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## Perspectives

How to cite:

Beinart, William. "Bio-invasions, Biodiversity, and Biocultural Diversity: Some Problems with These Concepts for Historians." In: "The Edges of Environmental History: Honouring Jane Carruthers," edited by Christof Mauch and Libby Robin, *RCC Perspectives* 2014, no. 1, 75–80.

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Leopoldstrasse 11a, 80802 Munich, GERMANY

ISSN 2190-8087

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### **Bio-invasions, Biodiversity, and Biocultural Diversity: Some Problems with These Concepts for Historians**

This essay grows from a book on the history of prickly pear, an American cactus, in South Africa, and it touches on Jane Carruthers' interests in the exchange of acacias between Australia and South Africa.<sup>1</sup> My aim is to generalise out from this case and address what is for me a central issue in contemporary environmental history and conservation debates. How do we balance biodiversity conservation on the one hand with, on the other, a recognition that species transfers have been part of dynamic production systems that have historically underpinned human civilisations and created incalculable value? Plant transfers, including some plants that are semi-invasive, are at the heart of many hybrid botanical and cultural landscapes, sometimes treasured, that are never going to be entirely reversed. A linked set of problems concerns the language and concepts we use to understand such changes. The term "plant transfers" potentially provides a different perspective from that of bio-invasion, aliens, and ecological imperialism. Our language perhaps shapes our analyses, whether we are protectionists and restorationists or happy hybridists. This debate also raises questions about the meaning of biodiversity, a concept that generally excludes human agency and influence. Can biocultural diversity be developed as a more totalising idea that is useful for historians?

I am also trying tentatively to explore different bodies of literature, which are not adequately integrated. Africanists, those concerned with subaltern groups in other continents, and those producing new work on biocultural diversity tend to privilege the interests of people, especially colonised and poorer people. Bio-invasions literature and discussions of biodiversity—as well as ecological economics, which has pioneered the increasingly powerful idea of ecosystem services and their quantification—tend to emphasise the environmental and economic costs of plant transfers. For example, maize, prickly pear, and black wattle have all been environmentally destructive of indigenous biodiversity in South Africa, but all have been particularly important plants for poor people. In the case of prickly pear and black wattle, their value has been

1 William Beinart and Luvuyo Wotshela, *Prickly Pear: The Social History of a Plant in the Eastern Cape* (Johannesburg: Wits University Press, 2011); Jane Carruthers and Libby Robin, "Taxonomic Imperialism in the Battles for *Acacia*: Identity and Science in South Africa and Australia," *Transactions of the Royal Society of South Africa* 65, no. 1 (2010): 48–64.

enhanced by their propensity to invade. Black wattle, which is now subject to the most energetic eradication campaign, has also attracted the most detailed analyses by scientists and economists. They argue that its costs in relation to water consumption far outweigh its value as a plantation crop and as a source of firewood and building materials for poor people.<sup>2</sup> But there is a counter-argument, and the calculations can be questioned.<sup>3</sup> We also need to analyse who benefits from the water, and who from the plant. That said, black wattle may have been more valuable a few decades ago than it is now. Rural electrification and new styles of building may be reducing demand and even facilitating invasion.

One of the problems in this debate is the tendency in the ecosystems services literature to conjure very high values for indigenous biodiversity. One can see the importance of this for scholars making quantitative arguments for environmental protection in the face of global forces that prioritise exploitation. The potential of such high values is exciting in rethinking the history of natural environments and indigenous species. Was *Acacia karoo* (also worth a book) or the prized grass *Themeda triandra* more important economically as well as environmentally over the long term than diamonds in South Africa? The same question could be applied to exotics such as maize, black wattle, and prickly pear. But we should be cautious about the deployment of such large figures (for example in valuing water) in ways that might undermine livelihoods for poor people.

Few protagonists of ecosystem services consider that exotics may also play valuable roles. My limited acquaintance with this literature, in which the concept of biodiversity protection is central, suggests that it focuses on the wealth of undisturbed environments. 2010 was the International Year of Biodiversity, and in his article in *Nature*, lead author Pavan Sukhdev makes a renewed argument that ecosystem services are most beneficial to poor people—especially in relation to their access to public or common goods.<sup>4</sup> He also puts bio-invasions at the heart of his discussion of degradation and environmental costs. He seems to work with a rather purist or nativist concept of biodiversity. The UNEP report, *Dead Planet Living Planet*, also focused largely on

2 M. P. de Wit, D. J. Crookes, B.W. van Wilgen, "Conflicts of Interest in Environmental Management: Estimating the Costs and Benefits of a Tree Invasion," *Biological Invasions* 3 (2001): 167–78.

3 Andreas de Neergaard et al., "Australian Wattle Species in the Drakensberg Region of South Africa – An Invasive Alien or a Natural Resource?" *Agricultural Systems* 85, no. 3 (2005): 216–33.

4 Pavan Sukhdev, "Costing the Earth," *Nature* 462, no. 7271 (2009): 277.

relatively undisturbed systems.<sup>5</sup> Such concepts of biodiversity have limited spatial applicability, often lack a historical dimension, and fail to cater for the actual diversity of plant species in most inhabited regions of the world—which is most of the world. Moreover, we cannot assume that, historically-speaking, poor people favoured indigenous plants, or derived more value from them. This is almost certainly not the case for most African communities.

Michael Soule argued that “a policy of blanket opposition to exotics will become more expensive, more irrational, and finally counterproductive as the trickle becomes a flood. Only the most offensive exotics will be eliminated in the future.”<sup>6</sup> We will have, he suggested, to study hybrid or recombinant ecology with reference to much of the world. Terms such as cosmopolitan or novel ecosystems, or multihorticulturalist, have also been offered as conceptualisations of plural ecologies and ecologists. Much of Britain is irredeemably hybrid. The concept of biodiversity does not preclude such an approach, but my sense is that the study of biodiversity largely veers around areas of hybridity or judges them to be degraded.

I should qualify this typically Africanist or populist view that puts people, especially poor people, and their rights to resources first. I have argued in recent publications that we should be cautious about automatically falling back on these positions.<sup>7</sup> We also need to keep in mind the big picture of massive destruction to indigenous nature on a global scale; scientists cite bio-invasions as an increasingly important cause. Introduced plants can offer economic advantages for periods of time but their value can diminish because of changes in usage and technology. Perceptions and aesthetic values also change.<sup>8</sup> In South Africa the American jacaranda was widely planted along city streets and valued for its shade and flowers; Pretoria was called Jacaranda City. Now the tree is cited as an invader because it can spread down sensitive water courses. The unique Cape Floral Kingdom has increasingly been championed and Table Mountain declared a World Heritage site, giving new commercial as well as scientific

5 Christian Nellemann (ed.), *Dead Planet Living Planet: Biodiversity and Ecosystem Restoration for Sustainable Development* (UNEP, 2010), [http://www.unep.org/pdf/RAAecosystems\\_screen.pdf](http://www.unep.org/pdf/RAAecosystems_screen.pdf).

6 Michal E. Soule, “The Onslaught of Alien Species, and Other Challenges in the Coming Decades,” *Conservation Biology* 4, no. 3 (1990): 233–39.

7 William Beinart, “African History and Environmental History,” *African Affairs* 99, no. 395 (2000): 269–302; William Beinart, Karen Brown, and Dan Gilfoyle, “Experts and Expertise in Colonial Africa Reconsidered: Science and the Interpenetration of Knowledge,” *African Affairs* 108 (2009): 413–33.

8 Peter Coates, *American Perceptions of Immigrant and Invasive Species: Strangers on the Land* (Berkeley: University of California Press, 2007).

momentum to indigenous biodiversity conservation. In this area, eradication of invasive Australian wattles, which shoulder aside fynbos, seems entirely justified.

How do we claw our way out of these dilemmas? Following Guyer and Richards, I think it is essential to introduce a social and cultural dimension into debates about biodiversity.<sup>9</sup> We should develop less emotive language as well as a more flexible approach that recognises plant transfers and the impact of human culture, particularly in densely settled and agrarian areas which cover so much of the world's land surface. The term "cultural landscape" is often used to talk about settled areas, but tends to refer to managed, even manicured, environments that include buildings, rather than the more ragged landscapes characteristic of many urban and agrarian contexts. Agro-ecological diversity is another major focus, which includes crops, although this tends to be applied largely to smallholdings in which multiple species are grown and native species permitted.

The concept of biocultural diversity may be useful to get at some of these complexities. It was possibly first used in the early 1990s by Darrel Posey in connection with Latin America.<sup>10</sup> An ethno-entomologist and an activist for indigenous people, his intention was to capture the "inextricable link between biological and cultural diversity." His motive was to champion indigenous knowledge and to argue that in key parts of the world, such as the Amazon, biodiversity could only be conserved if indigenous people were protected because of their knowledge, their skills, and their long historical experience in living in some kind of balance with nature. Protecting cultural identity would be the surest way of conserving biodiversity.

The idea was further developed in attempts to map biocultural diversity on a global scale; language was used as the main proxy for culture.<sup>11</sup> Loh and Harmon tried to quantify zones of high indigenous natural and linguistic diversity.<sup>12</sup> These included the Amazon, central Africa from Nigeria to Tanzania, and Southeast Asia/Papua New

9 Jane Guyer and Paul Richards, "The Invention of Biodiversity: Social Perspectives on the Management of Biological Variety in Africa," *Africa* 66, no. 1 (1996): 1–13.

10 Darrell A. Posey (ed.), *Cultural and Spiritual Values of Biodiversity* (London: United Nations Environmental Programme, 1999); Kristina Plenderleith (ed.), *Indigenous Knowledge and Ethics: A Darryl Posey Reader* (New York: Routledge, 2004).

11 Luisa Maffi, *On Biocultural Diversity: Linking Language, Knowledge and the Environment* (Washington: Smithsonian, 2001).

12 Jonathan Loh and David Harmon, "A Global Index of Biocultural Diversity," *Ecological Indicators* 5 (2005): 231–41.

Guinea. They pointed to areas of highly diverse indigenous cultures as the heartlands of global biodiversity. This wave of scholarship attempted to demonstrate that biological and cultural diversity were strongly interlinked, even constitutive of each other, although it could find no clear causal connection. Protagonists see such indexes of biocultural diversity as having both theoretical and practical implications for guiding strategic investments in biocultural diversity conservation.

Reviewing the literature in 2006, Michelle Cocks suggested that the term has largely been applied to “indigenous, traditional” people.<sup>13</sup> She argues that it should be adapted further to apply more generally, so that it can cater for rapid social change and a more fluid idea of culture. Her case studies in South Africa, however, still largely cover the changing use of indigenous plants in the Eastern Cape, showing both their centrality in cultural continuity and their significance in a more commodified context—for example as part of a commercial trade in medicinal plants. She is also an activist, celebrating African plant knowledge, concerned about its possible loss and working with schools and communities through a small NGO.

I think that for historians there are even deeper problems with the concept of biocultural diversity as it is generally deployed. For example, one study suggested that the Western Cape and Western Australia, though high in plant diversity, had low cultural diversity, with only a few languages.<sup>14</sup> In these cases, tentative attempts at mapping were ahistorical and discounted the diversity of languages before colonization—and, for that matter, the diversity of languages and culture in the present; there are certainly more than three languages spoken in Cape Town. The concept is still essentially about preserving and protecting the indigenous, whether culture or nature. Indigeneity is a problematic concept in itself and again, rather like biodiversity, this version of biocultural diversity fails to deal with environmental as well as cultural change and hybridity.

For biocultural diversity to work as a more general concept, it would need to include a more fluid notion of culture and a capacity to cater for historical change. It would need

13 Michelle Cocks, *Wild Resources and Cultural Practices in Rural and Urban Households in South Africa: Implications for Bio-cultural Diversity Conservation* (Grahamstown: Institute of Social and Economic Research, Rhodes University, 2006).

14 Larry J. Gorenflo et al., “Co-occurrence of Linguistic and Biological Diversity in Biodiversity Hotspots and High Biodiversity Wilderness Areas,” *Proceedings of the National Academy of Sciences of the United States of America* 109, no. 21 (2012): 8032–37.

to include the whole range of plants that are valued, used, or tolerated by people, as well as those that intrude themselves, whether exotic or indigenous. We need a concept in which the “agency” of natural species such as invasive plants—or at least their reproductive and survival strategies—can also be recognised in interaction with human agency and culture. We also need a more flexible concept of biodiversity. Does prickly pear increase or suppress biodiversity? It could be argued that at a national scale, South Africa’s 7,000 or more introduced plant species enhance biodiversity. At a local scale, however, where particular exotics come to dominate, they can suppress other species.

Such an approach to biocultural diversity, which implicitly accepts—and, I expect, legitimises—hybrid ecologies, does not necessarily get us off the hook concerning the protection of indigenous biodiversity. It seems to me entirely sensible to recognise distinctive biomes, characteristic of different areas, many under threat. I don’t wish to jettison a concept of environmental degradation and biodiversity loss. My approach therefore implies a strong argument for spatial differentiation and managed protected spaces. Cultural landscapes should also be acknowledged for their beauty and value—as recognised in world heritage sites—but these often have exotic vegetation.

It is an ambitious agenda to analyse and map culture and nature together and through time. Loh and Harmon write: “Biocultural diversity may be thought of as the sum total of the world’s differences, no matter what their origin. It includes biological diversity at all its levels, from genes to populations to species to ecosystems; cultural diversity in all its manifestations (including linguistic diversity), ranging from individual ideas to entire cultures; and, importantly, the interactions among all of these.”<sup>15</sup> This is an extraordinarily ambitious agenda and is not quite what they have tried to do so far. My suggestion is also essentially a totalising approach to environmental history. Perhaps a single concept such as biocultural diversity cannot carry all of this freight and will effectively lose any incisiveness if it becomes too all-embracing. The alternative, in a way, is a more descriptive environmental history that attempts to map the complexity of change and to evaluate it both in social and natural terms. It is an approach that is more comfortable for historians, who will also disagree about the balance between human priorities and those of environmental and biodiversity conservation.

15 Loh and Harmon, “A Global Index,” 231–32.