. 2009): 578–87.

28. <http://vault.sierraclub.org/borderlands/film.aspx> (accessed 21 Jul. 2014); <http://arizona.sierraclub.org/conservation/border/borderfilm.asp>; Priscilla Stuckey, ‘The Berlin Wall for Wildlife’, *This Lively Earth*, 27 Aug. 2009, <http://thislivelyearth.com/2009/08/27/the-berlin-wall-for-wildlife/> (accessed 21 Jul. 2014)

enveloped by sustainable use areas and linked by corridors permitting the dispersal and migration of species that is vital for gene pool health) whose parameters conform to ecological boundaries. Yet the Green Belt is equally important as a symbol of European reunification: a backbone for reconstruction and reconciliation (not least through the provision of 'identity cement') and a site for pioneering structures of transborder governance.²⁹ These objectives mobilise the age-old narrative of nature's healing powers, yet impart a fresh twist to the notion of therapeutic value. 'Nature', explains Giorio Andrian, with reference to the Iron Curtain zone's make-over, 'unites what borders divide'.³⁰

This is a restatement of the sentiment captured in a phrase employed with reference to the American–Mexican borderlands of the late nineteenth and early twentieth centuries. 'Nature has made us neighbors', commented Matías Romero, Mexican diplomat and governmental advisor, speaking at a dinner in New York City (1891) to promote investment in the American West and Mexico.³¹ Even if the disparate human communities sharing a physical space did not appreciate this elemental fact, observes Samuel Truett, 'they became neighbors *through* nature'.³²

Complementing this belief in the facilitating, even gently coercive, powers of the natural world is the hope that nature's borderless quality, its disinterested cosmopolitanism, will rub off on a human world that remains mired in parochial conflict and encumbered by divisive national and ethnic identities. Green borderlands are increasingly regarded as laboratories for testing the notion that cooperation over the common ground of environmental issues is a way to begin to heal rifts between human communities and foster peaceful relations that are sustainable over the longer term.³³

29. On the tendency to use terms such as transboundary, transnational, international and trans-boundary interchangeably, and the need for more analytical precision and theoretical rigour, see Joseph E. Taylor, 'Boundary Terminology', *Environmental History* 13 (Jul. 2008): 454–81.

30. Giorio Andrian, 'Joining Cultural and Natural Heritage along the Green Belt', in *The Green Belt of Europe*, p. 24.

31. As quoted in Samuel Truett, 'Neighbors by Nature: Rethinking Region, Nation, and Environmental History in the U.S.-Mexico Borderlands', *Environmental History* 2/2 (Apr. 1997): 162.

32. Truett, 'Neighbors by Nature': 169.

33. The EU seeks to address incongruity between political units and ecological/topographical units (bioregions) by creating a trans-frontier organisation known as the Euroregion. The mandate of associations of local and regional authorities located on either side of a national border within a designated Euroregion is to foster unity between peoples, cultures and economies that occupy environmentally-defined spaces, such as mountain ranges or deltas, that do not sit comfortably with the configurations of the nation state. The first Euroregion (Gronau) was established between Germany and Holland in 1958. Transnational environmental protection initiatives are encouraged, but, lacking political authority, the Euroregion is visible mostly through cultural events such as the Carpathian Culture Festival hosted by the Carpathian Euroregion (1993) that encompasses parts of Poland, Slovakia, Hungary, Ukraine and Romania.

The view that nature can act as a ‘catalyst for the reintegration of ... divided communities’ has also been powerfully articulated by Anna Grichting with reference to another ‘green’ ‘demilitarized’ ‘security zone’, the Green Line that divides Cyprus.³⁴ The United Nations Buffer Zone in Cyprus, established in the wake of the Turkish invasion in July 1974, divides the island into two: the southern portion controlled by the government of Cyprus, the de jure government for the entire island; and a smaller northern zone known as the Turkish Republic of Northern Cyprus, an entity without international recognition that covers just over a third of the island. The 180.5 kilometre ‘Green Line’ (patrolled by the United Nations Peacekeeping Force in Cyprus), is sometimes just a few metres wide. Elsewhere, though, it extends to seven kilometres and the zone encompasses a total area of 346 square kilometres, embracing a variety of environments and ecosystems, including deltas, wetlands, rivers, mountains, plains, forests, rocky coastlines and sandy beaches.

The name given to this borderland, ‘Green Line’, had nothing to do with ecology; it denotes the green ‘chinagraph’ wax pencil with which the British army officer, Major General Peter Young, drew the original line in late December 1963 to mark the ceasefire line between Turkish and Cypriot troops.³⁵ Though 10,000 civilians remain within this no-man’s land, it has become an informal wildlife haven. Here, after nearly forty recuperative years with relatively little human disturbance that have reversed the damage of over-hunting and habitat fragmentation, species such as the Cyprus Mouflon, an archaic breed of sheep, virtually absent elsewhere on the island, coexist with the minefields left over from the 1974 invasion. Meanwhile, the Mediterranean monk seal, one of Europe’s most endangered species, thrives within the Line’s coastal littoral, where development of the Mediterranean’s increasingly invasive tourist infrastructure has been stalled.³⁶

At the opposite end of the spectrum to fraught and contested borders within Cyprus and between the United States and Mexico is the frontier between the United States and Canada, which is indisputably the world’s longest undefended border. That the world’s first trans-boundary reserve, the

34. Anna Grichting/HPCR (Harvard Program for Humanitarian Policy and Conflict Research), *The Green Line of Cyprus: Human Development and Reconciliation through Environmental Cooperation* (Jul. 2006); Grichting, ‘Landscapes of the Green Line of Cyprus: Healing the rift’, *The Cyprus Dossier* (2011): 26–29.

35. Jon Calame, *Divided Cities: Belfast, Beirut, Jerusalem, Mostar, and Nicosia* (Philadelphia: University of Pennsylvania Press, 2009) p. 133; William Tuohy, ‘U.N. force keeping uneasy Cyprus peace’, *Los Angeles Times*, 6 Sept. 1971.

36. Grichting/HPCR, *The Green Line of Cyprus*; Steven Duke, ‘Sheep rule defunct Cyprus village’, *BBC News*, 18 Jun. 2009; Salih Gucel et al., *Monitoring Biodiversity of the Buffer Zone in Cyprus* (Nicosia: Near East University, 2007); Grichting, ‘Landscapes of the Green Line of Cyprus’; Open Cyprus in Europe, ‘Nature’s call from the buffer zone’ (blog posted 6 Jun. 2012), at <http://cyeuroblog.wordpress.com/2012/06/16/natures-call-from-the-bufferzone/> (accessed 21 Jul. 2014); Richard Hooper and Vibeke Venema, ‘Varosha: The Abandoned Tourist Resort’, *BBC News Magazine*, 14 Jan. 2014.

Waterton-Glacier International Peace Park (1932), was established astride this relatively innocuous national frontier is no surprise; this was truly low-hanging fruit. A flurry of more demanding 'peace parks' were established after 1945 in more heavily disputed areas, including various units in the Andes along the Chilean–Argentine border and the Great Limpopo Transfrontier Park that connects Mozambique, South Africa and Zimbabwe;³⁷ fresh park proposals continue to emerge.³⁸ Though the challenging nature of the task that confronts these parks' managers, of reconciling disparate interest groups, should not be underestimated, conservationists increasingly believe that the future for the nature reserve, that most traditional form of environmental protection, lies in trans-national configurations that are more aligned with ecologically defined units of space. In 1988, 59 protected areas crossed international boundaries; by 2005, the number had increased to 188, involving 818 protected areas and 112 nations. Moreover, politicians around the world (not least the late Nelson Mandela) increasingly believe that the trans-boundary conservation area offers a global solution to international strife.³⁹

Among the most recent batch of additions (twenty in July 2012) to the list of UNESCO biosphere reserves (the biosphere reserve is a new category of protected area pioneered by UNESCO's Man and the Biosphere Programme in 1971) was the 260,000-hectare West Polesie Transboundary Biosphere Reserve, shared by Poland, Ukraine and Belarus. Edge environments, such as this swamp-river-lake-forest complex, where the boreal coniferous forest and temperate deciduous forest biomes meet and overlap, are the most biologically productive of ecosystems. The West Polesie's location at the crossroads of two migratory bird flyways has further enriched the diverse avifaunal population.

Edge environments are often human borderlands too. As Omer Bartov and Eric Weitz observe, the central state frequently identifies the 'spaces-in-between' that the latter represent as 'sites for all sorts of political, military, and

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37. Peter Keller, 'Transboundary Protected Area Proposals along the Southern Andes of Chile and Argentina: Status of Current Efforts', in *Science and Stewardship to Protect and Sustain Wilderness Values: Eighth World Wilderness Congress Symposium, September 30-October 6, 2005, Anchorage, AK: Proceedings RMRS-P-49* (Fort Collins, CO: US Department of Agriculture, Forest Service, Rocky Mountain Research Station) pp. 244–48; William Wolmer, 'Transboundary Conservation: The Politics of Ecological Integrity in the Great Limpopo Transfrontier Park', *Journal of Southern African Studies* 29/1 (Mar. 2003): 261–78; Marloes van Amerom and Bram Büscher, 'Peace Parks in Southern Africa: Bringers of an African Renaissance?', *Journal of Modern African Studies* 43/2 (2005): 159–82; Saleem H. Ali (ed.) *Peace Parks: Conservation and Conflict Resolution* (Cambridge, MA.: MIT Press, 2007); Adrian Martin, Eugene Rutagarama, Ana Cascão, Maryke Gray and Vasudha Chhotray, 'Understanding the Co-existence of Conflict and Cooperation: Transboundary Ecosystem Management in the Virunga Massif', *Journal of Peace Research* 48/5 (Sept. 2011): 621–35.
38. Aamir Ali, 'A Siachen Peace Park: The Solution to a Half-Century of International Conflict?' *Mountain Research and Development* 22/4 (Nov. 2002): 316–19.
39. Büscher, *Transforming the Frontier*, pp. 1–6; Wolmer, 'Transboundary Conservation': 261.

economic projects'.⁴⁰ Yet lands on the margins also become sites targeted for equally intrusive environmental projects. In the early twentieth century, the German state tried to tame the marshes of the River Prypiat (Pripiet), which flows through the Polish-Russian borderlands of West Polesie – and onward through the Zone of Alienation around Chernobyl – on its way to join the Dnieper. This soggy frontier zone, whose sovereignty had been contested since it became part of the Russian empire in the partition of Polish territory in 1772, eventually rejoined Poland in 1921 under the provisions of the Treaty of Riga. Since Poland joined the European Union in 2004, the region has become the EU's eastern frontier. And now substantial tracts belong to the West Polesie Transboundary Biosphere Reserve.

David Blackbourn has demonstrated how the 'civilising' of the area's predominantly Slav residents (and Jewish minority, whose presence was considered just as if not more 'unnatural') and the conversion of their equally degenerate swampland *Heimat* to productive use were part and parcel of the same imperious improvement project based on a 'powerful mental connection between race and reclamation'. The drainage of an underdeveloped landscape entailed the cleansing (*Säuberung*) of its comparably backward inhabitants – who, for many Germans at the time, were not far removed from the Asiatic *Untermensch*. For these residents, in their inept passivity, were considered incapable of imposing themselves on their watery world and therefore had no 'natural place' there. Scornful of the Polish state's feeble efforts to drain the fetid marshes and replace their Ukrainian, Byelorussian and Jewish populations with more solid Polish settlers, the Danzig-based Prussian geographer, Martin Bürgener, characterised the region as 'dead space' (1939) awaiting revitalisation through Germanisation.⁴¹

Ecologically speaking, though, this much-derided dead space brimmed with life. These marshes were much more vital and bio-diverse than drained areas that had been harnessed for arable production. The wild larder of the Pripiet Marshlands' flora and fauna undoubtedly supplied welcome sustenance for the human groups that it served as a sanctuary and centre of resistance during Soviet and Nazi occupations. Part of this marshland, then and now, Europe's most extensive wetland ecosystem, had been protected within Ukraine's Shatsky National Park since 1983. But fences separated other national parks on opposite sides of the Poland–Belarus border and large stretches of marshland were coveted for agriculture in the 1990s, as Ukraine and Belarus strove to bring more land under production to compensate for the irradiated lands around Chernobyl. Biosphere reserve status now offers the prospect of more robust protective mechanisms to secure the marshlands' ecological diversity.

40. Omer Bartov and Eric D. Weitz (eds) 'Introduction', *Shatterzone of Empires: Coexistence and Violence in the German, Habsburg, Russian, and Ottoman Borderlands* (Bloomington: Indiana University Press, 2013) p. 1.

41. David Blackbourn, *The Conquest of Nature: Water, Landscape, and the Making of Modern Germany* (New York: Norton, 2006) pp. 251–310.

CONCLUSION: ERASURE?

West Polesie is a prime example of the type of place that is the subject of a recent collection of essays on imperial borderlands and shatter zones. This volume's editors, Omer Bartov and Eric Weitz, have no particular interest in the environmental dimensions of borderlands. Nonetheless, when referring to the contestation of memory in shatter zones of empire such as the swathe of borderland territory in Eastern Europe that stretches from the Baltic to the Black Sea, Bartov and Weitz acknowledge, if indirectly, that nature does matter. This clash of remembering is expressed through the erection of competing memorials that attempt to promulgate – and 'eternalise' – a single narrative at the expense of multiple stories and memories. Bartov and Weitz recognise the environmental context for remembering when they allude to the threat to memory from the spontaneous physical decay of the tangible material remnants of buildings and/or their demolition as part of the process of deliberate erasure.

I touched on such matters as part of the aforementioned project on militarised landscapes, which included a case study that examined the conversion of obsolete nuclear and chemical weapons manufacturing facilities in Colorado into formal wildlife refuges managed by the US Fish and Wildlife Service.⁴² Critics of this metamorphosis from 'weapons to wildlife' have objected that the older, unsavoury and troubling stories of human displacement, armaments manufacture and residual toxicity are being erased and replaced by a far more palatable and less troubled, brightly green narrative that reinvents these noxious locales as floral and faunal wonderlands. Removed from the clutches of grubby and messy history, these notorious places are redeemed through re-insertion in the pure, shiny and apparently ahistorical realm of nature.⁴³

Yet the presentation of the narrative of nature and the narrative of history in these places is not incompatible. The future for the West Polesie Reserve as an inclusive space for memories and multiple and intersecting narratives looks promising. UNESCO's Biosphere Reserve programme explicitly acknowledges the presence of local people and land uses within the buffer zones

42. Bartov and Weitz, 'Introduction', *Shatterzone of Empires*, p. 12; Peter Coates, Tim Cole, Marianna Dudley and Chris Pearson, 'Defending Nation, Defending Nature?: Militarized Landscapes and Military Environmentalism in Britain, France, and the United States', *Environmental History* 16 (Jul. 2011): 459, 461–62, 464, 470–71, 473–74, 478; Peter Coates, 'From Hazard to Habitat (or Hazardous Habitat: The Lively and Lethal Afterlife of Rocky Flats, Colorado)', *Progress in Physical Geography* 38/3 (Jun. 2014): 286–300. On the 'ironic' nature of militarised lands, see also John Wills, 'Welcome to the Atomic Park: American Nuclear Landscapes and the "Unnaturally Natural"', *Environment and History* 7 (2001): 449–72.

43. For critical scrutiny of 'W2W' conversions (also referred to as 'Military-to-Wildlife' [M2W]), see David G. Havlick, 'Disarming Nature: Converting Military Lands to Wildlife Refuges', *The Geographical Review*, 101/2 (Apr. 2011): 183–200; 'Opportunistic Conservation at Military Sites in the United States', *Progress in Physical Geography* 38/3 (Jun. 2014): 271–85.

of protected areas. Biosphere reserves 'seek to reconcile conservation of biological and cultural diversity and economic and social development through partnerships between people and nature'.⁴⁴ In its publicity materials for West Polesie, UNESCO acknowledges the rich confessional heritage that architecturally significant Catholic, Jewish and Orthodox houses of worship represent. At the same time, the organisation is alert to the region's position at the heart of the 'bloodlands' between Hitler's Germany and Stalin's Soviet Union.⁴⁵ Promotional literature cites the international cemetery where 1,346 soldiers who fought for Russia, Germany, Poland and Austria-Hungary in these borderlands during the First World War are buried, as well as the memorials to the victims of fascist occupation during World War Two.

There is even better reason to think that the fear of erasure is overstated after a visit to *Grenzlandmuseum* Eichsfeld (Borderland Museum Eichsfeld), which opened in 1995 near the former crossing between the two Germanies at Duderstadt. The museum does not purvey a single, exclusionary narrative. It offers two narratives, though they are in no sense competitive, nor of equal status. The main storyline is palpably that of the sombre and distressing events and experiences during the division of Germany (1945–89), and within it focuses on the fates of those who tried to flee the German Democratic Republic. The other, subsidiary, tale, told in a dedicated gallery on the ground floor of the control tower (*Kontrollturm*), is one of uplifting biodiversity, the remarkable, counter-intuitive story of how individual species of flora and fauna benefited from the Cold War environment of the *Grüne Band*. Left behind amidst the infrastructure of the frontier zone, and viewable from the six-kilometre circular trail, are hedgerows and meadows dotted with fruit trees. We should take seriously the therapeutic value of involuntary nature making an unscheduled appearance.

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44. UNESCO, Man and the Biosphere Programme, 'Biosphere Reserves – Learning sites for sustainable development', <http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/> (accessed 21 Jul. 2014)

45. Timothy Snyder, *Bloodlands: Europe between Hitler and Stalin* (New York: Basic Books, 2010).

Engineering Edens on This ‘Rivered Earth’? A Review Article on Water Management and Hydro- Resilience in the British Empire, 1860s–1940s¹

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ABSTRACT

This article presents an overview of the management of fresh water in the British Empire from the 1860s to the 1940s. We argue that imperial water management shaped and responded to the imperatives of diverse ecologies and topographies, contrasting political and economic agendas and, not least, different colonial societies, technologies and lay expertise. Building on existing studies, we consider the broader ecological and social effects of water management on irrigated agriculture and cities as well as water supply and drainage, with a particular focus on India and Australasia. Although imperial ideologies of improvement impelled settlement, drove resource extraction and transformed environments, we argue that at times they also diminished the availability, quality and distribution of water. Engineering projects also benefited some groups but not others. We show that normative Anglo assumptions of productive lands and watered environments were often ill-matched with colonial ecologies and water availability, in some cases prompting anxieties about the quality and quantity of water. While these anxieties encouraged further hydrological interventions, we show that they often had unexpected and undesired consequences. We introduce the concept of ‘hydro-resilience’ to demonstrate how interventions in water management diminished the quality

1. Vikram Seth, *The Rivered Earth* (New Delhi: Hamish Hamilton, 2011).

and quantity of water in ways that impacted unevenly on peoples and ecologies across the British Empire.

KEYWORDS

Water management, canal irrigation, flooding, British Empire, miasma, health, water, environmental history, urban environmental history, flood control

In the first volume of 1875 of the scientific forestry journal, the *Indian Forester*, one correspondent mused wryly, ‘Is not the spirit and tendency of rural improvement to make artificial swamps, to saturate the sub-soil with moisture and vegetable débris, to produce plenty, and to develop disease?’² He was referring to the British recommissioning of canal works in India in full knowledge that flaws in their design encouraged water pooling, which facilitated the spread of malaria. The correspondent’s pointed remarks suggest disillusionment among some nineteenth-century officials with the application of engineering expertise to colonial environments.

Guided by a vision of alleviating scarcity and ensuring abundance, of improving quality and providing sanitation, of aiding industry and encouraging agriculture, later nineteenth-century technocrats not only sought to engineer colonial waterscapes, but also to reorder colonial societies. However, colonial environments and peoples were not so easily remade. As the correspondent quoted above observed, colonial engineering frequently had unexpected and often unacceptable environmental, health, social and political outcomes.

In drawing on existing studies, this review article considers the broader ecological, economic, health and social effects of management of irrigated agriculture, flooding, and water supply and drainage during a period of modernisation extending from the late-nineteenth century to the 1940s. We argue that colonial water management shaped and responded to the imperatives of diverse ecologies and topographies, contrasting political and economic agendas and, not least, different colonial societies, technologies and lay expertise.

While demonstrating local variations, we also highlight the shared characteristics of colonial water management in different parts of the British Empire as a means of connecting often separate historiographies of imperial water management. This is necessary because historians often write about either settler colonies or colonies of extraction, or either tropical or temperate colonies, seldom both together, despite, as we show, there being considerable benefits to doing so. One such benefit is in highlighting points of similarity and

2. ‘Arboriculture in its relation to Climate’, *Indian Forester* 1 (1875): 148.

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convergence in water policies across the Empire. More particularly, an Empire-wide survey allows for the exploration of the role of local politics, cultures and environments in mediating responses to similar or even the same water policies. Aside from opening up new angles from which to consider points of commonality and contrast, considering these different historiographies together also makes sense because of the shared cultures of the British Empire and the movement of water engineers across the Empire.³ Furthermore, since the topics of irrigation, flood control and sanitation in rural and urban areas were considered to be interrelated at the time but have subsequently often been studied separately, our article demonstrates the benefits of bringing together the historiographies of the nascent subject of imperial urban environmental history with the better-developed fields of the social history of medicine and health of the British Empire.⁴ Our approach, then, demonstrates the advantages of a cross-fertilisation of topics formerly considered by scholars as geographically or historiographically separate.

To shape our review article, we advance the concept of hydro-resilience to describe the ways in which colonial water control schemes impacted unevenly on people's material comfort, health and economic opportunities, sometimes by empowering already strong groups and further disadvantaging others.⁵ The unevenness of water management's effects, where some groups benefited and others did not, resulted from variations in environments, as well as from the diverse political, economic and social contexts in which they were undertaken. By default or by design, colonial water management affected people's hydro-resilience and the ways in which they understood and responded to hydrological change.

In analysing these variations, we present a more nuanced and complex picture of colonial engineering's impacts in the years leading up to the high modernism of the 1950s, which James C. Scott, Greg Bankoff and Timothy Mitchell among others have studied. They argue that a valorisation of technocracy and a reliance on colonial engineers and engineering works hindered the development of schemes better suited to local conditions, and that such

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3. David Gilmartin, 'Imperial rivers: irrigation and British visions of empire', in Durba Ghosh and Dane Kennedy (eds), *Decentring Empire: Britain, India and the Transcolonial World* (Hyderabad: Orient Longman, 2006), pp. 76–103.
 4. See for example, William Beinart and Lotte Hughes, *Environment and Empire* (Oxford: Oxford University Press, 2007), pp. 148–66; Michael Mann, 'Delhi's Belly: on the management of water, sewage and excreta in a changing urban environment during the nineteenth century', *Studies in History* 23 (1) (2007): 1–31; Michael Mann and Samiksha Sehrawat, 'A City with a View: the afforestation of the Delhi Ridge, 1883–1913', *Modern Asian Studies* 43 (2) (2009): 543–70; Awadhendra Sharan, 'From source to sink: "official" and "improved" water in Delhi, 1868–1956', *Indian Economic and Social History Review* 48 (3) (2011): 425–62; Raghav Kishore, 'Urban "failures": municipal governance, planning and power in colonial Delhi, 1863–1910', *Indian Economic Social History Review* 52 (4) (2015): 439–61.
 5. Ruth A. Morgan, *Running Out? Water in Western Australia* (Crawley, WA: UWA Publishing, 2015).

a mindset encouraged deference to colonial expertise at the expense of local knowledge and technologies.⁶ Our study examines the beginnings of this process in the British Empire from the late-nineteenth century, and concludes with the high modernism of the 1950s.

Colonial and local approaches to water management were more closely intertwined in the nineteenth century, but later water management for the purposes of irrigation, flood-prevention and sanitary improvement was used to justify arguments for British rule because it promised to bring material improvements to people's lives. This approach was a response to post-World War I demands for self-determination, nationalism and equal rights. Officials pointed out that British science and technology raised the living standards of colonial subjects, and gave them access to Western education, medicine and markets.⁷

But we also show that, at the same time, colonial engineers sometimes used and admired local technologies, and that many colonial water-management projects brought improvements to health and living standards. While imperial race-based policies commonly impelled management schemes that benefited some groups over others, we demonstrate that some local groups resisted potentially beneficial schemes on the grounds of economic self-interest and political ideology. For hydrological management, wealth and class mattered as well as race and caste. This was true even from the late-nineteenth century with the beginnings of path dependency or technological lock-in, marked by the increasingly idealistic implementation of technocratic and centralised hydrological regimes built on colonial engineering expertise.⁸ Technological lock-in, we show, was both cultural and technological. Particular engineering schemes, predicated on the functioning of highly idealised models, fostered water cultures and behaviours that often disrupted pre-existing relationships with water and diminished the hydro-resilience of both people and environments. As well as imperial ideologies of improvement, the developing dependence of people on technocratic schemes, we show, encouraged behaviours and expectations

6. See for instance, James C. Scott, *Seeing like a State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven: Yale University Press, 1998); Timothy Mitchell, *Rule of Experts: Egypt, Techno-politics, Modernity* (Berkeley: University of California Press, 2002); Greg Bankoff, *Cultures of Disaster: Society and Natural Hazards* (New York: Routledge, 2004).

7. Note, for example, Thomas R. Metcalf, *Ideologies of the Raj* (Cambridge: Cambridge University Press, 1994), C.A. Bayly, 'Ideologies of the end of the Raj: Burma, India, and the World, 1940–1950', in Durba Ghosh and Dane Kennedy (eds), *Decentering Empire: Britain, India and the Transcolonial World* (New Delhi: Orient Longman, 2006), pp. 351–73; and Peter J. Cain, 'Character, "ordered liberty", and the mission to civilize: British moral justification of Empire, 1870–1914', *Journal of Imperial and Commonwealth History* 40 (4) (2012): 557–58.

8. See Sarah Bell, 'Urban Water Systems in Transition', *Emergence: Complexity and Organization* 14 (1) (2012): 45–58; Lionel Frost and Seamus O'Hanlon, 'Urban History and the Future of Australian Cities', *Australian Economic History Review* 49 (2) (2009): 1–18.

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that demanded further hydrological interventions. Yet we demonstrate that these interventions often fell short of expectations; worse, they had the very opposite result of what was intended, with deleterious results for people and environments. The mixed cultural and environmental legacies of the colonial engineering projects we examine in this paper have continued long after the sun has set on the British Empire.

HYDROLOGICAL IMPROVEMENT IN A DIVERSE EMPIRE

The British Empire spanned tropical and temperate lands, deserts of sand and ice, vibrant tropical biomes, low-lying savannahs and swamps, and vast mountain ranges. An equally bewildering number of people and variety of cultures – 458 million, or a fifth of the world's population following the First World War (1914–1918) – and animals lived in a territory that at its height encompassed over a quarter of the earth's landmass.⁹ Different political systems prevailed, from self-governing colonies like New Zealand, to semi-colonial treaty ports in China and semi-independent rajas in India.¹⁰

Even when only considering parts of it, the British Empire offered the observer a bewilderingly diverse set of environments. This is what struck inveterate imperial traveller Charles Dilke (1843–1911) when, in the 1860s, he contrasted India, Australia and New Zealand as he pondered the role of environments in colonial development. New Zealand's climate, 'is damp and windy', its land,

covered in most parts with a tangled jungle of tree-ferns, creepers, and parasitic plants; water never fails, and, though winter is unknown, the summer heat is never great; the islands are always green. Australia has for the most part flat, yellow, sunburnt shores; the soil may be rich, the country good for wheat and sheep, but to the eye it is an arid plain; the winters are pleasant, but in the hot weather the thermometer rises higher than it does in India, and dust storms and hot winds sweep the land from end to end.¹¹

The British Empire relied greatly on the exploitation of natural resources for its profits. This ranged from supplying its industrial manufacturing base with raw materials, to revenue-raising in India through agricultural production, to

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9. Janken Myrdal, 'Empire: The Comparative Study of Imperialism', in Alf Hornborg, Brett Clark and Kenneth Hermele (eds), *Ecology and Power: Struggles over Land and Material Resources in the Past, Present and Future* (New York: Routledge, 2012), pp. 37–51, p. 37; and Angus Maddison, *The World Economy: A Millennial Perspective* (Paris: Organization for Economic Co-operation and Development, 2001), pp. 98, 242.
 10. Robin Butlin, *Geographies of Empire: European Empires and Colonies, c.1880–1960* (Cambridge: Cambridge University Press, 2009), pp. 52–76.
 11. Charles Dilke, *Travellers' Tales of Early Australia & New Zealand: Greater Britain, Charles Dilke visits her new lands, 1866 & 1867*, ed. Geoffrey Blainey (North Ryde, NSW: Methuen Haynes, 1985 [1868]), p. 86.

the emergence of settler capitalism through land investment and the application of technology.¹² As Richard Drayton and James Beattie have shown, ‘improvement’ was the watchword of colonial administrators and engineers. The idealisation of Britain’s well-watered lands encouraged expectations that similar environments would be found in its colonies.¹³ An ethos of improvement impelled colonial engineers to apply their expertise to conjure water in places where they deemed it to be lacking.

Improvement informed a general increase in scientific bureaucracy in the nineteenth century, as part of a process of trying to rationally and efficiently utilise resources. In the settler colonies of Australasia, for instance, colonial governments shifted attention from exploration and the discovery of resources to ‘their regulation, conservation, and more efficient use’ – tasks expected of colonial scientists.¹⁴ But resource development was not an end in itself. As instruments of the state, the work of these burgeoning bureaucracies was fundamental to colonial state-building through the centralisation of scientific expertise and the exercise of political control.¹⁵ Such an alignment was especially clear in India, where the experience of military rule fostered the centralisation and administration of a growing cadre of ‘scientific soldiers’. By the end of the nineteenth century, the sub-continent’s ten scientific services directed the application of research to meet specific problems relating to meteorology, veterinary science, botany, economic production, agriculture, archaeology, geology, mining, forestry and surveying.¹⁶

The development and management of colonial water resources was vital to many of these services, shaping the paradigm of hydraulic interventions which Rohan D’Souza characterises as ‘colonial hydrology’. Although D’Souza was referring to the South Asian experience, his concept has broader relevance: ‘colonial hydrology’ encapsulates ‘the varied hydraulic interventions of colonialism’, which altered both the ‘fluvial and social worlds’ of the colonies of the British Empire.¹⁷ These hydraulic interventions, undergirded by the belief ‘that they were spreading enlightenment and civilisation’, led colonial water engineers to impose their ‘technological-environmental system on the landscapes

12. Butlin, *Geographies of Empire*, pp. 21–23.

13. Richard Drayton, ‘Science, medicine and the British Empire’, in Robin W. Winks and Elaine M. Lowe (eds), *Oxford History of the British Empire: Volume 5: Historiography* (Oxford: Oxford University Press, 1999), pp. 264–76, p. 265; James Beattie, *Empire and Environmental Anxiety: Health, Science, Art and Conservation in South Asia and Australasia* (Basingstoke: Palgrave Macmillan, 2011).

14. Jan Todd, ‘Science at the periphery: an interpretation of Australian scientific and technological dependency and development prior to 1914’, *Annals of Science* 50 (1) (1993): 33–58.

15. David Gilmartin, ‘Scientific Empire and Imperial Science: colonialism and irrigation technology in the Indus Basin’, *Journal of Asian Studies* 53 (4) (1994): 1127–49.

16. Roy M. McLeod, ‘Scientific advice for British India: imperial perceptions and administrative goals, 1898–1923’, *Modern Asian Studies* 9 (3) (1975): 343–84.

17. Rohan D’Souza, ‘Water in British India: the making of a “colonial hydrology”’, *History Compass* 4 (2006): 621–28, at 622.

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of the empire', as John Broich has observed.¹⁸ They did so in a variety of ways, through irrigation works, the control of flooding and the provision of running water. British water engineers in India, as we show, recommissioned canals built by a previous dynasty; in other cases, as in Australia, engineers started anew, ignoring indigenous examples of landscape authorship. Whatever the environmental conditions or interventions by British, colonial or native engineers, these projects were connected through a common aspiration for improvement, a shared training or common bureaucratic experience. Together, they shaped the colonial hydrology of the British Empire.¹⁹

IRRIGATING AN EMPIRE: INEQUALITIES AND DISEASE

Canal irrigation provides a clear illustration of how colonial engineers altered a society's hydro-resilience. The redistribution of water empowered certain groups at the expense of others, by exposing some to greater risks from disease or giving others economic opportunities. Drawing on case studies from India, Egypt, Australia, New Zealand, Canada and South Africa, we also show how the political and economic ambitions of imperial engineering could be counterproductive in the long term: water availability and other environmental resources sometimes could not sustain agricultural enterprises. When such plans failed, planners commonly sought further technological solutions to overcome perceived environmental deficiencies. Such attitudes, by failing to question the vision of development, and by entrenching particular modes of water management, very often exacerbated the problems that schemes sought to solve. In short, such efforts undermined the hydro-resilience of both peoples and ecologies, as well as the imperial project of improvement itself.

In colonies of extraction and settlement alike, by the later nineteenth century colonial administrators and settlers began to see irrigation as an important means of realising their agricultural aspirations. In India, the British understood irrigation's significance in a landmass of uneven water distribution. They recommissioned existing irrigation canals and added their own in an attempt to increase agricultural production.²⁰ Their activities were buttressed by the

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18. John Broich, 'Engineering the Empire: British water supply systems and colonial societies, 1850–1900', *Journal of British Studies* 46 (2007): 346–365, p. 347.
 19. Christopher V. Hill, 'Imperial design: The Royal Indian Engineering College and public works in colonial India', in Deepak Kumar, Vinita Damodaran and Rohan D'Souza (eds), *Environmental Encounters in South Asia* (Oxford: Oxford University Press, 2011), pp. 71–85, p. 73; John Broich, 'Native hydraulic engineers in the service of the British Empire', paper presented at the Britain and the World Conference (Edinburgh: British Scholar Society, 23 June 2012). The authors thank John for sharing his paper with us.
 20. Elizabeth Whitcombe, 'Irrigation', in Dharma Kumar (ed.), *The Cambridge Economic History of India, Volume 2, c.1757-c. 1970* (Cambridge: Cambridge University Press, 1983), pp. 677–737.

particularities of environment and government: post-1858, a colonial state ideology of utilitarianism encouraged large-scale development projects and the use of experts to deliver them. In addition, India's colonial masters were not answerable to an electorate, as was the case in settler colonies. With land revenue fixed, there was great impetus to extend irrigation schemes to increase profits. By 1892, almost 22,209 kilometres of canals and other smaller channels snaked their way through the sub-continent, slaking some 13.4 million acres of land.²¹ In the Punjab from 1887 to 1947, the British developed some 67,800 kilometres of canals that by the end of the Raj irrigated 30.6 million acres of land.²² This region of commercial crops was at the heart of irrigated India, where ninety per cent of irrigation projects were undertaken in the decade after the 1876–77 famine.

By virtue of Britain's ever-expanding political, economic and technological interventions on the sub-continent, India figured prominently in guiding imperial policy in other colonies in the nineteenth century. India's environment and the kinds of water technology in place there demanded new engineering skills from the British, skills and technology that were not available in Britain. Indeed, at certain points in the nineteenth century, demand for engineers very often outstripped supply.²³ Although demand later diminished, engineering colleges – such as the College of Civil Engineering at Roorkee (from 1854, the Thomason College of Civil Engineering) – and water engineers still proliferated across India into the twentieth century. Like their counterparts in the forestry departments, many of the engineers trained in India developed engineering projects elsewhere in the British Empire.²⁴

One of those was Indian-born hydro-engineer Sir William Willcocks (1852–1932), who was educated at Roorkee. Although Willcocks believed irrigation works represented a means of social control, he also came to admire Indian – as well as Egyptian – water systems, and was quick to criticise the many environmental problems caused by British engineering, notably in spreading malaria. Willcocks was also an international technocrat, working as an engineer on projects in India, Egypt and elsewhere. David Gilmartin demonstrates that Willcocks, like so many other engineers, believed that reducing imperial landscapes and water flows to mathematical formulae would help

21. David Arnold, *The New Cambridge History of India: Science, Technology and Medicine in Colonial India* (Cambridge: Cambridge University Press, 2000), pp. 119–20.

22. Calculated from M. Mufakharul Islam, *Irrigation, Agriculture and the Raj: Punjab, 1887–1947* (New Delhi: Manohar, 1997), table on p. 26.

23. Hill, 'Imperial Design', p. 73. For example, in 1868, India's Public Works Department required 80 engineers, but only 10 were available. Mike Davis, *Late Victorian Holocausts: El Niño famines and the Making of the Third World* (London: Verso, 2001), pp. 331–40.

24. See for example, Gregory A. Barton, *Empire Forestry and the Origins of Environmentalism* (Cambridge: Cambridge University Press, 2002); S. Ravi Rajan, *Modernizing Nature: Forestry and Imperial Eco-development 1800–1950* (Oxford: Oxford University Press, 2006); Beattie, *Empire and Environmental Anxiety*.

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extract 'water's duty' and, in turn, contribute to the spread of European 'civilisation', whether in Egypt or India.²⁵ Notwithstanding Willcocks' admiration for indigenous systems of water management, reductionist and technocratic responses, we show, came to dog many imperial engineering projects, and served to reduce the hydro-resilience of peoples and environments across the British Empire.

Although the individuals varied (in our examples, *ryots*, Egyptian farmers, white settlers, government officials, etc.), the empowerment of certain groups over others through water control was another story writ large across the land and waterscapes of Britain's formal and informal empire. Egypt's first Aswan dam (1902), designed by Willcocks, irrigated some four million of around 6.5 million acres of irrigable land,²⁶ but it created wealth disparities between northern farmers and farmers living in more southerly regions. The former received perennial irrigation, encouraging the growing of cash crops, but to the detriment of those living further south – who remained reliant on traditional semi-permanent irrigation. Migrants in the water-poor south consequently provided labour for the cash-crop cotton economy of the perennially irrigated north. Another group disempowered by the development of the first Aswan dam was the Nubians, whose land was expropriated.²⁷

The operation of the colonial state through agricultural irrigation projects highlights, as Kaushik Ghosh has noted, the colonial programme of divide and rule, in which the state incorporated some indigenous populations but excluded others.²⁸ For example, in India the construction of masonry weirs (called *anicuts*) along the Gadavari (Andhra) encouraged rice-growing and enabled peasant castes to move from a subsistence level 'to acquire considerable economic dominance in the post-anicut phase by virtue of their control over land and rice production'. Yet British neglect of the region's traditional tank irrigation caused a breakdown in the traditional patron-client relationships between *zamindari* (tax middle-men) and the local populace.²⁹

Using 'canal colonies', British officials tried to develop northern India's Punjab and 'civilise' its peasantry, but environmental, economic and social complexities led to the policy's failure. In the Punjab, imperial engineers

25. Gilmartin, 'Imperial Rivers', pp. 76–103.

26. Jennifer L. Derr, 'Drafting a map of colonial Egypt: the 1902 Aswan Dam, historical imagination, and the production of agricultural geography', in Diana K. Davis and Edmund Burke III (eds), *Environmental Imaginaries of the Middle East and North Africa* (Athens, OH: Ohio University Press, 2011), pp. 136–57, p. 138.

27. Derr, 'Drafting a Map', pp. 136–57. See also, Claire Cookson-Hills, 'The Aswan Dam and Egyptian water control policy, 1882–1902', *Radical History Review* 116 (2013): 59–85.

28. Kaushik Gosh, 'Between global flows and local dams: indigenouness, locality, and the transnational sphere in Jharkhand, India', *Cultural Anthropology* 21 (2006): 501–34.

29. B. Eswara Rao, 'Taming "liquid gold" and dam technology: a study of the Godavari Anicut', in Deepak Kumar, Vinita Damodaran and Rohan D'Souza (eds), *The British Empire and the Natural World: Environmental Encounters in South Asia* (New Delhi, Oxford University Press), pp. 145–59, p. 152.

quoted ‘biblical prophecies about new lands springing forth in deserts’, as they established the canal colonies. They viewed these colonies as engines ‘for converting the “superstitious” and “fatalistic” Indian peasant into an industrious self[-]sufficient yeomen’.³⁰ From the 1880s, the British earmarked former grazing grounds as agricultural settlements, using irrigation to transform six million acres of desert into agricultural colonies.³¹ Yet, in the Punjab, rapid commercialisation resulting from irrigation disrupted a fragile social order, and ultimately undercut British attempts to use wealth generated through irrigation as a means of quieting resistance to imperial rule. As a consequence of the introduction of irrigation colonies, many peasants fell into debt to urban entrepreneurs, who foreclosed on them, and took over peasants’ land. The British intervened by legislating against urban moneylenders owning rural land, while rural elites banded together to form a political alliance with colonial authorities against urban interests. Later, faced with a series of uprisings among canal colonies in 1907, the British fell back on trying to ensure the loyalty of local elites by awarding local ‘gentry’ some 7.5 per cent of the land area of the Lower Bari Doab Canal – a policy at odds with their avowed attempt to encourage modern cultivators.³²

In settler colonies, too, radical attempts to remake colonial societies and environments often pivoted on the efforts of engineers and the effectiveness of irrigation technology in projects which boosted farming but ultimately diminished the social and economic resilience of the poorer members of society, especially non-white subjects. In parts of semi-arid Australia, late-nineteenth-century boosters hailed irrigation technology as the means of bringing into production otherwise ‘worthless lands’, similar motivations to those that impelled transformations across Africa.³³ In Australia, the area under irrigation in

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30. Mubbashir Rizvi, ‘Jangal Vicch Mangal [Joy in the Wilderness]: Millennial Irrigation and the Colonial Infrastructure as Gift’ (Unpublished MS: Georgetown University, no date), 17. The authors thank Mubbashir for permission to cite this manuscript.
31. David Gilmartin, ‘Migration and modernity: The State, the Punjabi village, and the settling of the canal colonies’, in Ian Talbot and Shinder Thandi (eds), *People On The Move: Punjabi Colonial, and Post-Colonial Migration* (Karachi: Oxford University Press, 2004), pp. 3–20.
32. Ian Talbot, ‘The Punjab under colonialism: order and transformation in British India’, *Journal of Punjab Studies* 14 (2004): 3–10.
33. See Kirsty Douglas, “[F]or the sake of a little grass”: A comparative history of settler science and environmental limits in South Australia and the Great Plains’, in James Beattie, Emily O’Gorman and Matt Henry (eds), *Climate, Science, and Colonization: Histories from Australia and New Zealand* (New York: Palgrave Macmillan, 2015), pp. 99–118; Melissa Bellanta, ‘Engineering the Kingdom of God: irrigation, science and the Social Christian Millennium, 1880–1914’, *Journal of Religious History* 32 (2008): 1–15; Richard Grove, ‘Early themes in African conservation: the Cape in the nineteenth century’, in David Anderson and Richard H. Grove (eds), *Conservation in Africa: Peoples, Policies and Practice* (Cambridge: Cambridge University Press, 1987), pp. 21–40; Richard Grove, ‘Scottish missionaries, evangelical discourses and the origins of conservation thinking in southern Africa 1820–1900’, *Journal of Southern Africa Studies* 15 (1989): 163–87; Johann W. Tempelhoff (ed.), *African Water Histories: Transdisciplinary Discourses* (Gauteng: North-West University, 2005).

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Victoria grew six-fold between 1914 and 1940, from 100,000 to 600,000 acres, and in New South Wales between 1920 and 1940, from 60,000 to 380,000 acres.³⁴ Furthermore, in Victoria, the storage capacity in the irrigation districts increased over 4,500 per cent, from 215,523 megalitres in 1906/07 to 10,172,490 megalitres by the 1930s.³⁵ These projects significantly extended agricultural lands and correspondingly boosted productivity, leading to settlement and farm development. But despite the contemporary enthusiasm for them, as economist Bruce Davidson famously argued in the 1960s, these schemes showed that 'returns from irrigation were not sufficient to cover the cost of the capital invested in storage and distributory [sic] works'.³⁶ Undeterred, Australian governments renewed their commitment to irrigation after the Second World War to foster agricultural development and closer settlement.

Such development schemes commonly disadvantaged non-whites. By the turn of the twentieth century, for example, the development of irrigation for cattle ranching in British Columbia had combined with a programme of dispossession to limit accessible water for native peoples and to undermine their attempts to raise stock on the Indian reserves.³⁷ A similar situation emerged in twentieth-century Africa. For example, in the Kuruman District of South Africa, located in the Kalahari Desert, Nancy L. Jacobs has shown how, from 1920,

The Union government developed irrigation ... for a racially defined constituency, by granting land, financing development, providing expertise, allocating plots and regulating water use. It was this assistance which permitted whites to intensify their irrigated production at the expense of African land and water rights.³⁸

Officials earlier evicted blacks living around a spring in that district; now, as a result of white farmers using most of the water upstream, blacks forced to live downstream only had an intermittent water supply.³⁹ This state of affairs ran counter to other narratives. Evangelical missionaries in the nineteenth century read the dry landscape as evidence of the backwardness and ecological sinfulness of local populations, and tried to establish irrigated settlements. As Jacobs

34. Donald Garden, *Australia, New Zealand and the Pacific: an Environmental History* (Santa Barbara: ABC-CLIO, 2005), p. 111.

35. Edwyna Harris, 'Development and damage: water and landscape evolution in Victoria, Australia', *Landscape Research* 32 (2006): 169–181, at 177.

36. B.R. Davidson, 'Development of Australian Agriculture, 2. Developments since 1914', *Agriculture and Environment* 2 (1975): 357–85, at 361.

37. John Histle, 'A vast inland empire and the last great west: remaking society, space and environment in early British Columbia', *Journal of Historical Geography* 37 (2011): 418–28. See also, R. Cole Harris, *Making Native Space: Colonialism, Resistance and Reserves in British Columbia* (Vancouver: UBC Press, 2002), pp. 140–41.

38. Nancy L. Jacobs, 'The flowing eye: water management in the Upper Kuruman Valley, South Africa, c. 1800–1962', *Journal of African History* 37 (1996): 237–60, at 258–259.

39. Jacobs, 'The flowing eye', 237–60.

notes, across South Africa, 'Irrigation was an attempt to reverse desiccation [the perceived drying-up of land] and was a metaphor for mission work, but in a very real sense its fruits made missionary existence possible.'⁴⁰ Later, colonial developers also encouraged Africans to work in irrigated gardens, by involving them in a cash-crop economy, as means of uplifting them from their 'idleness'.

Colonial hydrological interventions not only disrupted human relationships, but also relationships between humans and other organisms. In India, Elizabeth Whitcombe's classic study of canal redevelopment demonstrated how flaws in British engineering – most notably the pooling of water – helped to spread malaria. In the short term, the Indian colonial state seemed prepared to sustain crippling health effects so long as irrigation increased agricultural productivity; a similar problem which also affected Egypt's Aswan Dam (1902).⁴¹ The first Aswan dam helped to spread malaria by creating ideal breeding conditions for its vector, the *Anopheles gambiae*, a species of mosquito native to sub-Saharan Africa but previously unknown in Egypt. The chronic disease bilharzia or schistosomiasis also arrived with perennial irrigation, which facilitated the transmission of parasitic flatworms (*Schistosoma*) to humans.⁴² Implicated, then, in the spread of disease such hydrological projects sit uneasily in triumphalist narratives of modernity and represent the kinds of uncertain social and ecological consequences of colonial hydrology identified in 1875 by the author quoted at the beginning of this article.⁴³

In addition to spreading disease, irrigation's environmental effects sometimes inadvertently imperilled improvement itself. Across many imperial landscapes, despoiled fields of once-watered land bore witness to the disastrous effects of over-watering and salinisation consequent on the establishment of perennial water systems. All-year-round watering raised water tables and, by bringing salt to the surface, devastated lands. This salty scourge was especially evident in south-eastern Australia, where the Mildura Royal Commission in 1896 found that some farmers were already experiencing problems with salinity just a decade after the *Irrigation Act*.⁴⁴ By 1916, according to the Royal Commission on Closer Settlement, northern Victoria's rising water table had

40. Nancy L. Jacobs, *Environment, Power, and Injustice: A South African History* (Cambridge: Cambridge University Press, 2003), p. 59.

41. Whitcombe, 'Irrigation', pp. 677–737; Elizabeth Whitcombe, 'The environmental costs of irrigation in British India: waterlogging, salinity and malaria', in David Arnold and Ramachandra Guha (eds), *Nature, Culture, Imperialism: Essays on the Environmental History of South Asia* (Delhi: Oxford University Press, 1996), pp. 237–59.

42. Derr, 'Drafting a map', p. 150.

43. Timothy L. Mitchell, *Rule of Experts: Egypt, Techno-politics, Modernity* (Berkeley, CA: University of California Press, 2002), pp. 29–53.

44. Hilary Howes, 'The spectre at the feast: the emergence of salt in Victoria's irrigated districts', *Environment and History* 14 (2) (2008): 217–39.

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rendered the land 'temporarily unfit for production of any kind'.⁴⁵ Meanwhile, in New South Wales, engineer Hugh McKinney (1846–1930), who had served in some of the worst salt-affected districts in India, dismissed the concerns of local soil scientists and campaigned for intensive irrigation in the colony at the turn of the twentieth century.⁴⁶ After all, he argued, there was 'no one "more entitled to be heard"' than the engineer.⁴⁷ The experience in south-eastern Australia points to a curious oversight in imperial engineering expertise – a seeming failure to heed the lessons of other parts of the Empire.

Despite evidence to suggest that irrigation and other hydrological interventions were proving to be neither the hoped-for social or economic panacea, the legacy of colonial hydrology remained alluring long into the twentieth century, and laid the basis for the post-1950 period of high modernism. The expansion of the Western Australian wheatbelt between the wars was founded on the extension of trunk-lines from the Golden Pipeline, which connected the eastern goldfields on the edge of the desert to a reservoir in the Darling Ranges, closer to the coast. Convinced that water would limit the nation's economic development after the Second World War, the Australian Rural Reconstruction Commission (1943–47) funded the development of additional infrastructure to support dryland agriculture in this 'hydraulically difficult country'. These pipelines, combined with the long run of moist seasons in the two decades after the war, seduced farmers into a dependency on this infrastructure to sustain high water usage, and diminished their hydro-resilience such that many were unprepared when droughts struck in the 1970s.⁴⁸

To an extent, these examples support Richard Grove's assessment of irrigation as a 'paternalistic intervention of the European in indigenous land use and governance'.⁴⁹ The control of water was more than simply a means to achieve agricultural bounty; it became a means to include and exclude, to redeem and neglect. In most of these cases, if not all, attempts at social engineering through hydrological schemes sought to encourage the permanent settlement of once nomadic people, while a policy of 'divide and rule' empowered some groups at the expense of others.⁵⁰ In the words of Alfred Deakin (1856–1919), then Minister for Water Supply in the colonial government of Victoria and later an Australian Prime Minister, the engineer was a 'ruler of men'.⁵¹ Yet resistance to engineering projects, not to mention the vagaries of complex hydrologies,

45. Cited in Howes, 'The spectre at the feast', 229.

46. Katrina Proust, 'Salinity in colonial irrigation: British India and south-eastern Australia', *Australian Geographer* 39 (2008): 131–47.

47. Cited in Tim Bonyhady, *The Colonial Earth* (Carlton South, Vic.: Melbourne University Press, 2001), p. 289.

48. Morgan, *Running Out?*, pp. 71–138.

49. Grove, 'Scottish missionaries', 172.

50. *Ibid.*

51. Alfred Deakin, *Irrigated India: an Australian View of India and Ceylon, their Irrigation and Agriculture* (Melbourne: E.A. Petherick, 1893), p. 229.

as well as the sometimes unexpected environmental and health impacts of schemes, curtailed the realisation of Deakin's rhetoric across the Empire.

ENGINEERING PROBLEMS: FLOODING

While water was wanted in some areas – to boost agricultural productivity, to settle nomadic peoples, to bring civilisation – in other places it was not. Here, to paraphrase anthropologist Mary Douglas, 'water [was] out of place'.⁵² The duty of the colonial engineer was to remove water where it was 'out of place' and to restore order to colonial hydrology in the interests of health, safety and prosperity. In the process, however, engineering works committed the British Empire and its subjects to ever more expensive technocratic measures to ensure that the one-in-a-hundred-years or one-in-200-years flood did not eventuate. The complexity of catchment systems often meant that the triumphant decrees issued by engineers of 'breaking-in wild rivers' or civilising nature came to nothing in the face of unruly environments.⁵³

Urbanisation across the British Empire increased rapidly in the late nineteenth and early twentieth centuries.⁵⁴ By 1900, the colonial centres of Bombay, Madras, Calcutta, Melbourne and Sydney were among a group of just thirty cities worldwide with over 500,000 inhabitants.⁵⁵ As settlements grew in size, they exposed more and more people to the risk of flooding, especially since many colonial towns were established near or at rivers. In many cases, settlers, encouraged by colonial surveyors, diminished their own social and economic hydro-resilience by founding settlements and establishing farms on flood-plains, along riverbanks, and on geologically unstable ground. Such choices were not the product of ignorance, for these situations offered considerable benefits too – river-courses guaranteed transportation and trade, and indicated rich alluvial soils suitable for agrarian endeavours.⁵⁶ Residents and landowners in the Australian town of Gundagai, for instance, took a risk by establishing a settlement on the flats of the Murrumbidgee River during the 1840s and

52. Mary Douglas, *Purity and Danger: an Analysis of Concepts of Pollution and Taboo* (New York: Praeger, 1966).

53. Richard White, *The Organic Machine: The Remaking of the Columbia River* (New York: Hill and Wang, 1995).

54. C.A. Bayly, *The Birth of the Modern World, 1780–1914* (Malden, MA: Blackwell Publishing, 2004), p. 189.

55. Eric E. Lampard, 'The urbanizing world', in Jim Dyo and Michael Wolff (eds), *The Victorian City*, vol. 1, (London: Routledge, 1999 [1973]), pp. 3–58, p. 9.

56. Grace Karskens, 'Floods and flood-mindedness in early colonial Australia', *Environmental History* 21 (2) (2016): 315–42.

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1850s, but repeated flooding eventually led the colonial government to permit exchanges of land to alleviate their vulnerability.⁵⁷

Rather than moving the population elsewhere, engineers in Christchurch, New Zealand – a city established on marshy land criss-crossed by rivers and rivulets, whose flow was also affected by tides – undertook extensive projects to try to prevent flooding. Like many of their peers elsewhere, Christchurch engineers drained, piped and cut banks to stop floods, and planted trees in the hope of draining swampy ground and making such places healthier.⁵⁸ Yet, as they were to discover with subsequent floods, the more they altered the environment, the more complex and expensive the problems became. In his report to the Canterbury Provincial Council in 1866 following the entering of floodwaters from the Waimakariri River into the town, engineer James Balfour (1831–1869) warned that '[i]t must be remembered that if the Government once commit themselves to the policy of confining the river absolutely to its present channel, they undertake a work which must be never ending and which must grow in magnitude from year to year'.⁵⁹ As predicted by its engineer in 1866, Christchurch's engineering works grew in both expense and sophistication in the ensuing decades and into the next century. Engineers blocked off one of the branches of the Waimakariri River; yet this only created further problems elsewhere, requiring more expensive remediation work such as extensive channel realignment and the introduction of groynes and stop-banks.⁶⁰

Local topography also posed particular problems to engineers. The steep bare hillsides of Dunedin, New Zealand, meant that, when it rained, water quickly rushed downstream, bringing freshets rushing along streets and into properties in the developing suburbs below. Several engineering measures were introduced, yet all they seemed to succeed in doing was to magnify the scale of destruction of subsequent floods. Canalising the lower reaches of Dunedin's Water of Leith sped up the flow of water, especially when flooding coincided with periods of high tide. This problem was witnessed over two days of flooding in April 1923, which required widespread evacuation of low-lying areas, and cost £41,000 to clean up, while floods in 1929 washed away bridges and inundated 500 homes. In the 1930s, flood-control measures costing over £600,000 were introduced to enlarge an existing artificial river channel,

57. Emily O'Gorman, *Flood Country: an Environmental History of the Murray-Darling Basin* (Collingwood, Vic: CSIRO Publishing, 2012), pp. 15–60.

58. James Beattie, 'Health panics, migration and ecological exchange between India, New Zealand and Australia', in Robert Peckham (ed.), *Empires of Panic: Epidemics and Colonial Anxieties* (Hong Kong: Hong Kong University Press, 2015), pp. 87–110.

59. Cited in Eric Pawson, 'On the edge: making urban places', in Eric Pawson and Tom Brooking (eds), *Environmental Histories of New Zealand* (Melbourne: Oxford University Press, 2002), pp. 226–40, p. 205.

60. Eric Pawson, 'Confronting nature', in John Cookson and Graeme Dunstall (eds), *Southern Capital Christchurch: Towards a City Biography 1850 – 2000* (Christchurch: Canterbury University Press, 2000), pp. 60–84, pp. 72–75.

reconstruct bridges and establish diversions. Engineers also erected boulder traps to prevent flood debris from washing down.⁶¹ As of 2016, flood-prevention work is ongoing, following large floods in winter 2015. In Dunedin, as in Christchurch, ever-more devastating floods have required ever-more complex and expensive engineering works demanding constant upkeep and expansion.

Not all engineers then or now, however, advocated controlling rivers by imposing technological solutions on them. The Easter floods of 1897 left behind a trail of destruction in eastern New Zealand. Roads were rendered impassable by slips. Dead stock bobbed above inundated fields or floated past twisted remains of bridges swept aside in the floods. Flood damage in Hawke's Bay Province caused an estimated £11,150 damage to roads and bridges. It also wrecked property to the value of £100,000.⁶² One article by an engineer prompted by the floods discussed its cause and displayed a sophisticated understanding of how rivers operate, at odds with prevailing orthodoxy. Recognising that floodwaters created the 'grandly fertile plains that lie about Hastings', the author recommended efforts to limit their destruction while also obtaining 'all the good we can from them'. 'We cannot afford to fight Nature', he wrote. '[O]ur safest way when she is in her tantrums', noted the writer, 'is to stand to one side, on some safe spot, and come back when the fit is over. Our business is rather to work hand in hand with Nature as far as we can.' Unlike many writers who assigned almost absolute catchment control to deforestation, this engineer recognised that natural and human causes influenced river flow and flooding. Rivers change course anyway, he observed, quite apart from the fact that the sea, as well as human-made structures like weirs and groynes, block up rivers and alter their channels. Bush clearance, he continued, also increases water flow.⁶³ The writer recommended planting willows to encourage the pooling of water and undertaking limited dredging and some river embankment work, none of which, he was careful to point out, should obstruct the river channel itself.⁶⁴ Lastly, he noted that people must realise living on a flood-plain can come with costs. Areas like '[t]he lower parts of the plains', he pointed out, 'are humanly habitable at risk'.⁶⁵

61. K.C. McDonald, *City of Dunedin: A Century of Civic Enterprise* (Dunedin: DCC, 1965); Pawson, 'On the edge', p. 207.

62. 'Appendix No. 14: Roads and Bridges Damaged by the Easter Floods of 1897', in *Appendices to the Journals of the House of Representatives* (NZ), C-1, 1898, pp.126–135. Figure for property damage from George S. Perrin, 'Conservation of New Zealand Forests', in *Appendix to the Journals of the House of Representatives* (NZ), C-8, 1897, p. 2. See also 'Through flood and storm', *New Zealand Farmer* 17 (5) (1897): 156–57.

63. 'Causes and control of flood in Lower Hawke's Bay', *New Zealand Farmer* 17 (8) (1897): 250–51.

64. *Ibid.*, 250.

65. *Ibid.*, 251.

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As this author highlighted, deforestation of upland areas was a problem.⁶⁶ Forests, explained New Zealand politician and author Robert McNab (1864–1917) in 1903, served as an important 'natural reservoir'. Their removal brought rain rushing 'down the hillside or along the plain in torrents or swollen streams'. The flooding 'denudes the land of its rich soil, and leaves bare clay or smooth rock, all to the detriment of agriculture'.⁶⁷ Other colonists warned that floods killed and destroyed: stymied commerce and cultivation, silted up harbours and river ports and ruined rivers suitable for future hydroelectric generation.⁶⁸ The trouble, as colonists were discovering, was that changes in one part of the environment very often had unforeseen impacts on other parts.

In contrast to the threats that floods posed to Australasian townships, the seasonal inundation of the pre-colonial deltaic environment of Orissa had long been integral to local agrarian practices. Imperial efforts to extract revenue from the land, however, led to a series of engineering interventions that, as historian Rohan D'Souza shows, 'transformed the Orissa Delta from being a flood-dependent agrarian regime into a flood-vulnerable landscape'.⁶⁹ Rather than establish a reliable and prosperous colonial hydrology, each intervention initiated a cascade of destabilising natural and social effects to which the state responded with further engineering works. Embankments were supposed to protect cultivated tracts and revenue flows from seasonal flooding, thus recasting these inundations as calamities rather than a geomorphological process characteristic of the region. This interference with the local flood regime produced further hydraulic volatility. To harness these unruly waters, hydraulic engineer Colonel Arthur Cotton (1803–1899) proposed 'controlling' the delta's rivers through a series of privatised irrigation and navigation canals that would form a profitable irrigation, navigation and flood-control scheme.⁷⁰ Cotton had greatly exaggerated the project's potential success: by the late 1920s, the East India Irrigation and Canal Company had managed to supply water to less than ten per cent of the acreage that he had predicted would be irrigated.⁷¹ Later imperial efforts to replicate the success of the US Tennessee Valley Authority (TVA) encouraged the introduction of 'Multi-Purpose River Valley Development' (MPRVD) to regulate the rivers of eastern India.⁷² Again,

66. Richard Grove, *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600–1860* (Cambridge: Cambridge University Press, 1995); Beattie, *Empire and Environmental Anxiety*, pp. 150–76.

67. Robert McNab, 'Forestry in its relation to the farm', *New Zealand Farmer* 24 (10) (1903): 787.

68. See J.P. Grossmann, *The Evils of Deforestation* (Auckland: Brett Printing and Publishing Co., 1909), pp. 30–34, 37, 41.

69. Rohan D'Souza, *Drowned and Dammed: Colonial Capitalism and Flood Control in Eastern India* (Oxford: OUP, 2006), pp. 215–16.

70. *Ibid.*, p. 127.

71. *Ibid.*, p. 147.

72. *Ibid.*, pp. 184–91

experience fell short of expectations. The MPRVD was supposed to produce rural electricity and accelerate the economic development of local communities, but few benefited from the resulting hydrological transformation.⁷³ The Orissa example demonstrates the ways in which engineering interventions could undermine the hydro-resilience of colonial peoples, while illustrating the extent of the environmental limitations of imperial endeavours.

As floodwaters periodically broke banks and reverted to older channels, so flood-control networks called for ever greater levels of technological intervention – and investment. Developing as a kind of arms race against nature, engineering works committed colonial administrators and taxpayers to evermore expensive engineering measures, which they hoped would vanquish the threat of flood. Yet each new measure diminished the effectiveness of the solution and the hydro-resilience of people, who became increasingly dependent on these works of flood abatement. This represented a situation of technological lock-in, as identified by Mark Elvin in imperial China to explain the Middle Kingdom's over-reliance on increasingly costly projects of hydraulic engineering. As the cases of Christchurch, Dunedin and Orissa suggest, technological lock-in and the dependence it fostered escalated financial and environmental costs of ongoing engineering works across the British Empire.⁷⁴ Alongside these schemes were others, such as the one suggested for Hawke's Bay, which encouraged minimal interference in river systems and which upheld an attitude of working with, rather than against, nature. Yet, increasingly, it was schemes such as those in Christchurch, Dunedin and Orissa which became the norm in the twentieth century. They became part and parcel of attempts to improve people's lives through technology, as was also the case with sanitation.

SANITISING COLONIAL CITIES

Urbanisation reduced the hydro-resilience of colonial peoples not only by heightening their vulnerability to flooding, but also by exposing them to greater risk of contracting disease. Rivers provided nineteenth-and-twentieth-century colonial towns and villages with drinking water, but also ready-made sewers. Turds bobbed down rivers. Offensive-smelling ditches caused passers-by to gag or swoon. An ebbing tide forced bloated floating animal carcasses back up rivers. These are just some of the more stomach-churning descriptions of life in settlements of the British Empire.⁷⁵ Epidemics of water-borne

73. *Ibid.*, 194–97.

74. Mark Elvin, *The Retreat of the Elephants: An Environmental History of China* (New Haven & London: Yale University Press, 2004).

75. Note, Pamela J. Wood, *Dirt: Filth and Decay in a New World Arcadia* (Auckland: Auckland University Press, 2005); Derek A. Dow, *Safeguarding the Public Health: A History of the New Zealand Department of Health* (Wellington: Victoria University Press, 1995).

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diseases like typhoid were rife even in the so-called 'workingman's paradise' of the Australian colonies; in the late-nineteenth century, mortality from gastro-intestinal diseases in Sydney, Melbourne and Brisbane was double that of London and Birmingham.⁷⁶ Added to typhoid was the dreaded 'King Cholera', as well as typhus, diphtheria, yellow fever, cholera and countless other water-borne diseases: disease, in its various combinations and forms, had devastating impacts on colonial populations in urban settlements from Wellington to Winnipeg, Cairo to Calcutta.⁷⁷

Momentum for the provision of potable water and sewerage systems for nineteenth-century cities came from the Sanitarians, who stressed the health and moral benefits provided by access to clean drinking water. In providing drinking water, most imperial authorities favoured gravity-fed schemes, often requiring the storage and piping of water from some distance from a settlement.⁷⁸ Imperial authorities generally attempted to replace locally controlled water systems with public waterworks. As John Broich has demonstrated of late nineteenth-century Bombay, in gradually closing local alternatives, new waterworks 'centralised control of the most critical element in the hands of the British, when the availability of water had formerly been decentralised'. This process, it was hoped, would bring about a general, and subtle, shift in the behaviour of the city's inhabitants. Clean water would replace dirty; habits would change and the population would become 'modern'.⁷⁹ At least this was the ideal. Similar sentiment underpinned engineering works in settler colonies. As well as targeting the perceived poor habits of indigenous peoples and ethnic minorities in colonial cities, engineering works sought improvements to the physical and moral health of lower-class whites.⁸⁰

76. Linda Bryder, 'A new world? Two hundred years of public health in Australia and New Zealand', in Dorothy Porter (ed.), *The History of Public Health and the Modern State* (Atlanta: Rodopi, 1994), pp. 313–34; Roy MacLeod and Milton Lewis (eds), *Disease, Medicine and Empire: Perspectives on Western Medicine and the Experience of European Expansion* (London and New York: Routledge, 1988); Philip D. Curtin, *Death by Migration: Europe's Encounter with the Tropical World in the Nineteenth Century* (Cambridge and New York: Cambridge University Press, 1989); Mark Harrison, *Public Health in British India: Anglo-Indian Preventive Medicine, 1859–1914* (Cambridge: Cambridge University Press, 1994); Milton James Lewis, *The People's Health: Public Health in Australia, 1788–1950* (Westport: Praeger, 2003), pp. 41–116.

77. Mark Harrison, *Disease and the Modern World, 1500 to the Present Day* (Cambridge: Polity Press, 2004); MacLeod and Lewis (eds), *Disease, Medicine and Empire*; Curtin, *Death by Migration*.

78. John Broich, 'Engineering the Empire: British water supply systems and colonial societies, 1850–1900', *Journal of British Studies* 46 (2) (2007): 346–65.

79. Broich, 'Engineering the empire', 359–60.

80. Note, Wood, *Dirt*; Claire Bashford and Claire Hooker (eds), *Contagion: Epidemics, History and Culture from Smallpox to Anthrax* (London and New York: Routledge, 2001); Alan Mayne, "'The dreadful scourge': responses to smallpox in Sydney and Melbourne, 1881–2", in MacLeod and Lewis (eds), *Disease, Medicine and Empire*, pp. 219–41; Harrison, *Disease*

The impacts of imperial water schemes were sometimes dramatic. In Calcutta, the provision of a new sewage system and filtered water supply in 1869 reduced the impact of cholera, a disease transmitted by polluted water. Each year between 1841 and 1865, some 2,500 to 7,000 residents died from the disease. Following improvement to city sanitation, deaths only once exceeded 3,000 between 1870 and 1900. Similar trends can be found across British India, where cholera mortality began to decline in the early twentieth century as a result of similar measures.⁸¹ Yet the very same water systems could also inadvertently spread disease. Melbourne's Yan Yean reservoir, perhaps the largest in the world when it was constructed in the 1850s, dramatically increased the supply of water to the city, but some consumers suffered lead poisoning from the leaching of reticulation pipes and contracted illnesses from water taken from a polluted catchment area.⁸² Contamination also dogged the extension of piped water supplies in Delhi in the 1920s.⁸³ In 1928, when a slight increase in the incidence of cholera occurred, the city's medical officer observed with disgust that water mains and leaky pipes frequently passed through drains, drain pits, and sewers, where 'foul water' could enter the supply.⁸⁴ While bringing health benefits to many, as the last two case studies show, schemes encouraging dependence on single, centralised water networks could also diminish hydro-resilience by exposing more people to contaminated supplies.

Sanitary systems benefited some groups more than others, and had the potential to provoke violent protest. Examples from Hong Kong, India, Canada and Australia demonstrate the complex interactions of class, religion, race, politics and economics in the development, use, and access by different people to waterworks. Access to water reveals fractures in the colonial state and across colonial societies. At times, the provision of water reinforced prevailing colonial ideas about morality, cleanliness, class and race among non-whites; yet its infrastructure was relatively limited in extent. At others, the best intentions of local officials were thwarted as health concerns were pushed aside over issues over the control of water.

In British India, public health measures mostly rated a poor second to financial concerns. Following the 1857 Revolution, authorities feared interfering

and the Modern World, pp. 91–117; Deborah Brunton, *Health and Wellness in the 19th Century* (Santa Barbara: ABC-CLIO, 2014).

81. See, David Arnold, *Colonizing the Body: State Medicine and Epidemic Disease in Nineteenth Century India* (Berkeley and Los Angeles: University of California Press, 1993), pp. 166–67; and Mark Harrison, *Public Health in British India: Anglo-Indian Preventive Medicine, 1859–1914* (Cambridge: Cambridge University Press, 1994), p. 216.
82. Tony Dingle, 'The life and times of the Chadwickian solution', in Patrick Troy (ed.), *Troubled Waters: Confronting the Water Crisis in Australia's Capital Cities* (Canberra: ANU Epress, 2008), pp. 7–18, p. 13; Danielle Clode, *Continent of Curiosities: A Journey through Australian Natural History* (Melbourne: Cambridge University Press, 2006), pp. 46–47.
83. Sharan, 'From source to sink', 442–45.
84. *Ibid.*

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overmuch in Indian society, lest it incite further violence. Many colonial officials also expressed a reluctance to promote public health, viewing it as outside the purview of the state, while opposition to western medicine existed among much of the Indian population.⁸⁵ Yet, as Mark Harrison, Mridula Ramanna and David Arnold show, by the late-nineteenth century some improvements in urban areas through provision of adequate water, if not in drainage or sewage schemes, had taken place on the subcontinent. In 1860, Bombay authorities completed a reservoir of 1,400 acres (Lake Vehar) to supply water to the city. In 1870, it supplied 9,643 houses, and authorities claimed that mortality rates had decreased as a result.⁸⁶ Yet, the scheme and claims of its success were questioned by the Indian press.⁸⁷ Opposition to public health schemes came from Indian ratepayers and community leaders unwilling to pay for or support the cost of extending and maintaining sanitary schemes. Intellectuals opposed such measures because they resented British control of municipal boards, and sought greater control for themselves. Some British officials, too, simply did not support the expense of such schemes. These problems had no relevance to most rural areas, however, because government mostly did not support sanitary schemes there.⁸⁸

As in India, the politicisation of urban schemes also occurred in colonial Hong Kong, but with different inflections. There, as Cecilia Chu shows, Chinese landlords at times used racial and economic arguments to undercut provision of adequate sanitation on the island. In late 1879, a Chinese property developer, Li Tak-cheong, put forward plans to erect 79 new houses for Chinese. The Surveyor General blocked Li's proposal because of their insanitary design, including a lack of plumbing, which, he argued, would encourage the spread of disease. In concert with other Chinese landlords, Li presented a petition which countered the Surveyor General's arguments. In it, he claimed that, while sanitarian arguments might apply to Europeans, they did not apply to Chinese. Li argued that the low death rates among Chinese living cheek-by-jowl in traditional housing in China provided evidence enough of their lack of need for Western science. In demonstrating the use of racial arguments over access to water, Li, as Chu notes, aligned his views with colonial laissez-faire policies. As this case study shows, water was yet to be viewed as a public good in many colonial cities – its access was instead largely dependent on race and wealth.⁸⁹

85. Harrison, *Public Health in British India*, pp. 19–20.

86. Mridula Ramanna, *Western Medicine and Public Health in Colonial Bombay* (Hyderabad: Orient Longman, 2002), p. 96.

87. *Ibid.*, pp. 97–98.

88. *Ibid.*, pp. 100–102; Harrison, *Public Health in British India*, pp. 166–201.

89. Cecilia Chu, 'Combating nuisance: sanitation, regulation, and the politics of property in colonial Hong Kong', in Robert Peckham and David M. Pomfret (eds), *Imperial Contagions: Medicine, Hygiene, and Cultures of Planning in Asia* (Hong Kong: Hong Kong University Press, 2013), pp. 17–36, pp. 22–25.

Controversy over the provision of water bubbled away in Hong Kong into the twentieth century. Debate over access again centred on racial arguments. In the early 1880s, sanitary engineer Osbert Chadwick (1844–1913, son of Edwin Chadwick, the famed British Sanitarian, 1800–1890) recommended the establishment of a metered public water supply that would, he argued, help prevent disease and provide an annual water supply to all residents, including to those Chinese living in tenements. Chadwick's proposal, however, met with stiff opposition from members of the colonial government, who argued that the 'profligate' nature of lower-class Chinese meant that, regardless of whether they received metered water or not, they would waste it. Officials also argued that Chinese landlords would exploit lower-class Chinese by charging them exorbitant rentals if given access to water. In contrast with the 1880s, when Chinese landlords based their objections to state intervention in building regulations on racial difference; in the early 1900s, they argued that, as a universal good, water should also be allocated to their tenants, regardless of race.⁹⁰

Bombay and Hong Kong illustrate the complex and often contested nature of colonial engineering, water resources and governance. In many cases, organised and spontaneous resistance to water engineering projects undermined the efforts of imperial engineers. Opposition took different forms reflective of the background and motivations of particular groups, as well as the areas and types of environments affected. Educated sections of a local community commonly organised public meetings, wrote to authorities, took legal action and penned letters-to-the-editor. For example, a public meeting in Karachi in 1859 saw local townspeople reject the government's plan to overhaul the city's water supplies.⁹¹ Religious considerations, though, could cut across caste or class divisions. Once new water supplies became available in Bombay, the sealing of wells and cisterns across the city the 1890s provoked uproar among Hindus, who complained that they were denied access to water vital to their religious ceremonies.⁹² Another common response involved rioting and armed resistance, as water schemes could become a flashpoint for long-held injustices. In the late 1890s in British Columbia, Secwepemc men armed with rifles attempted to prevent engineering works on Paul Creek, defending their claim to the entire flow of the water course from interference upstream.⁹³ British and settler observers tended to view these episodes of resistance as indicative of the backwardness of such groups, convinced as they were of what Alfred Deakin described as the 'sagacity, ability and magnanimity' of imperial engineers.⁹⁴

90. Ibid., pp. 25–36.

91. Broich, 'Engineering the empire', 361.

92. Ibid., 360.

93. Kenichi Matsui, *Native Peoples and Water Rights: Irrigation, Dams and the Law in Western Canada* (Montreal: MQUP, 2009), pp. 74–76.

94. Ibid., p. 75; Broich, 'Engineering the empire', 361–62; Deakin, *Irrigated India*, p. 10.

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Although facing opposition from different cross-sections of society, water schemes generally benefited wealthier residents over the less affluent, regardless of their ethnicity. Plans to expand Delhi's water supply network in the 1860s and 1870s, for instance, excluded a third of the city's population, which lived outside the city walls.⁹⁵ As a result, Colin McFarlane finds that, in the 1890s, the poorer areas of Bombay 'had some of the highest mortality rates in the city'. Bombay's municipal officer of health, T.S. Weir, attributed this to 'rapid residential expansion, [which] accompanied by a lack of sewer connections, led to increasing mortality rates'.⁹⁶ In some of the settler lands of British Columbia and Western Australia in the 1920s and 1930s, too, governments did not extend town water supplies to reserves for aboriginal peoples, thereby imposing on these peoples a 'discriminatory sanitary order' akin to that which faced many poorer Indians during the nineteenth century.⁹⁷

The more affluent might have benefited from the extension of reticulated water supplies, but these technologies fostered a culture of dependency that undermined their hydro-resilience in times of water scarcity. In the Western Australian capital of Perth, where wealthy residents could access the city's limited reticulated supplies, an especially profligate water culture developed from the turn of the twentieth century.⁹⁸ Wealth and privilege enabled better access to water, and supported outward signs of this status, such as cleanliness and the cultivation of gardens. Perth's long dry summers made gardening during those months especially difficult without easy access to water, so only those with private supplies or with enough money to pay for reticulated water were able to cultivate English-style summer gardens. A regular water supply, then, enabled a year-round garden and upheld a resident's middle-class status.⁹⁹

So also did cleanliness. Once piped water became available in Perth in the 1890s, many affluent residents invested in bathrooms, which allowed them to bathe more frequently than previously. Water scarcity in early 1920s Perth threatened middle-class values, and as a consequence of pressure, Western Australia's government undertook two decades of public works to increase the capital's water supplies, which ensured that, by the end of the Second World War, nearly all of Perth's houses had running water. The prevailing emphasis on the role of the suburban and domestic environment in improving the moral and physical health of (white) Western Australians played a significant role in

95. Mann, 'Delhi's belly', 16–19.

96. Colin McFarlane, 'Governing the contaminated city: infrastructure and sanitation in colonial and post-colonial Bombay', *International Journal of Urban and Regional Research* 32 (2008): 415–35, at 147.

97. Morgan, *Running Out?*; Anna Haebich, *For Their Own Good* (Nedlands: UWA Press, 1992); Mary-Ellen Kelm, *Colonising Bodies: Aboriginal Health and Healing in British Columbia, 1900–1950* (Vancouver: UBC Press, 1998), p. 48; Gyan Prakash, *Another Reason: Science and the Imagination of Modern India* (Princeton: Princeton University Press, 1999), p. 132.

98. Morgan, *Running Out?*, pp. 34–37, 55–62.

99. *Ibid.*

entrenching a thirsty lifestyle that committed successive governments to an ongoing programme of water resource development long after the war.¹⁰⁰

As these cases from South Asia, Hong Kong, Canada and Australia attest, engineering efforts to improve the moral and physical health of the residents of colonial cities had mixed results. Clean drinking water, swamp drainage and more efficient sewage removal helped to reduce disease among some colonial subjects, but not others. In this sense, sanitation inadvertently and sometimes by design became another means by which to reinforce and uphold socioeconomic and racial hierarchies. The provision of public water supplies and sanitation systems also became a battleground for wider issues over political representation, economic self-interest, racial ideas and the like. Most colonial wealthy – whether white or non-white – generally upheld their own interests against those of the poorer sections of the community. The reliance on extending networks of water provision and waste disposal ensured a prevailing expectation that, regardless of demand and supply, these services would be constant and unending, thus trapping these cities into a long-term pattern of path dependency and technological lock-in, which has led to water scarcity in some cities today – as witnessed by the reliance on desalination plants in some Australian coastal cities.

LEGACIES AND CONCLUSIONS

Imperial projects of water engineering – for irrigation, flood control and sanitation – promised to increase agricultural production and improve health, uplift native peoples and bring about economic transformation, while consolidating the power of the colonial state. Engineering works from the late-nineteenth century spoke to increasing imperial confidence in technocratic solutions able to transform ‘unproductive’ places and peoples.

As we have shown in this review article, however, such projects, whether inadvertently or by design, very often undermined the social, economic and environmental hydro-resilience of the peoples they were supposed to benefit. In particular, they adversely affected the lives and livelihoods of already marginalised members of society, while many colonial schemes also deliberately advantaged some people over others. In both colonies of extraction and settlement, investment in colonial water infrastructure demanded constant upkeep and expansion to sustain the water cultures and livelihoods that had become dependent on the uninterrupted provision of these technologies.

By heightening the risks to towns and agricultural settlements of flooding and drought, by facilitating the spread of disease, by contributing to environmental degradation and by entrenching cultures of water dependency, engineering projects demanded ever more complex and costly interventions,

100. *Ibid.*

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which further undermined the long-term hydro-resilience of colonial projects and peoples. That such schemes flourished from the middle of the twentieth century reflected not just the imperial accent on economic development and its transference to international programmes, but, so too, high modernism's almost blind faith in engineering, and a continued urge to uphold an ethos of 'improvement', predicated on belief in the need to engineer waterscapes and peoples. The tragedy is that today – across the world – millions of people are living with the legacies of the imperial hydro-engineering projects that aspired to engineer an imperial Eden.

But, as the opening observation from the *Indian Forester* suggests, some engineers and officials were not blind to these problems, and expressed anxiety about the unanticipated outcomes of irrigation and other engineering interventions. In India and Egypt, engineer William Willcocks later became an outspoken critic of the health and agricultural costs of irrigation projects which did not bring about the promised improvements.¹⁰¹ Although still committed to empire, their concerns suggest an awareness of the blurring of social and water worlds, and of the environmental limits of engineering interventions.

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101. Note, Derr, 'Drafting a map', 136–57; Whitcombe, 'The environmental costs', pp. 237–59.

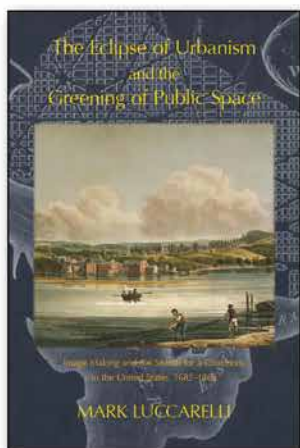
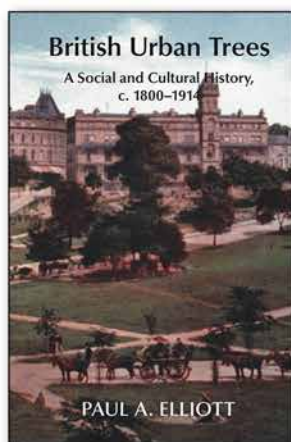
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