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Cosmopolitan Karoo: Land, Space and Place in the Shadow of the Square Kilometre Array

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Drawing on insights from critical cosmopolitanism and human geography, this article reflects on the tensions between the local and the global, and 'space' and 'place' within large areas of South Africa's arid Karoo region designated as Astronomy Advantage Areas (AAAs), and considers their significance for contemporary identity claims and relationships to land. To date most of the Northern Cape, encompassing some 30 per cent of South Africa, has been declared an AAA in terms of the 2007 Astronomy Geographic Advantage Act. The proclamation of AAAs is intended to facilitate the development of astronomy in the region, centred on the optical South African Large Telescope (SALT) in the south and an internationally networked mega-radio-astronomy project, the Square Kilometre Array radio telescope (SKA), in the centre. The core site of the SKA project, the focus of this article, is being built on a large block of formerly white-owned farms that have been bought by the state. Radio astronomy's specific requirements for minimising radio frequency interference around its operating sites make co-existence with other land uses (including but not only agriculture) more difficult than in the case of optical astronomy, and local townspeople feel aggrieved that their expectations of development have not been adequately met. In addressing these concerns the SKA has prioritised negotiations with national rather than local organisations, including the San Council, claiming to represent the descendants of the hunter-gatherers whose land this once was, and Agri-SA, representing commercial farmers nationally. To date the promotion of astronomy in the Karoo is premised on a metropolitan view of this region as politically and economically marginal: effectively empty space, to be put to good use in the service of global science and national development, rather than a deeply historical place, long embedded in trans-local dynamics and facing significant, largely unresolved social challenges today.

Keywords: critical cosmopolitanism; place; space; Square Kilometre Array; Karoo

Introduction: A New Era in Land Use in the Karoo

Since the transition to formal democracy in the mid-1990s, several high-profile contestations around land use and development priorities, along with some intriguing alliances, have been reconfiguring relationships to land within the arid Karoo region of South Africa's western interior.¹ This expansive, sparsely populated region covers some 30 per cent of the country's

1 For a fuller discussion of what 'the Karoo' refers to, see the Introduction to this part-special issue. Ecologists distinguish between the Succulent and Nama Karoo biomes, which together cover most of the Northern Cape Province and extend also into the Western Cape, Eastern Cape and Free State provinces, as shown in Figure 1.

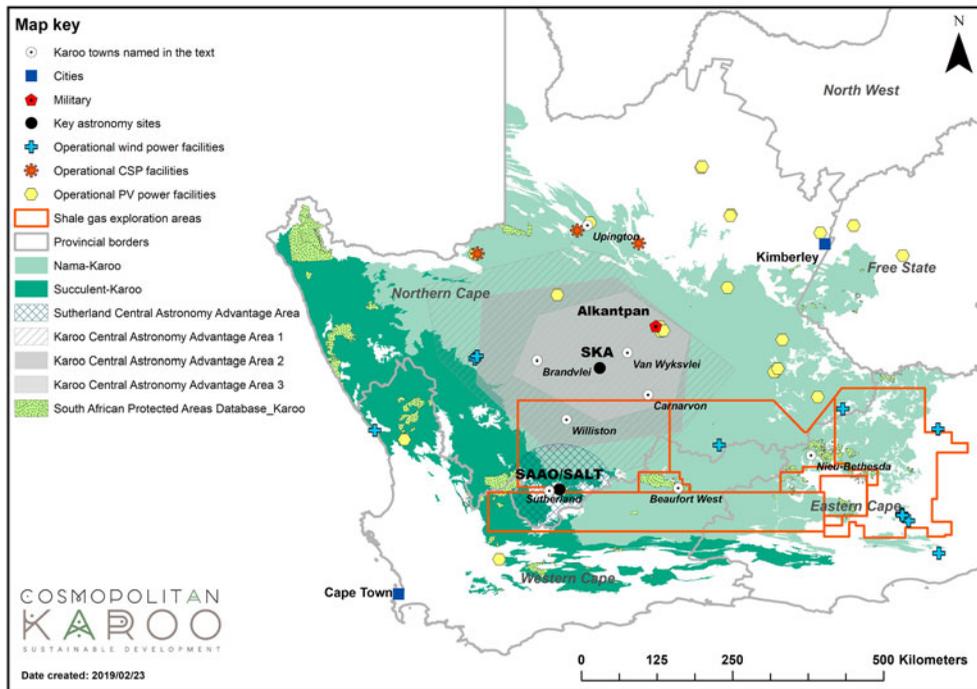


Figure 1. Overlapping land uses in the Karoo: the Central Astronomy Advantage Areas, renewable energy projects and shale-gas exploration rights. (Source: South African Research Chair in the Sociology of Land, Environment and Sustainable Development, Stellenbosch University.)

total area but is home to under two per cent of its total population.² The discrepancy between geographic and demographic scale, itself rooted in the bio-physical properties of the region, lies at the heart of contemporary disputes over what this land represents for different parties.

Today the Karoo is poised on the cusp of a significantly new era in terms of land use and the social-ecological relationships in which land is embedded, as external actors' interest in the region's bio-physical resources mounts. The practice of extensive sheep farming on large, white-owned, family farms, which has dominated the Karoo since the latter half of the nineteenth century, is being challenged by very different types of investment in and understandings of this land and its potential. As Figure 1 shows, astronomy features prominently in this reconfiguration, with the Karoo site of two globally significant astronomy nodes: the optical South African Large Telescope (SALT) and South African Astronomical Observatory (SAAO) field site outside the small town of Sutherland, in the southern Karoo, and the Square Kilometre Array (SKA) radio telescope core site (currently the location of South Africa's MeerKAT telescope), some 80 kilometres north-west of the small town of Camarvon, in the Kareeberg Local Municipality in the centre of the Karoo.³

2 See C. Walker, S.J. Milton, T. O'Connor, J.M. Maguire, W.R.J. Dean, 'Drivers and Trajectories of Social and Ecological Change in the Karoo, South Africa', *African Journal of Range and Forage Science*, 35, 3-4 (2018), Table 1.

3 The MeerKAT telescope, comprising 64 dish antennas and built by South Africa as a precursor to the SKA, was officially inaugurated on 13 July 2018: SKA South Africa Media release, available at <http://www.ska.ac.za/media-releases/meerkat-radio-telescope-inaugurated-in-south-africa-reveals-clearer-view-yet-of-center-of-the-milky-way/>, retrieved 23 July 2018. In July 2017 its management was transferred to the newly constituted South African Radio Astronomy Observatory (SARAO), under which all national radio astronomy facilities in South Africa now fall.

The MeerKAT/SKA site is a key infrastructural node in a complex international network that is driving this mega ‘big-science’ project. In 2018, the international SKA Organisation had twelve member countries – Canada, China, France, India, Italy, the Netherlands, New Zealand, Spain, Sweden and the United Kingdom, along with Australia and South Africa, the two member countries that are hosting the bulk of the Array itself.⁴ Once completed the full Array will comprise several thousand individual dish antennas in sites across Africa and in Australia, all linked together through an extraordinarily sophisticated computer network. This network will transform the Array into a ‘single’ giant telescope that is expected to probe the Universe more deeply than any other telescope in the world to date. The SKA core site outside Carnarvon sits at the heart of the African component of this global endeavour. From here dish antennas are planned to extend into Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia and Zambia. At the time of the writing of this article the projected completion of the full Array was the late 2020s,⁵ although a 2018 report in *Science* magazine warned of the financial challenges threatening the complete realisation of this goal and the ‘months of delicate negotiations [that] lie ahead’ to get ‘member governments [to] agree to fully fund the work’.⁶

In the Karoo the impact of astronomy reaches far beyond the immediate vicinity of the SALT and SKA sites. In order to advance the national and global investment in astronomy, the South African government has declared most of the Northern Cape province an Astronomy Advantage Area (AAA), in terms of the Astronomy Geographic Advantage Act of 2007.⁷ This legislation enables the Minister of Science and Technology to regulate any activity deemed to disadvantage the pursuit of astronomical science across the designated Area. The total area covered by the Act amounts to well over a third (some 36 per cent) of all commercial farm land nationally⁸ – an extraordinary commitment of land resources to what is a tiny sector of the national economy. To put this in perspective, this ‘astronomy reserve’ is larger than the total land area set as a target for the country’s beleaguered land reform programme in the mid-1990s, which was for 30 per cent of commercial farm land to be redistributed from white to black ownership across the country as a whole.⁹

Nested within the general AAA are smaller ‘core’ and ‘central’ AAAs that permit area-specific regulations designed to accommodate the particular research requirements of optical astronomy, primarily for minimal light pollution, and the yet more stringent requirements of radio astronomy, for minimal radio frequency interference from non-cosmic sources. The

4 Square Kilometre Array, ‘Participating Countries’, available at www.skatelescope.org/participating-countries/, retrieved 1 December 2018. In addition, Germany (which became a full member in 2019), Japan, Malta, Portugal and Switzerland are ‘non-member’ participating countries. On the early history of the SKA, see S. Wild, *Searching African Skies: The Square Kilometre Array and South Africa’s Quest to Hear the Songs of the Stars* (Johannesburg, Jacana Media, 2012).

5 R. Adam, ‘SKA SA Project: On track, on Schedule and within Budget’, presentation to the Science and Technology Parliamentary Portfolio Committee, South African Parliament, 31 May 2017, available at http://www.ska.ac.za/wp-content/uploads/2017/06/presentation_parliament_2017.pdf, retrieved 9 July 2019.

6 D. Clery, ‘New Radio Telescope in South Africa Will Study Galaxy Formation’, *Science*, 19 June 2018, available at <http://www.sciencemag.org/news/2018/06/new-radio-telescope-south-africa-will-study-galaxy-formation>, retrieved 23 July 2018.

7 Astronomy Geographic Advantage Act 21 of 2007.

8 The Act applies to the whole of the Northern Cape Province (including districts falling outside the two Karoo biomes), less the Sol Plaatje Municipality (encompassing Kimberley), hence effectively all the agricultural land in the province. On the distribution of commercial agricultural land per province see C. Walker, *Landmarked: Land Claims and Land Restitution in South Africa* (Johannesburg, Jacana Media and Athens, OH, Ohio University Press, 2008), p. 245.

9 The target of 30 per cent was proposed by the World Bank in 1993: World Bank, ‘Options for Land Reform and Rural Restructuring in South Africa’ (unpublished presentation, Land and Agricultural Policy Conference on Land Redistribution Options, Johannesburg, 12–15 October 1993). While the state subsequently distanced itself from this figure, it has remained a politically potent marker of failed implementation.

SKA core site is being built on a block of 32 formerly white-owned farms which were bought from local farmers by the National Research Foundation (NRF), representing the state, in a bitter but nationally largely invisible process that was finally wrapped up in mid-2018.¹⁰ Phase 1 of the project, planned to get underway in 2019, involves the construction of another 133 dish antennas over the next five years, to add to the 64 already built for MeerKAT. To reduce the threat from human activity as much as possible, the core site, totalling approximately 130,000 hectares in extent,¹¹ has also been earmarked as a ‘special nature reserve’ in terms of South Africa’s Protected Areas Act.¹² This will afford it maximum protection as a conservation area dedicated purely to scientific research, to which the general public will not have access. However, SKA infrastructure will also reach into the surrounding, privately owned farm land along three spiral ‘arms’ extending outwards from the core site, along which some of the 133 dishes will be built.¹³ Here relationships with local farmers are to be managed through servitude agreements as well as the applicable AAA regulations for the area.

At the same time, space and place in the Karoo (and the Northern Cape more generally) are also being redefined by major investments by international companies and their South African partners in the exploitation of the region’s significant energy resources: renewable and non-renewable, actual and potential. Renewable energy projects, in the form of wind farms and solar power plants, are reshaping the landscape in several Karoo districts, while companies interested in the potential of non-renewable energy sources – shale gas but also uranium – have staked out prospecting rights over large swathes of land.¹⁴ These externally driven investments, designed with the national electricity grid rather than local energy needs in mind, are repositioning the Karoo in the ‘minerals-energy complex’ that Fine and Rustomjee have identified as central to South Africa’s political economy throughout the 20th century.¹⁵ As [Figure 1](#) shows, individual renewable energy projects and shale-gas mining (‘fracking’) exploration rights overlap spatially with the national investment in astronomy in potentially mutually disruptive ways. Analysis of the political and economic dynamics shaping these cross-cutting investments is beyond the scope of this article, but they are important dimensions of the larger context within which the South African state’s commitment ‘to elevate our Astronomy research to truly international levels’,¹⁶ through the Karoo, should be located.

These recent developments are being laid down on top of older, more local concerns that are also being reconfigured in the current conjuncture. Significant here are persistent, highly racialised social inequalities and declining small-town economies, along with threats to the bio-diversity of the region and the long-term viability of commercial farming in its current

10 See T. Kahn, ‘Telescope Project Makes Progress on Radio-Quiet Zone’, *Business Day*, 18 April 2017, available at <https://www.businesslive.co.za/bd/national/science-and-environment/2017-04-18-telescope-project-makes-progress-on-radio-quiet-zone/>, retrieved 25 July 2018.

11 Adam, ‘SKA SA Project’, slide 9.

12 National Environmental Management: Protected Areas Act 57 of 2003, section 45.

13 See [Figure 1](#) in the Introduction to this special issue.

14 The first significant renewable energy plants in the Northern Cape started operating in 2013/14. In 2016 it emerged that an Australian company, with Russian funding and local partners, was planning to mine uranium on some 75,000 hectares near Beaufort West; see S. Kings, ‘An Ill Wind Blows Radiated Dust across the Karoo’, *Mail & Guardian*, 15–21 April 2016, pp. 10–11.

15 B. Fine and Z. Rustomjee, *The Political Economy of South Africa: From Minerals-Energy Complex to Industrialisation* (Johannesburg, Wits University Press, 1997).

16 Republic of South Africa, Department of Science and Technology (DST), ‘National Strategy for Multi-Wavelength Astronomy’, July 2015, available at http://www.dst.gov.za/images/Attachments/Final_MultiWavelength_Astronomy_Strategy_July_2015.pdf, retrieved 13 March 2018.

form.¹⁷ Contrary to popular conceptions of the Karoo as quintessentially rural, most of its residents are urban,¹⁸ living in the widely scattered and generally marginal small towns and villages that developed as service centres for the farming and, in selected areas, mining sectors that have dominated the Karoo's economy since the late 19th century. These towns, even the more prosperous ones, bear a heavy burden of social problems, including high levels of unemployment and dependence on social grants, along with extremely high levels of substance abuse and associated problems, such as foetal alcohol syndrome prevalence rates that are among the highest in the world.¹⁹ Educational levels are low, with the Northern Cape (here used as a proxy for the Karoo) among the five worst performing of South Africa's nine provinces.²⁰ There is considerable anxiety in Karoo communities about the impact of the new development interventions and how their costs and benefits are to be calculated and distributed. In this new phase in the region's history, established understandings of identity and relationships to land, self and other among long marginalised residents, with deep historical claims to the land, are being reshaped.

How these contestations will play out in coming decades is unclear. What is clear is that the direction and manner of their unfolding have far-reaching consequences not only for the social, economic and environmental health of the Karoo but also for the country's national development trajectory. They bring the politics of scale in determining development outcomes – the uneven interplay of local, national and global interests – into sharp focus.²¹ They also pit very different understandings of the Karoo and its resources against each other: the Karoo as an essentially empty, bio-physical space, to be developed for the greater (national or global) good, versus the Karoo as a deeply historical, peopled place, the future of which should be shaped primarily, if not exclusively, by and for the people who live there (who are themselves not united on what this might mean).

Against this background, the following two sections draw on insights from critical cosmopolitanism (on the relationship between the local and the global) and from human geography (on understandings of place and space) to explore the earthly footprint of astronomy in the Karoo and its ramifications for identity politics and land. The first expands on the notion of the Karoo as a cosmopolitan confluence rather than a parochial backwater in South African history. It begins with a brief discussion of critical cosmopolitanism, followed by reflections on the SKA, the history of the region and contemporary identity claims in the light of this body of ideas. The second looks more directly at the contestations around space and place in relation to the SKA, and the implications of radio astronomy's spatial politics for the entwined politics of identity and land – in the Karoo, in the first instance, but nationally too.

My focus is on the SKA because of the distinctively large shadow it casts as a radio astronomy project. In its development, the contestation between the Karoo as empty (terrestrial) space and the Karoo as connected social place has emerged particularly sharply. Here the project's need to enforce not simply the idea but the manifestation of emptiness has

17 For a fuller discussion of these themes, see J.R. Henschel, M.T. Hoffman, C. Walker (eds), 'Karoo Special Issue: Trajectories of Change in the Anthropocene', *African Journal of Range and Forage Science*, 35, 3–4 (2018).

18 By 2004 the urban population of the Karoo region accounted for 73 per cent of the total – see T. Hill and E. Nel, 'Commentary: Population Change in the Karoo', *African Journal of Range and Forage Science*, 35, 3–4 (2018), Table 3, p. 207.

19 L. Olivier, L.M.G. Curfs and D.L. Viljoen, 'Fetal Alcohol Spectrum Disorders: Prevalence Rates in South Africa', *South African Medical Journal*, 106, 6 (June 2016), pp. S103–S106.

20 See, for instance, comparative data in StatsSA, *Millennium Development Goals 2: Achieve Universal Primary Education* (Pretoria, Statistics South Africa, 2015).

21 For a fuller discussion of the politics of scale, see C. Walker and D. Chinigò, 'Disassembling the Square Kilometre Array: Astronomy and Development in South Africa', *Third World Quarterly*, 19, 10 (2018), pp. 1979–1997.

required partnerships with several national organisations. These partnerships insulate the project's operations against more insistently local claims to the land on which it is being constructed and its history – thereby tacitly belying the presumption of emptiness that the international SKA Organisation has touted as the primary characteristic of the region. National partners include the San Council, claiming to represent all people of 'San' descent in South Africa generally; Agri-SA, representing organised commercial agriculture nationally; and South African National Parks (SANParks) and a network of ecologists linked to the Arid Lands Node of the South African Environmental Observation Network (SAEON).

Cosmopolitan Karoo

British sociologist Gerard Delanty has described critical cosmopolitanism as an 'emerging direction in social theory' that is primarily concerned with the 'new relations between self, other and world' that are shaped in the encounter between the local and the global 'in moments of openness'.²² From this perspective the building of MeerKAT and the SKA telescope constitutes a significant although historically not unprecedented 'moment of openness' for the Karoo.

The description of the Karoo as 'cosmopolitan' may seem unduly fanciful to those who have only passed through this region by road or over it by air, or viewed it via photographs and satellite imagery. Some local residents have themselves expressed surprise when introduced to this phrase during fieldwork. While archaeologists and historians have argued for a deeper understanding of the historical importance of this region in the shaping of not only South African but global history, most commentators relegate it to the outer edges of history: a peripheral space, far removed from the metropolitan mainstream and, despite its considerable extent, unrepresentative of the South African countryside as a whole. However, even a cursory consideration of the history of the Karoo makes it clear that this is an area long shaped by the intersection of local and trans-local dynamics – a crossroads, as William Beinart has described it.²³ In the present period, describing the Karoo as cosmopolitan invokes the major investment in astronomy in the region: the Karoo as a significant location for the scientific exploration of the cosmos through its globally networked, big-science infrastructural projects. At the same time, the descriptor references the analytical resources of critical cosmopolitanism for thinking about the Karoo and its residents in relation to the wider world in the contemporary era.

Critical Cosmopolitanism

While critical cosmopolitanism is relatively neglected in contemporary South African studies,²⁴ it has exploded as a subject of debate in the social sciences more

22 G. Delanty, 'The Cosmopolitan Imagination: Critical Cosmopolitanism and Social Theory', *The British Journal of Sociology*, 57, 1 (2006), pp. 25, 27.

23 W. Beinart, *The Rise of Conservation in South Africa: Settlers, Livestock and the Environment 1770 – 1950* (Oxford, Oxford University Press, 2003), p. xviii.

24 Dan Yon's work on cosmopolitanism and the history of St Helenan miners in Namaqualand is an exception: D. Yon, 'The Island, the Ocean and the Desert: Memory and the St Helena Presence in the Northern Cape' (unpublished paper, Toronto, n.d.). To the extent that cosmopolitanism has been addressed in contemporary South African studies, it is mainly in relation to citizenship, the Constitution and immigration, generally with a strong metropolitan bias. See, *inter alia*, A. Habib and K. Bentley (eds), *Racial Redress and Citizenship in South Africa* (Cape Town, HSRC Press, 2008); P. Gilroy, 'A New Cosmopolitanism', *Interventions*, 7, 3 (2005), pp. 287–92; P. Landau, 'Hospitality without Hosts: Mobility and Communities in Africa's Urban Estuaries' (unpublished paper, Johannesburg, 2012), available at <https://wiser.wits.ac.za/system/files/seminar/Landau2012.pdf>, retrieved 9 July 2019; O.B. Sichone, 'Xenophobia and Xenophilia in South Africa: African Migrants in Cape Town', in P. Werbner (ed.), *Anthropology and the New Cosmopolitanism: Rooted, Feminist and Vernacular Perspectives* (Oxford, Berg, 2008), pp. 309–24.

widely.²⁵ This reflects growing concern not only with globalisation as a feature of late modernity but, more urgently, with what ecologists describe starkly as ‘global change’ – that is, with the extraordinarily complex, accelerating, planetary-wide and, to a significant if disputed degree, anthropogenic processes that are driving climate change. Central concerns of critical cosmopolitanism are how to understand the interconnectedness of human activity around the world and the need to locate unfolding socio-ecological dynamics in any one place within a planetary frame: for humans urgently to start thinking of ourselves as, first and foremost, ‘earthlings’ (to quote Bruno Latour).²⁶

As used here, critical cosmopolitanism is not an all-encompassing ‘grand theory’, nor a soft synonym for globalisation. Nor is it particularly concerned with commitments to global governance or multicultural values among metropolitan elites. Rather, it is about developing a framework for understanding emergent ways of being, seeing and doing in people’s encounters, in locally specific places, with an inter-connected world. Thus Delanty, among others, is at pains to distance the subject matter of critical cosmopolitanism from conventional understandings of cosmopolitanism as a political or moral philosophy concerned with ‘world polity or universalistic culture’. Instead, he stresses the particularity of local contexts and the importance of acknowledging ‘the multiple ways’ in which the interaction between the local and the global plays out, including in processes of ‘hybridization, creolization, indigenization’.²⁷ This concern with the local in the global is shared by philosopher Kwame Appiah, who, in his endorsement of what he calls ‘rooted cosmopolitanism’, emphasises the need to reconcile cosmopolitanism as a principle of human co-existence with an appreciation of ordinary people’s attachments to ‘the lives [they] have made for themselves, within the communities that help lend significance to those lives’.²⁸ In affirming the importance of people’s attachments to and in particular places, Appiah and Delanty underscore the normative underpinnings of critical cosmopolitanism as an analytical tool, in particular its commitment to respecting the perspectives of ordinary people when theorising the relationship between the local and the global in contemporary society.

At the same time, critical cosmopolitanism is also a mode of enquiry – in Delanty’s words, a ‘mode of cultural framing’ that ‘reflects both an object of study and a distinctive methodological approach to the social world’.²⁹ Ulrich Beck has been particularly insistent on the methodological importance of ‘the cosmopolitan imagination’ for moving social analysis beyond the limitations of ‘methodological nationalism’ and the often unselfconscious privileging of the nation-state as the locus of both the phenomenon under investigation and its sufficient explanation.³⁰ He highlights climate change as an issue that most urgently demonstrates the inadequacy of methodological nationalism: ‘The destiny of human beings in far-off regions is linked with our own, and our destiny with theirs’.³¹ This insistence is salutary in the South African context, where academic, policy and political debates tend to be inward-looking, fixed on pressing but nationally bounded preoccupations. Even as ‘cosmopolitan’ an issue as climate change is generally subordinated to local and

25 See, for instance, G. Delanty (ed.), *Routledge Handbook of Cosmopolitanism Studies* (London and New York, Routledge, 2012).

26 B. Latour, ‘A Plea for Earthly Sciences’, in J. Burnett, S. Jeffers and G. Thomas (eds), *New Social Connections: Sociology’s Subjects and Objects* (Basingstoke, Palgrave Macmillan, 2010), pp. 72–84.

27 Delanty, ‘Cosmopolitan Imagination’, p. 36.

28 K.A. Appiah, *The Ethics of Identity* (Princeton, Princeton University Press, 2005), pp. 222–3.

29 Delanty, ‘Cosmopolitan Imagination’, pp. 31, 25.

30 U. Beck, ‘Global Inequality and Human Rights: A Cosmopolitan Perspective’ in Delanty (ed.), *Handbook of Cosmopolitanism Studies*, pp. 302–15.

31 Beck, ‘Global Inequality and Human Rights’, p. 309.

national concerns around the economy and the environment. This was clearly visible in the national debates that erupted around ‘fracking’ in the Karoo from 2012, in which South Africa’s major contribution to global climate change as a result of its very large, coal-driven carbon footprint was overshadowed by the intense arguments over national job creation and economic growth versus threats to local livelihoods and the Karoo environment.³² More recently, similar dynamics are playing out in contestations around the place of renewable energy in the country’s energy mix.³³

The SKA through the Lens of Critical Cosmopolitanism

In this regard, astronomy could be seen as a powerful antidote to methodological nationalism, because of the way it directs the researcher’s gaze outwards, beyond not simply local and national but planetary boundaries. This is where critical cosmopolitan’s emphasis on understanding the local and the global relationally helps to deepen the analysis. For while the cosmic perspective of astronomy as pure science is exhilarating, even paradigm-shifting at times, it also erases the role of the local in the underpinnings of its work and the significance of astronomy as a terrestrial land use with potentially far-reaching social impacts.

The SKA is a compelling case in point. As a ‘big-science’ project in which the cosmic, global, national and local dimensions of existence are brought into dizzying relationship with each other, this initiative is perhaps the easiest of the new land uses in the Karoo to analyse through the lens of critical cosmopolitanism. At the level of pure science, the scale of the ambitions driving it is breathtaking, with the potential to shift humanity’s understandings of its place in the Universe. Thus, in announcing the outcome of South Africa’s bid to host the SKA in 2012, then Minister of Science and Technology, Naledi Pandor, lauded the project as ‘a global scientific enterprise ... designed to answer fundamental questions in physics, astronomy and cosmology in order for us to understand the origin and workings of the Universe better’.³⁴ At the same time, as an intergovernmental ‘assemblage’ that is to be regulated by means of an international treaty binding its founding members, it is enmeshed in politically saturated relationships among the local, the national and the global in its very constitution.³⁵ Globally the SKA project is tightly bound up with the national ambitions of each of its member states for political and material benefits beyond the pursuit of pure astronomical knowledge in the name of all humanity. For its part, SKA South Africa consistently emphasises the national benefits that will accrue from its significant investment in boosting science, engineering and technology capacity in the country. While there is recognition of the organisation’s corporate social responsibilities towards local communities, the primary thrust of its ‘human capacity development’ programmes is to advance the national rather than the local economy, including by ‘creating a large group of young scientists and engineers with world-class expertise in the technologies which will be crucial in the next 10–20 years, such as very fast computing,

32 See S. Borchardt, ‘What Are We SEA-ing? An Exploration of the Communication Strategies and Extent of Public Participation at the Strategic Environmental Assessment (SEA) Public Briefings for Shale Gas Development in the Karoo’ (unpublished Honours Research Project, Department of Sociology and Social Anthropology, Stellenbosch University, 2016).

33 See, for instance, L. Steyn, ‘Green Power is Still up in the Air’, *Mail & Guardian*, 23 March 2018.

34 Ministry of Science and Technology (South Africa), ‘Statement: Mrs Naledi Pandor, Minister of Science and Technology, Square Kilometre Array Organisation Site Decision’ 25 May 2012, available at <https://archive.li/bMVFD>, retrieved 9 July 2019.

35 On the SKA as a treaty organisation see <https://www.skatelescope.org/news/ska-treaty-now-open-for-initialling/>, retrieved 1 December 2018. On the SKA as a complex ‘assemblage’, see Walker & Chinigò, ‘Disassembling the SKA’.

very fast data transport, large networks of sensors, software radios and imaging algorithms'.³⁶

South Africa's commitment to skills development and economic growth through the SKA is also embedded in more existential concerns to promote the country's international status as an African country that can compete at the highest level in the global economy.³⁷ The SKA has been promoted by post-apartheid Ministers of Science and Technology and their senior officials and advisers as a prime example of South Africa's quest to demonstrate to the world that it is not, in the oft-quoted words of the ANC government's 1996 *White Paper on Science and Technology*, a 'second class nation, chained forever to the treadmill of feeding and clothing ourselves'.³⁸ However, in distancing itself from 'the treadmill' of daily life, the SKA project also distances itself from the priorities and preoccupations of most residents of the district in which its core infrastructure is being built, many of whom are deeply anxious about securing their footing on that daily treadmill. In addition to concerns about the loss of home and income on the part of those individual farmers and farm workers who used to live on the SKA's core site, there are wider concerns about the negative impact that taking this land out of agricultural production will have on the local, agriculturally based economies of the neighbouring small towns of Carnarvon, Williston, Brandvlei and Vanwyksvlei.³⁹ As several studies are showing, the development of the SKA has also been accompanied by widespread criticism in these towns of what is experienced as its top-down communication style, along with simmering discontent because the initially very high expectations of the local job and livelihood opportunities that this project would generate have thus far been largely disappointed.⁴⁰

The Karoo as Crossroads

In his history of conservation in South Africa, William Beinart argues that 'historians of the countryside ... have underestimated the significance of the pastoral economy and society in the Cape of the 19th century', noting that 'more capital was probably invested into the pastoral farms of the Karoo and eastern Cape than in the diamond mines of Kimberley'. He highlights the historical importance of the Karoo as a 'crossroads for new species, new agricultural techniques, and new ideas', and points to the significance of the 19th century 'Cape landowners' 'in shaping not only their own world, but the character of the Cape state as well'.⁴¹ From the perspective of deep history, the Karoo is also far from being an isolated and peripheral region of the world. Geologically speaking it is extremely old, as evidenced in its globally significant repository of fossils that predate the dinosaur era and index its

36 National Research Foundation/South African Radio Astronomy Observatory, 'The Project', available at <http://www.ska.ac.za/about/the-project/>, retrieved 23 April, 2019. See also Adam, 'SKA SA Project'.

37 On this see Walker and Chinigò, 'Disassembling the SKA'; also K. Gottschalk, 'The Political Uses of Astronomy', *African Skies*, 11 (2007), pp. 33–4.

38 Department of Arts, Culture, Science and Technology [DACST], *White Paper on Science and Technology*, 4 September 1996, ch. 2, s. 7, available at https://www.dst.gov.za/images/pdfs/Science_Technology_White_Paper.pdf, retrieved 13 March 2018.

39 J.F. Kirsten, 'An Estimation of the Agricultural Economic and Local Economic Impact of Phase 1 of the SKA' (unpublished paper, Pretoria, 2016), available at <http://www.ska.ac.za/wp-content/uploads/2019/03/Agriculture-Economic-Study.pdf>, retrieved 16 March 2018.

40 See D. Atkinson, 'When Stars Collide: Competing Development Paradigms in the Central Karoo'; D. Chinigò, 'From the "Merino Revolution" to the "Astronomy Revolution": Land Alienation and Identity in Carnarvon, South Africa'; M. Gastrow and T. Oppelt, 'The SKA and Local Development Mandates in the Karoo', elsewhere in this issue. See also D. Atkinson, R. Wolpe and H. Kotze, 'Socio-Economic Assessment of SKA Phase 1, 2017', available at <http://www.skaphase1.csr.co.za/wp-content/uploads/2017/01/SocioEconomic-Assessment.pdf>, retrieved 16 March 2018; and S.S. Butler, 'Knowledge Relativity: Carnarvon Residents' and SKA Personnel's Conceptions of the SKA's Scientific and Development Endeavours' (MA thesis, University of Stellenbosch, 2018).

41 Beinart, *The Rise of Conservation in South Africa*, pp. xviii, xix.

importance as a site in which the first mammals evolved. Over and above that, the Karoo is of significance as a site of deep human history, evidenced by its extraordinary archaeological record that reaches far back in time over many millennia.⁴²

Understanding the Karoo's unique ecology is fundamental for understanding the region's deep and more recent history, its contemporary challenges and its future prospects. It is an area of abundant sunshine and clear skies, hence its prime suitability for astronomy and solar energy generation. Total rainfall is not only low but seasonally highly variable. Until the introduction of wind-driven borehole pumps that could drill into its underground aquifers – first introduced into the region from the 1870s⁴³ – it was unsuitable for settled livestock farming and crop production. However, this does not mean that it was an unproductive landscape, unable to support human life and thus outside history: from the beginning of human history this environment has successfully sustained small groups of hunter-gatherers and, from some 2,000 years ago, pastoralists, the latter farming mainly with small stock (i.e. sheep and goats) rather than the cattle which were so central to the pre-colonial societies in the better-watered and far more densely settled eastern half of southern Africa.

The Karoo is also of historical significance in the colonial period as a very early contact zone between its indigenous 'Khoisan' societies and the European settlers moving into the interior from Cape Town in the south.⁴⁴ As the historical record shows, this encounter was often brutal, and the reverberations of what amounted to genocide at times continue to echo in present-day social ills.⁴⁵ At the same time, the colonial encounter also saw the emergence of new, culturally hybrid groups such as the Basters and the Griqua (whose first leader, Kok, was likely a runaway slave from Cape Town).⁴⁶ One chronicler of the history of Carnarvon has even used the term 'cosmopolitan' to describe this newly proclaimed, predominantly black town in the mid-nineteenth century, because of the diverse ancestry of its residents, including Xhosa, Baster, Xam and European.⁴⁷

These dynamics are indicative of dense processes of cultural and economic suppression, resistance, assimilation, adaptation and exchange, reflected *inter alia* in new relationships to land as property as the region was brought under the control of successive colonial administrations. Important mediating currents in this encounter between 'self, other and world' were the spread of Christianity, centred on European mission stations established at strategic water points across the interior (the nucleus of the subsequent 'Coloured Reserves' of the Northern Cape); the introduction of new technologies such as boreholes, fencing,

42 See D. Morris, 'Before the Anthropocene: Human Pasts in Karoo Landscapes', *African Journal of Range and Forage Science*, 35, 3–4 (2018), pp. 179–90; and J. Parkington, D. Morris and J. de Prada-Samper, 'Elusive Identities: Karoo Xam Descendants and the SKA', *Journal of Southern African Studies*, 45, 4 (2019) (this issue).

43 S. Archer, 'Technology and Ecology in the Karoo: A Century of Windmills, Wire and Changing Farming Practice', *Journal of Southern African Studies*, 26, 4 (2000), p. 681.

44 The term 'Khoisan' is used here as a general umbrella term to encompass the different hunter-gatherer and pastoralist groups living in the interior of the Cape Colony.

45 N. Penn, *Forgotten Frontier: Colonist and Khoisan on the Cape's Northern Frontier in the 18th Century* (Athens Ohio, Ohio University Press, 2005); M. Adhikari, "'The Bushman Is a Wild Animal To Be Shot at Sight": Annihilation of the Cape Colony's Foraging Societies by Stock-Farming in the Eighteenth and Nineteenth Centuries' in M. Adhikari (ed.), *Genocide on Settler Frontiers; When Hunter-Gatherers and Commercial Stock Farmers Clash* (Cape Town, UCT Press, 2014), pp. 32–59.

46 L. Waldman, *The Griqua Conundrum: Political and Socio-Cultural Identity in the Northern Cape, South Africa* (Oxford, Peter Lang, 2009), p. 212. See also M. Legassick, *Hidden Histories of Gordonia: Land Dispossession and Resistance in the Northern Cape, 1800–1990* (Johannesburg, Wits University Press, 2016).

47 S. Potgieter, *VG Kerk Carnarvon Gedenkboek, 1847–1997* (Carnarvon, United Reforming Church, n.d.), p. 9; see also Chinigò, 'From the "Merino Revolution" to the "Astronomy Revolution"'.

surveying and mapping;⁴⁸ and the emergence of Afrikaans as the dominant *lingua franca* in the region. Today Afrikaans is the first language of most people living in the Karoo, black and white – a shared cultural resource that mediates without dissolving entrenched divisions of race and class.⁴⁹

From the mid-19th century the spread of commercial sheep farming drew the region more tightly into world markets. This signalled the end of Khoisan resistance and shaped the cultural landscape of large, white-owned sheep farms and small country towns that many tourists regard as emblematic of the ‘unspoilt’ Karoo and its unique sense of place today. But while this ushered in a period of relative prosperity for the white, landowning class, it confirmed the dispossession and economic marginalisation of the black majority. Unlike in the eastern half of what was to become South Africa, no ‘native reserves’ were established in the Karoo in the colonial period, with consequences for relationships to land and the scope of post-apartheid land reform in this region that have barely begun to be unpacked in present-day policy debates on this issue.⁵⁰

Khoisan Identity and the SKA

In the 20th century the consolidation of white supremacist ideologies in South Africa snuffed out the possibilities of the more open, creolised society that the 19th-century town of Carnarvon hinted could perhaps have emerged. In 2011, people classified as ‘coloured’ in terms of the racial typology of apartheid accounted for some 40 per cent of the population of the Northern Cape as a whole but formed the overwhelming majority in the Karoo districts most directly affected by the national investment in astronomy.⁵¹ Those classified as white amounted to just seven per cent of the provincial total,⁵² but remained at the apex of the racial hierarchy that apartheid successfully established as the seemingly normal state of affairs.

More research is needed on the history of apartheid in the Karoo, and what it has meant for identity claims and the apartheid-era divisions of race since 1994. Of particular interest in relation to the SKA is the revitalisation of ethnic identities that are rooted *not* in a strong sense of being or becoming South African, but in claims to indigeneity and a revalorised Khoisan past. Some commentators have used the term neo-Khoisan to describe these emerging forms of identity among sections of the population still classified officially as ‘coloured’.⁵³ The growing normalisation of these constructs in everyday language is evident in a 2016 newspaper article on local responses to the threat of uranium mining near Beaufort West. The article begins and ends with strong expressions of anti-mining sentiments by a local man with an Afrikaans surname (Steenkamp), who is described in the article as ‘a

48 On the significance of astronomy for the development of surveying and mapping, see S. Dubow, ‘Before the Big Bang of the Square Kilometre Array (SKA): 250 Years of Astronomy in South Africa’, *Journal of Southern African Studies*, 45, 4 (2019) (this issue).

49 See Walker *et al.*, ‘Drivers and Trajectories’, Table 1.

50 A small number of ‘coloured reserves’, based on 19th-century mission stations, were recognised in the then Cape Colony by the Mission Stations and Communal Reserves Act of 1909, but the 20th-century trajectory of these areas differed from those of the ‘native reserves’ scheduled in terms of South Africa’s Natives Land Act of 1913. See R.F. Rohde and M.T. Hoffman, ‘One Hundred Years of Separation: The Historical Ecology of a South African “Coloured Reserve”’, *Africa*, 78, 2 (2008), pp. 189–222.

51 See Walker *et al.*, ‘Drivers and Trajectories’, Table 1.

52 Statistics South Africa, ‘Provincial Profile: Northern Cape, Census 2011’, Report No. 03-01-72 (Pretoria, Statistics South Africa, 2011), p. 18.

53 See M. Besten, ‘“We Are the Original Inhabitants of this Land”: Khoes-San Identity in Post-Apartheid South Africa’, in M. Adhikari (ed.), *Burdened by Race: Coloured Identities in Southern Africa* (Cape Town, UCT Press, 2009), pp. 134–55.

descendant of the |Xam Khoisan' and regards himself as a custodian of the land, in no small part because of his ancestry.⁵⁴

These identity claims have implications not only for those investing in the mineral resources of the Karoo but also for the territorial integrity of the SKA's core site near Carnarvon. This is because – remarkably, although not coincidentally, given the history of the region – the SKA project is being built on land that in the mid-19th century was part of the remnant heartland of the |Xam people, a hunter-gatherer group whose disappearing way of life is documented in the archive that linguists Wilhelm Bleek and Lucy Lloyd put together in Cape Town in the 1870s and 1880s.⁵⁵ In taking its science agenda forward, SKA South Africa has felt compelled to acknowledge this past. However, it has opted to manage this history not by engaging directly with the local descendants of those whose land the core SKA site once was, but by signing a Memorandum of Understanding (MOU) with the San Council of South Africa, a regional body which it describes as representing 'the interests of the descendents [*sic*] of the earliest inhabitants of the Karoo'.⁵⁶ Signed on 16 May 2017, the MOU formally recognised the Council's status as the custodian of 'the San culture and heritage' and committed both SKA South Africa and the San Council 'to explore opportunities for the promotion and growth of San Peoples' through the promotion and protection of that culture and heritage.⁵⁷ The signing of the MOU was preceded in March 2017 by a visit to the core site by 'the chieftainship of four San tribes and the Griqua Khoi', during which visit 'a ceremonial blessing and cleansing of the SKA project and site' was held.⁵⁸

The San Council is a non-governmental organisation that is headquartered in Upington, some 350 kilometres from Carnarvon. On the SKA website it is described as representing four 'San tribes' – 'the !Xun and Khwe from Platfontein, the Khomani San and the Xam from the Eastern Cape'.⁵⁹ Here the imprint of the ANC government's larger, widely contested national policy framework for consolidating the authority of 'traditional leadership' in South Africa's former bantustans to the east and north of the Karoo is evident.⁶⁰ Among the many elisions and omissions in the SKA's imposition of tribal identities on 'the San', it is telling that the |Xam homeland is assigned not to the area where the SKA core site is located, as per the historical and archaeological record, but to the Eastern Cape, and that the symbolic recognition of cultural rights to the SKA core site that the MOU recognises is awarded to groups whose actual histories are rooted in present-day

54 Kings, 'An Ill Wind'.

55 On this archive see J. Deacon and P. Skotnes, *The Courage of ||kabbo: Celebrating the 100th Anniversary of the Publication of Specimens of Bushman Folklore* (Cape Town, UCT Press, 2014); also Parkington *et al.*, 'Elusive Identities'.

56 SKA South Africa, 'Media Release: SKA and Agri SA Partners for the Benefit of Local Communities', 22 February 2017, quoting Dr Rob Adam, SKA South African Managing Director, available at <http://www.ska.ac.za/media-releases/ska-and-agri-sa-partners-for-the-benefit-of-local-communities/>, retrieved 13 March 2018. In 2018 Rob Adam became the Managing Director of SARAO.

57 SKA South Africa, 'San Council of SA Visits SKA Site', 22 March 2017, available at <https://www.facebook.com/SKASOUTHAFRICA/posts/san-council-of-sa-visits-ska-site-square-kilometre-array-south-africa-hosted-the/640832329451006/>, retrieved 13 July 2019.

58 *Ibid.*

59 *Ibid.*

60 The Traditional and Khoi-san Leadership Bill 23 of 2015 provides for the official recognition of Khoisan communities and leadership structures within this framework, for people who identify themselves as 'Cape-Khoi, Griqua, Koranna, Nama or San', and, *inter alia*, observe 'distinctive established Khoi-San customary law and customs'. For a critique, see A. Claassens, 'South Africa's Traditional Leadership Proposal, the TKLB, Is Desperate and Dangerous', Land and Accountability Centre, University of Cape Town, 6 December 2016, available at <http://www.customcontested.co.za/south-africas-traditional-leadership-proposal-tklb-desperate-dangerous/>, retrieved 24 July 2018.

Namibia and the Kalahari, not the Kareeberg.⁶¹ This repackaging of history, Parkington *et al.* argue, is based on two myths that are obstructing recognition of the continued presence of |Xam descendants in the immediate neighbourhood of the SKA: the myth of extinction (of the 19th-century hunter-gatherers of the Karoo) and the myth of retreat (of the surviving San people northwards, into the Kalahari).⁶²

By elevating the San Council to represent all the descendants of those hunter-gatherer groups who were dispossessed of their land in the Cape hinterland in the colonial era, while granting this body symbolic recognition as custodians of the precolonial heritage of the SKA site, the MOU effectively quarantines this land against other, potentially more material and locally grounded claims; the 20th-century history of the descendants of the |Xam people in and around the Kareeberg is expunged from the official record.⁶³ Beyond the Kareeberg, a further consequence of this alliance is national affirmation of the San Council's arrogation to itself of the right not only to speak *for* those people identifying as San throughout the Karoo and beyond, but also to control who can speak *to* 'San peoples' more generally. This extends to researchers addressing issues relating to 'indigenous knowledge' and San cultural heritage more generally, which the Council sees as falling under its exclusive authority. With the assistance of the South African San Institute, the Council developed a Code of Research Ethics for researchers across the natural and social sciences. The Code sets out 'specific requirements through every step of the research process', from design through to publication, while reserving the Council's right not to 'automatically approve ... any research projects that are brought to us'.⁶⁴ At issue are not simply concerns about unethical research practices but also, as noted by Parkington *et al.*, concerns about who has rights over the proceeds from the commercial development of 'indigenous knowledge' around, for instance, local plants with medicinal, cosmetic or culinary properties (such as the *hoodia* plant and *rooibos* tea).⁶⁵

In promoting itself as a global project the SKA has also woven the conceit of a singular, idealised Khoisan past into its narrative of human progress through science in its public outreach activities. Notable here is the 'Shared Sky' exhibition that SKA South Africa hosted with its Australian counterparts in 2014/15, in the aftermath of the highly competitive bidding contest between the two countries around the siting of the international Array. This exhibition opened in Perth, Australia in September 2014, before moving to Cape Town, South Africa in early 2015 and from there to the United Kingdom and other European destinations from mid-2015.⁶⁶ It combined Australian aboriginal art with tapestries made by South African artists from a community Art Centre in Nieu Bethesda (in the Eastern Cape, some 400 kilometres from the SKA core site), who are working with stories from the Bleek-Lloyd archive in their art and have come to describe themselves as 'a group of artists of/Xam descent' on their website.⁶⁷ The Australian and South African artists who created the artworks depicting aboriginal and Khoisan myths about the cosmos were described in the

61 The !Xun and Khwe residents of Platfontein trace their origins back to Namibia where their male forebears served in the Angolan Bush War as trackers for the South African Defence Force; the Khomani San were the beneficiaries of a complex land restitution claim to the Kalahari National Park that was formally settled in 1999. See Parkington *et al.*, 'Elusive Identities'.

62 *Ibid.* for a fuller discussion.

63 On land claims in the Carnarvon area see Chinigò, 'From the "Merino Revolution" to the "Astronomy Revolution"'.
64 South African San Institute, 'San Code of Research Ethics' (South African San Institute, Kimberley, 2017).

65 Parkington *et al.*, 'Elusive Identities'.

66 SKA Project, 'Shared Sky: The SKA's Indigenous Astronomy/Art Exhibition', available at <https://www.skatelescope.org/shared-sky/>, retrieved 1 December 2018.

67 Available at <http://nieubethesda.org/>, retrieved 12 March 2018. This link may explain the SKA's location of the |Xam people in the Eastern Cape in its subsequent publicity materials around its MOU with the San Council.

‘Shared Sky’ exhibition brochure as ‘working in remote communities from either side of the Indian Ocean’, with ‘ancient cultural connections to the ... sites where the SKA will be located’. Through these ‘ancient’ connections to a ‘shared’ southern sky, the political contest between Australia and South Africa around the siting of the Array was glossed and the global claims of astronomy further embellished:

Being located on similar latitudes on both continents the two sites in Australia and South Africa present essentially identical views of the night sky to the peoples that have lived there for tens of thousands of years, and to whom some of the oldest known artwork on earth can be attributed. Shared sky also embodies the idea that no borders exist in the sky and that the night sky is an increasingly scarce natural resource that belongs to and is shared by all humanity.⁶⁸

Critical Cosmopolitanism, Indigeneity and Land

On the face of it the reassertion of Khoisan identities in the Karoo may appear to challenge the analytical utility of critical cosmopolitanism, because of the essentialism permeating these claims and the associated ideas of cultural purity and political hierarchy that the actual history of hunter-gatherers and herders in the Karoo belies. This, however, is to overlook the dynamic relationships among ‘self, other and world’ that are shaping these claims in the present. Placing contemporary claims around indigeneity in the Northern Cape in their larger context reveals the deep debt that the current wave of Khoisan revivalism owes to a discourse around the rights of ‘First Peoples’ that is global rather than local, promoted by international advocacy groups such as Survival International (headquartered in London) and national bodies such as the South African San Institute.⁶⁹ The San Council’s Code of Research Ethics, for example, has been supported by an international network funded by the European Union.⁷⁰ It is largely because of the international movement around aboriginal and first-peoples rights that a Khoisan narrative has been able to gain some political traction in South Africa, despite the politically and economically marginalised status of most of its standard-bearers. At its core this narrative is about emergent identity claims in the contemporary networked world, rather than about a stable identity in a singular past. The Nieu Bethesda artists who travelled to Perth for the opening of the ‘Shared Sky’ exhibition as representatives of the |Xam people on whose land the SKA core site now sits were participating in a global network that nurtures the ‘First Peoples’ movement internationally.⁷¹ The SKA’s limited but carefully curated engagement with selected representatives of this movement is testament to the symbolic power of this narrative especially on the global stage.

At the same time, Khoisan assertions of first-peoples status are also of national interest within South Africa because of their potential to decentre an equally essentialist but far more powerful narrative of (‘black’) African identity, indigeneity and nationalism that infuses the populist politics around land reform in South Africa today. This narrative maps its assertion of a singular ‘African’ ownership of land in South Africa onto the post-1910 geography of modern South Africa in its entirety, including the Karoo with its particular precolonial and

68 SKA Project, ‘Shared Sky’, p. 3.

69 See their respective websites: <https://www.survivalinternational.org/info>; <https://www.sasi.org.za/>.

70 M. Gosling, ‘San Council Launches Code of Ethics for Researchers’, *Ground-Up*, 3 March 2017, available at <https://www.groundup.org.za/article/san-council-launches-code-ethics-researchers/>, retrieved 31 March 2018.

71 The artists were introduced to the Bleek-Lloyd archive by the (white) director of the Art Centre (field visit, Bethesda Art Centre, Nieu Bethesda, 15 March 2016).

colonial past. By challenging the claims of historic precedence underlying this Africanist nationalist narrative, neo-Khoisan assertions of ‘true’ indigeneity inadvertently disrupt all demands for land reform premised on the return of ‘the land’ (in the abstract) to the country’s original, therefore most legitimate, owners. At their most insistent, ‘first-peoples’ claims are presented not as claims to ownership of or cultural rights over pockets of land in the Northern Cape, but as morally pure and empirically indisputable ancestral rights to all of southern Africa. These ancestral rights, if taken to their logical extreme through the land restitution process, trump all other claims (black and white) to ‘original’ ownership of the land and its resources, and thereby expose the practical if not the moral limitations of such claims as a basis for meaningful land reform in a multi-ethnic country of some 57 million people today. In the words of an obscure group calling itself the Xoraxoukhoe Khoisan Indigenous People’s Organisation: ‘The land claim of the Khoi is not regarding property and an area but an entire country. It is different than any other. We cannot speak only of a Land Claim here, we should be speaking of a treaty’.⁷²

The SKA, Place and Space

In order to realise its global and national ambitions around the exploration of the Universe, the SKA project requires a physical infrastructure on Earth – an undertaking that cannot be constructed just anywhere but requires a very particular ‘somewhere’, with the optimal configuration of bio-physical characteristics, infrastructure and locality in relation to other sites of human activity. The selection of the Kareeberg as this favourable ‘somewhere’ for the SKA’s future development, followed by the declaration of the Northern Cape as an Astronomy Advantage Area, has pitted very different understandings of this region against each other. As already noted, these understandings operate across different scales – global, national and local. A productive way for exploring the resulting tensions is to work with the distinction between the Karoo as ‘place’ and the Karoo as ‘space’ that can be seen at work in these competing understandings.

This section builds on the discussion of the Karoo as a cosmopolitan ‘crossroads’ to reflect on it as simultaneously a space with an exciting future for the national and global science community and their backers, and a place with an unresolved past and difficult present for local residents – an encounter in which the unequal power relations between the national backers of the science project and local residents have meant that thus far understandings of the Karoo as ‘space’ have overshadowed understandings of it as ‘place’.

Place and Space

As geographer John Agnew points out, both space and place are geographically grounded terms, i.e. both refer to what he describes succinctly as ‘the “where” of things’. Thus, he argues, if one wants to understand *how* that ‘where’ matters, the two concepts are best analysed together:

The question of space and place in geographical knowledge is ultimately not just about whether the question of ‘where’ matters in the way that ‘when’ does in explaining ‘how’ and even ‘why’ something happens. It is also about *how* it matters. Given that both space and

72 Quoted in C. Walker, ‘Sketch Map to the Future: Restitution Unbound’, in B. Cousins and C. Walker (eds), *Land Divided, Land Restored: Land Reform in South Africa for the 21st Century* (Johannesburg, Jacana Media, 2015), p. 236.

place are about the ‘where’ of things and their relative invocation has usually signaled different understandings of what ‘where’ means, it is best to examine them together rather than separately.⁷³

Agnew identifies three distinct dimensions of what he terms the ‘meta-concept’ of place that are useful for thinking about the SKA in the Karoo: firstly, that of ‘location or site in space where an activity or object is located’; secondly, a ‘series of locales or settings where everyday life activities take place’; and thirdly, the ‘sense of place or identification with a place as a unique community, landscape, and moral order’.⁷⁴ For Tim Cresswell the primary distinction between ‘space’ and ‘place’ lies in Agnew’s third dimension, which associates ‘place’ – but not ‘space’ – with attachments to a specific community and/or landscape and/or moral order. In this typology ‘place’ is ‘richly suggestive of meaning and attachment’ while ‘space’ is not only more abstract but also more suggestive of ‘action’.⁷⁵ One consequence is that understandings of ‘place’ are not only more clearly socially bounded than those of ‘space’, but are also likely to be more conservative and resistant to new interpretations of the physical locality’s possibilities than constructions of this locality as ‘space’ permit. Because space is more abstract than place, as argued by Cresswell, it is much easier to project major new land uses onto it, as in the case of the Karoo, where astronomy, fracking, uranium mining, nature conservation, ‘green’ energy and the armaments industry have all been identified by external players as appropriate uses of this ‘empty’ land.⁷⁶

Applying Cresswell’s logic, the farms that the SKA has bought up in the Kareeberg are multi-layered ‘place’, with familiar names and (contested) local histories for those who have lived and worked on them, often for generations, but promising ‘space’ that is ripe for development for those looking from afar for the optimal site from which to probe the mysteries of the Universe. A description of the siting of the Array on the homepage of the international SKA Organisation’s website in early 2018 neatly captured the authority of space over place in the international consortium’s account of its decision to build the Array not in a particular place or places, with names and histories, but (in language reminiscent of the description of the Armscor test range at Alkantpan) ‘the deserts of South Africa and Australia’:

In 2012, one of the most momentous decisions in recent scientific times was taken with the decision to co-site the Square Kilometre Array (SKA) in the deserts of South Africa and Australia. This unique project is set to test the limits of human engineering and scientific endeavour over the next decade.⁷⁷

In marked contrast, the international SKA Organisation locates its own Head Office very clearly in a particular place (one that is also laden with wider geo-political significance as a

73 J.A. Agnew, ‘Space and Place’, in J.A. Agnew and D.N. Livingstone (eds) *The SAGE Handbook of Geographical Knowledge* (London, Sage, 2011), p. 316.

74 *Ibid.*, 326–7.

75 T. Cresswell, ‘Place’, in R. Lee *et al.* (eds), *The SAGE Handbook of Human Geography*, pp. 4–5.

76 In the case of the armaments industry, the development of Alkantpan ‘in the central semi-desert part of South Africa’, as per its website, has some interesting although largely unresearched parallels with the SKA. Alkantpan was a sheep farming area northeast of Carnarvon which the South African military bought up from white commercial farmers in 1987 to develop into an Armscor weapons testing site (‘Alkantpan: Profile’, available at http://www.armscor.co.za/?page_id=4493, retrieved 4 February 2018). Today this site is a source of radio frequency interference which the SKA is having to address through negotiations with its principals (ongoing fieldwork in Carnarvon).

77 SKA International, ‘The SKA Organisation’, available at <https://www.skatelescope.org/ska-organisation/>, retrieved 3 February 2018. Interestingly this text was revised during 2018 to describe the two core sites not as deserts but as ‘some of the most remote locations on Earth’: ‘The SKA Project’, available at <https://www.skatelescope.org/the-ska-project/>, retrieved 1 December 2018.

centre of imperial science). This understanding was elaborated through the detailed description of its international headquarters that could be found on the same website page as that describing the siting of the physical infrastructure of the Array in ‘the deserts’ of South Africa and Australia:

The SKA Organisation headquarters, located near to, and with views of the iconic Lovell Telescope at Jodrell Bank Observatory, near Manchester, UK, is the central control hub for a global team who over the next decade is building the SKA – the largest radio telescope ever seen on Earth. The elegant and modern building ... is a state of the art facility, home to some 50 members of staff, including visiting scientists and engineers. ... the building uses numerous environmentally friendly engineering solutions ... to ensure a minimal environmental impact.⁷⁸

The developers who see the Karoo as space are generally located elsewhere (in other places) without the attachments to the specific locality of those whom their development projects are displacing. As a result they are far more attuned to the future possibilities than this, for them, abstract site represents, than to its present social realities and its contested past. That said, this lack of attachment could change, if the developers were to spend time at the physical site and thereby begin to build their own personal histories with it as place, i.e. as the locale for a new community or moral order (in Agnew’s terms) in which they themselves are invested. However, what is significant here in relation to the SKA core site is that major technological advances in astronomy mean that today astronomers no longer need to work from the actual (emplaced) observatory where their primary data are being collected. Unlike in the early days of astronomy described by Saul Dubow,⁷⁹ astronomers attached to the SKA are not required to leave their research institutions in the world’s metropolitan centres in order to conduct their science. Rather, the ‘world-class’ information and communication technology that connects the SKA’s core site in the Karoo to research institutions around the globe will transmit the data captured at the site by high-speed fibre-optic cables to the facility’s main data processing centres and from there to participating institutions internationally. Thus, most astronomers will only ever access the SKA core site virtually: the power of modern technology over geography thereby reinforcing metropolitan astronomers’ understanding of the Karoo as little more than a distant, abstract space in the service of their work.

At the same time, it is not only local residents who have historically thought of the Karoo as place rather than space, in the sense proposed here. Many non-residents have long identified strongly with what they regard as the Karoo’s distinct ‘sense of place’, notably the natural scientists working to understand and conserve its fragile bio-diversity, as well as the tourists, writers and artists who seek out the quietness and open vistas that they experience as central to the region’s special appeal.⁸⁰ Furthermore, as these examples suggest, while ‘place’ is imbued with personal meanings which are likely to reinforce a conservative commitment to the preservation of what is valued about that place, a ‘sense of place’ does not necessarily involve an investment in the inherently social constitution of the place in question. In the case of the Karoo, it is the seeming absence of people in the landscape that many non-residents identify as central to its unique appeal, and this can complicate local residents’ endeavours to advance development agendas that non-residents may see as threatening their ‘sense of place’. For many environmentalists the Karoo’s unique environment stops short of the small towns and villages in which the great majority of

78 SKA International, ‘The SKA Organisation’.

79 Dubow, ‘Before the Big Bang’.

80 M. Ingle, ‘Making the Most of “nothing”: Astro-Tourism, the Sublime, and the Karoo as a “Space Destination”’, *Transformation: Critical Perspectives on Southern Africa*, 74 (2010), pp. 87–111.

Karoo residents are trying to cobble together a living. While local people may highlight the natural landscape beyond the built environment of farmstead and town in their appreciation of the Karoo as place, the social and the bio-physical are likely to be strongly intertwined in their accounts. Current research on social dynamics in several small Karoo towns suggests that both the intimacy of small-town support networks and the open landscape in which these towns are located feature prominently in the positive ‘sense of place’ that many local residents attribute to their Karoo, despite its evident poverty and social problems. Combined with this is the call for ‘development’ that will bring local jobs to these towns.⁸¹

The Astronomy Advantage Areas

The understanding of the Karoo as empty space, to be harnessed to the greater national good, is exemplified in the proclamation of Astronomy Advantage Areas over most of the Northern Cape. As already noted, the AAAs are a product of the Astronomy Geographic Advantage Act of 2007, with the specific purpose of ‘advanc[ing] astronomy and related scientific endeavours’ in South Africa by ‘identify[ing] and protect[ing] areas in which astronomy projects of national strategic importance can be undertaken’.⁸² Capitalising on the ‘Mandela dividend’ of the early years of South Africa’s return to international respectability after 1994, visionaries within the post-apartheid state drove the identification of astronomy in the 1996 *White Paper on Science and Technology* as a ‘flagship’ science in which South Africa had a strong competitive advantage.⁸³ The considerations for determining areas suitable for proclamation as AAAs are listed in the legislation as ‘high atmospheric transparency, low levels of light pollution, low population density or minimal radio frequency interference’.⁸⁴ By 2007, national policymakers had already identified the Northern Cape as meeting these criteria and in 2010, after the legislation was in place, declared the entire province an AAA, with the exception of the Sol Plaatje Local Municipality in which the provincial capital, Kimberley, falls.⁸⁵ This was followed by the declaration of the Core and Central Astronomy Advantage Areas around the SKA core site and the SAAO site outside Sutherland between 2010 and 2014.⁸⁶

The long-term significance of this legislation for the social and economic development of the Northern Cape as a whole is as yet unclear. However, it certainly has the potential to act as a brake on other land uses that are seen to compromise the earthly environmental needs of astronomy. Here the differences between optical and radio astronomy’s operating requirements become critical in determining the extent to which astronomy will be able to co-exist in practice with other land uses in the province; the presumption is that co-existence will continue to be more difficult around the SKA core site than around SALT. As already noted, radio astronomy has far more onerous demands around minimising data interference from terrestrial sources than optical astronomy. Cell phones, petrol-driven cars, electric

81 See Butler, ‘Knowledge Relativity’; J. Vorster and I. Eigelaar-Meets, ‘Sutherland: Sosiaal-Ekonomiese Kenmerke’ (unpublished research report, South African Research Chair in the Sociology of Land, Environment and Sustainable Development, Stellenbosch University, 2018).

82 Republic of South Africa, ‘Astronomy Geographic Advantage Bill; Memorandum on the Objects of the Astronomy Geographic Advantage Bill, 2007’ (B 17B–2007), p. 28, available at https://pmg.org.za/files/bills/071127B17B-07_0.pdf, retrieved 10 July 2019.

83 DACST, *White Paper*.

84 Republic of South Africa, *Government Gazette*, 516, 31157 (2008).

85 SKA South Africa, ‘Explanatory Memorandum on the Draft Regulations for the Protection of the Karoo Central Astronomy Advantage Areas’, clause 3.4, available at <http://www.skaphase1.csir.co.za/wp-content/uploads/2015/12/20151103-Explanatory-Memo-for-Karoo-Cen-AAAs-Regulations.pdf>, retrieved 20 July 2019.

86 *Ibid.*; Republic of South Africa, ‘Department of Science and Technology: Declaration of the Sutherland Central Astronomy Advantage Areas in Terms of the Astronomy Geographic Advantage Act, 2007’, Notice 140 of 2014, *Government Gazette*, 37397 (2014).

fences, microwave ovens, analogue television transmission all transmit disruptive radio signals that interfere with the extremely faint radio signals emanating from deep space. This interference thus has to be reduced as far as possible if the SKA dish antennas are to function optimally. This makes co-existence between astronomy and other established land uses such as agriculture far more difficult in the shadow of the SKA than in the vicinity of the optical astronomy telescopes outside Sutherland.

In media coverage of this issue since 2014, SKA personnel have stressed their commitment to finding technical solutions to the challenges of maintaining a radio-quiet zone without impinging on other major investments in the area, including shale-gas mining (should it proceed), civil aviation (all Cape Town–Johannesburg air routes pass over the SKA core site) and the Alkantpan Test Range. However, they have also pointed to their powers under the Astronomy Geographic Advantage Act to protect the hegemony of astronomy. For instance in 2014 an SKA spokesperson told parliament with regard to fracking: ‘The builders of the Square Kilometre Array (SKA) radio telescope in the Northern Cape hope to co-exist with shale gas prospectors, but if needs be will invoke new astronomy laws to protect their interests’.⁸⁷ In July 2018 the Executive Manager of South Africa’s Air Traffic and Navigation Services was reported as complaining at an aviation symposium that they were being told to redesign the Cape Town–Johannesburg air route so as to avoid the SKA core site; this he said was a major ‘headache’ requiring a ‘technical solution ... to allow the SKA and aviation to co-exist’.⁸⁸

Of more immediate concern to local residents is how radio astronomy will co-exist with continued livestock farming on the commercial farms bordering or in close proximity to the SKA core site and covered by its spiral arms. Unlike shale-gas mining and civil aviation, local farmers do not constitute a powerful, nationally and internationally networked industry in their negotiations with the state around co-existence.⁸⁹ In trying to reduce concerns about the impact of the SKA on the agricultural sector, in 2016/17 SKA managers pursued a partnership with Agri-SA, the national body representing the majority of commercial farmers in South Africa. A MOA signed in February 2017 committed both organisations ‘to continuously explore ways where affected agricultural land is optimised to accommodate ongoing farming activities where possible, as long as the functioning of the radio observatory is not compromised’.⁹⁰ ‘Through this agreement with Agri SA’, noted Rob Adam, then SKA Managing Director, ‘the SKA SA expresses its commitment to work in partnership with the organised farming sector to ensure that maximum benefit is derived from hosting the SKA radio telescope in the Karoo’.⁹¹

In the SKA’s preference for engaging with national rather than local representatives of farmers there are clear parallels with its elevation of the San Council over local descendants of the vanquished |Xam people. Many local farmers have been sceptical of the Agri-SA ‘partnership’, which they feel does not adequately address their day-to-day and longer-term interests in their district. These interests include the continued viability of local abattoirs, with fewer local sheep farms to supply them; the management of livestock predators such as jackals and caracal on the core site; the maintenance of the SKA’s boundary fences; and

87 ‘SKA Builders Warn on Fracking Interference’, *News24*, 3 September 2014, available at <https://www.news24.com/Green/News/SKA-builders-warn-on-fracking-interference-20140903>, retrieved 2 April 2018.

88 R. Campbell, ‘SKA to Cost South African Airlines’, *Engineering News*, 22 May 2018, available at <http://www.engineeringnews.co.za/article/ska-to-cost-south-african-airlines-2018-05-22>, retrieved 24 July 2018.

89 Atkinson, ‘When Stars Collide’.

90 SKA South Africa, ‘Media Release: SKA and Agri SA’. The SKA has also committed to employing farm workers who have been displaced by its land acquisition programme as general workers on the core site, but the details of how this will work were not known at the time of writing this article.

91 *Ibid.*

constraints on farmers' ability to communicate with their neighbours and the wider world.⁹² The suspicion is that the MOA is driven more by the national agenda of Agri-SA to cultivate good relationships with the state, at a time of heightened tensions around land reform nationally, than by the interests of the affected farmers trying to maintain their farming operations in a relatively marginal agricultural region of the country. While the SKA has dismissed responsibility for poor cell phone coverage in the Kareeberg and emphasised the alternative communication technologies they are promoting, local farmers bordering the core site have been vocal about the threats not simply to their livelihoods but to their ability to communicate with family and friends.⁹³

The Special Nature Reserve

The hierarchy of space over place in the promotion of astronomy as the premier land use for the Northern Cape is also evident in the intention to declare the core site a 'special nature reserve' in terms of South Africa's Protected Areas legislation, and the partnership that the SKA has entered into with environmentalists to manage this reserve on its behalf. Over the course of negotiations around the management of this land once it would no longer be farmed, SANParks, the body responsible for managing South Africa's national protected areas, was identified as the most appropriate management authority for what was described in early 2018 as the 'future SKA National Park'.⁹⁴ As already noted, access to the 'special nature reserve' category of protected area is prohibited for anyone other than designated officials and those approved by the Minister, such as scientists performing 'scientific work'.⁹⁵

In tandem with this institutional arrangement, the SKA management has also signed a three-year MOA with SAEON, in November 2017, to implement the Integrated Environmental Management Plan of the core site and 'mitigate its environmental impact and enhance its environmental benefit'.⁹⁶ This Agreement recognises natural scientists as important allies in advancing the primary science agenda for the site, that of astronomy, in what is regarded as a win-win outcome for South Africa's national science community. In reflecting on the significance of this MOA, the Deputy CEO of the NRF commented on its importance as a 'strategic alignment' that creates 'new opportunities for integrative science and ... new platforms for the training of the next generation of scientists'.⁹⁷ For their part environmentalists regard the relationship as a happily symbiotic one, given the very limited extent of formal conservation areas in the Nama Karoo. According to the Managing Director of SAEON: 'South Africans will experience significant value-addition from this extraordinary synergistic relationship between two seemingly opposing sciences. For the

92 This is based on ongoing fieldwork in the Carnarvon area since 2016.

93 The SKA is promoting satellite phones in lieu of cellular phones: 'SKA "Dead Zones" Rile Farmers', *Cape Times*, 27 November 2017, available at <https://www.pressreader.com/south-africa/cape-times/20171127/281732679798133>, retrieved 2 December 2018; Save the Karoo, 'SKA Is Ruining the Karoo's Future', 16 January 2017, available at <http://savethekaroo.com/>, retrieved 2 April 2018.

94 SKA South Africa, 'Appointment of a Facilitator to Assist with the Development of the "Desired State" of the SKA National Park Management Plan as the First Step to the Development of the Park Management Plan', RFQ (Request for Quotations) Number: NRF SARAO RFQ PEP6 001 2018, available at http://www.ska.ac.za/wp-content/uploads/2018/02/nrf_sarao_rfq_pep6_001_2018.pdf, retrieved 24 July 2018.

95 National Environmental Management: Protected Areas Act 57 of 2003, section 45.

96 SKA South Africa, 'Media Release: SARAO and SAEON Sign Three-Year Memorandum of Agreement to Implement the Integrated Environmental Management Plan for SKA in South Africa', 1 November 2017, available at <http://www.ska.ac.za/media-releases/sarao-and-saeon-sign-three-year-memorandum-of-agreement/>, retrieved 18 March 2018.

97 *Ibid.*

first time ever, Radio Astronomy and Earth Observation research infrastructures will be collaborating in South Africa to ensure sound environmental management'.⁹⁸

In the SKA core site ecologists will be able to monitor the environment, conserve threatened biodiversity and assess ecological change unhindered by the challenges of engaging with the public and/or managing local people with different expectations of how the land could best be put to work – here ecologists' own 'sense of place' for the Karoo can find welcome expression. While analysts and activists around the world have fiercely criticised environmental conservation through protected areas (dubbed 'fortress conservation' by Dan Brockington in 2002) as antithetical to people-centred rural development, including in South Africa,⁹⁹ in the SKA core site the state has quietly circumvented this negative discourse. Here a particularly exclusive form of environmental protection is being positioned as the unencumbered ally not simply of the public good of conservation but of 'development' itself (fortress conservation of a special type, if you will).

It is revealing of the politically marginal standing of the Karoo how little discussion there has been in the public domain nationally about the declaration of first the AAAs and then the 'special reserve' status of the SKA core site. This is particularly noteworthy given the scale of the land that is affected. The comparison between the state's commitment to land for astronomy and to land for land reform that I referenced in my introduction is indicative of the insignificance of the Karoo in national debates on people-centred development in general and land reform in particular. This is despite its considerable spatial extent, hence potential impact on national land redistribution targets.

As already noted, there is a striking, albeit coincidental, correspondence between the area protected by the Astronomy Advantage Act and the area targeted for post-apartheid South Africa's land reform programme, which was set during the transition to democracy in the mid-1990s at 30 per cent of commercial farm land. My contention is that at least part of the reason why it is possible for the state to declare some 36 per cent of the country's commercial farm land an astronomy reserve, without serious public debate on its implications either for the people and places most directly affected or for its articulation with national commitments to land reform, is because the land in question is of marginal interest in the national imaginary. The overwhelming majority of South Africans living outside the Northern Cape share their government's view of this huge expanse of land as politically and economically peripheral space – effectively a non-place that can be dedicated to astronomy in the service of national development goals, rather than a 'place of attachment' in which the concerns of those who live there (in which 'the treadmill' of daily life looms large) should take centre stage.

Conclusion

This article has explored the unequal relationship among global, national and local interest groups in the development of the SKA project in the Karoo. An assessment of the present and future gains for global and national science that the SKA represents is not the issue here. Rather, my focus has been on the very different understandings of the Karoo that are at stake in this project, along with the unequal, multi-scalar power relations driving its development. What this constellation of issues reveals is the significance not only of the bio-physical

98 NRF/SAEON, 'Innovative Agreement Paves the Way for a New Era of Symbiotic Science', available at <http://www.saeon.ac.za/enewsletter/archives/2017/december2017/doc02>, retrieved 29 July 2018.

99 D. Brockington, *Fortress Conservation: The Preservation of the Mkomazi Game Reserve, Tanzania* (Bloomington, Indiana University Press, 2002). See B. Buscher and W. Whande, 'Whims of the Winds of Time? Emerging Trends in Biodiversity Conservation and Protected Area Management', *Conservation and Society*, 5, 1 (2007), pp. 22–43.

properties of this arid region but also of its marginalised history in rendering it a suitable site for a project of the extraordinary magnitude of the SKA.

Here the analytical resources of human geography on place and space have been drawn upon to account for dominant perceptions of the Karoo as a region whose future is best determined by those ready to develop it for the greater, i.e. national and/or global good. At the same time, using critical cosmopolitanism as a lens brings into sharp relief the extent to which the Karoo has long been an historically connected place. It also brings into focus the issue of social justice in this uneven encounter between the local and the global, and the importance of a normative commitment to respecting, in Appiah's words, 'ordinary people's attachments to the lives they have made for themselves'¹⁰⁰ in negotiating this encounter. To date this normative commitment has been far less evident in the state's promotion of astronomy as a major land use in the Karoo than its commitment to the needs of global and national science. What more meaningful engagement with local constituents and local priorities should involve is thus still an open question.

The core argument of this article is that the development of the SKA – a manifestation of global science, in partnership with national ambition, in a marginalised but far from empty part of the country – has been premised on a fundamentally metropolitan view of the Karoo as politically and economically peripheral: desert space rather than social place. At the same time, because the actual Karoo is a peopled place (and has been for many thousands of years), those driving the SKA project have been obliged to engage with local dynamics in the operationalisation and justification of their work. Yet even when the SKA has acknowledged the claims of place, local histories and development priorities have been treated as essentially a footnote to the project's primary concerns. Thus in developing partnerships to ensure the security of its core site as a special reserve, SKA managers have largely overlooked local residents, as in the MOU with the San Council and agreements with Agri-SA and SAEON. Although formally acknowledging the historical significance of this site through the MOU with the San Council, the SKA has diluted this recognition by endorsing a truncated history, with little material purchase on the land and its new owners (the state) in the present. From this perspective the shadow cast by the SKA renders the Karoo at best an ambiguous space for the advancement of national and global science agendas, rather than a deeply historical, multi-layered place, with unresolved claims around recognition and resources today.

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