

A Colonial Cartographic Economy: the Contested Value of Mapping in Northern Rhodesia, 1915-1955

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Declaration of Authorship

I, Elizabeth Haines, hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is clearly stated.

Signed:

A handwritten signature in black ink, appearing to read 'Elizabeth Haines', written over a light grey rectangular background.

Dated: 24th June 2016

ABSTRACT

This thesis addresses the production and use of cartography in Northern Rhodesia (today Zambia), under colonial rule between 1915 and 1955. The predominant narrative has previously been one of ‘absence’: that mapping in British colonial Africa was side-lined due to a lack of available resources. However, this narrative evidences a strategy that has been critiqued, the use of technical failure as an explanation to mask positive political choices. It also treats cartography teleologically, with full, modern ‘state’ mapping as an inevitable endpoint. This endpoint was not achieved in Northern Rhodesia (arguably never has been), and yet colonial rule was maintained.

What then, the thesis asks, *was* the relationship between mapping and colonisation? Whilst colonial cartography in Northern Rhodesia failed to meet ‘universal’ cartographic ideals, hybrid, *ad hoc* forms of mapping emerged. These forms were determined by thoroughly local social, material and political conditions. I propose that investment in cartography was weighed against the potential value of a map; its symbolic value, utility, and financial cost. I use ethnographic archival analysis to reveal these local discussions of resources and values across multiple sites. Those discussions are then brought together within the framework of a ‘cartographic economy’.

In addition to developing this theoretical approach, the thesis makes three further contributions. Firstly, it supplements the scant available description of the practices of colonial survey in the early twentieth century. Secondly, it differentiates the influence of an expanded range of actors and processes on Northern Rhodesian cartography going well beyond ‘survey experts’ to include; private enterprise, indigeneous authorities, scientists, rural administrators, and African labour. Thirdly, it innovates the historiography of cartography by contrasting the use of maps with alternative *non-documentary* governance practices, such as peripatetic administration, and the embedding of colonial knowledge within local populations.

PREFACE

This thesis arises from a Collaborative Doctoral Award (CDA), funded by the Arts and Humanities Research Council (AHRC), UK. CDA projects are supervised jointly between a higher education institution and an independent research organisation; in this case Royal Holloway, University of London (RHUL) and the Science Museum. The research agenda for the thesis stems from a proposal that I made to the Science Museum Junior Research Fellowship scheme. This proposal was then subsequently championed for doctoral funding by Peter Morris, honed by Innes Keighren and Alasdair Pinkerton, and awarded funding by the AHRC. At RHUL, I was supervised by Innes Keighren and Alasdair Pinkerton. At the Science Museum I was initially supervised by Jane Wess, and later by Tim Boon and Peter Morris.

Working within the Science Museum offered me the opportunity to use the set of twentieth-century surveying instruments as a historical source. The material culture of surveying held at the museum, although fairly invisible in the final thesis, has had an important role in shaping the direction of the research. The museum's collection gives a much stronger indication of the continuity in survey technology, and technique, than other forms of historical source (which tend to emphasise innovation). Equally, the changes in casing for the instruments are highly indicative of how that continuity operated in changing technological and social contexts. These qualities of the material culture of the survey collection are not interrogated directly in the thesis, but prompted and nourished a desire to place the quotidian practices of colonial mapping at the forefront of the research.

Another significant 'invisible' force that has guided the thesis is the testimony provided in informal discussions granted by a number of generous individuals. I was assisted in my understanding of the role of mapping in the work of District Officers in Northern Rhodesia through discussions with John and Greta Hudson, and Ian and Barbara Mackinson. Others who carried out mapping work in the region in later periods (particularly the 1960s and 1970s) were able to elucidate some of the challenges of survey work that endured, and also described some of their inherited traditions. Thanks in this respect to Joseph Chalila (then Chief Cartographer at the University of Zambia), John Leatherdale (formerly of Hunting Surveys), David Skippings (private surveyor in the Copperbelt), and Graham Slough (formerly of AOC Geomatics, Johannesburg).

The scope of the research project has been extended materially and conceptually by a number of opportunities. Financial support from RHUL's Shackleton Fund allowed for extended archival research in Zambia. Conference bursaries from the British Society for the History of Science, and the Royal Geographical Society's Historical Geography Research Group enabled me to present and develop my work. Two external projects have provided the opportunity to develop my thinking and receive generous critical feedback. The first of these, *100 Hours*, was a material culture research project conceived and organised by Leonie Hannan and Kate Smith at University College, London. Many thanks to them and the other participants for the lively and productive discussions on reading and narrating the past from material culture collections. The second, *Contested Landscapes*, was a graduate research workshop convened by the Cornell Institute of Social Sciences, and in particular by Sara Pritchard, Steven Wolf, and Wendy Wolford. The convenors and the other workshop participants provided a week of interdisciplinary discussion, enriched by further close-reading and criticism that was both inspiring and incredibly useful. Two anonymous referees at *Environment and Planning A* challenged me to greater levels of theoretical precision.

I have benefitted from support and guidance from a number of sources. My supervisors have provided these in very diverse forms, all of which I am very grateful for. Further thanks are due to colleagues who have assisted me by locating, copying and sharing materials and in providing introductions, especially in Zambia: Jessica Achberger and Marja Hinfelaar of SAIPAR; Jack Hogan, Duncan Money, and Mike Musgrave. Finally, a much wider circle of friends and colleagues has read drafts, listened and argued with me. I'm extremely grateful to them for their time and enthusiasm for the project. My family, and my shifting adoptive family in Brixton (Anthea, Jude, Lydia, Vlad) were both tolerant and supportive. Adam has eased the moments when I've felt most challenged by this project, and revelled with me in the best.

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ABBREVIATIONS

AOC	Aircraft Operating Company Ltd.
CAF	Central African Federation
CSC	Colonial Survey Committee
DCS	Directorate of Colonial Surveys
LSE	London School of Economics (archive)
NA UK	The National Archives, United Kingdom
NAZ	The National Archives of Zambia
RCBC	Rhodesia Congo Border Concession Company
ZCCM	Zambia Consolidated Copper Mines (archive)
ZSM	Zambesi Saw Mills Ltd.

“Few... could explain with force and clarity the necessity to map an apparently worthless piece of ‘bush’ *now* in order to get it done in time by painfully slow methods. In time for what?”

M. Hotine, ‘Survey for Colonial Development’, *Survey Review* 10, no. 77 (1950): 291.

**1 / Introduction: a colonial cartographic
economy**

This thesis begins in the map cupboard of the District Office at Mongu-Lealui in 1953. Mongu-Lealui was a rural district in the heart of what is now Western Province, but was then called Barotse Province. The ‘map cupboard’ for the District held forty documents, which might seem, on first consideration, a fairly reasonable collection.¹ However, scanning that list begins to dislodge the impression of an orderly well-stocked cartographic archive.

The most important and detailed item in the map collection was, arguably, the district map.² This document, at a scale of 1:250,000, was produced locally, and hand-drawn by a predecessor of the existing administrator using compass and cyclometer.³ It is likely, in fact, that this district map was a tracing of the original that was produced twenty-four years earlier. It certainly would in any case have become heavily annotated in the course of its regular use. In addition to this ageing palimpsest, the District Office held a mixture of other cartographic documents. One map had been produced by a forestry officer in the course of his inspection of the province.⁴ Yet others were published by private organisations for promotional purposes. The office held a copy of a map of ‘Rhodesia’ by the British South Africa Company, marking their zone of influence in Southern Africa.⁵ It also held a map produced by Wenela—the Witwatersrand Native Labour Association—showing the routes by which Africans came from across the Southern Africa to reach the mines at the Rand.⁶

The remainder of the indexed documents seem to have been the outline of specific features: some showed road systems or borders, most traced the path of single rivers,

¹ ‘Index to District Maps’, 10 June 1953, BSE1/10/31, National Archives of Zambia (hereafter NAZ).

² J. C. Stone, ‘The District Map: An Episode in British Colonial Cartography in Africa, with Particular Reference to Northern Rhodesia’, *The Cartographic Journal* 19, no. 2 (1982): 104–12.

³ G. R. R. Stevens and L. A. Russell, ‘*Lealui District*’ (*Mongu-Lealui, n.d.*), No. 510, NAZ digitised collection.

⁴ Martin, J. D., ‘*Vegetation and Forest Map of Barotseland*’, 1:500,000. Sunprint of hand-drawn map, 1945. CO1054/191, National Archives, UK, (hereafter NA UK).

⁵ District Commissioner, Mongu to Resident Mining Engineer, British South Africa Company, ‘The British South Africa Company Map’, 29 May 1946, BSE1/10/31, NAZ.

⁶ Stead, A. D. “*Map of Southern Africa: Showing the Recruiting Systems of the Native Recruiting Corporation and the Witwatersrand Native Labour Association: Sources of Mine Native Labour*”. Johannesburg, SA: Transvaal Chamber of Mines, 1946. SC Map P-36, New York Public Library.

canals, or roads. Other maps—more strictly plans—showed the layout of individual public buildings, or demonstrated standard legal town-planning formats (such as Standard Type European Latrines). Such documents are hard to track in the historical record and very few feature in cartographic bibliographies, yet these piecemeal representations of aerodromes, hospital sites, canals, and cattle routes comprised the total geographic documentation available to the local administrative office for its daily work.

Jeffrey Stone, the most important historian of African cartography to date, began his key work *A Short History of the Cartography of Africa* (1995) with a similar anecdote about his encounter with the District Map on his arrival at a District Office posting in Northern Rhodesia in 1959. Stone notes that his office relied on “crudely compiled but neat small scale sketch maps”, while, “published maps which met no immediate need were stacked away in a drawer without a second glance”.⁷ Yet in that book (and elsewhere in his writings) the District Map is presented more as a ‘pioneer’ document produced in the face of adversity; a make-do precursor to modern, scientific mapping. In that narrative, the District Map takes its place, in brief, as a part of the pre-history of the inevitable, total, cartographic rendering of the empire and the world. In this schema from the Second World War onwards, “the rate of production gathered momentum and indeed that momentum was sustained well into independence”, until “only very recently... the sheer magnitude of political and economic problems in Zambia put a brake on that momentum”.⁸

At a desk in the National Archives of Zambia, as I attempted to understand the problems and priorities of colonial cartography, the inevitability, indeed the fact, of that total cartographic rendering seemed moot. Likewise for the values in which comprehensive governmental cartography was synonymous with progress. I repeatedly encountered accounts of ignored amateur cartographic endeavours, of rival mapping authorities, and of incommensurable, uncoordinated local documents. The archival accounts sat uneasily with prevalent narratives about the role that maps play in establishing colonial authority and producing colonial ‘territory’. The challenge for this thesis became that of finding ways to meet those prevalent narratives of dominance, inscription, and progress with the *ad hoc*, hybrid, and disordered cartography in Northern Rhodesia. How far would it be possible to extend theories of systems, grids, and ordering before they collapsed? How far could those theories be

⁷ J. C. Stone, *A Short History of the Cartography of Africa* (New York, NY: E. Mellen Press, 1995), i.

⁸ *Ibid.*, 136.

read in the remains of Northern Rhodesian mapping? Where did other modes of interpretation need to be found?

Jeffrey Stone's oeuvre has provided cartographic (and other) historians with a superb platform from which to discover sources, and to consider the production of maps in the context of colonial rule. However, this story of gradual unification towards a single end, 'the' mapping of Africa must—as I will demonstrate—be abandoned. It obscures and impedes our understanding of the reality of colonial map *use* in Northern Rhodesia. State mapping sat within and against other forms of cartographic circulation by other agents. Furthermore, all those who had the resources to produce cartography, made the choice of how to map (and even *whether* to map) from amongst a variety of alternative practices that served similar ends. The value of maps was not a given, it was regularly, and successfully contested. Stone's anecdotal remark that the District Office preferred crude hand sketches to large-scale scientific mapping, is not incidental, but crucial to understanding the mechanisms by which Northern Rhodesia was conceived and organised.

In order to bridge between narratives of unity and evidence of heterogeneity in colonial mapping, and in order to consider the quotidian and piecemeal, as well as the strategic this thesis approaches colonial cartography with an economic model. That is, I am less interested in understanding how maps carried meaning than in what we can learn from interrogating their value. I take value in its broadest sense. In this thesis a map's value is taken to include its financial cost, its political import, symbolic authority, and the regularity of its use. It also means the map's importance to the attainment of larger colonial ambitions.

Maps could be conceived as having been tools for anchoring and justifying competing visions for the future of Northern Rhodesia. However, taking that position would perpetuate the association between cartography and rational debate, or coordinated planning. The thesis extends the context for understanding cartography beyond this, into the realms of disparate and contradictory behaviours and the very un-modern modes of governance deployed by colonialists in Northern Rhodesia. The thesis examines practices and policies within different offices and outposts involved in ordering the colony.

Mapping, colonialism, governance

Mapping is...one of the vitamins necessary to the body politic.⁹

Cartography has come to be seen as the technical and symbolic epitome of colonial governance in three interrelated ways. One strand is perhaps best exemplified by the work of the political scientist James C. Scott. Scott's influential volume *Seeing Like a State* (1997) describes powerful authorities producing documents to make unknown environments legible from a distance.¹⁰ With documents in hand, such distant authorities then feel enabled to rationally reorganise those environments in order best to serve their interests. For Scott, maps epitomise the shift from localised contingent systems of ordering land to one that is centrally defined.¹¹ A series of related studies have followed that trend in focusing on the role of the map in assisting the enumeration—statistical modelling and reorganisation—of colonial spaces.¹²

Cartography has been assigned a similar, but slightly different role in recent theorisations and genealogies of state power. Within this scholarship the production of an abstracted, homogeneous, and unified 'space' through cartographic geometry is seen to be foundational to the conceptual history of the state and the material production of 'state-spaces' across the globe.¹³ Other scholarship has placed colonial cartography within the framework of the 'imperial archive,' analysing the symbolic power of inscription. Matthew Edney's celebrated study, for example, sees the process of producing an (approximately) trigonometrically-defined India as the creation of a

⁹ H. S. L. Winterbotham, 'Mapping of the Colonial Empire', in *Report of the Annual Meeting of the British Association for the Advancement of Science (Blackpool)* (London, UK: Office of the British Association, 1936), 116.

¹⁰ James C. Scott, *Seeing Like State: How Certain Schemes to Improve the Human Condition Have Failed* (New Haven, CT: Yale University Press, 1998), 18.

¹¹ "All the state simplifications that we have examined have the character of maps. That is, they are designed to summarize precisely those aspects of a complex world that are of immediate interest to the mapmaker and to ignore the rest". *Ibid.*, 87.

¹² Scott, *Seeing Like State*; David Demeritt, 'Scientific Forest Conservation and the Statistical Picturing of Nature's Limits in the Progressive-Era United States', *Environment and Planning D: Society and Space* 19, no. 4 (2001): 431–59; Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley, CA: University of California Press, 2002); Mark Whitehead, Rhys Jones, and Martin Jones, *The Nature of the State: Excavating the Political Ecologies of the Modern State*, Oxford Geographical and Environmental Studies (Oxford, UK: Oxford University Press, 2007); Stuart Elden, 'Governmentality, Calculation, Territory', *Environment and Planning D: Society and Space* 25, no. 3 (2007): 562–80; Jeremy W. Crampton, 'Cartographic Calculations of Territory', *Progress in Human Geography* 35, no. 1 (2011): 92–103.

¹³ Neil Brenner et al., *State/Space: A Reader* (Malden, MA: Blackwell, 2003); Neil Brenner and Stuart Elden, 'Henri Lefebvre on State, Space, Territory', *International Political Sociology* 3, no. 4 (2009): 353–77; Stuart Elden, *The Birth of Territory* (Chicago, IL: University of Chicago Press, 2013); Jordan Branch, *The Cartographic State: Maps, Territory, and the Origins of Sovereignty* (Cambridge, UK: Cambridge University Press, 2014).

geographical archive.¹⁴ For these scholars, maps, in addition to providing information, also performed a role within a visual culture of metonymical or synecdochal possession.¹⁵ Whether for the symbolic possession of territory, the inscription of resources for exploitation, or the demarcation of a sovereign political domain, all three strands agree on the centrality of cartography to the foundation of colonial rule.

Despite the relative youth of this critical scholarship, belief in the foundational role of cartography for good governance is not new. During the period covered by this thesis (1915–1955), maps were regularly pronounced as being essential to imperial rule. In 1936, Brigadier Winterbotham, a doyen of British cartography, declared mapping to be a necessary condition, a ‘vitamin’ to the body politic. Winterbotham’s views were echoed by others campaigning for the application of scientific, rational approaches to managing empire, such as Edgar Barton Worthington, author of the study *Science in Africa* (1938). As Worthington noted,

The geodetic and topographical surveys of a new country are in fact as fundamental as roads, bridges and railways, and therefore it can be argued that survey work, like other branches of development, should be financed by pledging the future and anticipating the increase in revenue at which development aims.¹⁶

In fact, various parties in the late nineteenth and early twentieth century called for, imagined, and regretted the absence of, not maps in the plural, but *the* map of Africa.¹⁷ This desire is revealing since it helps to expose two conjoined teleologies. First, is the *telos* of complete *coverage* (fully embracing a specific area). Second, is the *telos* of a complete cartographic *system*. This system was regularly promoted by cartographic experts as a *sequence* for the mapping of ‘new countries’.¹⁸ First, geodetic survey and triangulation should be carried out, then topographic detail added and, finally, private property could be outlined on the earth’s surface. In other words, the maps should be

¹⁴ Matthew H. Edney, *Mapping an Empire: The Geographical Construction of British India, 1765–1843* (Oxford, UK: Oxford University Press, 1999), 39–41; 319–340.

¹⁵ Timothy Mitchell, *Colonising Egypt* (Berkeley, CA: University of California Press, 1988); Thomas Richards, *The Imperial Archive: Knowledge and the Fantasy of Empire* (London, UK: Verso, 1993); Matthew H. Edney, ‘Mapping Empires, Mapping Bodies: Reflections on the Use and Abuse of Cartography’, *Treballs de La Societat Catalana de Geografia* 63 (2007): 83–104.

¹⁶ Edgar Barton Worthington, *Science in Africa: A Review of Scientific Research Relating to Tropical and Southern Africa* (Oxford, UK: Oxford University Press, 1938), 35.

¹⁷ E. F. Chapman, ‘The Triangulation of Africa’, *The Geographical Journal* 5, no. 5 (1895): 468; John George Bartholomew, ‘The Mapping of the World (Part 2)’, *Scottish Geographical Magazine* 6, no. 11 (1890): 575–97.

¹⁸ Worthington, *Science in Africa*, 116.

ordered, working from the global and physical, towards the local and social, step, by step. In our cultural imaginary, both *telos* have been met by contemporary state mapping, thus the ideals expressed by the colonial cartographers remain at the heart of present-day attitudes towards maps. This agreement between contemporary theory and past technical experts has left the *telos* of coverage and the *telos* of system in place as the guiding principles for interpreting colonial cartography.

As fundamental as roads, bridges, and railways. Yet in 1953, after sixty years of colonial authority, there was no map of Mongu upon which the location of waterways or villages were detailed and measured at a scale that the administration themselves would have considered sufficient for good rule. The array of documents that were available to administrators was certainly not embedded within a central hierarchy organised by a central authority. They were profoundly insufficient to allow much by way of legislative defence of state boundaries or scientific management of state resources. In comparison to more densely mapped areas of the ore-rich Copperbelt, or nascent urban environments such as Lusaka, Mongu was cartographically invisible. Cartographic ‘progress’ (if measured by density and detail in mapping) did not spread evenly across Northern Rhodesia.

It seems appropriate, therefore, to approach these ‘expansionist’ claims for cartography’s role in empire with some of the same caution with which we might treat narratives of the ubiquitous spread of modernity or of capital.¹⁹ As Achille Mbembe and Steven Rendell argue, “long term developments, more or less rapid deviations, and long term temporalities are not necessarily separate or merely juxtaposed. Fitted within one another they relay each other; sometimes they cancel each other out, and sometimes their effects are multiplied”.²⁰ We might note, with James Ferguson, that ‘failed’ colonial (or neo-colonial) projects were not necessarily without consequences.²¹ For at least sixty years the available maps in Mongu had formed part of the daily life of the District Office. In order to understand how mapping functioned to generate and order twentieth-century colonial territories, the unevenness of cartographic effort, and the *consequences* of that unevenness need to be addressed.

¹⁹ David Harvey, *The Limits to Capital* (Oxford, UK: Blackwell, 1982); Homi K Bhabha, *The Location of Culture* (London, UK: Routledge, 1994).

²⁰ Joseph-Achille Mbembé and Steven Rendell, ‘At the Edge of the World: Boundaries, Territoriality, and Sovereignty in Africa’, *Public Culture* 12, no. 1 (2000): 260.

²¹ James Ferguson, *The Anti-Politics Machine: ‘Development’, Depoliticization, and Bureaucratic Power in Lesotho* (Minneapolis, MN: University of Minnesota Press, 1990).

This thesis interrogates the possibility that a richer and more useful understanding of the role of cartography in Northern Rhodesia comes by perceiving it as more than a spindly bridge barely closing the gap between imperial technical intent and colonial realities. It suggests that more productive histories can emerge if we leave behind projected ideals, descriptions of the *intended* form of colonial cartographic endeavours, and ask, instead, how cartography was, *in fact*, produced and used within the particular political, economic, and social contexts of the colony.

'Doing' Like A State? Legibility and value

Rather than taking cartographic production as the keystone of statecraft, and examining how that production unfolded *within* the context of Northern Rhodesia, this thesis operates from the reverse position. Prompted by the goal of situating the collection of surveying instruments at the Science Museum within the circumstances of their use, it foregrounds the mass of quotidian colonial activity from which published maps *occasionally* emerged. The word "quotidian" is important here; it signals to the ethnographic approach taken in this thesis, reflecting an interest in the 'doing' of cartography and, in particular, a close attention to how value is evidenced in the archives through that 'doing'.

Cartography is incontestably a powerful tool, yet it was not enrolled in Northern Rhodesia in ways that we might have come to expect. We can detect a huge variation in the density of cartographic representations of different sites in the colony. Mongu serves as a prime example of a site that was barely visible to the colonial or imperial governments. When we reject the notion of cartographic simultaneity (*full coverage*, map *series*, even a '*whole sheet*') there are corresponding implications for notions of homogenised colonial space and homogenised experiences of colonial governance. This non-synchronicity calls for more attention.

If the heterogeneous coverage of cartography was merely circumstantial (due to historical contingencies such as the availability of staff or geographical accessibility) then the *consequences* of cartographic indifference would require better understanding. However, this thesis goes one step further. It argues that the forms of colonial power exerted in Northern Rhodesia (and in particular that of indirect rule) present problems to the basic principle that governed territory needed to be 'legible'. It argues that variance in the accuracy, detail, and recurrence of mapping at different sites should be ascribed to *positive intentions*, and that a more profound conceptual reorganisation of the connection between colonial geographic knowledge and power is required.

Observing the circumstances that shape the extension of cartographic legibility across Northern Rhodesia allows us to see that the value of maps was not fixed but was dynamic. A map's value was defined within the shifting social material, financial, and symbolic forces that formed the texture of colonial everyday life.

Histories of twentieth-century cartography in British colonial Africa

The existing literature on twentieth-century colonial cartography in Africa is not extensive. The relatively well-developed body of research into forms of nineteenth-century imperial cartography and geographic epistemologies trails off dramatically as colonial boundaries were settled and interlocking spheres of influence began to resemble discrete, mutually exclusive territories.²² The literature that does address twentieth-century colonial cartography can be sorted into three genres or modes. These categories are slightly contrived, since there is a degree of overlap, but they can still usefully be identified as: (1) technical histories and the assessments of various cartographic schemes and authorities; (2) histories of mapping cultures; and (3) spatial histories.

The most basic form of the technical history of twentieth-century African cartography is the bibliography. Several of these have been created by a number of different institutions, most often as part of global cartographic cataloguing.²³ In relation to Northern Rhodesia, detailed work has largely been carried out by Robert Pullan and Jeffrey Stone. Their extensive investigations into the histories of different types of cartographic material are often accompanied by brief explanations of the techniques and institutional rationale.²⁴ Stone's attention to the wider set of cartographic activities in the colony (beyond those of 'professional' actors), has served as an invaluable guide to historical sources in the context of this thesis. Stone was also the

²² Even the briefest summary of this includes for example; Morag Bell, R. A. Butlin, and Michael J. Heffernan, eds., *Geography and Imperialism: 1820-1940* (Manchester, UK: Manchester University Press, 1995); Felix Driver, *Geography Militant: Cultures of Exploration and Empire* (Oxford, UK: Wiley, 2000); Lawrence Draitsas, *Zambesi: David Livingstone and Expeditionary Science in Africa* (London, UK: I.B. Tauris, 2010).

²³ Early versions of these were usually produced as international collaborations by development agencies, a recent scholarly example is: John McIlwaine, *Maps and Mapping of Africa: A Resource Guide* (East Grinstead, UK: Hans Zell, 1997).

²⁴ R. A. Pullan, 'The History and Use of Aerial Photography in Zambia', *Zambia Geographical Journal* 31 (1976): 33-52; Robert Alan Pullan, *A First Check List of the Published Maps of Northern Rhodesia, 1890-1949* (Lusaka, Zambia: Zambia Geographical Association, 1978); J. C. Stone, *A Guide to the Administrative Boundaries of Northern Rhodesia* (Aberdeen, UK: Department of Geography, University of Aberdeen, 1979); Stone, 'The District Map'; J. C. Stone, 'An Early Map of the Hook of Kafue', in *An African Miscellany for John Hargreaves*, ed. R. C. Bridges (Aberdeen, UK: Aberdeen University African Studies, 1983), 93-96.

author of the only existing attempt at a critical synthesis of cartography in Africa (more properly British colonial Africa) that looks comparatively across different colonies.²⁵ Since the publication of Stone's *A Short History of the Cartography of Africa* (1995), a significant quantity of similar historical work has been carried out on the cartography of South Africa, principally by Elri Liebenberg.²⁶

In parallel to these histories of maps are a smaller number of histories of the institutions involved in the mapping of British colonial Africa. With the exception of an edited collection on the history of survey in Malawi, these have primarily focused on metropolitan cartographic agencies.²⁷ Peter Collier has done much to illuminate inter-agency rivalry in early twentieth-century London, whilst Gerald McGrath and, more recently, Alastair Macdonald have documented the work of the Directorate of Overseas Survey.²⁸

This first genre of cartographic history—primarily focused on the techniques and institutions that frame map production—has been supplemented by a second genre of scholarship that is interested in the cultural context of African cartography. This second genre is strongly influenced by Brian Harley, and approaches the map record of Africa less as a source of information about experts and expertise than as a means to

²⁵ Stone, *A Short History of the Cartography of Africa*.

²⁶ Elri Liebenberg, '1:500,000 "Irrigation Map" of South Africa, 1935-7' (Pretoria, SA: University of South Africa), accessed 18 January 2015, http://africageodownloads.info/082_liebenberg.pdf; Elri Liebenberg, 'Mapping British South Africa: The Case of G.S.G.S. 2230', *Imago Mundi* 49, no. 1 (1997): 129-42; Elri Liebenberg, 'Providing a Tolerably Correct Map of South Africa: The Cartography of Henry Hall' (International Symposium on 'Old Worlds-New Worlds': The History of Colonial Cartography 1750-1950, Utrecht University, Utrecht, The Netherlands: ICA-ACI, 2006); Norman Etherington, *Mapping Colonial Conquest: Australia and Southern Africa* (Crawley, W.A.: University of Western Australia Press, 2007).

²⁷ C. G. C. Martin, *Maps and Surveys of Malawi: A History of Cartography and the Land Survey Profession: Exploration Methods of David Livingstone on Lake 'Nyassa': ... and Land Registration Data in Central Africa* (Rotterdam, NL: A.A. Balkema, 1980).

²⁸ Peter Collier and Rob Inkpen, 'The RGS, Exploration and Empire and the Contested Nature of Surveying', *Area* 34, no. 3 (2002): 273-83; Peter Collier and Rob Inkpen, 'The Royal Geographical Society and the Development of Surveying 1870-1914', *Journal of Historical Geography* 29, no. 1 (2003): 93-108; Peter Collier, 'The Colonial Survey Committee and the Mapping of Africa' (International Symposium on 'Old Worlds-New Worlds': The History of Colonial Cartography 1750-1950, Utrecht University, Utrecht, The Netherlands: ICA-ACI, 2006); Peter Collier, 'The Work of the British Government's Air Survey Committee And Its Impact on Mapping in the Second World War', *The Photogrammetric Record* 21, no. 114 (2006): 100-109; Gerald McGrath, *The Surveying and Mapping of British East Africa 1890 to 1946: Origins, Development and Coordination* (Toronto, CA: Department of Geography, York University, 1976); Gerald McGrath, 'The Setting For The Work Of The Directorate', *Cartographica: The International Journal for Geographic Information and Geovisualization* 20, no. 1 (1983): 1-42; Alastair MacDonald, *Mapping the World: A History of the Directorate of Overseas Surveys 1946-1985* (London, UK: HMSO, 1996).

reveal ‘discourse’.²⁹ Early work in this vein interrogated the interplay between maps and particular conceptions of nationality, imperialism, and forms of what might be called a ‘global consciousness’.³⁰ Recent scholarship has linked cartography to research on the reception of geographic knowledge by considering the ‘readership’ of maps of Africa.³¹

A third body of work, different again to those described above, has come from the intersection between histories of cartography and what might be referred to as ‘spatial history’ or at least histories of cartography-in-context. Thomas Bassett observed in 1994 that cartography enabled and legitimated European colonisation in multiple ways.³² This third genre of interest in cartography has thoroughly substantiated Bassett’s statement through the examination of the role of maps in histories of the production of, and resistance to, colonial spatial orders. Research in this mode has addressed state boundaries between and within African colonies, regional definitions, cadastral survey, and a veterinary cordon.³³ Work in a different discipline—but with similar theoretical underpinnings—has considered the planning and documentation of colonial urban spaces.³⁴

²⁹ Stone’s *Short History* interrogates the maps produced up until the early twentieth-century as cultural products, but from around the 1920s ‘progress’ and ‘accuracy’ prevail in his analysis.

³⁰ David Matless, ‘The Uses of Cartographic Literacy: Mapping, Survey and Citizenship in Twentieth-Century Britain’, in *Mappings*, ed. Denis E Cosgrove, Critical Views (London, UK: Reaktion, 1999), Chapter 9; Michael Heffernan, ‘The Politics of the Map in the Early Twentieth Century’, *Cartography and Geographic Information Science* 29, no. 3 (2002): 207–26; Denis Cosgrove, *Apollo’s Eye: A Cartographic Genealogy of the Earth in the Western Imagination* (Baltimore, MD: Johns Hopkins University Press, 2003); James R. Akerman, *The Imperial Map: Cartography and the Mastery of Empire* (Chicago, IL: University of Chicago Press, 2009).

³¹ Few as yet. See for example: Amy Prior, ‘British Cartographic Representations of Africa c.1880–c.1915’, *Imago Mundi* 64, no. 2 (2012): 242–43; Amy Prior, ‘British Mapping of Africa: Publishing Histories of Imperial Cartography, c.1880 – c.1915’ (PhD Thesis, University of Edinburgh, 2012); Michael Heffernan, ‘The Cartography of the Fourth Estate: Mapping the New Imperialism in British and French Newspapers, 1875–1925’, in *The Imperial Map: Cartography and the Mastery of Empire*, ed. J. R. Akerman (Chicago, IL: University of Chicago Press, 2009), 11–45.

³² Thomas J. Bassett, ‘Cartography and Empire Building in Nineteenth-Century West Africa’, *Geographical Review* 84, no. 3 (1994): 316–35.

³³ Lindsay Frederick Braun, ‘The Cadastre and the Colony: Surveying, Territory and Legibility in the Creation of South Africa C. 1860-1913’ (PhD Thesis, Rutgers University, 2008); John W. Donaldson, ‘Marking Territory: Demarcation of the DRC-Zambia Boundary from 1894 to the Present Day’ (PhD Thesis, Durham University, 2010); Vincent Hiribarren, ‘From a Kingdom to a Nigerian State: The Territory and Boundaries of Borno (1810-2010)’ (University of Leeds, 2012); Giorgio Miescher, *Namibia’s Red Line: The History of a Veterinary and Settlement Border* (Basingstoke, UK: Palgrave Macmillan, 2012).

³⁴ Garth Myers, *Verandahs of Power: Colonialism and Space in Urban Africa* (Syracuse, NY: Syracuse University Press, 2003); Carlos Nunes Silva, ed., *Urban Planning in Sub-Saharan Africa: Colonial and Post-Colonial Planning Cultures* (London, UK: Routledge, 2015).

These three genres of cartographic history (technical, cultural, and spatial) have all contributed to the writing of this thesis. None, however, fully succeeded in providing parameters that could make sense of my first encounters with the archival records. The ‘technical history’ genre failed in the archive not only due to its commitment to cartographic ideals, but also because its authors tended to draw overly fine distinctions between different forms of mapping. In Britain, different modes of map (for taxation, scientific study, or studies of land-use) are derived from separate traditions and are considered to have converged conceptually into the idealised hierarchy in a particular manner.³⁵ In Britain those modes were (and are still) executed by separate agencies. In colonial Africa, the Survey Department, private land surveyors, and scientific departments were variously engaged in mapping projects that were *deliberately designed to bridge these modes*. Colonial cartographic hybridity is suppressed where technical histories hold categories of ‘topographic’, ‘cadastral’, or ‘thematic’ mapping (of vegetation, geology, and so on) as inalienable.

This problem seems to be solved by the analytical approach of the ‘cultural’ genre of cartographic history in which maps are considered as part of a discourse. Matthew Edney, in particular, has championed the interpretation of maps within a ‘spatial discourse’.³⁶ For Edney, much of the nature of a spatial discourse depends on the particular phenomena that a group is interested in (which might be as varied as food distribution, ocean navigation, or urban property).³⁷ The spatial discourse might consist of multiple representational strategies (oral, written, graphic, numerate, and cartographic) depending on the cultural tendencies of the group in question. Where colonial maps offer hybrid representations of terrain (topography) and property (cadastre) we can ask whether those maps reflect the circumstances and ambitions a spatial discourse specific to Northern Rhodesia. This gives us purchase on the piecemeal and the hybrid qualities of the colony’s cartography.

The cultural histories of cartography do not generally, however, provide a sufficient means to understand colonial cartography. Brian Harley makes a useful distinction

³⁵ Convergence of several cartographic modes through the emergence of the concept of a ‘base’ or general map. Roger J. P. Kain and Elizabeth Baigent, *The Cadastral Map in the Service of the State: A History of Property Mapping* (Chicago, IL: University of Chicago Press, 1993), 236–64; Matthew H. Edney, ‘The Irony of Imperial Mapping’, in *The Imperial Map: Cartography and the Mastery of Empire*, ed. J. R. Akerman (Chicago, IL: University of Chicago Press, 2009), 17.

³⁶ Matthew H. Edney, ‘Field/Map: A Historiographic Review and Reconsideration’, in *Scientists and Scholars in the Field: Studies in the History of Fieldwork and Expeditions*, ed. Kristian Hvidtfelt Nielsen, Michael Harbsmeier, and Christopher Jacob Ries (Aarhus, Denmark: Aarhus University Press, 2012), 445.

³⁷ *Ibid.*, 444.

between the ‘internal’ power of the map (its ability to conceptually organise and standardise) and its ‘external’ power (how it is co-opted in the physical production of power relations).³⁸ The term ‘spatial discourse’ appears to draw on Harley’s theorisation about the relationship between maps and power, however Edney, and the authors mentioned above, have (contra-Foucault) largely focused on the representational and semiotic aspects of colonial mapping. An investigation of the ‘internal’ power of colonial cartography does not seem sufficient for this project. Colonial cartography did do violence to pre-colonial conceptions of identities, languages, or cultures. However, colonial maps, by definition, also testify to *acts* of appropriation. The use of the maps to police African lives and environments in Northern Rhodesia was accompanied by implicit and explicit physical violence.³⁹ Nonetheless, it is far too simplistic to say that the semiotics of the maps caused this violence and without examining the context of a map’s use, it is not possible to differentiate between graphic symbols, attitudes, and behaviours.

Cartographic histories in the ‘spatial history’ genre are the most useful of all since they consider both the cultural and material consequences of the colonial presence in Africa. In doing so they succeed in engaging with rich lineages of research by Africanist historians and anthropologists that provide thick descriptions of forms of social and political life under colonial rule. For example, Gregory Miescher’s work on the veterinary cordon in Namibia discusses the complex iterations of cause and effect between colonial enforcement of the ‘red line’ and siting of local communities.⁴⁰ Vincent Hiribarren has described the relationship between the pre-colonial kingdom of Borno, the colonial memorialisation of pre-colonial cultures, and the ensuing spatial patterns of colonial administration.⁴¹ Lindsay Braun has studied how the production of cadastral cartography unfolded in two regions of South Africa that had very different settler histories and population densities.⁴² Further studies focus on the mapping and

³⁸ J. B. Harley, ‘Deconstructing the Map’, *Cartographica* 26, no. 2 (1989): 12–13. These two aspects are also explored conjointly in Denis Wood’s and John Fel’s influential work, *The Power of Maps* (New York, NY: Guilford Press, 1992).

³⁹ As most clearly articulated by Nick Blomley; ‘Law, Property, and the Geography of Violence: The Frontier, the Survey, and the Grid’, *Annals of the Association of American Geographers* 93, no. 1 (2003): 121–41.

⁴⁰ Miescher, *Namibia’s Red Line*.

⁴¹ Hiribarren, ‘From a Kingdom to a Nigerian State.’

⁴² Braun, ‘The Cadastre and the Colony.’

policing of national borders.⁴³ Garth Myers' study of African 'new' cities bridges the theory and the practice of an orientalist panopticon in African urban environments.⁴⁴

This work also represents the closest engagement to date between African cartographic history and the theoretical conceptions of maps in political science. In fact, this work tends to bring together three groups of scholarship. The first is work on African spatiality by historians such as Paul Nugent, John Noyes, and Allen Howard.⁴⁵ The second is scholarship on sovereignty and territory by theorists such as Stuart Elden and Jonathan Agnew.⁴⁶ The third is the critical scholarship on cartography such as that of Brian Harley and Jeremy Crampton.⁴⁷ This thesis, however, extends the interpretational 'arena' for cartography into new domains.

Beyond 'spatial history'?

How does this study step beyond the apparent parameters of 'spatial history'? One key to change has been to look at the role of mapping beyond the relationship between site and representation; and in particular beyond borders/boundaries and townships. While these are no doubt flashpoints for the relationship between cartography and colonial society, there are many more conjunctions that need to be explored. Mapping produced forms of firebreak through the clearing of vegetation along sightlines, as surveyors traced geometric paths across the environment. Mapping provided motivation for the technical education of Africans, thereby introducing new criteria to parse Northern Rhodesian society. Mapping contributed to the expansion of colonial bureaucracy and generated a network of landing strips and air communications. Mapmakers mediated between government and private enterprise.

⁴³ Gregor Dobler, 'Boundary Drawing and the Notion of Territoriality in Pre-Colonial and Early Colonial Ovamboland', *Journal of Namibian Studies: History Politics Culture [Online]* 3 (2014): 7–30; Wolfgang Zeller, 'Neither Arbitrary nor Artificial: Chiefs and the Making of the Namibia-Zambia Borderland', *Journal of Borderlands Studies* 25, no. 2 (2010): 6–21; Donaldson, 'Marking Territory.'

⁴⁴ Myers, *Verandahs of Power*.

⁴⁵ John Kenneth Noyes, *Colonial Space: Spatiality in the Discourse of German South West Africa 1884 - 1915* (Chur, Switzerland: Harwood Academic Press, 1992); Paul Nugent and Anthony I. Asiwaju, *African Boundaries: Barriers, Conduits, and Opportunities* (London, UK: Pinter, 1996); Allen M Howard and Richard Matthew Shain, *The Spatial Factor in African History: The Relationship of the Social, Material, and Perceptual* (Leiden, NL: Brill, 2005).

⁴⁶ John Agnew, 'Sovereignty Regimes: Territoriality and State Authority in Contemporary World Politics', *Annals of the Association of American Geographers* 95, no. 2 (2005): 437–61; Elden, 'Governmentality, Calculation, Territory'; Jeremy W Crampton and Stuart Elden, *Space, Knowledge and Power: Foucault and Geography* (Aldershot, UK: Ashgate, 2008).

⁴⁷ Harley, 'Deconstructing the Map'; Jeremy Black, *Maps and Politics* (Chicago, IL: University of Chicago Press, 1997).

In holding all these situations to be relevant to the impact of cartography on colonial society I have drawn on other scholarly models. Two outstanding longitudinal studies have influenced this thesis: *Producing India* (2004) by Manu Goswami, and *Environmentality* (2005) by Arun Agrawal.⁴⁸ Goswami and Agrawal each examine the dynamic negotiation of resources, social categories, and behaviours. However, unlike studies in the ‘spatial history’ mode, Goswami and Agrawal both attempt to frame the power of visual (and statistical) renderings of territory within a complex representational economy. The main intention of so doing is not to establish or understand the connection between map and field, but rather to identify the patterns that reveal an overarching ‘economy’; a framework for assessing value. This thesis follows their lead.

The cartographic economy of Northern Rhodesia

Outlining a multi-sited and dynamic cartographic economy requires finding new perspectives to replace the top-down imperial view. Relinquishing the perspective of the metropole is perhaps more complicated for cartography than for other forms of colonial knowledge due to the role of maps in *generating* centre-periphery iconographies.⁴⁹ That centre-periphery model has been further reinforced by Matthew Edney’s recent assertion that the imperial map is characterised by a difference between the geographic extent of the territory depicted, and the patterns of its circulation.⁵⁰ For Edney, an imperial map is one of a distant land, intended to be read at the metropole. Cartography continues, it would seem, to have a natural centre in Europe.

In his recent treatment of cadastral survey in South Africa, Lindsay Braun describes how this might be countered by other perspectives. Braun contrasts the centred, top-down view of the meta-structures of colonial survey, as exemplified by Matthew Edney in his *Mapping an Empire* (1999), and the ambulant view of the surveyor, as exemplified by D. Graham Burnett in his *Masters of All They Surveyed* (2001).⁵¹ Braun’s own project bridges these. More socially distributed histories are potentially made possible by Actor-Network Theory (ANT), in which colonial knowledge-making is

⁴⁸ Arun Agrawal, *Environmentality: Technologies of Government and the Making of Subjects* (Durham, NC: Duke University Press, 2005); Manu Goswami, *Producing India: From Colonial Economy to National Space* (Chicago, IL: University of Chicago Press, 2004).

⁴⁹ Cosgrove, *Apollo’s Eye*.

⁵⁰ Edney, ‘The Irony of Imperial Mapping.’

⁵¹ Edney, *Mapping an Empire*; D. Graham Burnett, *Masters of All They Surveyed: Exploration, Geography, and a British El Dorado* (Chicago, IL: University of Chicago Press, 2001).

modelled as moving between sites, institutions and practitioners. Alan Lester, in particular, has reimagined the British Empire as constructed under ANT.⁵²

This thesis, however, favours a different sociological model, one developed by John Law. Michel Callon and John Law, in their investigation of the British fighter aircraft TSR2, suggest that the plane had a ‘variable geometry’—that it took on different forms within the different networks within which it was embedded.⁵³ More recently, Law proposed that it might better be said that the TSR2 had ‘simultaneous multiple geometries’.⁵⁴ More prosaically, we could say that the aircraft was different things for different people.

How does this assist the thesis? Whilst ANT analyses allow us to understand the genesis of socio-technological systems as multi-sited, they tend to focus on outcome from just one point of view. Warwick Anderson, has succinctly described this ‘flattening’ effect, it makes “the ‘local’ ... quite abstract, strangely depopulated, and depleted of historical and social content”.⁵⁵ Law’s approach, on the other hand, encourages us to consider diverse perspectives simultaneously. His methods offer the opportunity to respond to calls for symmetrical colonial histories that treat “metropole and colony in a single analytic field, addressing the weight one gives to causal connections and the primacy of agency in its different parts”.⁵⁶

The term ‘simultaneous multiple geometries’ seems, then, to be a useful way of reorganising the context and content of cartographic history. It offers the means to reconsider the dynamic interplay between environments, institutions, individuals, and cartographic projects in colonial Africa. ‘Mapping’ in the vernacular was a sufficiently salient term, I suggest, for those engaged in projects to operate a shared understanding based on common imperial geographical cultures. Yet colonial ‘rule’ was the result of on-going negotiations between groups that held multiple rhetorical

⁵² Alan Lester, ‘Imperial Circuits and Networks: Geographies of the British Empire’, *History Compass* 4, no. 1 (2006): 124–41.

⁵³ M. Callon and J. Law, ‘On the Construction of Sociotechnical Networks: Content and Context Revisited’, *Knowledge and Society* 8 (1989): 57–83.

⁵⁴ John Law, *Aircraft Stories: Decentering the Object in Technoscience* (Durham, NC: Duke University Press, 2002), 78.

⁵⁵ Warwick Anderson, ‘From Subjugated Knowledge to Conjugated Subjects: Science and Globalisation, or Postcolonial Studies of Science?’, *Postcolonial Studies* 12, no. 4 (2009): 392.

⁵⁶ Frederick Cooper and Ann Laura Stoler, ‘Between Metropole and Colony: Rethinking a Research Agenda’, in *Tensions of Empire: Colonial Cultures in a Bourgeois World*, ed. Frederick Cooper and Ann Laura Stoler (Berkeley, CA: University of California Press, 1997), 4; Andrew Zimmerman, ‘Africa in Imperial and Transnational History: Multi-Sited Historiography and the Necessity of Theory’, *The Journal of African History* 54, no. 3 (2013): 331–40.

and material resources. If we acknowledge this, then it follows that we must be more nuanced about the purpose and practices of knowledge-making. We do not, however, have to assume that everyone experienced ‘mapping’, imagined project outcomes, or applied technical standards, in the same way in each case.

Priorities for mapping were not uniform, even within a single site. In the metropole alone, Northern Rhodesian ‘mapping’ had several identities within multiple agencies with different agendas. The Colonial Office, the War Office, the Royal Engineers, the Ordnance Survey, the Directorate of Colonial Surveys, and the RAF shared some ambitions and opinions, but were also competing and divergent at times. These metropolitan organisations operated with (and sometimes in parallel to) the governmental cartographic activity that was determined in Northern Rhodesia itself. Here, in addition to the priorities and vagaries of the Survey Department, the local scientific and technical departments also held sway. The Agricultural Department, the Public Works Department, and later the Forestry Department, all played an important role in determining Northern Rhodesian survey priorities. A significant amount of colonial topography in Northern Rhodesia was produced by these agencies, in parallel to the execution of their primary responsibilities. As we will see, Northern Rhodesia also welcomed experts, expertise, and equipment from its neighbours, most notably Southern Rhodesia and South Africa, who brought their own practices and cultures.

In addition to the panoply of government bodies, other influential agencies need to be considered as part of the Northern Rhodesian cartographic economy: profit-making organisations of various kinds. Firstly, because the greater part of governmental cartography in Northern Rhodesia was produced within projects that were public-private partnerships. Private enterprise contributed to the topographic data held by the government Survey Department, private licensed surveyors were recruited for state mapping and, as we will see private aerial photography companies were also seeking to use Northern Rhodesian cartography to pursue their own goals. Secondly, however because of the quantity of cartographic projects pursued by private enterprise *entirely outside of the governmental realm*, such as in mining, timber extraction or plantation agriculture. Private interests are granted agency in histories of colonial knowledge-making far too infrequently.⁵⁷ As a result, even the more recent studies of

⁵⁷ Exceptions include: Bruce Braun, ‘Producing Vertical Territory: Geology and Governmentality in Late Victorian Canada’, *Cultural Geographies* 7, no. 1 (2000): 7–46; Marionne Cronin, ‘Northern Visions: Aerial Surveying and the Canadian Mining Industry, 1919-1928’, *Technology and Culture* 48, no. 2 (2007): 303–30; Jeremy Vetter, ‘Field Life in the American West: Surveys, Networks, Stations and

African colonial cartography that are produced within the ‘spatial history’ paradigm tend to reproduce a meta-narrative whereby knowledge and power are cumulatively focused within centralised state organisations. Inevitably this is more appropriate in some locations than in others.

Taking into account this diversity of interests and objectives is important, because it allows the history of cartography to meet the historiography of twentieth-century Africa with the nuance it requires. The imposition of colonial sovereignty in sub-Saharan Africa was subject to geographical and historical constraints as well as operating within shifting ideologies. The overarching goals of the British in Africa have been characterised as fluctuating between accumulation and legitimation.⁵⁸ Attempts to meet those goals were also framed by an environment in which the relationship between land as geometrically measured and land a means of subsistence was very different than in Europe. It has been considered that cartography as a state technology was developed in response to increasing pressure to secure land resources in Europe in the face of a rising population.⁵⁹ How then did that technology translate to the sparsely populated context of sub-Saharan Africa where power has historically competed over people rather than territory?⁶⁰

To date, the role of cartography in these processes has largely only been interrogated in the context of appropriating tracts of land. Cartography was most obviously symbolic of the British colonial presence where maps supported and organised white settler farming, or the taxation of land as property.⁶¹ It is certainly true that where pursuing these goals, the colonial state had a strong interest in direct land management and a motivation to register or inscribe its territory. For a variety of reasons (discussed in more depth below) white settlement was a relatively low priority

Quarries’, in *Scientists and Scholars in the Field: Studies in the History of Fieldwork and Expeditions*, by Kristian Hvidtfelt Nielsen, Michael Harbsmeier, and Christopher Jacob Ries (Aarhus; Denmark: Aarhus University Press, 2012), 225–58; Tomas Frederiksen, ‘Seeing the Copperbelt: Science, Mining and Colonial Power in Northern Rhodesia’, *Geoforum* 44 (2013): 271–81.

⁵⁸ John Lonsdale and Bruce Berman, ‘Coping with the Contradictions: The Development of the Colonial State in Kenya, 1895-1914’, *The Journal of African History* 20, no. 4 (1979): 487–505.

⁵⁹ Such as Henri Lefebvre’s theory of the ‘State Mode of Production’. Brenner and Elden, ‘Henri Lefebvre on State, Space, Territory’, 359.

⁶⁰ Jeffrey Herbst, *States and Power in Africa: Comparative Lessons in Authority and Control* (Princeton, NJ: Princeton University Press, 2000), Ch.1.

⁶¹ Lindsay Frederick Braun, ‘The Cadastre and the Colony: Surveying, Territory and Legibility in the Creation of South Africa C. 1860-1913’ (PhD Thesis, Rutgers University, 2008); Giorgio Miescher, *Namibia’s Red Line: The History of a Veterinary and Settlement Border* (Basingstoke, UK: Palgrave Macmillan, 2012).

in Northern Rhodesia compared to those of mining and transporting valuable minerals. Here, therefore, colonial land management was more embroiled in other objectives than that of agricultural appropriation. Land was not only something to be pegged out across the earth's surface, it was a bargaining chip in a gambit to secure African labour for the extractive industries.⁶² Territorial knowledge had a somewhat different role within a labour reserve.

In addition to the question of political priorities in Northern Rhodesia there was the question of political strategy. The primary use of cartography is often considered to be as a means to centralise knowledge and power, "the ceaseless reproduction of the culture that brings them into being".⁶³ This mode of governance is visible in Northern Rhodesian towns. Here colonial power was achieved by using the physical structuring of urban space to induce cooperation from the colonised.⁶⁴ In such contexts, the process that Timothy Mitchell describes, of *enframing* the colonised population and territory, can clearly be identified.⁶⁵ In rural areas, however, political power was exercised not so much by control over physical spaces, but by co-option of indigenous authorities. As a result, although the Northern Rhodesian colonial state still conceptually *enframed* the African population and rural land, that ordering was less strongly tied to spatial bounding. This thesis demonstrates the importance of interrogating the role of cartography under these conditions.

Having introduced some of the range of perspectives that affected the function of cartography within colonial governance, we can see the emergence of 'multiple geometries' for mapping. My approach to exposing these is to move the analytical focus from the 'universal' or at least the position of centralised power, to the local. Northern Rhodesia's physical, social and political geographies created non-metropolitan, localised constraints and possibilities for cartographic practice. In addition to these factors, cartographic value in Northern Rhodesia was framed by even more extremely local conditions, opportunities, and impediments to colonial projects; from the problem of staffing an administration, to seasonal flooding. In this respect the thesis has drawn heavily from cartographic history in the 'spatial history mode' but

⁶² Charles Van Onselen, *Chibaro: African Mine Labour in Southern Rhodesia, 1900-1933* (Johannesburg, South Africa: Pluto Press, 1980).

⁶³ Wood and Fels, *The Power of Maps*, 1. See also, Bruno Latour, *Science in Action: How to Follow Scientists and Engineers Through Society* (Cambridge, MA: Harvard University Press, 1987), 215-28.

⁶⁴ Myers, *Verandahs of Power*.

⁶⁵ Timothy Mitchell, *Colonising Egypt* (Cambridge, UK: University of Cambridge Press, 1988).

has slightly different objectives in scope and in emphasis. Through considering cartography-in-context, *but across multiple moments and sites* the thesis is able to ask what maps seemed to offer, what they actually allowed, and finally what they couldn't do within a variety of colonial projects.

Thus, in this thesis, the Northern Rhodesian cartographic 'economy' can be seen as emerging from a comparison of local readings of the value of cartography to colonial agencies that were attempting to manage territory. The study doesn't consider the cartography of different colonial agencies as inferior or superior according to its accuracy, level of abstraction or object of interest. It pluralises the *telos* of cartographic 'progress' into the different goals of farming, forestry growth, accounting periods, air-mindedness, administrative tours, and pensionable occupations. It then situates those local definitions within other more generalised patterns of colonial 'value', patterns that were organised with, without, around, (and sometimes despite) knowledge of territory. 'Local' here includes the periphery of empire, but is not restricted to it. Although this economy is centred around Northern Rhodesia, the sites and factors from which it is constituted interlock and overlap with those of its neighbours, and indeed the global historical geographies of finance and empire.

Northern Rhodesia, could, in many ways, be seen to be a particularly discordant, unruly bastion of the British Empire. Tensions between different aspects of colonial society (white settlers, global mining corporations, the colonial and imperial state, and an emerging black proletariat) were particularly strongly felt in the colony.⁶⁶ In Northern Rhodesia the multiple geometries of colonial interest in territory are very clearly exposed. However, the fact of having concurrent, rival and sometimes opposing colonial interests at work, is typical right across sub-Saharan Africa. The analytical approach proposed here (as well as some of the empirical findings) could, therefore, be of use in prising apart histories of cartography from histories of the successful actualisation of 'modern' state power in other contexts; on the continent, in the wider British empire, and beyond.

⁶⁶ L. J. Butler, *Copper Empire: Mining and the Colonial State in Northern Rhodesia, c.1930-64*, Cambridge Imperial and Post-Colonial Studies Series (Basingstoke, UK: Palgrave Macmillan, 2007).

A Northern Rhodesian cartographic economy: sources and methodology

An extended cartographic archive?

The range of groups and projects already outlined here makes for a complex web and a large horizon. However, even a ‘decentred’ lateral picture of colonial cartography needed to begin somewhere. An initial prompt to expand outwards from the traditional sources for cartography came from studying the collection of twentieth-century survey instruments at the Science Museum. Although much of the published technical record focuses on innovation in mapping technologies, the collection items demonstrated that there was great continuity in survey practice in the early twentieth century.⁶⁷ The few exemplars of ancillary material in the museum such as cases, field packs, and instruction manuals indicated quotidian mapping practices on which the records in the National Archives at Kew were silent. The reports filed back from the African colonies to the metropole gave little more than tantalising glimpses of the failure and replacement of expensive items, and almost nothing on mundane mapping work. This realisation prompted a search across a wider range of archives.

The archives of private enterprise (the first examined were those of the Tanganyika Concessions in Manchester, and the Selection Trust in London) seemed to hold more procedural documents and prompted me to look harder for the equivalent governmental records. In an effort to locate these, I made a scoping visit to the National Archives of Zambia (NAZ). This short trip made it clear that research into the vernacular experience of Northern Rhodesian cartography would need to place the records in Zambia at the heart of the research. The relatively smaller National Archive in Lusaka was selected for more detailed examination with the intention of drawing from its collections a sense of what the vernacular of ‘mapping’ meant in the colony in that period. In practical terms, this necessitated taking the deliberately naïve approach of identifying records stored under the terms ‘Survey’ and ‘Maps’ from throughout the archival collections. Although the processes of reordering and reorganising that have taken place at NAZ mean that those titles cannot strictly be taken as the actors’

⁶⁷ See for example the historical accounts in *The Photogrammetric Record*, or studies such as the following: Mark S. Monmonier, *Technological Transition in Cartography* (Madison, WI: University of Wisconsin Press, 1985); Peter Collier, ‘The Impact on Topographic Mapping of Developments in Land and Air Survey: 1900-1939’, *Cartography and Geographic Information Science* 29, no. 3 (2002): 155–74.

categories, nonetheless it seems the best approximation we have to understand how cartography served the Northern Rhodesian government.⁶⁸

Files given these titles contained a rich variation of material depending on the branch of government that filed them. The texture and depth of the archival record also varied across different departments, projects, and administrative districts. The case studies selected for detailed scrutiny in this thesis were determined by the location of deeper seams in the historical record. These deeper seams were tested for typicality by comparison with the thinner archival remains of similar or parallel cases. The baldly titled 'Survey' or 'Map' records, furnished suggestions of other files (and other archives) where particular narratives might be followed up. As hoped, these files were rich with exchanges of correspondence that disputed and questioned, clarified, chastened, or complained. They presented a very different forum for discussion than the hierarchically rendered reports received in London. They also presented a wider cast of actors.

The opportunity to extend the cartographic archive to investigate the workings of private enterprise was facilitated by particular historical circumstances. The first of these circumstances was the transition of the records of the mining companies into the public domain after Zambian industrial nationalisation in the 1960s.⁶⁹ These archival records now held at ZCCM, Ndola, afford an unparalleled window into early twentieth-century industrial mining. The second of these circumstances was the protracted existence (albeit in altered forms) of two further companies: the Aircraft Operating Company of Africa, and the Zambezi Saw Mills. Representatives of later iterations of these organisations had access to the archives of their businesses and happily saw fit to contribute to the historical record.⁷⁰ The trade and professional

⁶⁸ 'Survey' and 'Map' files consulted came from archival sets including: Government Publications, Ministry of Lands, Ministry of Agriculture, Ministry of Lands and Works, Ministry of Home Affairs and Mines, Federal Correspondence, Secretariat files, and Provincial records.

⁶⁹ Marja Hinfelaar, *A First Guide to Non-Governmental Archives in Zambia* (Lusaka, Zambia: National Archives of Zambia, 2004).

⁷⁰ Thus I have to thank Chris Tanner and Graham Slough of AOC Geomatics for giving me a copy of *A Lifetime & More of Aerial Survey in Africa* which records the history of the company, and also for allowing me access to the company's early minute-books and photographic albums. I also have to thank John Leatherdale, formerly of Hunting Surveys for offering me a copy of the in-house history produced by Hunting PLC. Employees of the Zambezi Saw Mills participated in first international conference on the teak forests of Southern Africa in 1986, contributed to earlier work by Geof Calvert that was vital to my research in Chapter Five, and also allowed access to Mike Musgrave, who has shared with me some of his 'haul' from their archives. Informal access to the records of these companies was supplemented by access to official records relating to copper-mining in Northern Rhodesia in the archives of Alfred Chester Beatty held at the London School of Economics, and the archives of the Tanks Group held at the University of Manchester. Penelope Hunting, ed., *The Hunting History: Hunting Plc since 1874* (London, UK: Hunting plc, 1991); Aircraft Operating Co., *A Lifetime & More of Aerial Survey in Africa AOC* (Johannesburg, South Africa: AOC Geomatics (Pty.) Ltd., 2011); Pearce G. D International

literatures of the imperial surveyors, mining firms, and air industry were also extremely useful, particular in documenting informal relationships and the broader culture of these organisations.⁷¹

Finally, an important part of the 'cartographic archive' assembled for this thesis was constituted by personal testimonies from Northern Rhodesian colonial society. This was particularly important in seeking records of map use. An image of self as imperial citizen and conduit for natural scientific, geographical, and social knowledge of 'new country' seems to have been shared by a much broader group of Northern Rhodesian colonialist society, not only government officials but also mining engineers and farmers. This impulse produced a significant quantity of amateur and self-published literature that has been crucial to the wider contextualisation of the archival records and the journals and newsletters of various learned societies. These accounts, together with a small number of archived diaries, have also provided a valuable supplement to procedural records by giving an insight into the mundane. Only from these sources, for example, are we able to learn about the discomfort of using a bicycle on tracks between villages, or the excitement produced by the arrival of the most recent *National Geographic* to the 1920s Copperbelt.⁷² In this corner of the expanded cartographic archive, some records are the personal accounts of professional surveyors, but these were frustratingly few in number.⁷³ A far larger proportion of these records were produced by non-professionals who were making or using maps in the colony. These diaries, articles, and reminiscences could, however, be read for a number of insights, most particularly attitudes towards maps, alternative means of navigation, and the spatiality of indirect rule.

Conference on the Teak Forests of Southern Africa, Zambia, and Forest Department, eds., *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa, Livingstone, Zambia, 18-24th March 1984* (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986); Geof M Calvert, *Sitimela: A History of the Zambesi Saw Mills Logging Railway, 1911-1972* (Livingstone, Zambia: Barotse Development Trust, 2005).

⁷¹ The trade literature of the air industry is used extensively as a counterpoint to government-centred narratives about early aerial photography as will be seen in Chapter Two. The *Empire Survey Review* provides a wonderful resource for getting a sense of the mores and norms of the imperial survey community, as much as for technical detail.

⁷² C. W. G. Stuart, 'Diary Entry', 5 January 1929, NAZ; Sir Kenneth Bradley, *The Diary of a District Officer* (London, UK: Macmillan, 1966); Ian Mackinson, *Footprints in the Dust* (Romsey, UK: The Studio, 2003).

⁷³ Jeffrey Stone uncovered the diary of an early Northern Rhodesian surveyor (W. G. Fairweather), in the records of the Livingstone Museum, and published the transcript in 1993. The only other personal records from a professional surveyor used in in this project was the diaries of C. W. G. Stuart, private surveyor. Stuart's diaries are held at the National Archives of Zambia.

Whilst including ‘amateur’ literature and accounts, this study does, however, exclude some key groups who have been identified with the ‘unofficial’ mind of empire.⁷⁴ Those who are familiar with the history of the cartography of Africa in the nineteenth century will notice the absence of two groups in particular: (i) missionaries; (ii) social scientists, in particular anthropologists. This is in part, because the tighter remit of this thesis is the more strictly political and economic interventions on Northern Rhodesian territory. However, it is also because the contributions to African cartography are, if not almost entirely absent then certainly less visible in the twentieth century. The role of missionaries in nineteenth-century imperial geography is substantially documented.⁷⁵ David Livingstone’s contribution is, of course, particularly celebrated. However, in the twentieth-century operating at the ‘frontier’ of Christianity ceased to be a means to bring attention and finance to their cause. Mission groups were still generating geographical knowledge through a variety of networks due to what David N. Livingstone calls their “long-term residential topophilia”.⁷⁶ Further work is required, I believe, to understand the extent to which missionary contributions to colonial ethnography, epidemiology and agriculture were recorded cartographically from 1900 onwards.⁷⁷

They weren’t necessarily. An anecdote about Audrey Richards’ study *Land, Labour and Diet in Northern Rhodesia* is telling.⁷⁸ When Henrietta Moore and Megan Vaughan retraced the archival remains of this study, they found almost nothing to suggest that even Richards’ work—an intense study of the economic geographies of the

⁷⁴ Roy C. Bridges, *Historical Role of British Explorers in East Africa*, 1982. cited in J. C. Stone, ‘Imperialism, Colonialism and Cartography’, *Transactions of the Institute of British Geographers* 13, no. 1 (1988): 59.

⁷⁵ Ruth Kark, ‘The Contribution of Nineteenth Century Protestant Missionary Societies to Historical Cartography’, *Imago Mundi* 45, no. 1 (1993): 112–19; Pellervo Kokkonen, ‘Religious and Colonial Realities: Cartography of the Finnish Mission in Ovamboland, Namibia’, *History in Africa* 20 (1993): 155–71; Lawrence Dritsas, *Zambesi: David Livingstone and Expeditionary Science in Africa* (London, UK: I.B. Tauris, 2010).

⁷⁶ David N. Livingstone, ‘Scientific Inquiry and the Missionary Enterprise’, in *Participating in the Knowledge Society: Researchers Beyond the University Walls*, Ruth Finnegan, ed., (Palgrave Macmillan UK, 2005), 51.

⁷⁷ Claire C. Robertson, ‘Black, White, and Red All over: Beans, Women, and Agricultural Imperialism in Twentieth-Century Kenya’, *Agricultural History* 71, no. 3 (1997): 259–99; Michael Worboys, ‘The Colonial World as Mission and Mandate: Leprosy and Empire, 1900–1940’, *Osiris* 15 (2000): 207–18.

⁷⁸ Audrey Isabel Richards, *Land, Labour and Diet in Northern Rhodesia: An Economic Study of the Bemba Tribe* (Oxford, UK: Oxford University Press, 1939).

Bemba—was founded on a graphic mapping of spatial relations.⁷⁹ It seems that both missionaries and anthropologists at work in twentieth-century Northern Rhodesia turned primarily to non- (carto)graphic means for orienting themselves within the regions of their interest, although this claim merits deeper investigation. In this thesis the ‘turning to non- (cartographic) means’ for spatial orientation and documentation is explored in relation to political and economic governance but not within the activities of these ‘para-statal’ colonial knowledge-makers.

The sources therefore, reflect the goals of the thesis, finding the traces of the mundane and the embodied in the production and use of colonial maps. They reflect the ambition of retrieving the local, primarily in the context of bureaucracies, but across a variety of sectors, institutions and offices.

Northern Rhodesia, maps, and territorial form

Constructing this expanded, virtual ‘cartographic archive’ for Northern Rhodesia meant recognising the impact of political and social changes of the colonial period on its territorial infrastructure and priorities for ‘mapping’. As suggested above, the governmental form of the colony was quite unstable; for thirty-four years (1890–1924) it was administered by the British South Africa Company (BSAC); for a further nineteen years (1924–1953) it was a British Protectorate; for ten years (1953–1963) it was part of the Central African Federation, with a short period of uncertainty before independence as Zambia in 1964. During that time, the internal divisions of the colony, and the relationship between governmental authority and geographical units, varied quite regularly. Attitudes towards the creation of European property and African rights to land were inconstant.

The period covered by this thesis, 1915–1955, begins after Northern Rhodesia became a whole territory ruled by the British South Africa Company with a unified survey office based in Livingstone. Those forty years saw that department come under control of the Crown in 1924, and a departmental move to the new capital in Lusaka. The thesis ends at the moment that the Northern Rhodesian survey department became subordinate to that of the CAF in Salisbury. The shifting loci of decision-making, and resultant changes in attitudes and policies, affected cartographic production in ways it is necessary to summarise for readers unfamiliar with Northern Rhodesia’s history.

⁷⁹ Henrietta L. Moore and Megan Vaughan, *Cutting Down Trees: Gender, Nutrition, and Agricultural Change in the Northern Province of Zambia, 1890-1990* (Portsmouth, NH: Heinemann, 1994), xii.

The beginnings of the colony were contingent on a number of events and personalities. Linear boundaries were not articulated across most of central Southern Africa in the European discussions at the Berlin Conference of 1884–85.⁸⁰ Politically, the region was considered to be useful (in the maintenance of manoeuvrability in Southern Africa, and in the inscription of a British North-South axis across Africa). Reports of minerals in Southern Rhodesia (today's Zimbabwe) in the 1880s and around Belgian Congo (from at least the time of Livingstone) suggested that there was also economic benefit to be gained from authority in the region, though this was not certain.⁸¹

The colony's jointed shape can be attributed to the fact that British administration arrived in the region from two directions simultaneously.⁸² The first of these was from south of the Zambezi, from South Africa via Matabeleland. Here, Cecil Rhodes and other entrepreneurs had been consolidating the work started by traders, missionaries, and hunters in carving out routes and relationships across Southern Africa—processes that can be seen emerging in Figure 1. The second direction was from the East. Here, British activity had been expanding around the Lakes region, first through missionary activity, then commercial activity in the form of the African Lakes Company, and, finally, through military activity when existing traders became frustrated by British interference in their monopoly, and weapons were deployed to oppose them.⁸³

Cecil Rhodes' British South Africa Company (hereafter BSAC) had provided the means for much British political expansion in the region, and although by the mid 1890s it was losing favour with the Imperial government it was still the mechanism for the process of gaining 'effective occupation' and extending the 'sphere of British influence' as had been laid down in the terms of the Berlin Conference. Rhodes' money (most concretely in the form of the railway) and ambition was securing British dominance in the face of German competition from South-West Africa and the opposition of the Afrikaners.⁸⁴

⁸⁰ Sir Edward Hertslet, R. W. Brant, and H. L. Sherwood, *The Map of Africa by Treaty*, 3rd ed., vol. 1 (London, UK: Cass, 1967), 265–266; H. Wilson Fox, 'The Development of Rhodesia from a Geographical Standpoint', *The Geographical Journal* 48, no. 4 (1916): 294.

⁸¹ Lewis H. Gann, *A History of Northern Rhodesia: Early Days to 1953* (London, UK: Chatto & Windus, 1964), 56. Alfred John Wills, *An Introduction to the History of Central Africa: Zambia, Malawi, and Zimbabwe*, 4th ed. (Oxford, UK: Oxford University Press, 1985), 194.

⁸² Wills, *An Introduction to the History of Central Africa*, 125.

⁸³ Gann, *A History of Northern Rhodesia*, 55; Wills, *An Introduction to the History of Central Africa*, 170.

⁸⁴ Gann, *A History of Northern Rhodesia*, 58; Wills, *An Introduction to the History of Central Africa*, 131.

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Figure 1: European routes of travel and some African political dominions in late nineteenth-century Southern Africa

From: Norman Magnus MacLeod and George Westbeech, *Trade and Travel in Early Barotseland: The Diaries of George Westbeech, 1885-1888, and Captain Norman MacLeod, 1875-1876*, ed. Edward C. Tabler (London, UK: Chatto & Windus, 1963).

The BSAC had secured predominance in the region through sponsoring negotiations with the Lozi and Ngoni peoples. As a result of armed conflict between the Chartered Company and Africans in Matabeleland (considered to have been badly handled), the Colonial Office intervened and ruled that the BSAC could not treat the ‘Company’ areas of North-Eastern Rhodesia and North-Western Rhodesia as unified, but instead were obliged to manage them as separate administrative entities.⁸⁵ BSAC activity in North-Eastern Rhodesia and North-Western Rhodesia was also supervised by

⁸⁵ Lewis H. Gann, *The Birth of a Plural Society: The Development of Northern Rhodesia Under the British South Africa Company, 1894-1914* (Manchester, UK: Manchester University Press, 1958), 62.

different parts of the British imperial machinery. North-Eastern Rhodesia was initially managed by the Commissioner for the British Central African Protectorate, and North-Western Rhodesia by the High Commissioner for South Africa.⁸⁶

From the outset of their rule in the region, the BSAC's chartered status allowed them a monopoly on European trade and all economic activity, and also the right to raise taxes from the local population. In return, the Company had the responsibility to implement administration.⁸⁷ This mandate was just as ambiguous as it seems. It was, in fact, some years before officials arrived to take their posts; administration spread slowly from initial colonial forts and, at local levels, the existing social conditions and the personalities of both British and African leaders shaped what 'British administration' was.⁸⁸

Although many histories emphasise the political aspects of these negotiations, it seems important to clarify the characteristics of 'chartered company rule' as opposed to direct imperial administration. In the first instance, such rule meant that the cost of organising British presence and developing these territories was carried by the investment of shareholders in a private company, rather than by the British taxpayer. Secondly, it meant that all the administrative activities, from peacekeeping and taxation to justice, were carried out with a strictly economic outcome in mind. The Secretary of State for the Colonies monitored the activities of the BSAC and retained vetoes over appointments that were felt to be inappropriate, or ordinances that were too exploitative.⁸⁹ Nonetheless, the British government in London interfered very little in the day-to-day circumstances of the territory.⁹⁰ Early on, the BSAC was ambivalent about settling the country, although it later began to excise private property more rigorously.⁹¹ The BSAC saw its role as opening up the territory for others to carry out profitable activity.⁹² Only a little formal cartography was initiated

⁸⁶ Gann, *A History of Northern Rhodesia*, 80; Wills, *An Introduction to the History of Central Africa*, 182; Stone, *A Guide to the Administrative Boundaries*.

⁸⁷ Gann, *The Birth of a Plural Society*, 50–51.

⁸⁸ Stone, *A Guide to the Administrative Boundaries*. Gann, *The Birth of a Plural Society*, 59; Wills, *An Introduction to the History of Central Africa*, 164.

⁸⁹ Gann, *The Birth of a Plural Society*, 64–65.

⁹⁰ Gann, *A History of Northern Rhodesia*, 149.

⁹¹ *Ibid.*, 127–31.

⁹² Gann, *The Birth of a Plural Society*, 52; Peter Slinn, 'Commercial Concessions and Politics During the Colonial Period the Role of the British South Africa Company in Northern Rhodesia 1890–1964', *African Affairs* 70, no. 281 (1971): 371.

by the BSAC, although some magistrates and Native Commissioners were active in documenting their districts.⁹³

In 1911 (the year Rhodes' railway reached the copper-rich region just north of the border in the Belgian Congo), the two separate territories were unified into the single 'Northern Rhodesia'.⁹⁴ By this time there was also a larger and permanent white presence; European activity had begun to spread as farmers, prospectors, and traders moved out and across the region.⁹⁵ The white settlers of Northern Rhodesia expressed the desire, from the earliest days, to be part of an even greater union—a single 'Rhodesia'.⁹⁶ This desire was initially thwarted when, in 1924, Northern Rhodesia was sold back to the British government by the BSAC. The company had failed to make any profit for their shareholders until this point, but received £3,750,000 by way of compensation for their work in establishing an administrative structure, laying out the skeletons of transport and communication networks, and creating a workforce out of the African population.⁹⁷ Despite general hesitation about the suitability of the region for white occupation, the Company had succeeded in drawing more than three and a half thousand settlers into the territory.⁹⁸ The BSAC continued to hold more influence than the government over the Northern Rhodesia economy between mid-late 1920s through its control of mineral rights and railway system.⁹⁹

From 1924 to 1953, Northern Rhodesia was a British Protectorate, run predominantly by a Governor acting on behalf the Colonial Office. Following more substantially backed prospecting of the Northern Rhodesian copper deposits in the 1920s, and the development of the technology for profitable extraction from low-grade ore, the colony rapidly became a site of intense interest to multi-national mining conglomerates.¹⁰⁰ From a territory with poor economic prospects and a sparse European population it became, in short order, more prosperous. Although affected by

⁹³ Stone, 'The District Map.'

⁹⁴ Kenneth Bradley, *Copper Venture: The Discovery and Development of Roan Antelope and Mufulira. With 8 Drawings* (London, UK: Mufulira Copper Mines and Roan Antelope Copper Mines, 1952), 75.

⁹⁵ Gann, *The Birth of a Plural Society*, 175–79; Gann, *A History of Northern Rhodesia*, 192–203.

⁹⁶ Gann, *A History of Northern Rhodesia*, 175–77.

⁹⁷ Slinn, 'Commercial Concessions and Politics During the Colonial Period the Role of the British South Africa Company in Northern Rhodesia 1890–1964.'

⁹⁸ *Ibid.*, 369.

⁹⁹ Butler, *Copper Empire*, 36.

¹⁰⁰ Bradley, *Copper Venture*, 75–90.

the global depression, copper mining continued to expand and shape the future of the colony during the Protectorate era. In 1924 the exports from the first year of crown government were worth less than £400,000; by 1952 they were worth more than £82,600,000.¹⁰¹ This change in fortunes for the colony was obviously marked by intense mapping activity in order to secure concessions and identify ore-bodies. It is important to note, however, that this work was carried out almost entirely by private enterprise. Although the Northern Rhodesia government sometimes received data from mining companies, there was no pre-emptive compilation of maps to *support* private mining until after a geology department was founded in 1950.¹⁰²

The transformation of the economy of the colony was accompanied by related change. The government in London became more financially committed to investing in its colonies, a fact that was demonstrated by agreements to underwrite larger loans in the 1920s and the institution of a Colonial Development Fund in 1929.¹⁰³ Whilst the downturn in the global economy generally led to a decrease in technical staff in African colonies, the Colonial Office became generally more involved in imperial scientific and technical work through the distribution of these funds.¹⁰⁴ The Colonial Office became embroiled in Northern Rhodesian development projects, key amongst which was the institution of a pioneering ecological survey that was intended to provide a solid foundation for agricultural policy and land distribution.¹⁰⁵

Increased pressures on farming land had led to support for a more systematic land policy, including the introduction of 'Native Reserves' in 1927. This legislation included (from 1929) the possibility of preventing further African construction outside of reserves and the forcible expulsion from European-owned lands.¹⁰⁶ Despite this apparently apartheid policy, however, there was an increasing adherence to the concept of 'trusteeship'. A new governor, Sir James Maxwell, appointed in 1927, began

¹⁰¹ Alexander John. Hanna, *The Story of the Rhodesias and Nyasaland*, 2nd ed. (London, UK: Faber & Faber, 1965), 169.

¹⁰² 'Annual Report, Geological Survey of Northern Rhodesia', 1951, CO799/31, NA UK.

¹⁰³ Stephen Constantine, *The Making of British Colonial Development Policy 1914-1940* (London, UK: Cass, 1984).

¹⁰⁴ Kirk-Greene, *On Crown Service*, 37; Helen Tilley, *Africa as a Living Laboratory: Empire, Development, and the Problem of Scientific Knowledge, 1870-1950* (Chicago, IL: University of Chicago Press, 2011), Tables A14-24.

¹⁰⁵ See especially Chapter Two.

¹⁰⁶ Wills, *An Introduction to the History of Central Africa*, 261-62.

to introduce the Lugardian policy of indirect rule into the territory.¹⁰⁷ This position was also gradually more formalised in the metropole. In 1930, the Passfield Memorandum imposed a principle on colonial policy-making that the interests of indigenous Africans should be paramount.¹⁰⁸ In 1929, this policy resulted in Native Courts and Native Authorities Ordinances that reinvested judicial powers within the hands of African chiefs and headmen.¹⁰⁹ In 1936, the Native Treasuries Ordinance meant that those same African authorities could collect native tax and reinvest those funds.¹¹⁰ From 1947, limits were placed on the expansion of European land ownership and the category 'Native Trust Land' was created. Land designated as such could be leased (with profits going to the native authorities), but not permanently titled.¹¹¹ These moves towards a parallel African political system had further implications for the ways in which land and demography were considered and mapped by the colonial government.

Post-war governmental policy in Northern Rhodesia reflected a dramatic change in development intervention from the metropole. This shift originated in pre-war stirrings that manifested themselves in Lord Hailey's seminal report on the state the African colonies under British rule.¹¹² This, in turn, led to the founding of a far more substantial fund under the Colonial Development and Welfare Act in 1940.¹¹³ Again, increased financing produced tighter metropolitan controls on the organisation of colonial natural resources.¹¹⁴ Local District Offices now devised five- and ten-year plans which were then rationalised at Provincial and Colonial levels of administration.¹¹⁵ Schemes were devised to encourage more European education and

¹⁰⁷ Ibid., 263.

¹⁰⁸ Hanna, *The Story of the Rhodesias and Nyasaland*, 194.

¹⁰⁹ Wills, *An Introduction to the History of Central Africa*, 264.

¹¹⁰ A District Officer, 'The Native Development Board: A Useful Institution in Northern Rhodesia', *Journal of the Royal African Society* 39, no. 156 (1940): 244.

¹¹¹ Wills, *An Introduction to the History of Central Africa*, 271.

¹¹² Lord Hailey, *An African Survey. A Study of Problems Arising in Africa South of the Sahara* (Oxford, UK: Oxford University Press, 1938).

¹¹³ Ibid.; Tilley, *Africa as a Living Laboratory*, Ch. 2.

¹¹⁴ Christophe Bonneuil, 'Development as Experiment: Science and State Building in Late Colonial and Postcolonial Africa, 1930-1970', *Osiris* 15 (2000): 258-81; Sabine Clarke, 'A Technocratic Imperial State? The Colonial Office and Scientific Research, 1940-1960', *Twentieth Century British History* 18, no. 4 (2007): 455.

¹¹⁵ Wills, *An Introduction to the History of Central Africa*, 271.

greater intervention into African farming.¹¹⁶ Attempts were also made to encourage secondary industry.¹¹⁷

Although European land ownership was now restricted, the white population had increased by a factor of ten since Northern Rhodesia had become a protectorate in 1924.¹¹⁸ The success of the mining industries and post-war settlement schemes meant that by 1951 there were 37,097 Europeans in Northern Rhodesia.¹¹⁹ During that same time, however, the mining industry had produced a large number of technically skilled and educated Africans who demanded greater levels of parity with Europeans. By the late 1940s these shifts in demographics were producing high levels of political tension.¹²⁰

From 1953, Northern Rhodesia sat as a member of the Central African Federation (CAF) within “a triangle of power, whose three points rested on Salisbury [Southern Rhodesia], London and Lusaka”.¹²¹ To the satisfaction of much of the white population of Northern Rhodesia, and the intense dismay of the most of the black population, its goals and policy were brought closer in line with those of its more powerful southern neighbour. During the lifespan of the CAF, 1953–63, the federal government was responsible for several key aspects of Northern Rhodesian policy. Although certain responsibilities remained with the government in Lusaka (policies relating to land, agriculture, and African education, for example), several technical departments were gradually affiliated to the federal capital in Southern Rhodesia, including the Survey Department. For the Northern Rhodesian Survey Department, this subservient relationship was not entirely without precedent. The main route into Northern Rhodesia for technology, technicians, and techniques had for decades been the rail-line from South Africa. Their colleagues in Salisbury, Johannesburg, and Cape Town had long been their advisors and their lenders. One radical difference was, however, the altered centre of gravity for infrastructural policy; particularly energy and

¹¹⁶ Not only as a means of creating better living conditions for Africans, but also as a means of extending the cash economy and reducing labour migration. Gann, *A History of Northern Rhodesia*, 375–78.

¹¹⁷ Wills, *An Introduction to the History of Central Africa*, 305.

¹¹⁸ This meant a proliferation of titles, particularly urban plots and smaller farms.

¹¹⁹ Gann, *The Birth of a Plural Society*, 441.

¹²⁰ See Chapter 12, Gann, *A History of Northern Rhodesia*.

¹²¹ *Ibid.*, 434.

transport.¹²² These were being organised in relation to a larger network of sites and institutions across the Federation. The Kariba Dam, for example, was a project designed on a thoroughly federated rationale.

The forty years between 1915 and 1955 also saw large shifts in survey technologies. As this thesis will explore, the instrumentation and representational techniques of European mapping were not always suited to the Northern Rhodesian terrain, and its seasonality bent some technologies and techniques to their limits. Sometimes technological ‘developments’ in mapping meant easier, more efficient, work but they often had unexpected effects on cartographic practices. This fact was true of specialised tasks such as printing.¹²³ It was even truer, however, in relation to the mundane technologies of survey in Northern Rhodesia. Bureaucratic technologies, such as the advent of typewriters in the colony, changed the geographies of administration; other bureaucratic technologies increased the use of clerical labour and employment of women.¹²⁴ Transport technologies produced new sets of relations not only between surveyor and the field, but also for those using cartography to journey across the territory. The prevalence of Tsetse fly across certain areas of Northern Rhodesia had restricted the possibilities for using beasts of burden to transport people and equipment.¹²⁵ The presence of the fly also confined District Officers to performing their administrative tours on foot or by bicycle. As we will see, this slower mode of journeying may have reduced the need for cartography. The introduction of aerial photography as a technology did not initially have the revolutionary results that were predicted by its evangelists, but the deployment of ‘excess’ planes, pilots, and cameras in the aftermath of the Second World War did cause radical changes.

This brief description of forty years of change between centres of colonial authority, economic strategies, and definitions of proper colonial responsibilities gives an indication that the determining forces behind cartographic production were far from uniform. European attempts at mastery over the Northern Rhodesian environment and peoples sometimes ceded to practical challenges, and sometimes continued in spite

¹²² Wills, *An Introduction to the History of Central Africa*, 322–24.

¹²³ Karen Severud Cook, ‘The Historical Role of Photomechanical Techniques in Map Production’, *Cartography and Geographic Information Science* 29, no. 3 (2002): 137–54; Patrick H. McHaffie, ‘Towards the Automated Map Factory: Early Automation at the U.S. Geological Survey’, *Cartography and Geographic Information Science* 29, no. 3 (2002): 193–206.

¹²⁴ Gann, *The Birth of a Plural Society*, 103.

¹²⁵ Fox, ‘The Development of Rhodesia from a Geographical Standpoint’, 293; Jan-Bart Gewald, ‘People, Mines and Cars: Towards a Revision of Zambian History 1890–1930’, in *The Speed of Change Motor Vehicles and People in Africa, 1890–2000*, ed. Jan-Bart Gewald, Sabine Luning, and Klaas van Walraven (Leiden, NL: Brill, 2009), 24.

of apparent difficulties. The correspondence to, from, and ‘around’ the governmental archive in Lusaka has, above all, contributed to tracing these shifting demands and expectations, against willingness to invest in technological solutions.

As noted above, the history of colonial governance in Northern Rhodesia, exemplifies what Lonsdale and Berman have described as a vacillation between profit and political expediency. It clearly demonstrates how competing ambitions shaped the ordering, re-ordering and dis-ordering of the territory. Having established, therefore some of the range of contexts for mapping, I will now address how the relationship between goals and the ‘value’ of mapping has been read.

Reading for value

The prevalence and success of cartography in the twentieth century is taken for granted in our understanding of modern life. As a result, the process of describing Northern Rhodesia’s partial, *ad hoc*, and parochial ‘mapping’ has sometimes felt like writing counterfactual history. The archival records tell a jumble of stories that are much paler and less coherent than the one ingrained in our beliefs. This was also a problem for the colonial officials who had been inculcated with British values. For Britons of the early twentieth century it would seem that ‘mapping’, in the abstract, meant the Survey of India and the work of the Ordnance Survey.¹²⁶ These ideals complicated the practicing of colonial survey in ways that often emerge obliquely in the record. Understanding the multiple ‘values’ of colonial cartography means pinpointing the contradictions between monolithic, yet vague, imperial principles and practical decisions. However it has meant more than reading *for* discordance, but to find the quieter expression of alternative strategies and values that were enacted in response to it.

In this thesis, the primary indicator that mapping was valued is given to be the allocation of resources, but there were a number of other comparisons used to seek value out. The first of these is to be found in the tone of the written documents. For example, reports to the metropole invariably justified the extent and quality of map production in ways that hint at unarticulated norms. Disappointment or surprise could be detected in the correspondence of those newly arrived in the colony. The more sardonic colonialists saw humour in the disparity between idealised goals and the

¹²⁶ Cartographic and geographic skills were being increasingly valued within British education as a means for general ‘improvement’ and for inculcating imperial attitudes. See, Teresa Ploszajska, ‘Constructing the Subject: Geographical Models in English Schools, 1870–1944’, *Journal of Historical Geography* 22, no. 4 (1996): 388–98; Matless, ‘The Uses of Cartographic Literacy: Mapping, Survey and Citizenship in Twentieth-Century Britain.’

cartographic status quo: “Your reference to the OS in Britain amuses the writer who was employed there with 1,000 others at its headquarters in 1945”, noted G. H. Quiggin.¹²⁷ An unfortunate Mr Thompson—subject to one of Harold St. John Winterbotham’s unforgiving character assessments after his tour of the African colonial survey departments—is derided for his lack of humour on the same topic:

Mr Thompson, the Town Planner, is another who wins immediate sympathy. He is so wholehearted and evidently so successful that his schemes carry conviction. But he has the demerits as well as the merits of a Pickwickian character. The Survey is his Mr Jingle. He asks for impossibilities in the shape of vast areas of accurate large scale mapping because his previous work has been in civilised neighbourhoods. He cannot understand delay and attributes it to obstructionism.¹²⁸

The nature of these tensions can often be read from the maps themselves. One key method is to examine their content for the implicit gaps between intent and realisation. A 1:250,000 map sheet produced in 1922, as part of an apparently ‘complete’ series, was in fact a large sheet of almost blank paper with a title and a few vague or dashed lines.¹²⁹ Claims about the extent of mapping projects in both coverage and detail are often exaggerated.

Understanding the *reasons* that these maps diverged from orthodox, metropolitan procedures requires attention to the contexts in which the maps appeared, their handling and their deployment. In a summary of this literature, Kitchin, Glees, and Dodge have outlined four methods for ‘unfolding mapping practices’.¹³⁰ They suggest ‘ethnographic’ studies as one of these; the art of seeking to develop “a nuanced understanding of the lifeworld of a community—its social relations, its rhythms, its cultural meanings, its patterns of power and decision-making”.¹³¹ Ethnographic studies of cartography propose that the ‘meaning’ of such documents is perpetuated or

¹²⁷ G. H. Quiggin (on behalf of the Director of Surveys and Lands) to Town Engineer, Lusaka, ‘Organising the Survey of Lusaka’, 29 January 1955, MM1/2/3, NAZ.

¹²⁸ H. S. L. Winterbotham, ‘Memo to the Officer Administering Government: Survey Staff, Nigeria’, 1929, CO323/1041/10, NA UK.

¹²⁹ As almost a parody of the enlightenment convention of leaving blank spaces to represent unknown areas: J. C. Stone, ‘Imperialism, Colonialism and Cartography’, *Transactions of the Institute of British Geographers* 13, no. 1 (1988): 57. Chief Surveyors’ Department ‘NW18: Nalolo’ Northern Rhodesia, Provisional Series, 1:250,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1922. mr Zambia G.7., RGS.

¹³⁰ Rob Kitchin, Justin Gleeson, and Martin Dodge, ‘Unfolding Mapping Practices: A New Epistemology for Cartography’, *Transactions of the Institute of British Geographers* 38, no. 3 (2013): 480–96.

¹³¹ *Ibid.*, 484–85.

re-aligned through their use (or misuse) by various groups.¹³² By going beyond the printed paper and investigating the gestures and handling of cartography we can discover these realigned meanings.¹³³ Sensitivities learned from, for example, Eric Laurier and Barry Brown's research have been particularly useful in imagining colonial maps as objects that are held, passed around, kept in pockets, or posted on the wall.¹³⁴ Veronica della Dora's characterisation of atlases as 'theatres of memory' has also offered inspiration for re-imagining the historical performance of reading maps through careful attention to their materiality.¹³⁵

It is interesting that to date ethnographies of cartography (such as those mentioned above) have usually emphasised individualised interactions between people and maps and dwell on the affective. So, although these studies have been useful, this thesis probably has more in common with ethnographies of laboratory and bureaucratic practices. Pioneering work in the 1980s, such *Science in Action* (1987) and *Leviathan and the Air-Pump* (1985) demonstrated the benefits to be gained from the careful observation of tasks that might be too mundane to ordinarily describe.¹³⁶ It has become common to use these ethnographic methods to understand the production of certainty, and rationality, and authority.¹³⁷ An important recent contribution to this literature is Matthew Hull's 2012 book *Government of Paper*, which has been influential

¹³² See in particular Chris Perkins, 'Cartography - Cultures of Mapping: Power in Practice', *Progress in Human Geography* 28, no. 3 (2004): 381–91; Martin Dodge, Rob Kitchin, and Chris Perkins, eds., *Rethinking Maps: New Frontiers in Cartographic Theory* (London, UK: Routledge, 2011); Martin Dodge, Rob Kitchin, and Chris Perkins, *The Map Reader: Theories of Mapping Practice and Cartographic Representation* (Oxford, UK: Wiley-Blackwell, 2011).

¹³³ V. Del Casino and S.P. Hanna, 'Beyond the "Binaries": A Methodological Intervention for Interrogating Maps as Representational Practices.', *ACME: An International E-Journal for Critical Geographies* 4, no. 1 (2006): 34–56.

¹³⁴ Barry Brown and Eric Laurier, 'Maps and Journeys: An Ethnomethodological Investigation', *Cartographica* 4, no. 3 (2005): 17–33.

¹³⁵ Veronica della Dora, 'Performative Atlases: Memory, Materiality, and (Co-) Authorship', *Cartographica* 44, no. 4 (2009): 240–55.

¹³⁶ Michael Lynch, *Art and Artifact in Laboratory Science: A Study of Shop Work and Shop Talk in a Research Laboratory* (London, UK: Routledge, 1985); Latour, *Science in Action*; Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Stanford, CA: Princeton University Press, 1985).

¹³⁷ Karin Knorr Cetina, 'Laboratory Studies: The Cultural Approach to the Study of Science', in *Handbook of Science and Technology Studies*, ed. Sheila Jasanoff et al. (Thousand Oaks, CA: Sage Publications, 1995); Mette N. Svendsen, 'Articulating Potentiality: Notes on the Delineation of the Blank Figure in Human Embryonic Stem Cell Research', *Cultural Anthropology* 26, no. 3 (2 November 2012): 414–37; Michael Lynch, 'Science, Truth, and Forensic Cultures: The Exceptional Legal Status of DNA Evidence', *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, Special Issue: Forensic Cultures, 44, no. 1 (2013): 60–70.

to this thesis.¹³⁸ *Government of Paper* explores the workings of the bureaucratic machinery that regulates town planning in Islamabad. In doing so, it situates the maps and plans in relation to their broader and more nebulous material contexts: exchanges of business cards, photocopying, franking, and fraud. A particular lesson from Hull is that documents such as synoptic maps and reports seem to have accrued weight by having been centrally produced, but, in fact, actually gain their power through becoming currency. They are powerful not as representations, but as shared points of reference.¹³⁹ Where value matches potency, it is because of how the document is transmitted; how it is framed and circulated.¹⁴⁰

With that in mind, this thesis has also read value from the contemporary distribution of the records in the cartographic archive, albeit with caution. A first observation can be drawn very rapidly: the archives themselves demonstrate that colonial cartographic circulation was limited. The ‘whole’ of a published series can often only be inspected by making journeys across several sites. This points to the dangers of considering such published maps to have been widely available or mass-produced. Their status is closer to that of manuscripts. As we will see in Chapter Four, small runs of sunprints, blue prints, and dyelines constitute an important percentage of archived colonial maps.¹⁴¹ A majority of the ‘mapping’ of Northern Rhodesia consisted of bespoke maps that were produced for projects and had smaller ‘publics’ through their circulation between departments, between local bodies, or in private networks. In a situation of ‘map-scarcity’ it seems likely these *ad hoc* documents were more highly valued than they might otherwise have been.

It is also necessary to qualify Hull’s position on power gained through transmission when reading documents from across governmental and private archives. In these cases it is important not to overemphasise circulation as the only means for maps to produce action or create value. Some of the cartographic data produce by profit-making organizations was made available to the colonial government. Some remained invisible and gained potency by virtue of their inaccessibility. This is the case of the forestry maps created by Zambesi Saw Mills that are considered in Chapter Five. The lesson we can retain from *Government of Paper* is, however, that the *value* of mapping is

¹³⁸ Matthew Stuart Hull, *Government of Paper: The Materiality of Bureaucracy in Urban Pakistan* (Berkeley, CA: University of California Press, 2012).

¹³⁹ *Ibid.*, 4.

¹⁴⁰ See also: Sylvia Sellers-García, *Distance and Documents at the Spanish Empire’s Periphery* (Stanford, CA: Stanford University Press, 2014).

¹⁴¹ A summary of these techniques is given in Chapter Four.

generated in the hands of a more distributed group than simply producers or the consumers of published cartography.

An outstanding question of value that remains to be addressed is the historical evaluation of the ability, character and therefore ‘worth’ of different parts of the populace. Recognition of effort and skill in colonial cartographic narratives falls asymmetrically; and the most obvious of differential is race. Accounts by white authors often follow the trope of describing themselves as ‘alone’ in the office or in the field, when, in fact, accompanied by anywhere between two and one hundred Africans who were essential to the completion of the task in hand.¹⁴² Numerically, the most prevalent of the discounted African cartographic workers were those recruited to provide manual labour as porters and builders. There were, however, a large number of Africans enrolled in the wider process of cartography for their local knowledge, particularly messengers and chiefs, and those working in skilled European-trained positions, in particular the African Assistant Surveyors, printers, and clerks.

I have deliberately sought out the more elusive archival records that account for this expanded set of colonial ‘cartographers’, from porters to mathematicians. Those records are generally constituted by written and photographic evidence of their work and working conditions as produced by those higher in rank. There are very few circumstances in which these contributors to the cartographic archive speak for themselves, rather than being spoken for, but every so often I have been able to find clues to their life beyond ‘mappings’; of their political aspirations or living conditions. As a result, the interplay of *their* values with the outcomes of cartographic projects can occasionally be elucidated.

Notwithstanding, this thesis remains *within* the domain of ‘colonial mappings’. The thesis corresponds to the programme that Ann Laura Stoler and Frederick Cooper prescribe, to “take apart the shifts and tensions within colonial projects with the same precision devoted to analysing the actions of those who were made their objects”.¹⁴³ As such, the thesis cannot trace the role of mapping in what Premesh Lalu describes as the “effects of evidence in relation to the emergence of subjectivity”.¹⁴⁴ The host of endeavours and situations that have been addressed in the thesis do not encompass the

¹⁴² Felix Driver and Lowri Jones, *Hidden Histories of Exploration* (London, UK: Royal Holloway, University of London: Royal Geographical Society (RGS-IBG), 2009), 5.

¹⁴³ Cooper and Stoler, ‘Between Metropole and Colony: Rethinking a Research Agenda’, 6.

¹⁴⁴ Premesh Lalu, ‘The Grammar of Domination and the Subjection of Agency: Colonial Texts and Modes of Evidence’, *History and Theory* 39, no. 4 (2000): 51.

interface between colonial cartography and African epistemologies and practices. That work would be of immense value, but was beyond the scope of this project.¹⁴⁵ Likewise, the thesis only obliquely addresses the contribution of customary African practices to the *representational content* of the colonial maps. When it does so, it is primarily in consideration of customary patterns of mobility and authority in delineating the spaces of colonial rule, rather than, for example, in colonial toponymy. I hope, however, that a better understanding of the larger colonial cartographic economy offers a greater number of intersections from which to explore the contribution to, and appropriation of, colonial mapping practices by the colonised.

A concluding note on methodology should briefly describe the role of the reproductions and re-drawing of maps in this thesis. The question of map scale is crucial to the thesis, and in particular to Chapter Three. In order to provide easy reference, examples of mapping of the Royal Holloway campus (at 1:2,500, 1:10,000, 1:50,000, 1:250,000, and 1:500,000) are presented in Appendix 1. There are several extracts from maps that have been reproduced from the archive or from secondary literature and framed so as to pick out particular features. It is always noted whether the reproductions are at the full size of the original. Certain maps have been re-drawn, largely to combine details from several sources and reveal patterns that are more apparent visually than textually. Finally, a few maps have been reproduced as full sheets. This is in order to emphasise some aspect of their materiality (the density of detail relative to the size of the paper, or changes in scale). These maps constitute Appendices 2, 3 and 4, and are referenced in the text as Folded Maps no. 1, 2 and 3.

Presenting the cartographic economy

This introduction has given the reader some insight into how a path through the archive was organised. The presentation of the material in the thesis is not arranged (as other histories have been) on chronological lines. Jeffrey Stone has suggested two periodisations that could be applied to Northern Rhodesian cartography. Stone's first

¹⁴⁵ Study of the ongoing division between customary and state land rights, and the different use of mapping in these two domains would be greatly facilitated by such work. Little scholarship, however has attended to the interaction between African epistemologies and cartography with a few notable exceptions, Thomas J. Bassett and Philip W. Porter, "From the Best Authorities": The Mountains of Kong in the Cartography of West Africa', *The Journal of African History* 32, no. 3 (1991): 367–413; Ivor Wilks, 'On Mentally Mapping Greater Asante: A Study of Time and Motion', *The Journal of African History* 33, no. 2 (1992): 175–90; Peter Yearwood, 'From Lines on Maps to National Boundaries: The Case of Northern Nigeria and Cameroun', in *Maps and Africa: Proceedings of a Colloquium at the University of Aberdeen*, ed. Jeffrey Stone (Aberdeen, UK: Aberdeen University African Studies Group, 1994), 36–42; Thomas J. Bassett, 'Indigenous Mapmaking in Intertropical Africa', in *Cartography in the Traditional African, American, Arctic, Australiam and Pacific Societies*, ed. E. Woodward and G. Malcolm Lewis, vol. 2, *History of Cartography* (Chicago, U.S.A.: University of Chicago Press, 1998).

periodisation identifies three phases: (1) imperial cartography that had a directly nationalistic bent with the aim of marking European domination at a continental scale; (2) the ‘transitional cartography of emissaries and travellers’; and (3) the cartography of colonial rule that sought a geographical basis jurisdiction.¹⁴⁶ Elsewhere he identifies cartographic ‘periods’ *within* the time span of colonial administration. In this schema, the phase of establishing rule was accompanied by vigorous mapping. That phase was followed by a period of ‘tranquility’ which was marked by an apathetic attitude to cartography. The 1930s then saw renewed endeavours stemming from early experiments in imperial development. Finally, the post-war period saw a huge increase in mapping sponsored by metropolitan agencies that now saw self-governed African states on the horizon.¹⁴⁷ Although Stone puts caveats on how cleanly these can be discerned, he is sufficiently confident in their relevance to Northern Rhodesia is “the Cartography of Colonialism Characterised”.¹⁴⁸

These categories certainly have useful qualities, and helpfully begin to associate patterns in mapping with the overarching goals of colonial rule, but they are not, I think, sufficiently strong to *characterise* Northern Rhodesian mapping. My differences with Stone are largely based on how mapping ‘activity’ is measured. The numbers of survey staff employed in the colony between 1924 and 1939 increased fairly steadily, indicating an equivalent increase in mapping activity (see Table 1). Cadastral mapping, which was the predominant activity for the department throughout both the 1920s and the 1930s, does not, in Stone’s view, constitute ‘progress’.¹⁴⁹

¹⁴⁶ Stone, *A Short History of the Cartography of Africa*, 70, 115–20.

¹⁴⁷ *Ibid.*, 104–05.

¹⁴⁸ *Ibid.*, 109.

¹⁴⁹ *Ibid.*, 103.

Year	No. of European Surveyors (inc. Director/Deputy)	No. of European Office Staff (Draughtsmen / Computers/ Clerks)	No. of African Field Staff	No. of African Office Staff	Total staff
1924	7	-	6	1	14
1925	7	-	5	1	13
1926	7	1	5	2	15
1927	9	1	7	1	18
1928	10	2	7	-	19
1929	8	3	8	1	20
1931	14	4	11	2	31
1932	13	5	15	3	36
1934	10	4	9	2	25
1934	10	4	9	1	24
1935	10	4	9	3	26
1936	9	5	11	3	28
1937	10	3	13	4	30
1938	10	3	12	4	29

Table 1: Survey Department of Northern Rhodesia, employees 1924-1938

This information based on the Survey based on their Annual Reports NA UK CO799/1 to CO799/17

Yet the 1920s also saw the publication of more *topographic* maps than the 1930s. Then there is the question of the intense loci and moments of private cartographic activity. As Stone himself says, the “occasional suggestions of map-making by other professional officers” implies that “the existing record is less than the complete account of topographic map making”.¹⁵⁰ It is difficult to account for these more diverse mappings and mapmakers within a chronology that is driven by high-level governmental concerns. Examining sequences of mapping of a single site over time (Chapter Three of this thesis) clearly demonstrates that these centralised chronologies have only minimal relevance.

Neither are the comparisons in this thesis organised following a geographical rationale. That would have been a different project, one that would have included, for instance, early plantation sites in Northern or Eastern Province and an example of urban cartographies. Instead, I present a series of different perspectives or access-

¹⁵⁰ Ibid.

points for thinking about colonial cartography. The particular sites, and periods addressed emerged (as described above) from the archival material. Their geographical distribution can be seen in Figure 2.

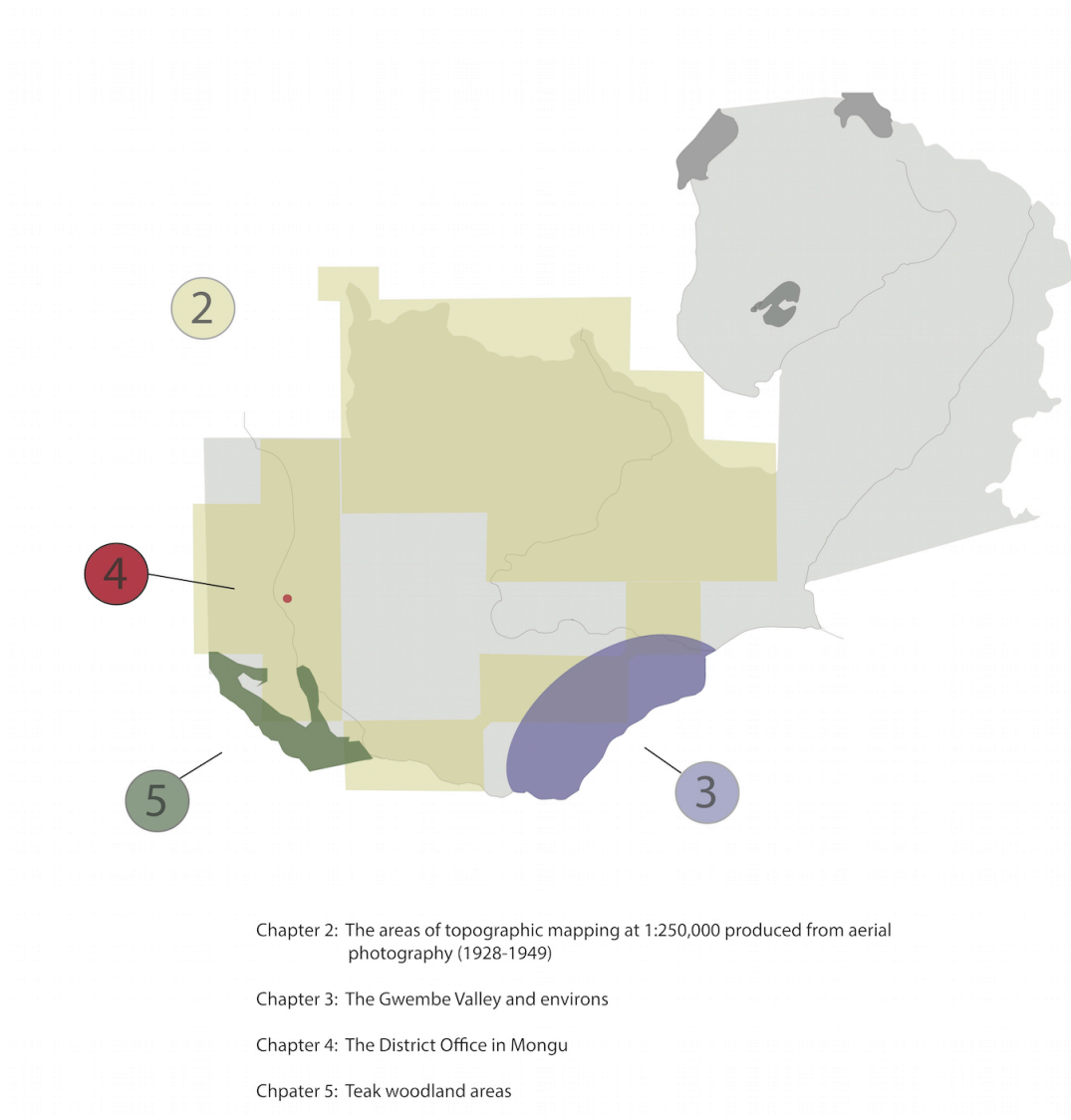


Figure 2: The geographical areas addressed in this thesis

The first chapter considers influences on the production of topographic mapping in the years 1928 to 1949. The pattern of map production during this period is revealed to have been highly determined by the use of aerial photography at different sites in the colony. Demonstrating that connection exposes the effect of economic interests on state cartography in Northern Rhodesia. Aerial photography was a particularly capital-intensive method of mapping, and the Copperbelt of Northern Rhodesia was the site of early experiments into its possibilities. Its deployment reordered expectations about mapping, forms of expertise and institutional relationships. It

demonstrates that the patterns of cartographic production in Northern Rhodesia were determined less by the global graticule, or the construction of sovereign territory, than by the sites and routes of capital investment. Sites that did not play a role in the colonial economy were liable to be neglected, and remain below what I call the 'topographic threshold'. In tracing the nature of investment in territorial knowledge, I show that what has been called the 'economic logic' of British colonial knowledge-creation needs further attention.¹⁵¹

The next chapter considers a site that lay below the 'topographic threshold'; the Gwembe Valley. Despite the fact that the valley was not prioritised in state topography before the late 1940s, it was, nonetheless, mapped in various ways. This chapter explores the relationship between the local forms of *ad hoc*, hybrid forms of mapping of rural areas of Northern Rhodesia, and the peculiarly colonial set up of cartographic technology and technicians. It considers the relationship between disparate groups of the cartographic workforce, map scale, and the variety of colonial interests in territory: the administration of the population, the creation of private property and the promotion of economic development. A number of mappings of the Gwembe Valley took place, but yet they were not co-ordinated in any meaningful way. Un-integrated layers of cartography presented different 'objects' of colonial territorial interest, and effectively wrote over each other rather than generating a cumulative data set. Different sites (the local office, the colonial headquarters, and the government in London) had differing documentation of the valley, offering views that were fundamentally incompatible.

Chapter Four examines a 'peripheral' imperial cartographic archive, the collection of maps at an outpost of colonial administration, the district office. The historical record has offered us an exceptional insight into the circulation of maps through the District Office in Mongu (Western Province), in the form of a snapshot of their map holdings in 1953. The chapter examines that collection, and considers how these documents guided the daily business of colonial administration. Here I investigate the material constraints on the production governmental cartography, including the availability of paper and printing technologies. I show how those constraints were reproduced or bypassed by other cartographic producers. Finally I demonstrate what the 'District Map', an inherently local document, reveals about the role of maps in the peripatetic practices of district administration.

¹⁵¹ Tilley, *Africa as a Living Laboratory*, 17.

The last chapter addresses the role of maps in colonial governance in Northern Rhodesia; the imposition of power in, through, and alongside cartography. It argues that the political modality of Indirect Rule affected both the kinds of maps that were made, and *how* those maps were produced. It suggests two alternative readings for colonial map use that go beyond situating cartography within ‘high modernism’ or centralised legibility.¹⁵² The first of these is the deliberate maintenance of geographical ignorance—cartographic indifference—a position that was assumed in order for the government to benefit from decentralised forms of power over the Northern Rhodesian environment. The second was the recruitment of the environment and of colonial subjects to reinforce unreliable and insufficient cartographic records. This situated ‘extra-institutional’ memory substituted for more refined cartographic procedures; higher-orders of precision in the mapping process, and rational, internal order within the colonial geographical archive.

It could be argued that starting from the fragments of records that describe the local is less reliable. It could be argued that the process of *differentiating* values across Northern Rhodesian mapping is less constructive, less explanatory, than seeking out unifying narratives or coherent periods. Those arguments have some merit; in the conclusion to this thesis I will address how far these ‘situated perspectives’ might be representative of British colonial cartography in Africa more broadly. I defend, however, the contribution of these more fragmented viewpoints.

The increased global interest in agricultural land is generating increased pressure to render ‘evidence’ of past ownership and policy decisions. The relationship between modern cartography, cadastre, and the geographies of customary land rights, is under more strain than ever. The thesis accentuates the diversity of methods and intentions that shaped the multifarious documents now available to Zambian citizens. The value of maps, contested in the first half of the twentieth-century, remains contested today.

The model of the cartographic economy allows us to see how those forms of document embody particular frameworks for value; divergences and dissonances between the cartographic ideal and colonial realities. It allows us to see how thin the veneer of the ‘universality’ of state mapping is. Understanding those frameworks is crucial when historical cartography is used as a basis for precedent, and a platform from which to organise resources and rights today.

¹⁵² Scott, *Seeing Like State*.

**2 / Cartography and expansion: capital,
territory, and topographic mapping**

Introduction

The question this chapter addresses is encapsulated in Figure 3, a representation of the radically uneven production of topographic mapping at 1:250,000 of Northern Rhodesia up to 1955. This schema shows that parts of the territory were mapped at very different densities of detail. For certain areas topography was drawn up from aerial photography; for others it was drawn up with much sparser information from land-based survey. In 1955, a significant proportion of the colony had seen *no mapping at that scale at all*. 1:250,000 was considered to be the minimum necessary scale for governance, yet mapping at 1:500,000 (a scale at which the entire Benelux region could be represented on a single sheet) was the most detailed published mapping available to many local administrators during colonial rule, particularly in the West of the colony (See Appendix 1 for examples of mapping at these scales).¹

Anecdotally, this situation is familiar, but it has not been adequately addressed by literature on the role of cartography in twentieth-century state formation and governance. This chapter begins to explore the cartographic economy as a new way of analysing this heterogeneity. It proposes that the necessity (even the relative usefulness) of topography to the colonial state cannot be taken for granted. Edgar Barton Worthington suggested in his 1938 review, *Science in Africa*, that “Survey work, like other branches of development, should be financed by pledging the future”.² What kind of futures and what kinds of pledges were being made? The chapter takes contestation over the cartographic economy in its most literal and financial sense and asks under what circumstances topographic maps were considered to be worth producing, and whose interests and futures determined that ‘worth’.

¹ This chapter considers an episode in topographic mapping that had a lasting effect. The series of topographic mapping at 1:250,000 discussed here was part of a broader set of Northern Rhodesian topography. This 1:250,000 series is interesting, however, in epitomising later trends. Aside from this series there was an earlier provisional series of topography (more ‘complete’ in some respects if not all, see Chapter Three). Other sections of topography were produced at a larger scale, although only occasional until 1948. From 1949 the Directorate of Colonial Surveys (DCS) working from London, began a topographic series at 1:50,000. The geographical distribution of DCS activity in the later period follows the rationale I demonstrate here closely.

² Edgar Barton Worthington, *Science in Africa: A Review of Scientific Research Relating to Tropical and Southern Africa* (Oxford, UK: Oxford University Press, 1938): 35.

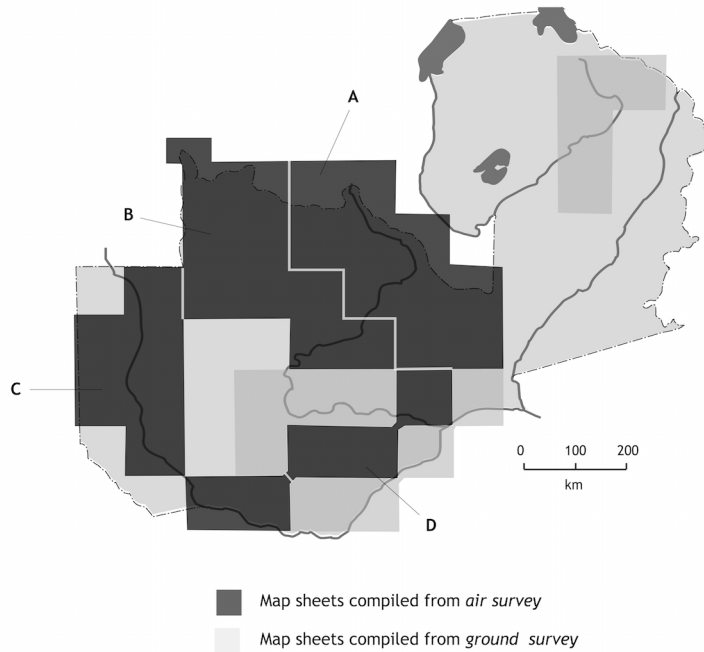


Figure 3: Distribution of map sheets at 1:250,000 compiled by the Survey Department of Northern Rhodesia, 1928-1955

Adapted from: Pullan, R. A. *A First Checklist of the Published Maps of Northern Rhodesia, 1890-1949*. Lusaka, Zambia: Zambia Geographical Association, 1978.

This position breaks strongly from prevailing conceptualisations of state topography. Amongst the variety of forms that state visualisations can take, topography has a privileged status since it forms the ‘base map’ or geographical index for a much broader range of governmental projects: whether the organisation of cadastral records; the notation of vegetable, mineral, animal, and water resources; or the analysis of demographic data.³ The very notion of the base map suggests the unification of multiple cartographic functions into a single cartographic system, “an epistemological singularity that required that at any *one* time there should be only *one* map of *one* territory”.⁴ Scholarship since the 1990s has made it a commonplace that the topographic or base map is not ‘neutral’ or experienced as such, nonetheless, topography is generally considered to have uniform characteristics and function within a single ‘state-space’.⁵ This perspective prevails to the point that the homogenisation

³ Mark S. Monmonier, *Technological Transition in Cartography* (Madison, WI: University of Wisconsin Press, 1985).

⁴ Matthew H. Edney, ‘Cartography Without “Progress”: Reinterpreting the Nature and Historical Development of Map Making’, in *Classics in Cartography*, ed. Martin Dodge (Chichester, UK: Wiley-Blackwell, 2011), 78. Emphasis added.

⁵ Blomley, ‘Law, Property, and the Geography of Violence’; Harley, ‘Deconstructing the Map’; Wood and Fels, *The Power of Maps*.

of heterogeneous sites and spaces through topographic mapping has come to be seen as a necessary condition for the genealogy of the ‘state-space’ or ‘territory’⁶

Assumptions about the uniformity and ubiquity of state cartography underpin a wide variety of literatures. General treatments of state cartography tend to accentuate the ways in which governmental power is increased through the centralised accumulation of territorial visualisations, and state-determined ontologies of natural resources.⁷ Marxist spatial theory brings a vocabulary that is highly attuned to various forms of unevenness.⁸ That vocabulary might have assisted our understanding of this topography as related to the production of “a differentiated and integrated space economy”.⁹ But this scholarship offers us surprisingly little purchase on differences in the deployment of cartographic visualization. The *principle* of uniform topographic coverage also frames technical histories of African cartography, which, therefore, explain unevenness as failure on the part of British colonial regimes due to insufficient governmental resources.¹⁰ This explanation clearly falls into the mode outlined by James Ferguson, in which political intent is obscured by narratives of technical inadequacy.¹¹ The positive choices—which areas *were* mapped—remain naturalised or unaccounted for. This chapter takes up the challenge of filling in this middle-ground; the no-man’s land between the theoretical position where topography is seen as inevitable, and the historical account in which it is described merely as absent or late. It resituates Northern Rhodesian topographic production within new contexts, and demonstrates how those contexts defined the resultant mapping.

To address that challenge, this chapter will reconstruct the early twentieth-century Northern Rhodesian cartographic economy from three key perspectives: that of the mining companies who invested in the Copperbelt, that of an early aerial photographic

⁶ Michael Biggs, ‘Putting the State on the Map: Cartography, Territory, and European State Formation’, *Comparative Studies in Society and History* 41, no. 02 (1999): 374–405; Branch, *The Cartographic State*; Elden, *The Birth of Territory*.

⁷ Crampton, ‘Cartographic Calculations of Territory’; Demeritt, ‘Scientific Forest Conservation and the Statistical Picturing of Nature’s Limits in the Progressive-Era United States’; Scott, *Seeing Like State*; Whitehead, Jones, and Jones, *The Nature of the State*.

⁸ Harvey, *The Limits to Capital*; David Harvey, *Spaces of Global Capitalism: Towards a Theory of Uneven Geographical Development* (London, UK: Verso, 2006); Henri Lefebvre, *State, Space, World: Selected Essays*, ed. Neil Brenner and Stuart Elden (Minneapolis, MN: University of Minnesota Press, 2009).

⁹ Harvey, *The Limits to Capital*, 375.

¹⁰ McGrath, *The Surveying and Mapping of British East Africa 1890 to 1946*; Stone, *A Short History of the Cartography of Africa*.

¹¹ Ferguson, *The Anti-Politics Machine*.

business, and finally that of the colonial government. For each of these groups topography represented the means to a different end; they had differing resources, and variable leverage. The coincidence and divergence of the intentions, resources, and values of these three groups shaped the uneven patterns of cartography.

The influence of aerial photography on topographic mapping

In exploring the history of the ‘value’ of Northern Rhodesian topography, this chapter focuses, in particular, on *aerial photography as a cartographic technology*. Critical literature is beginning to address the variety of civil uses of early twentieth-century aerial photography.¹² I am honing in here on its use for mapping for two reasons. Firstly, because as seen by comparing Figure 3 and Figure 4, the production of topography was tightly linked to the deployment of aerial photography. Four aerial photographic projects that were carried out in quick succession between 1927 and 1931 by the Aircraft Operating Company (AOC) became the basis of three-quarters of the mapping at 1:250,000 produced by the Northern Rhodesian government *for the subsequent twenty-four years* (Blocks A-D in Figure 3). Secondly, aerial photography was more capital-intensive than traditional land-based surveying methods and, as a result, it allows us to see the workings of the cartographic ‘economy’ in more vivid relief. The case studies examined here set down a pattern of sporadic investment in mapping in Northern Rhodesia that continued well beyond the life of this topographic series.

¹² Cronin, ‘Northern Visions’; Matt Dyce, ‘Canada between the Photograph and the Map: Aerial Photography, Geographical Vision and the State’, *Journal of Historical Geography* 39 (2013): 69–84; Jeanne Haffner, *The View from Above: The Science of Social Space* (Cambridge, MA: MIT Press, 2013); Mark Monmonier, ‘Aerial Photography at the Agricultural Adjustment Administration: Acreage Controls, Conservation Benefits, and Overhead Surveillance in the 1930s’, *Photogrammetric Engineering and Remote Sensing* 68, no. 11 (2002): 1257–61.

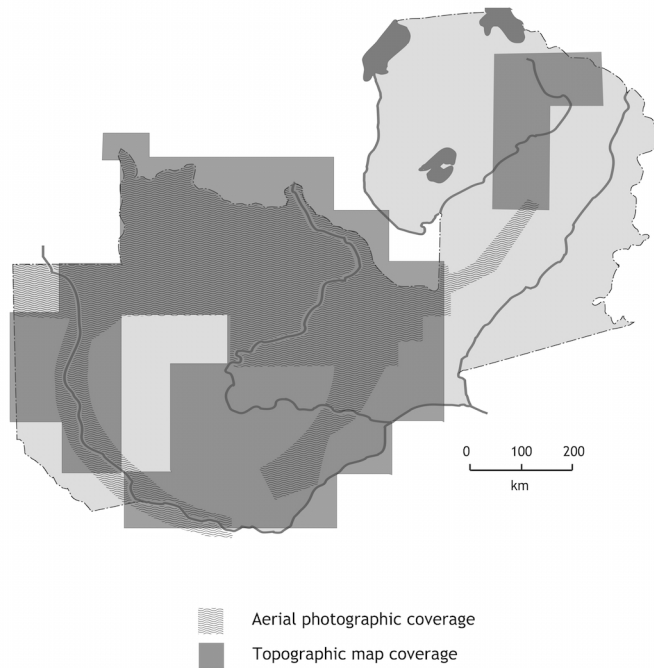


Figure 4: Aerial photography carried out in Northern Rhodesia, 1927-1931, against topographic mapping at 1:250,000, 1928-1955

Adapted from: Pullan, R. A. 'The History and Use of Aerial Photography in Zambia.' *Zambia Geographical Journal* 31 (1976):33-52 and Pullan, R. A. *A First Checklist of the Published Maps of Northern Rhodesia, 1890-1949*. Lusaka, Zambia: Zambia Geographical Association, 1978.

The chapter explores this question in four sections. The first section examines the context within which aerial photographic technologies arrived in the colony: mineral prospecting. The second section examines the effect of the AOC's commercial strategies on the subsequent deployment of aerial photography in Northern Rhodesia. The third section considers the narratives (historical and contemporary) that describe colonial conceptual frameworks for identifying and organizing resources. The chapter concludes by examining how these perspectives challenge or disrupt predominant narratives about topographic mapping and the construction of state-space. As I elaborate in the third section, the approach of this chapter diverges strongly from existing historical descriptions of the AOC's work in Northern Rhodesia. Those accounts situate aerial photography at the nexus of scientific investigation and the extension of governmental control over environment and peoples.¹³ Here, by contrast, the work of the AOC serves to reveal a relationship between the perceived value of

¹³ Peder Anker, *Imperial Ecology: Environmental Order in the British Empire, 1895-1945* (Cambridge, MA: Harvard University Press, 2001); Peter Adey, *Aerial Life: Spaces, Mobilities, Affects* (Oxford, UK: Wiley-Blackwell, 2010); Tilley, *Africa as a Living Laboratory*.

topography and the anticipated value of territory that was both dynamic and reciprocal.

Teleologies of cartography: mapping and the pre-history of the modern state

We need to consider cartography with the same critical spirit given to the spread of modernity and of capital. Yet instead cartography is told teleologically. In histories that consider the *raison d'être* of colonial cartography, the dominant tendency is to see it as a mechanism for overturning pre-colonial spatial practices and establishing a new modern spatial order. This can be seen strongly, for example, in Matthew Edney's account of the East India Company's Survey of India; Timothy Mitchell's depiction of cartography in nineteenth-century colonial Egypt; in the dislocation of colonial cartographic principles into Siam as described by Thongchai Winichakul; and more recently in Raymond Craib's investigation of modern cartography in Mexico.¹⁴ So whilst technical studies of cartography tend to draw out the differences between varieties of maps and mapmakers, these contextual studies of late nineteenth- and early twentieth-century colonial cartography tend to frame all government mapping activity within the context of a singular, unified outcome: the consolidation of centralised, distanced power. Although, for example, in *Cartographic Mexico* (2004) Raymond Craib elaborates a diversity of mapping projects, emphasis is placed on the ways in which successive regimes *intended* to break with the one before, and produce diachronic spatialities or 'fixations'.¹⁵

This tendency has been somewhat compounded by the success of the literature on mapping in South-East Asia where this characterisation of the relationship between cartography and centralised power is particularly apt. Studies of colonial rule in this region have given us evidence of how cartographic practices served the centralised organisation of forestry, the implementation of a cadastre, and the creation of a cartographic icon that cohered 'an' Indian identity.¹⁶

¹⁴ Edney, *Mapping an Empire*; Mitchell, *Rule of Experts*; Thongchai Winichakul, *Siam Mapped: A History of the Geo-Body of a Nation* (Honolulu, Hawaii: University of Hawaii Press, 1994); Raymond B. Craib, *Cartographic Mexico: A History of State Fixations and Fugitive Landscapes* (Durham, NC: Duke University Press, 2004).

¹⁵ Craib, *Cartographic Mexico*.

¹⁶ Agrawal, *Environmentality*; Gregory Barton, 'Empire Forestry and the Origins of Environmentalism', *Journal of Historical Geography* 27, no. 4 (2001): 529–52; Edney, *Mapping an Empire*; Bernardo A. Michael, 'Making Territory Visible: The Revenue Surveys of Colonial South Asia', *Imago Mundi* 59, no. 1 (2007): 78–95; Benedict Anderson, *Imagined Communities: Reflections on the Origin and Spread of Nationalism* (London, UK: Verso, 1983); Sumathi Ramaswamy, 'Maps and Mother Goddesses in Modern India', *Imago Mundi* 53 (2001): 97–114.

Although this literature offers many insights, it is difficult to observe a strong desire for ‘modern’ spatial order in colonial Northern Rhodesia. In 1936, when Brigadier Winterbotham, Director General of the British Ordnance Survey, addressed the British Association for the Advancement of Science, he went so far as to suggest that his audience was witnessing a “cycle of indifference [to mapping]”.¹⁷ We are not used to accounting for governmental ‘indifference’ to modern cartography. How should we do so? Retrospectively, Jeffrey Stone has suggested that British apathy towards colonial mapping in this period stemmed from confidence in the long-term nature of colonial rule.¹⁸ This offers us part of an explanation (a temporal framework for defining cartographic value) but not the whole. In 1936, Brigadier Winterbotham reached the conclusion that, despite global financial depression, the imperial government considered itself, “rich enough to survive the handicap of inadequate mapping”.¹⁹ Whilst his claim was deliberately provocative, it seems to be closer to the mark.

The contextual studies of colonial cartography that speak to ‘spatial ordering’ tend to frame its economic potential within the aims of a Foucauldian governmental state.²⁰ Thus, for example, Craib argues that in Mexico, in the late 1880s, the government used cartography to frame the country as a coherent, stable site for investment.²¹ For Mitchell the mapping of Egypt served to render a fiscal landscape more efficiently in the effort to counter intransigent national debt.²² The intensity of cartographic activity between the years 1927 and 1931 that we will examine here seems to speak to a ‘gestural governmentality’ that would blossom into more substantial bureaucratic territorial management.²³ However, this is not supported by the longer-term view of topographic production. On the contrary, when considering the topographic production over a longer period up to 1955 (Figure 3), it seems that earlier economic attitudes to imperial territories in tropical Africa prevail, in which it was anticipated that the influx of private capital would organically produce profit from the innate

¹⁷ Winterbotham, ‘Mapping of the Colonial Empire’, 102.

¹⁸ Stone, *A Short History of the Cartography of Africa*, 107.

¹⁹ Winterbotham, ‘Mapping of the Colonial Empire’, 102.

²⁰ Crampton and Elden, *Space, Knowledge and Power*.

²¹ Craib, *Cartographic Mexico*.

²² Mitchell, *Rule of Experts*.

²³ Matthew G. Hannah, *Governmentality and the Mastery of Territory in Nineteenth-Century America* (Cambridge, UK: Cambridge University Press, 2000), 37.

natural wealth of the continent.²⁴ I would argue that, whilst the patterns of Northern Rhodesian topography could be seen to reflect political miscalculation or hesitance, they are better understood as resulting from a temporary injection of capital into mapping, within the framework of British imperial government in the late 1920s and early 1930s that had an extremely *laissez-faire* attitude to resource management.

In sum, I propose that the isolated blocks of mapping in Figure 3 do not represent a monolithic, homogeneous spatial order, or the absence of a spatial order, but rather a spatial interest that was *tactical*. Above all, these topographic maps did not anticipate economic activity but were produced in the wake of relatively unregulated commercial activity, *post hoc*. From this perspective, the analytical benefit of the ‘cartographic economy’ becomes clearer. To understand the role of these maps in the history of the colony we need to address the contingencies and specificities of their creation, and the diversity of forces in play. We begin with a detailed history of *Block A*, mapping that resulted from the first aerial photographic project in the colony, which allows us to introduce the history of anticipated value and investment in colonial cartography, and how these were altered by coppermining.

Pledging the future: cartography, investment, and risk

The Arrival of Aerial Photography

In the very first weeks of 1927, the AOC arrived in Northern Rhodesia. Their ‘African Expedition’ was by no means a simple undertaking. The forest and shrubs that covered the larger part of the area they were commissioned to fly required the new, two-motor planes—aircraft that could fly for longer distances without risk of making forced landings.²⁵ Their client would not, however, wait for the several months these planes would take to commission and build; instead it was decided to construct emergency landing grounds in the bush at 20-mile intervals.²⁶ This required a considerable amount of manual work, towards the costs of which the government agreed to contribute, and local administrators recruited African labour to hack and burn out the bush.²⁷ The company’s two aeroplanes did not come by air in the manner

²⁴ Cyril Ehrlich, ‘Building and Caretaking: Economic Policy in British Tropical Africa, 1890-1960’, *The Economic History Review* 26, no. 4 (1973): 649; Sally Herbert Frankel, *Capital Investment in Africa: Its Course and Effects* (Oxford, UK: Oxford University Press, 1938); Tilley, *Africa as a Living Laboratory*.

²⁵ ‘Air Survey: Rapid Progress of Unsubsidized Enterprise’, *The Times*, 7 January 1928, sec. Trade and Engineering Supplement.

²⁶ *Ibid.*

²⁷ ‘Annual Report, Survey Department of Northern Rhodesia’, 1927, CO799/3, NA UK.

of spectacular Cape-to-Cairo ‘show’ flights of the previous years.²⁸ They came in pieces along with the team and all their equipment. The group travelled from England to South Africa on the steamer *Kenilworth Castle*, moved north by train to the Copperbelt, then made the last stages of the journey by motor car, Ford lorry (see Figure 5), and occasionally by raft.²⁹



Figure 5: Air Survey arrives in Northern Rhodesia, by motorcar

From: “Commercial Air Surveying,” *Aeroplane*, May 18, 1927. Reproduced with kind permission of Key Publishing Ltd.

Once in-situ, the company set up an elaborate field-base. The company’s team consisted of eight Europeans: two pilots (one of whom was also the team-leader, Major William John Charles Kennedy-Cochran-Patrick), alongside photographers, and mechanics.³⁰ Their camp included an aircraft hangar, an engine and carpenter’s workshop (with additional watchmaker’s tools for the repair and adjustment of delicate instruments), a large photographic building with camera stores and a repair workshop, a development room, a washing and drying room, an enlarging and printing room, a chemical store and mixing room, and a room that held the special lighting set required

²⁸ Alan J Cobham, *My Flight to the Cape and Back* (London, UK: A. & C. Black Ltd., 1926); ‘Cape-to-London’, *Flight*, 18 March 1926.

²⁹ ‘Commercial Air Surveying’, *Aeroplane*, 18 May 1927.

³⁰ J. McAdam, ‘The Flying Mapmakers: Some Notes on Early Developments of Air Survey in Central and Southern Africa’, *Rhodesiana* 30 (June 1974): 44–64.

for the volume of printing.³¹ In addition to this was a drawing office, where the photographs were stored, sorted, and fitted together. Finally, of course there were the living quarters of the men involved.³²

In addition to being large in scale, the 'African Expedition' represented the vanguard of various kinds of technology. Colonel Hoare, technical advisor on equipment to the Union Air Force suggested that the AOC were:

Working with the most advanced apparatus of its kind in existence... improving their instruments and their technique every day... [And they] have beautifully equipped workshops where they can manufacture instruments to meet special needs.³³

Another witness to the survey described how the sounds of German opera could be heard coming from the AOC base camp in the bush, echoes of what was probably the first radio transmission from Europe to be received in Northern Rhodesia.³⁴

The translation of modernity—laboratories, high-capital technologies, networked equipment—into the border regions of Northern Rhodesia was not a given. How did that happen? And at what cost? The following section outlines the strategies for geographic representation that were being deployed before the arrival of the AOC, and then considers how these were affected as the Northern Rhodesia cartographic economy structured itself around a new, efficient, but expensive mode of data collection.

Territory, visualization, and value: Northern Rhodesia up to 1927

If we are to consider how investment in territorial visualisation was shaped by the risks and rewards, we need to reconsider the early history of cartography and mineral prospecting within the same framework. How was the value of territory defined in Northern Rhodesia and what role did visualisation play in that process? In considering these questions it must be remembered that British interests in the region (between 1890 and 1924) were administered by a shareholder-owned business. This was an expansion of the British Empire financed by private individuals, and not the state. The

³¹ Ibid.

³² Ibid.

³³ *Bulawayo Chronicle*, May 21, 1927, cited in Ibid.

³⁴ Joseph Austen Bancroft and T. D. Guernsey, *Mining in Northern Rhodesia: A Chronicle of Mineral Exploration and Mining Development* (Salisbury, Southern Rhodesia: British South Africa Company, 1961).

administration of the territory was clearly managed with the goal of producing profit, as Wilson Fox, Director of the BSAC outlined in 1910:

The problem of Northern Rhodesia is not a colonization problem. It is . . . the problem of how best to develop a great estate on scientific lines so that it may be made to yield the maximum profit to its owner³⁵

Realisation of that profit was inhibited however, by indecision about exactly *how* to do this. For a reader today, the terms ‘scientific lines’ might imply extensive mapping, but the lack of long-term plans made it difficult to prioritise projects or justify expenditure of cartography.³⁶ So although in 1910 in both North-Eastern Rhodesia and North-Western Rhodesia, survey ‘departments’ had been established, their data set was largely the result of the work of diverse other bodies.³⁷ In 1918, when the War Office began a new continental map, it was noted rather sourly that for the greater part of the British territories in Africa a scale of 1:2 million was, “adequate to represent existing material”.³⁸ This was squarely the case for most of Northern Rhodesia. After some debate, in 1924 Northern Rhodesia was sold back to the Crown by the BSAC. The BSAC had failed to make any profit for their shareholders until this point, but received £3,750,000 by way of compensation for their work in establishing an administrative structure, laying out the skeletons of transport and communication networks, drawing three-and-a-half-thousand settlers to the colony, and their efforts to transform the African population into a workforce.³⁹ The British government had different priorities, means, and modes of investment and perhaps a longer-term view of territorial value, but the Colonial Office was tied to a Treasury that was very reluctant to release funds or guarantee debt.⁴⁰ As a result the new administration had meagre resources to invest in realising that value. The British government instated a Governor, and took over the payroll, but otherwise the bureaucracy of Northern Rhodesia seems to have remained intact from the BSAC regime. In the case of

³⁵ Slinn, ‘Commercial Concessions and Politics During the Colonial Period the Role of the British South Africa Company in Northern Rhodesia 1890–1964’, 371.

³⁶ ‘Annual Report, Public Works Department of Northern Rhodesia’, 1926, CO799/2, NA UK.

³⁷ C. J. Hazard, ‘Recollections of North-Western Rhodesia in the Early 1900’s (Part II)’ 4, no. 1 (1954): 54; Stone, *A Short History of the Cartography of Africa*, 70; Donaldson, ‘Marking Territory.’

³⁸ Arthur R. Hinks, ‘Notes on the Construction of a General Map of Africa, 1/Two Million’, *The Geographical Journal* 52, no. 4 (1918): 218–33.

³⁹ Gann, *A History of Northern Rhodesia*, 191.

⁴⁰ Michael Havinden and David Meredith, *Colonialism and Development: Britain and Its Tropical Colonies, 1850-1960* (London, UK: Routledge, 1993).

cartographic expertise, the Crown inherited a Survey department with just seven surveyors for 290,000 square miles of territory, and very little geographical information available to assist with the management of the colony.⁴¹ From London the survey of Northern Rhodesia was seen to be in a “most chaotic state”.⁴²

With all these factors in mind, the map of ‘work done’ by the Survey Department in 1927—three years after Northern Rhodesia became a Crown Colony (Figure 6)—is telling but not surprising. The European field staff had increased to nine, but even so the ground they could cover that year figures only as thin scattered scrawls of red ink.⁴³ Annotation by the department shows what their work consisted of: largely it was the demarcation of farms, the marking out of roads, and some work on the ‘internal’ boundary with Nyasaland. The intervention by the AOC had, by contrast, dramatic and large-scale results. By 1929, the *Annual Report of the Survey Department* could record that one-fifth of the Northern Rhodesia had been photographed.⁴⁴ Aerial photography would seem to have offered a rapid effective solution to the slow accumulation of topography possible in constrained circumstances by a small staff, but it did not, in fact, resolve these problems straightforwardly or completely.

⁴¹ ‘Annual Report, Survey Department of Northern Rhodesia’, March 1925, CO799/1, NA UK.

⁴² ‘Northern Rhodesia (Tribal Lands); Commons Sitting, British Empire Exhibition’, *House of Commons Debate 19 May 1924 Vol 173 cc1821-2*, accessed 19 July 2015, http://hansard.millbanksystems.com/commons/1924/may/19/northern-rhodesia-tribal-lands#S5CV0173P0_19240519_HOC_225.

⁴³ ‘Annual Report, Survey Department of Northern Rhodesia’, 1927.

⁴⁴ ‘Annual Report, Survey Department of Northern Rhodesia’, 1929, 435, CO799/5, NA UK.

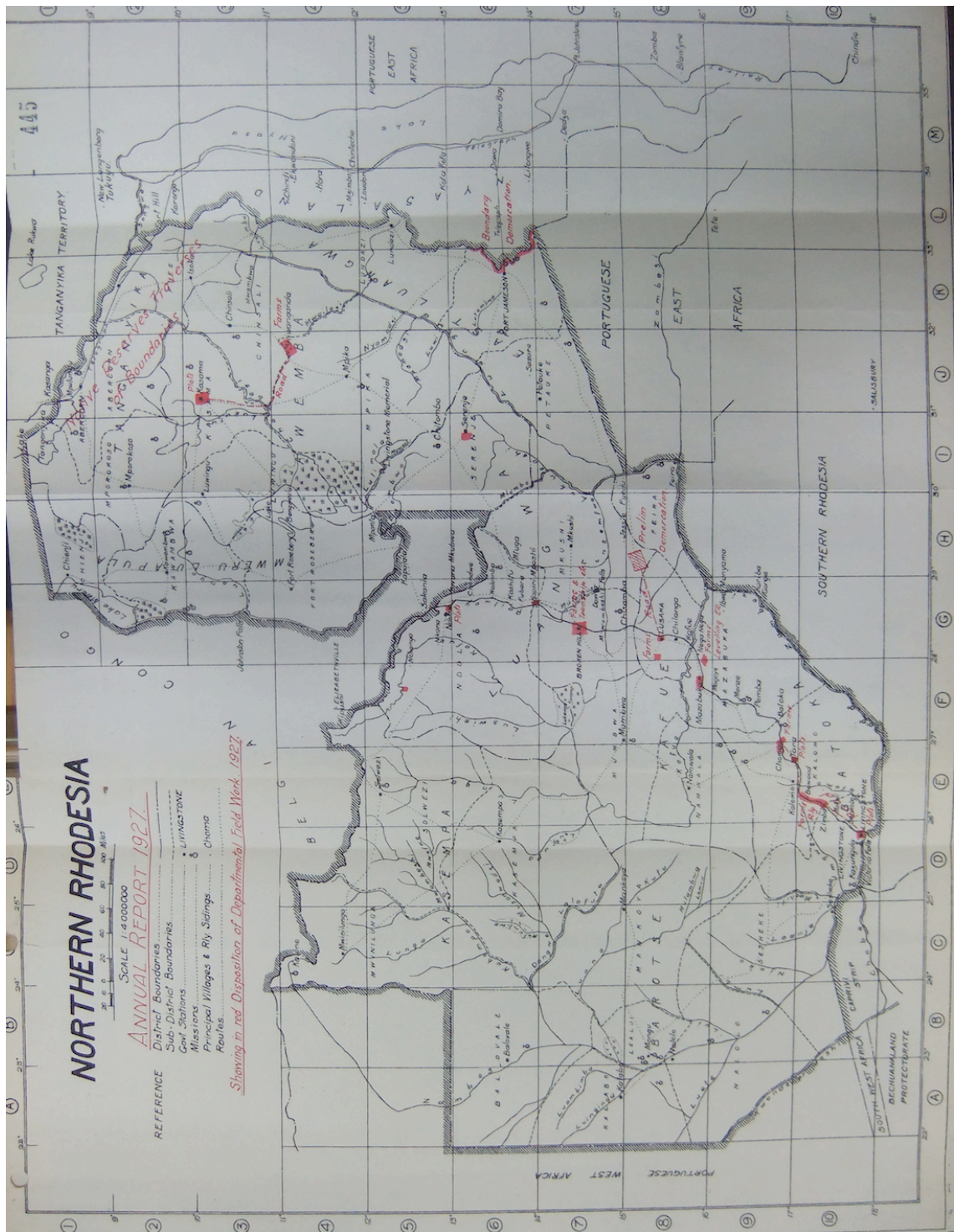


Figure 6: 'Work done' by the Survey Department, Northern Rhodesia, 1927

Map inserted into the Annual Report of the Survey Department for 1927. This represents some boundary demarcation (e.g. 6N), some road measurement (e.g. 8G) and the cadastral survey of farms such as at (7G).

Hartland, K. W., 'Northern Rhodesia [Survey Department, Work Done 1927]', 1:4,000,000. Northern Rhodesia: Survey Department, Northern Rhodesia, (manuscript annotation showing survey work by the department 1927), 1927. Enclosed in the Annual Report of the Survey Department, CO799/3. Reproduced under license from NA UK. Not reproduced at full size.

Locating minerals

The relative value of land in Northern Rhodesia met with a dramatic change from the mid 1920s, when the colony began to arouse the interest of international mining corporations. This heralded a great deal of cartographic activity, born of three interconnected motives. Firstly, the potential value of deposits required property and concession boundaries to be demarcated at a greater level of precision, thus activating the value of cartographic records: “A country with a valuable mining industry cannot afford to be careless of inches”.⁴⁵ Secondly, was the mapping that facilitated the expansion of related infrastructure, such as roads, townships, and hydroelectric schemes. Thirdly, and most importantly, was the mapping related to the discovery of minerals. The nature of the copper deposits in Northern Rhodesia (large, but quite far below the surface, and of quite a low grade) necessitated the identification of wider geological patterns.⁴⁶ Thus systematic prospecting and mapping was carried out across vast stretches of territory, to trace underlying strata.

Tomas Frederiksen has recently investigated the techniques used to visualise Copperbelt ore.⁴⁷ Frederiksen identifies the new intensive and systematic forms of documentation involved in making the copper deposits ‘legible’ to the headquarters of the mining companies in London. This documentation, which bypassed government and went straight to the boardrooms, allowed mining engineer-financiers to decide how to locate boreholes, and where to begin exploitation. However, Frederiksen implies that expenditure on geographical knowledge production—according to retrospective assessments this reached more than £470,000 between 1926 and 1934—can be taken for granted.⁴⁸ I propose that these decisions to invest in territorial visualisation need more careful consideration. First, how did the companies justify the considerable initial cost of the *knowledge production* itself? Second, how far did scientific knowledge intersect *with other factors* to determine the likelihood of investment? The choices of the large concession companies in technologies and methods for mapping their claims need to be considered within the companies’ expectations, their available funding, and their particular temporal obligations.

⁴⁵ Worthington, *Science in Africa*, 30.

⁴⁶ Bradley, *Copper Venture*.

⁴⁷ Frederiksen, ‘Seeing the Copperbelt.’

⁴⁸ As calculated in, Bancroft and Guernsey, *Mining in Northern Rhodesia*, 90.

The AOC's 'African Expedition' was commissioned by the Rhodesia Congo Border Concession Ltd. (RCBC) for the purposes of prospecting. Yet, the decision to commission aerial photography was not without risk.⁴⁹ The principal aim of the air survey was "spotting the 'mineral dambos' that were expected to accompany the outcrops of all the copper orebodies of the region".⁵⁰ It was also hoped the survey might find remains of old African copper workings. In 1927 it was not certain that the photography could yield these results. So why was the RCBC prepared to risk bringing the AOC to Northern Rhodesia?

A lacuna at the heart of this story is that the archival record contains no direct evidence as to how the RCBC's 1927 decision to use aerial photography came about. None of the Company staff seems to have been particularly anxious to take credit for it. It seems unlikely that the British South Africa Company initiated the decision, as they refused to give the AOC assistance when they were constructing their base in Central Africa the following year.⁵¹ Robert Pullan suggested that it was the successful use of aerial survey for geological work in North America that prompted the choice. This seems a plausible (albeit vague) answer.⁵² The RCBC formed part of the portfolio of the Selection Trust, a company controlled primarily by the American Alfred Chester Beatty. Many of the mining engineers arriving in the region had begun their careers in North and South America, and some had possibly had previous experience of the successful use of aerial survey in prospecting in those locations.⁵³

Whatever the lost details of this decision, it can be framed within the attributions of rights and modes of mineral investigation that characterized the nascent mining industry in Northern Rhodesia. The allocation of mineral rights is one of the clearest ways of 'producing' financial value from tracts of land. However the relationship between territorial representation, the allocation of rights, and the realisation of value is not a fixed one. Changing policies about the definition of those rights affected what

⁴⁹ H. Hemming, 'Air Surveying in Rhodesia', *AIRWAYS*, December 1927.

⁵⁰ Donald Gill, 'Aerial Survey in Relation to Economic Geology', *The Journal of the Royal Aeronautical Society* 37 (1933): 227–54; 'Progress in Northern Rhodesia', *Aeroplane*, 21 August 1927.

⁵¹ J. McAdam, 'The Birth of an Airline: The Establishment of Rhodesia and Nyasaland Airways', *Rhodesiana* 21 (December 1969): 36–50.

⁵² Pullan, 'The History and Use of Aerial Photography in Zambia.'

⁵³ London Office, Selection Trust to Nicolaus, Selection Trust Manager, Northern Rhodesia, 'RE: Monthly Report, Muliashi', 19 January 1928, ST/G/1, London School of Economics, Special Collections (hereafter LSE). Bancroft and Guernsey, *Mining in Northern Rhodesia*. 'Records of Alfred Chester Beatty, Candidate Information (1915-1932)', ST/ACB/171, LSE.

needed to be known, how quickly, and what kinds of resources were appropriate to invest in exploration. These varied widely in the early years of colonial rule.

Since the BSAC's earliest negotiations with local chiefs, the acquisition of mineral rights had formed a central political goal. Although the geographical limits and permanence of these early agreements were later disputed, once considered sufficiently solid, they were immediately put into practice. Between 1895 and 1905, on the basis of their treaties, the BSAC issued thirty prospecting licenses and agreements to European prospectors. These licenses were one of two types: either they gave exclusive rights to prospect a large area within a limited period, or, alternatively, they gave the right to exploit a specific number of claims from areas that were believed to be mineralised.⁵⁴ In the earliest years, prospecting activities were often carried out by companies that were formed specifically for that purpose. The documents of incorporation of these companies carried geographical terms. So it was, for example, with Tanganyika Concessions Ltd., formed with

The initial object of exercising (1) the right of locating and registering, within a period of two years from November 1898, an area of 2,000 sq. miles in any part of The British South Africa Company's territory North of the Zambezi river and the exclusive right of prospecting for a period of two year from the date of registration of the area, and (2) the right of pegging 1,000 claims on any open ground either within or without the boundaries of the above area.⁵⁵

These companies drew on funds from shareholders (and were often part of existing mining cartels), in order to invest fairly heavily in the investigation of the territory. They commissioned relatively large-scale expeditions, such as the two-year exploratory mission that departed in 1901 with "fifteen Europeans, including a medical doctor, a geologist, an accountant, a surveyor and several miners and prospectors, as well as about fifty porters, one hundred oxen, numerous wagons and some donkeys".⁵⁶ These corporate expeditions started tracing and notating their own routes through Northern Rhodesia, but were generally not particularly successful in locating minerals. The map (Figure 7) following the course of an expedition financed by Tanganyika Concessions from the first years of the twentieth century gives an impression of both the erratic movement of the prospecting group, and their reliance on existing routes through the territory.

⁵⁴ Bancroft and Guernsey, *Mining in Northern Rhodesia*, 55.

⁵⁵ *Ibid.*, 49.

⁵⁶ *Ibid.*, 50.

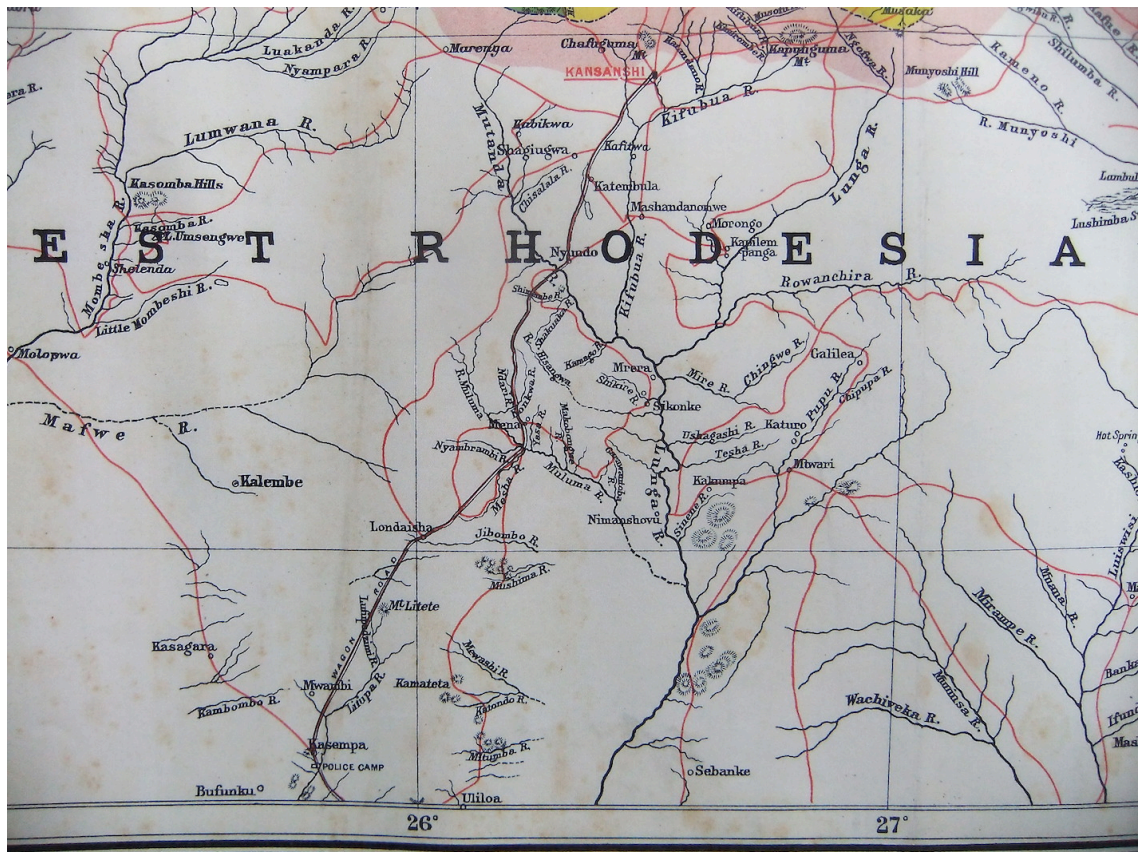


Figure 7: A prospecting map from early 1900s

Tanganyika Concessions, Ltd. “*Tanganyika Concessions, Ltd. Mr George’ Grey’ map showing Exploration & Discoveries to Sept 30th 1902,*” 1:1,000,000. London, UK: Edward Stanford, 1903. Held at RGS mr Congo (D.R.) S.45. Not reproduced at full size.

This large-scale prospecting contrasts with the kind of investigation that was encouraged by a Mining Proclamation of 1912. This proclamation introduced a cheap prospecting licence (£1) that would allow the registered owner to search for mineral prospects anywhere in the territory that had not already been reserved.⁵⁷ The BSAC were hoping to encourage a different form of prospecting, carried out by the “type of man most likely” to discover minerals.⁵⁸ This ‘type’ was not a technical or scientific expert but men later nostalgically described by a geologist as, “shrewd, honest, resourceful... simple, honest and indefatigable”.⁵⁹ Their talent (the geologist claimed), did not lie in geographical skill, but rather in negotiation

⁵⁷ Bancroft and Guernsey, *Mining in Northern Rhodesia*.

⁵⁸ Bradley, *Copper Venture*, 56.

⁵⁹ *Ibid.*, 66. The biography of one of such prospector encompassed a childhood in Dorset, work as a prison warden in Cape Town, farming, prospecting, then mine management. *Ibid.*; Michael Gelfand, *Northern Rhodesia in the Days of the Charter: Medical and Social Study, 1878-1924* (Oxford, UK: Basil Blackwell, 1961).

A friendly face, a little humour now and then and a supply of beads, calico, and tobacco as presents to selected individuals were more important than geological knowledge and a prospecting pick.⁶⁰

As Frederiksen has observed, geographical documentation of these early investigations and claims certainly was not building up systematic topographic or geological knowledge.⁶¹ The cartographic results of these investigations (if any) were lines, routes, small sites.

This phase of policy was also unsuccessful in generating new prospects, and after 1922 the BSAC decided to change their policy in the hope of finding a more efficient means of producing industry from the mineral stuffs speculated to exist.⁶² The BSAC decided to return to granting exclusive rights over large areas to ‘responsible mining interests’ that would be able to carry out more thorough and systematic investigations and in which the BSAC itself would hold a stated allotment of shares.⁶³ These concession companies had to spend a minimum amount each year on investigating their concession, and could then either use (as before) a certain number of claims or, alternatively, take up certain smaller areas of ‘Special Grants’ for more thorough investigation.⁶⁴ This policy set up an entirely new relationship between expenditure, geographical knowledge, the potential value of the land, and the time frame of its realization. Whilst, according to Stone, the Northern Rhodesian government were possibly experiencing a *lack* of temporal incentive to map the colony, the concession companies were under pressure to produce profit rapidly. The vast scale of these concessions and the short time limit for investigating, together with a greater understanding of the region’s mineralization, created a new context for the production of geographical knowledge.⁶⁵

⁶⁰ Bancroft and Guernsey, *Mining in Northern Rhodesia*, 63.

⁶¹ Frederiksen, ‘Seeing the Copperbelt.’

⁶² Bradley, *Copper Venture*.

⁶³ Slinn, ‘Commercial Concessions and Politics During the Colonial Period the Role of the British South Africa Company in Northern Rhodesia 1890–1964.’

⁶⁴ London Office, Selection Trust to Nicolaus, Selection Trust Manager, Northern Rhodesia, ‘Special Grant Survey’, 21 February 1928, ST/G/4, LSE.

⁶⁵ M. W. Ellis et al., ‘Exploration’, in *The Geology of the Northern Rhodesian Copperbelt.*, ed. F Mendelsohn (London: MacDonal, 1961), 166–212; John Phillips, ‘Alfred Chester Beatty: Mining Engineer, Financier, and Entrepreneur, 1898–1950’, in *Mining Tycoons in the Age of Empire, 1870–1945: Entrepreneurship, High Finance, Politics and Territorial Expansion*, ed. Raymond E. Dumett (Farnham, UK: Ashgate Publishing, Ltd., 2009), 215–38.

This context meant that the concessions could only be taken on by large businesses that had sufficient credentials to raise large funds on the stock market. In 1922, the first of these large areas was awarded to Copper Ventures, subject to the formation of a syndicate of £150,000 in £1 shares with a cash working capital of £45,000 and an annual expenditure of a minimum of £9,000.⁶⁶ The syndicate was registered in 1923 as the Rhodesia Congo Border Concession Ltd. and was awarded an area of 50,000 square miles of prospecting rights for a period of five years. Its western boundary was the frontier with Portuguese West Africa, and its approximate southern boundary was the 14th parallel of southern latitude. The vast scale of the RCBC territory can be seen from the map in Figure 8 which shows it against the landmass of Southern Africa, appearing (in European terms) closer to the size of a nation-state than an estate.⁶⁷ During the five-year concession period, the RCBC had exclusive prospecting rights and aimed to locate specific areas for which it then had the option to secure exploitation rights. From this first concession grant, others rapidly followed.

Considering the activities of the RCBC in the early stages of prospecting gives us two key insights into the relation between value and visualization. Firstly, it allows us to see that the systematic 'modern' visualization described by Frederiksen was built on very 'pre-modern' foundations. In the first phases of gathering information the RCBC often reacted abruptly, and with large sums of money, to information that was far from solid. The role of their local managers 'on the ground' in Northern Rhodesia was not only that of technical expert. The managers' correspondence shows that these men shared qualities with the lone prospectors; they were attentive gatherers of information of all sorts and careful persuaders. This is particularly evident in the series of letters dating from 1926 with numerous occurrences of statements such as:

⁶⁶ Bancroft and Guernsey, *Mining in Northern Rhodesia*.

⁶⁷ The RCBC area was in fact larger than are 99 of the 193 countries that currently hold seats in the United Nations.



Figure 8: The RCBC Concession area

Map produced for their own report. Rhodesia Congo Border Concession Ltd., “*Map of Southern Africa*” 1 inch to 300 miles. November 25, 1925), ST/G/47, LSE. Reproduced with kind permission of LSE Special Collections. Not reproduced at full size.

While at Ndola I met the man who did the work there and from what he says the geology is quite like that of Roan... I put Parker on to this man and he will get all possible information.⁶⁸

Mr Horner informs me that there is a man called J. G. McDonald who lives at Madonna in the Serenje District. He knows all about the minerals in the country but is quite untrustworthy. He is very well liked by the natives.⁶⁹

The concession was, after all, 12,000 square miles and only valid for five years.

Working simply from ‘left-to-right’ was thorough, but only justifiable if it were likely to yield success. Later, more thorough investigations, were based on a first survey or

⁶⁸ Geppert, R.M to London Office, Selection Trust, ‘Report on Roan Antelope and Rietbok’, 14 May 1926, ST G/29, LSE.

⁶⁹ Selkirk to London Office, Selection Trust, ‘Report on Serenje Concession’, April 1926, ST G/29, LSE.

parsing of the region through the managers' roaming visits and their collection of rumour and gossip.

The second observation we can draw from the activities of the RCBC is that the mining companies were making profit at multiple layers. Chairman of the RCBC, Alfred Beatty, was described by the President of the Institution of Mining and Metallurgy in London as a man of 'far-sighted vision'.⁷⁰ This far-sightedness related not only to mining knowledge, but also to market acumen. Mine engineers had emerged as a new form of expert in the nineteenth century.⁷¹ Beatty was typical of a new and yet more specific 'type' in the industry: the mining engineer-financier.⁷² Ostensibly, the mining engineers were reducing the risk of mining investment by creating more solid, reliable knowledge about potential ore-bodies and their extractability. The credibility of this form of 'expertise' has, however, been rigorously contested. Ian Phimister and Jeremy Mouat, for example, suggest that increased scientific knowledge served to allow investors to cushion themselves from the uncertainty of mineral deposits by marshalling shareholders' money through several different layers of companies. The activity of mining-engineers meant risk was "reconfigured, rather than reduced".⁷³ As Herbert Hoover (erstwhile mining engineer) explained,

A mine might be capitalised at £1,000,000—the Insiders might sell it to the Outsiders for this amount—but the 'economic' investment in it might be only £120,000. Now, what if the mine completely failed; would the £880,000 difference be considered an economic loss? No, argued Hoover, this amount would only have been transferred from one party to another. For that matter, from an economic point of view, this £880,000 of capital in the hands of the Insiders was often invested to more reproductive purpose than if it had remained in the hands of the idiots who parted with it.⁷⁴

The time and money spent in assessing the potential of a mine was an increasingly important way of creating profit for the 'insiders'. In an industry that was based on

⁷⁰ Bradley, *Copper Venture*, 99; Phillips, 'Alfred Chester Beatty: Mining Engineer, Financier, and Entrepreneur, 1898-1950', 217.

⁷¹ Ian Phimister and Jeremy Mouat, 'Mining, Engineers and Risk Management: British Overseas Investment, 1894-1914', *South African Historical Journal* 49, no. 1 (2003): 1-26.

⁷² Phillips, 'Alfred Chester Beatty: Mining Engineer, Financier, and Entrepreneur, 1898-1950.'

⁷³ Phimister and Mouat, 'Mining, Engineers and Risk Management', 4.

⁷⁴ Hoover, 'Economics of a Boom', *Mining Magazine*, May 1912, as cited in Nash, *Hoover: The Engineer*, 480. In Phimister and Mouat, 'Mining, Engineers and Risk Management.' 26.

complex distributions of shares across a broad base, and the careful distribution of knowledge across a very different one, the value of *knowledge about the concession* was being produced separately from the value of the *concession itself*. The cartography generated between the years 1922 and 1932, as the large syndicates investigated and developed their claims, must be considered in this manner.

This combination of time-pressure, geographic scale and high capital, was a context that allowed for experiments into innovative, alternative ways to locate the sites of most value within the RCBC concession. It was in these conditions that the AOC were brought all the way to Central Africa. The cost of the aerial survey for the RCBC is recorded only as being a 'major expenditure', but it can be compared to the cost of other prospecting methods in place at the time.⁷⁵ A failed foray into electrical prospecting carried out by the RCBC in 1926 had cost £10,000.⁷⁶ Equally large sums were being invested into 'regular' ground survey. The Loangwa Concession Company, also in Northern Rhodesia, spent £21,000 in 1927 on pedestrian fieldwork, with a staff ranging from nineteen to twenty-five geologists and two prospectors.⁷⁷ Between 1927 and 1934, the pedestrian field staff from the RCBC mapped 39,900 square miles.⁷⁸ According to Bancroft's estimates, over twelve years the Concession companies in Northern Rhodesia carried out ground survey of 95,000 square miles at a cost of £471,181 (or £3,650 per month).⁷⁹ Aerial photography draws historical attention, however, amongst the heady figures representing the other investigations of the Concession companies, the 52,000 square miles covered by the AOC in 1927 is not quite as spectacular as it might seem. Despite even the 'major' expenditure of importing aeroplanes, setting up a base camp, and carrying out a year of intense photographic work, the AOC's survey would have only represented a fraction of the total spending on geographic visualization during the period.

All of the above represent an enormous contrast to the resources that the colonial government allocated to survey. Through a combination of techniques, maps were being produced by the Concession Companies at a rate and cost that dwarfed the efforts of the colonial survey department, and its nine staff whose expenditure in 1927

⁷⁵ Bancroft and Guernsey, *Mining in Northern Rhodesia*, 85.

⁷⁶ *Ibid.*, 86.

⁷⁷ *Ibid.*, 96.

⁷⁸ *Ibid.*, 88.

⁷⁹ *Ibid.*, 90.

was only £5,812 on salaries and £142 on instruments.⁸⁰ Despite (or because of) this intense activity, the Northern Rhodesian government did not invest in a cartographic framework that actively facilitated or regulated the activities of the mining companies. Those companies (under occasional inspection) literally drew up their own maps. This *laissez-faire* attitude towards the 'spatial ordering' of resources is particularly well characterized by the fact that the colony did not instate a geological department until 1950 despite the fact that the value of Northern Rhodesia's mineral exports increased from £52,000 per year to nearly £4.5 million per year between 1913 and 1935.⁸¹

The bounding of the concession areas at this immense scale, and the imposition of time limits on investigations, provoked a rapid investment of capital into Northern Rhodesia. This investment served to create a quantity and detail of mapping that was unprecedented—a visualization of the territory that would serve to increase the value of the land in question, and enrich the mining conglomerates regardless of whether copper was present or not. It is clear that private industry had the financial resources to produce a layering and density of territorial and geographical knowledge that it was not possible for the state to equal or emulate. The result of the mining companies' ability and motivation to take risks in the process of visualising Northern Rhodesian territory was, that after years of disparate activity by the Survey Department, large stretches of the colony were available to the distanced gaze.

⁸⁰ 'Annual Report, Treasury Department of Northern Rhodesia', 1927, CO799/3, NA UK.

⁸¹ Frankel, *Capital Investment in Africa*, 212.

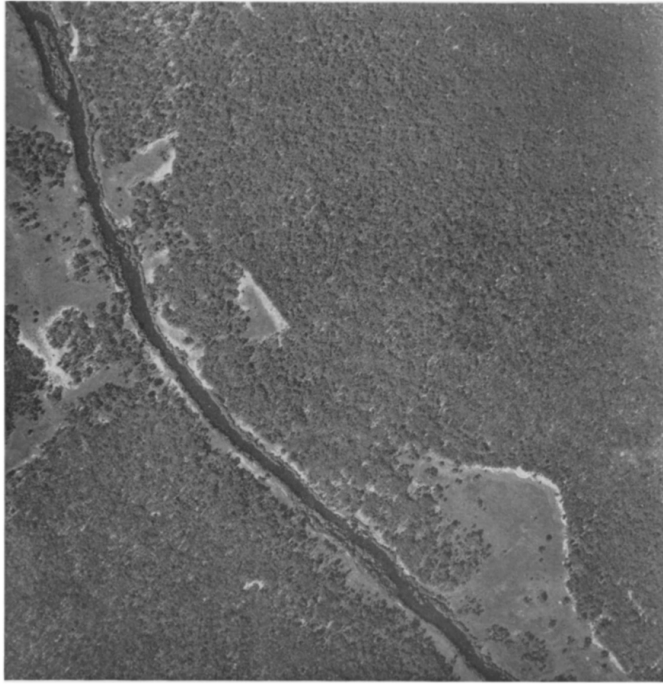


FIG. 5—A vertical photograph of typical Northern Rhodesian country. The land is covered with thick bush in which some trees reach a height of 20 to 30 feet. On the borders of the streams, which swell to swamps during the rains, there are as a rule open spaces, *dambos*, which during some nine months of the year are covered with long grass.

Figure 9: Vertical aerial photograph from the RCBC project

Picture from C. K. Cochran-Patrick, "Aerial Reconnaissance Mapping in Northern Rhodesia," *Geographical Review* 21, no. 2 (1931). 216. Reproduced with kind permission of Wiley International.



Figure 10: Oblique aerial photograph from the RCBC project

Photograph enclosed in: Captain Cochran-Patrick to Permanent Secretary, Colonial Office, 'The AOC's Work in Northern Rhodesia', 15 August 1927, CO323/971/9, NA UK. Reproduced under license from NA UK.

Inscription as Enterprise: selling Aerial Photography

Re-framing the history of the arrival of aerial photography in Northern Rhodesia demonstrates how the first aerial-photographic project (that behind the topography in *Block A*, Figure 3) sits within a history of territorial value and investment. However this still does not tell us all we need to know to understand the effect of private enterprise on the patterns of topographic mapping in the colony. Aerial photography had emerged in the 1920s as a service that could be purchased, and that process shaped the ways in which the technology was deployed. The merchants of aerial photography had a significant impact on both the locations and circumstances of its use.

Aerial photography appeared on the market as a saleable service through advances that were made during the First World War, in particular from its use in the Middle East and North Africa.⁸² On the Western Front trench warfare was being fought on territory that had been thoroughly mapped, and was known to all parties. In that situation aerial photography served, above all, to chart changes in enemy location and movement. Much of the action in the East, by contrast, was in territory that was unfamiliar to the British forces. As a result, aerial photography was being used in that region not only to document military action on the landscape, but also to provide a basic comprehensive topographic framework for the forces.⁸³ They could ‘see’ across enemy lines. In 1917, the British (with groups made up mostly from officers of the Survey of India and the Survey of Egypt) used aerial photography to create a map of the town of Gaza, Palestine, at a scale of approximately 1:7,500, in just two weeks, at a point in the war when Gaza lay within enemy territory.⁸⁴

At the close of the conflict the new aerial photographic experts who had worked in the East were fairly evangelical about the merits of the technique. Independently and together, these veterans began experimenting and campaigning. Most particularly, they emphasised the reconnaissance potential for aerial photography in civilian work for the documentation of “unsurveyed country”.⁸⁵ These veterans had different levels

⁸² Peter Collier, ‘The Impact on Topographic Mapping of Developments in Land and Air Survey: 1900–1939’, *Cartography and Geographic Information Science* 29, no. 3 (2002): 155–74.

⁸³ Peter Collier, ‘Innovative Military Mapping Using Aerial Photography in the First World War: Sinai, Palestine and Mesopotamia 1914–1919’, *The Cartographic Journal* 31, no. 2 (1994): 100–104.

⁸⁴ Dov Gavish and Gideon Biger, ‘Innovative Cartography in Palestine 1917–1918’, *The Cartographic Journal* 22, no. 1 (1985): 38–44.

⁸⁵ Leo Walmsley, ‘The Aeroplane in African Exploration’, *The Geographical Journal* 54, no. 5 (1919): 296–97; H. Hamshaw Thomas, ‘Geographical Reconnaissance by Aeroplane Photography, with Special Reference to the Work Done on the Palestine Front’, *The Geographical Journal* 55, no. 5 (1920): 349–70; B. Melvill Jones and J. C. Griffiths, ‘The Mapping of Large Areas of Unsurveyed Country’, *The Geographical Journal* 61, no. 6 (1923): 419–23.

of influence in different quarters. One early success was to convince the Survey of India to investigate several different potential uses for aerial photography. These included not only straight topographic mapping, but also attempts to map dense urban conglomerations such as Lucknow, and the monitoring of crop production to support 'correct' taxation.⁸⁶

More generally, however, the British government appeared to be paying aerial photography only lukewarm interest, a point that historians have noted with curiosity. Different reasons have been suggested for this, but it seems certain that the diversity and complexity of the bases of expertise within the British forces certainly played a role.⁸⁷ It was also the case that after the war, an atmosphere of severe budget cuts for the armed forces reigned.⁸⁸ A general reduction in governmental spending made it harder to justify the cost of experimenting with aerial survey.⁸⁹ Some steps were taken in the metropole, including the founding of an interdepartmental Air Survey Committee in 1920. This was staffed by members of the Ordnance Survey alongside members of the Geographical Section General Staff, and the Air Ministry.⁹⁰ Peter Collier has documented this body closely, and his work reveals that over the following years, the Committee proved more interested in perfecting the technology than in testing or practicing its use. As an organisation it was also fairly impotent. The Air Survey Committee did not hold its own aircraft, nor did the Ordnance Survey, and the RAF did not always make theirs available for the few experimental projects in hand.⁹¹ The existence of a strong institution for mapping in the UK, a well-developed body of cartography, and engrained practices for topographic mapping, seem to have diluted the urgency for introducing aerial survey. In Britain the technique was only likely to

⁸⁶ H. Hamshaw Thomas, 'Report on Visit to India of Capt. H Hamshaw Thomas in Connection with the Development of Aerial Photography', 15 March 1919, Military Intelligence Museum, Medmenham; Major C. G. Lewis and Captain H. G. Salmond, 'Experiments in Aeroplane Photo-Surveying', Survey of India Professional Papers, 1920, I.S. 170/6, British Library.

⁸⁷ Peter Collier and Rob Inkpen, 'Photogrammetry in the Ordnance Survey from Close to MacLeod', *The Photogrammetric Record* 18, no. 103 (2003): 224–43.; James C. Campbell, 'Origins of Aerial Photographic Interpretation, U.S. Army, 1916 to 1918', *Photogrammetric Engineering & Remote Sensing* 74, no. 1 (2008).

⁸⁸ Peter Fearon, 'The Formative Years of the British Aircraft Industry, 1913–1924', *Business History Review* 43, no. 4 (1969): 476–95.

⁸⁹ Collier and Inkpen, 'Photogrammetry in the Ordnance Survey from Close to MacLeod.'; Collier, 'The Impact of Topographic Mapping.'

⁹⁰ Collier, 'The Air Survey Committee and Mapping.'

⁹¹ Collier and Inkpen, 'Photogrammetry in the Ordnance Survey from Close to MacLeod.'

yield immediate fruits in the *revision* rather than *production* of maps. Initially, therefore, aerial photography seems to have ranked low on the priorities of these organisations.⁹²

These two different strands of governmental aerial photography, one slightly atrophied in the metropole under the Ordnance Survey, versus more free-thinking experimental work in colonial departments, were, however, only part of the story. Taking this perspective alone obscures the importance of private enterprise. In existing literature on aerial survey, the role of private companies (if mentioned at all) is more or less that of a foil, or an aside, in accounts that focus on state expertise and capabilities.⁹³ However, these companies led innovation and technical development in air survey techniques, and even more crucially, put them into common practice across the British Empire.

The debate about how aerial photography should be deployed by the government in civil conditions was part of a much larger debate about subsidies and national interest in the burgeoning new air industries. This context shaped the way in which the companies were formed and how they promoted their work. Firstly, their teams combined technical expertise from pilots and photographers trained in the First World War, with the showmanship of pre-war celebrity aviators and the financial backing of aircraft manufacturers. In the case of the AOC (founded in 1923), the Managing Director, Harold Hemming, was a famous pilot who had then flown for the RAF during the war. Major Mayo, director of AOC from 1924, had been involved in aircraft design as an engineer since before the war.⁹⁴ Alan Butler, Chairman of the AOC, was also a celebrity pilot and director of De Havilland, a new but powerful aircraft design and manufacturing company.⁹⁵ Major William John Charles Kennedy Cochran-Patrick, leader of the ‘African Expedition’— and Director from 1929—was an ex-RAF flying ‘ace’.⁹⁶ The array of contacts, and the avid entrepreneurial spirit shown by these teams, was crucial to developing and promoting their work.

Although the rhetoric of air-mindedness was strong following the First World War, in Britain attempts to set up passenger, mail, and freight services, and the development

⁹² Collier, ‘The Impact of Topographic Mapping.’

⁹³ Collier and Inkpen, ‘Photogrammetry in the Ordnance Survey from Close to MacLeod.’; A. S. Macdonald, ‘Air Photography at Ordnance Survey from 1919 to 1991’, *The Photogrammetric Record* 14, no. 80 (1992): 249–60.; Collier, ‘The Air Survey Committee and Mapping.’

⁹⁴ David Edgerton, *England and the Aeroplane: Militarism, Modernity and Machines* (London, UK: Penguin, 2013).; ‘Aircraft Operating Company’s Activities’, *Flight*, 27 November 1924.

⁹⁵ ‘A De Havilland Dinner’, *Flight*, 8 February 1923.

⁹⁶ ‘Cape-to-London.’

of civilian and military aircraft for the global market, were dependent on fairly substantial subsidies. The print media was a forum of debate and propaganda about the value and future of British aviation. The close links between the press and the aircraft manufacturing industry have been explored by David Edgerton, and these relationships appear to carry through for the aerial photography firms.⁹⁷ Peter Collier and Rob Inkpen describe Hemming, Managing Director of the Aircraft Operating Company as having “*The Times* in his pocket”.⁹⁸ That there was a recycling of articles and statements between the newspapers and industry publications is evidenced by one example from the periodical *Flight*:

Like the suggestion of *The Times*, that the Air Ministry should publish a report on the progress that has been made in mapping from the air... as our contemporary very aptly points out, the less support civil aviation is to receive from the State, the more it will have to depend upon its commercial applications. Obviously, the more widely known these application can be made, the more opportunity there will be for Governments and individuals to appreciate the uses to which aerial survey can be put.⁹⁹

From teams that were put together on an *ad hoc* basis to carry out specific projects, the AOC and its rivals, the Air Survey Company Ltd., took shape. They were quite rapidly successful businesses and won a number of overseas contracts. Once aeroplanes and the teams of experts arrived in those locations, they solicited and won further business.¹⁰⁰ Thus the team brought together for the Burma contract formed a branch of the Air Survey Company that worked all around the Indian Ocean region (and eventually established a permanent base in Calcutta in 1928).¹⁰¹ By 1927, the various directors of the AOC had been involved in projects in Newfoundland, Burma, Brazil, Venezuela, and British Guiana.¹⁰² As they collected and hunted down new clients, the private air survey companies consistently pushed the British government to hire,

⁹⁷ Edgerton, *England and the Aeroplane*.

⁹⁸ Collier and Inkpen, ‘Photogrammetry in the Ordnance Survey from Close to MacLeod’, 235.

⁹⁹ ‘Mapping from the Air’, *Flight*, 8 December 1921. See also the ‘recycling’ evident in ‘Commercial Air Surveying’; H. Hemming, ‘Some Commercial Aspects of Air Surveying’, *Journal of the Institution of Aeronautical Engineers* 1, no. 6 (1927): 632–35.

¹⁰⁰ Major Cochran-Patrick, ‘Air Surveys in Burma’, *The Journal of the Royal Aeronautical Society* 29, no. 180 (1925): 603–24; ‘Air Survey in British Guiana’, *Flight*, 12 June 1924.

¹⁰¹ ‘Air Survey Services’, *Flight*, 24 January 1929.

¹⁰² ‘Profiting by Aircraft’, *Flight*, 31 January 1930.; ‘Oil-Prospecting by Supermarine’, *Flight*, 7 April 1921.; ‘On Air Surveying as a Profession’, *Aeroplane*, 18 May 1927.; ‘Air Survey Developments’, *Flight*, 21 June 1928.

endorse, and promote their services.¹⁰³ They carried almost all of the aerial survey nominally performed by the Ordnance Survey during the interwar period, and became the only branch of the British air industry that was viable without financial support from the government.¹⁰⁴ However, in line with the air photography veterans from Palestine and Egypt, they saw the Empire as their most important market.

To this end they launched campaigns across a variety of forums. The firms were in constant communication with the Colonial Office to whom they sent newspaper clippings, journal articles, updates on their business and lobbying letters on a regular basis. They lobbied British imperial officers abroad, including those in Sudan, Egypt, and Nigeria.¹⁰⁵ They also lobbied those same officials on their visits to London. Demonstrations and exhibitions were made to visiting colonial officials at the Dominions Conference, the Colonial Conference, and the Imperial Economic Conference.¹⁰⁶ They set up a stand at the British Empire Exhibition at Wembley (1924-25) directly alongside their potential clients.¹⁰⁷ In addition to this the companies gave public lectures and demonstrations of their equipment and their work.¹⁰⁸

There was, however, a major *constraint* to the operations of the air survey companies, and that was the cost of arriving in-situ. To reach each new region of the world the companies needed at least one contract that was large enough to cover the costs of transferring the equipment and personnel. Once relocated, these expedition teams could then offer cheaper services and undertake smaller-scale projects. Aerial

¹⁰³ Beaumont Newhall, *Airborne Camera: The World from the Air and Outer Space*. (New York, NY: Hastings House, 1969) See also correspondence between the Air Ministry and the AOC such as H. Hemming, 'The Aircraft Operating Company: For the Information of the Controller of Civil Aviation, Air Ministry', January 1923, NA UK, AVIA2/177.

¹⁰⁴ 'Air Survey: Rapid Progress of Unsubsidized Enterprise.' Gill, 'Aerial Survey in Relation to Economic Geology.'

¹⁰⁵ 'Air Survey Work in British Dependencies', Colonial Office Note, 21 April 1926, CO323/971/9, NA UK; Secretary of State, Dominion Affairs to Aircraft Operating Co., 'Response: Sudan', 25 April 1927, CO323/971/9, NA UK.

¹⁰⁶ Sefton Branker to Permanent Under-Secretary, Colonial Office, 'Air Survey Exhibition: Imperial Conference 1926', 27 October 1926, CO323/971/9, NA UK; F. G. L. Bertram (Air Ministry) to G. H. Creasy (Colonial Office), 'Air Survey Exhibition: Colonial Office Conference 1927', 2 May 1927, CO323/971/9, NA UK.

¹⁰⁷ 'Aeronautics at Wembley', *Flight*, 16 July 1925.

¹⁰⁸ *Ibid.*; The Conquest of the Air: Being a Descriptive Guide to the Royal Air Force and Air Transport Galleries in His Majesty's Pavilion at the British Empire Exhibition (Wembley, UK: British Empire Exhibition, 1925). 'The "Eagle" Aerial Camera: A New British Electrically Operated Outfit', *Flight*, 11 November 1926; 'The Work of the British Air Survey Firms', *Aeroplane*, 18 May 1927. 'Commercial Air Surveying.'

photography seemed like a candidate for extensive work in the British African colonies, but first it had to reach them.¹⁰⁹

Innovation, enterprise, and scale

One of the keys to the commercial success of these small companies seems to have been their adaptability. The small teams could be recruited and disbanded more easily than government employees, and they could adapt their working methods to purpose rather than following the one-size-fits-all institutional weight of the bureaucratic state. They were also flexible towards the nature of the contracts they could fulfil, and could expand their business by responding to client briefs across sectors, and increasing the range of their services. Flexibility was built into the business model of the companies. Given the scale and the novelty of the technology involved, the firms were all initially established with relatively low capital (between £3,000 and £15,000).¹¹⁰ This was, in part, because they could make use of the planes, cameras, pilots, and experienced aerial photographers that emerged as civil surplus at the end of the conflict.¹¹¹ In the case of the AOC it was because the main investor in the company was Alan Butler, director of an aviation manufacturing company. In fact, in the first years of the business, the AOC generally deployed aeroplanes already owned by the directors.¹¹² When sufficient contracts were assured, they used their contacts in the aviation industry to loan or rent more aircraft, and only infrequently bought new planes.

The quality of adaptability played out during the 1920s as the air survey firms answered each of their international contracts through the improvisation of new equipment and methods. The common factor shared by all the international survey contracts was that they were difficult to access for traditional ground-based surveyors, whether due to forest cover, mountainous terrain, or swamp, but every project was, in effect, an experiment.¹¹³ Could aerial photography be used to calculate timber stocks

¹⁰⁹ 'Air Surveying and Its Development: Aircraft Operating Co.'s Pioneering Work', *Flight*, 11 July 1929.

¹¹⁰ 'New Companies Registered', *Flight*, 29 May 1919; 'Aircraft Operating Co., Ltd.', *Flight*, 8 February 1923; 'New Company Registered', *Flight*, 6 November 1924.

¹¹¹ The historian of aviation Peter Fearon calculates that at the end of the First World War, the British had trained 26,000 pilots, and the combined British armed forces owned 22,647 aeroplanes. Fearon, 'The Formative Years of the British Aircraft Industry, 1913–1924.'; H. Hamshaw Thomas, 'The Photographic Section of the Royal Air Force: A Peace Footing', *The British Journal of Photography* 66, no. 3095 (1919): 509–10.

¹¹² 'Minutes of the First Meeting of Directors of the Aircraft Operating Company (Pty.) Ltd.', 23 September 1931, Aircraft Operating Company (Pty.) Ltd.

¹¹³ Cronin, 'Northern Visions'; Stephen Bocking, 'A Disciplined Geography: Aviation, Science, and the Cold War in Northern Canada, 1945–1960', *Technology and Culture* 50, no. 2 (2009): 265–90.

or to prospect for oil? Could it be used to identify air routes for the nascent passenger services? Different environments and objectives required extensive alteration of the materials and processes involved; from cutting holes in the undercarriage for the camera, to adding skids or floats to 'land planes', to experimenting with radio signals and 'automatic pilots', to inventing new techniques to build the final photographic mosaic.¹¹⁴ In the late 1920s, the AOC commissioned an entirely new aircraft design for survey purposes.¹¹⁵ As a result the air survey firms were able to respond to demand and invent new means of visualising territory. As Matt Dyce has observed, the aerial photograph has aesthetic and epistemological qualities that differ strongly from a map.¹¹⁶ The various customers of the AOC were not as tied to the aesthetic and cultural conventions of cartography as the Ordnance Survey was, and seem to have been more ready to adopt the range of possibilities that aerial photography offered.

By 1927, tackling a broad range of projects, developing unique expertise and bringing together key nodes of government, the aviation industry, and just a touch of propaganda, was proving successful. The companies were receiving direct and indirect endorsement from the government for their work. Even the sceptical Brigadier Winterbotham (Director of Colonial Surveys) offered an endorsement at a meeting of the Royal Aeronautical Society in 1925:

I feel that I am speaking for other British surveyors in saying that we feel confident that the companies with which Major Cochran-Patrick has successively been associated, are in a position to secure and to retain a national pre-eminence in this matter.¹¹⁷

Robert Pullan credits the arrival of the AOC in Northern Rhodesia to the discussions at the Eleventh Meeting of the Governors' Conference at Nairobi in early 1926.¹¹⁸ It was the discussions at this meeting, he suggests, that led to the publication and distribution of a report by the British Air Survey Committee on the comparative costs and advantages of aerial photography. Although this publication may well have

¹¹⁴ H. Hemming to Controller of General Civil Aviation, Air Ministry, 'Incorporation and Company Details: Aerial Survey Co. (Newfoundland) Ltd.', 20 January 1923, AVIA2/177, NA UK.; Hemming, 'Air Surveying in Rhodesia.'; 'Avro "Avian" Mk. III. Adapted for Air Survey', *Flight*, 12 April 1928.; Cochran-Patrick, 'Air Surveys in Burma.'

¹¹⁵ 'Introducing the Gloster Survey', *Aeroplane*, 29 January 1930.

¹¹⁶ Dyce, 'Canada between the Photograph and the Map.'

¹¹⁷ H. S. L. Winterbotham et al., 'Air Surveys in Burma-Discussion', *The Journal of the Royal Aeronautical Society* 29, no. 180 (1925): 625.

¹¹⁸ Pullan, 'The History and Use of Aerial Photography in Zambia.'

brought the technique to the attention of the Governors of British Africa, it seems unlikely that this was quite as pivotal as Pullan suggests. I would suggest that by that time the work of the aerial photographic companies had been well done. By early 1927 when the RCBC decided to pay the initial costs of transporting a team to Southern Central Africa, the AOC had been lobbying the Colonial Office and other colonial governments for years. Short on capital, they had, however, certainly been persuaded that the lesser costs of hiring the company in-situ were a useful, or at least interesting risk to take.

From seeing the imperial government as the progenitor of aerial survey, we are now forced to reconsider it as a client. The government of Northern Rhodesia was not rich enough to take the risk of commissioning its own substantial aerial photographic survey, but perhaps once the level of capital required had lowered, it could more easily manage further costs within the remit of its annual expenditures? Although the government financed several extensions to the RCBC's work in the following three years, aerial photography still did not enter its 'ordinary' colonial accounts. Neither did the regular production of topography.

Investment in knowledge: government expenditure and cartographic production

For the RCBC, the investment in aerial photography was a failure. The reaction to the aerial survey by the engineers, managers, and owners of the RCBC was generally one of disappointment. Like electrical survey, it had failed to identify copper deposits.¹¹⁹ It was not possible to identify the geological substructures from the air as had been hoped. Yet although the photography did not fulfil its primary intended use, it took on others; the RCBC now had a basis from which to better mark information, and on which to annotate the work of their pedestrian geologists. The Northern Rhodesian government were keen to take the photography even further—they wanted the photography translated into map sheets of the Copperbelt.¹²⁰ It was suggested to the

¹¹⁹ F Mendelsohn, ed., *The Geology of the Northern Rhodesian Copperbelt*. (London UK: MacDonald, 1961); R. J. Parker and A. Gray, 'The Copper Deposits of Northern Rhodesia: Geology, Orebodies, Potentialities, with Special Reference to the Nkana Concession.', *Engineering and Mining Journal* 128, no. 11 (1929): 431–48.

¹²⁰ The RCBC project had resulted in photographs and mosaics but not in 'drawn' maps. 'Annual Report, Survey Department of Northern Rhodesia', 1927.

RCBC that they might pay for these map sheets, but the request was refused.¹²¹ The RCBC did, however, agree to release the relevant photographs.

A high-capital cartographic technology had arrived in Northern Rhodesia because the government had imposed time limits on the investigation of the concessions; now the time pressures were returned onto them. The AOC were keen to do as much business as possible before they left the region. The company campaigned vigorously in 1927 and 1928 for more photographic commissions.¹²² Using the strategy that had been successful in other locations, pointing out that their costs would be lower *whilst they were in the neighbourhood*, the AOC provided motivation for organisations to find partners who would share the costs of further projects. Between 1927 and 1931 this included three key ‘extensions’ to the RCBC aerial photography, commissioned by the Northern Rhodesian government.

The precise origins of these further governmental contracts between the Northern Rhodesian government and the AOC remain unclear. The Director of Surveys claimed it to have been the result of “personal investigation into air survey and methods and results”.¹²³ In the local press, the AOC claimed that the contract had come about through negotiations between the pilot Major Cochran-Patrick and the Governor of Northern Rhodesia.¹²⁴ In any event, since the contracts are not mentioned in the Survey Department’s Annual Report for 1926, it is fairly safe to conclude that negotiations between the AOC and the Northern Rhodesian government only began once the aerial photography was underway over the Concession.¹²⁵

The pressure of timing, however, certainly did have an effect, documented in the archive, and from 1927, events moved quickly.¹²⁶ By the end of 1927, the Director of Surveys reported to the Colonial Office that they had made arrangements with the AOC for several projects in the territory. These extensions resulted in further topography. The first photographic extension (incorporated in the map sheets in *Block*

¹²¹ Pullan, ‘The History and Use of Aerial Photography in Zambia.’

¹²² McAdam, ‘Flying Mapmakers.’

¹²³ ‘Annual Report, Finance Department of Northern Rhodesia’, 1927, CO799/3, NA UK.

¹²⁴ McAdam, ‘Flying Mapmakers.’

¹²⁵ ‘Annual Report, Survey Department of Northern Rhodesia’, 1926, CO799/2, NA UK.

¹²⁶ Aircraft Operating Co. to Colonial Office, ‘Air Survey- Railway Bridge across Zambesi’, 22 December 1927, CO 795/16/6, NA UK; Colonial Office, ‘Topographical Maps from Air Survey in Northern Rhodesia- Visit from Major Hemming’, 20 June 1927, CO795/16/6, NA UK; Governor of Northern Rhodesia to Colonial Office, ‘Funding of the Zambesi Waterway Aerial Survey’, 1 October 1927, CO795/16/6, NA UK.

C) aimed to analyse the transportation potential of the Upper Zambezi. The second (incorporated in the map sheets of *Block B*) extended the initial Copperbelt survey. The third (map sheets in *Block D*)—that we will discuss in the next section—documented the profitable farmland along the line of rail. Finally the Northern Rhodesian government also commissioned air photography of six townships (lying within these other areas) and the production of the topographic mapping from the photography in *Block A*, that the RCBC had declined to produce.¹²⁷

Even now that the AOC had set up a temporary base in Southern Africa, the cost of this air photography was still prohibitive. An officer for the Imperial Forestry Institute, Ray Bourne, had observed the AOC at work in Northern Rhodesia and remarked on the fact that:

Relatively accurate topographical maps can be produced at a speed and at a cost per unit of area which compare very favourably indeed with ground methods. On the other hand, this capital expenditure, which in the ordinary course of events would be spread, for instance, over half a century, has to be met in a few years.¹²⁸

The contract price for the Zambezi work was £6,500; the price for the township surveys, £900.¹²⁹ The compilation of Rhodesia Congo Border Concession photographs into a map at 4 miles to 1 inch was £6,000, at 10/- per mile.¹³⁰ The first aerial photographic work commissioned by the Northern Rhodesian government came, therefore, to a total of £12,900. To meet the costs of just these two projects the government would need to find a sum that was more than twice the Survey Department's annual expenditure on salaries.¹³¹ Naturally, these costs could not be met from the ordinary departmental vote.¹³² Purchasing the services of the AOC would require a great deal of capital in a short space of time, money that would otherwise be scraped together over decades.

¹²⁷ Pullan, 'The History and Use of Aerial Photography in Zambia.'

¹²⁸ Ray Bourne, *Aerial Survey in Relation to the Economic Development of New Countries: With Special Reference to an Investigation Carried Out in Northern Rhodesia*, vol. 2, *Oxford Forestry Memoirs* 7 (Oxford, UK: Clarendon Press, 1928), 5.

¹²⁹ 'Annual Report, Survey Department of Northern Rhodesia', 1927.

¹³⁰ *Ibid.*

¹³¹ 'Annual Report, Treasury Department of Northern Rhodesia.'

¹³² Governor of Northern Rhodesia to Colonial Office, 'Funding of the Zambesi Waterway Aerial Survey.'

So how *did* the Northern Rhodesian government pay for these activities? They rapidly began negotiations with a variety of partners to find the funds for these extension projects. Some of these partners were private. For example, they managed to persuade the railway owners Robert Williams Co. Ltd., to cover £1,500 of the Zambezi photography, since it would assist Robert Williams to plan the extension of their line into Angola.¹³³ The Northern Rhodesian government also began discussion with the Colonial Office who were in the process of reconsidering the methods of financing colonial 'development'.¹³⁴ Northern Rhodesia made a bid for funding their share of the costs through funds made available by the 1926 Palestine and East Africa Loan Act.¹³⁵ The metropolitan Air Survey Committee was invited to endorse the several AOC contracts and did so.¹³⁶ As a result of the Committee's approval, the Northern Rhodesian government won the £6,500 funding from the East Africa Loan scheme to cover the cost of the survey of the Zambezi (Figure 3, *Block C*).¹³⁷ Further projects taken up by the AOC between 1929 and 1930 (the township surveys, extension of the Copperbelt photography, and railway belt) were paid for from the Colonial Development Fund (Figure 11). This, again, was a new, extraordinary source of funding intended to stimulate economic growth.¹³⁸

¹³³ Ibid.

¹³⁴ Havinden and Meredith, *Colonialism and Development*.

¹³⁵ Ibid., 146.

¹³⁶ Air Survey Committee to Colonial Office, 'Zambesi Waterway Aerial Survey', 17 February 1927, CO795/16/6, NA UK.

¹³⁷ 'Annual Report, Finance Department of Northern Rhodesia.'

¹³⁸ Havinden and Meredith, *Colonialism and Development*, 147.

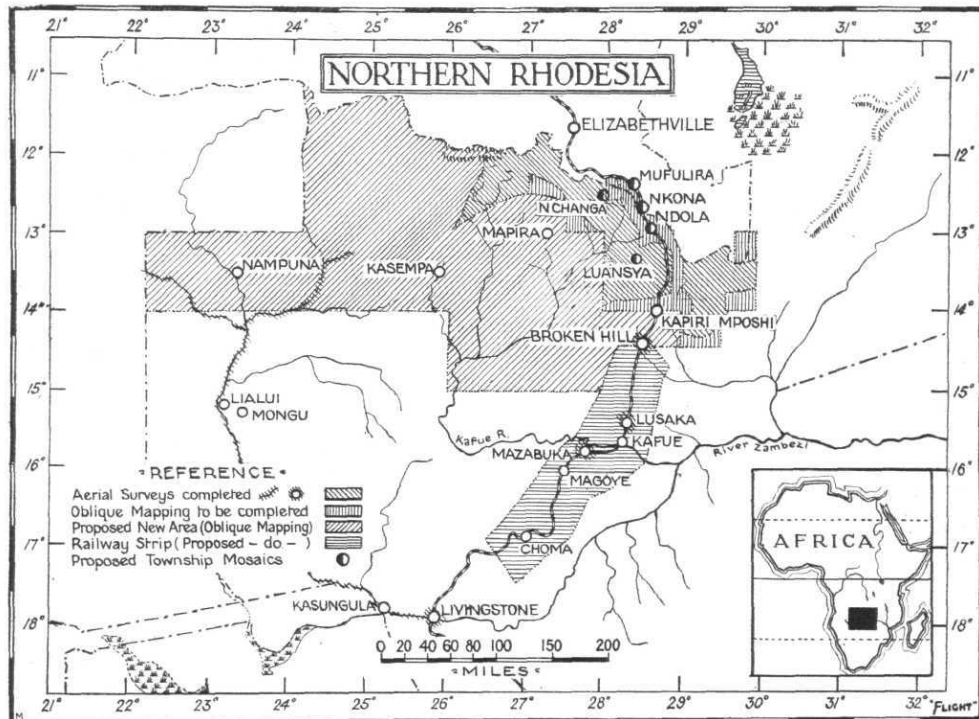


Figure 11: AOC contracts, completed and proposed up to 1929

This sketch map published by the AOC that shows work done (and the proposed new work in 1929). From: "A New Air Survey Contract in Northern Rhodesia," *Flight*, December 27, 1929. Reproduced with the kind permission of Flightglobal.

The AOC's work was considered an unequivocal success by the Survey Department who described the aerial surveys variously as "invaluable," and "rapid and accurate," noting that, "we would not be without them".¹³⁹ The projects planned up to 1929 represented photographic coverage of one-fifth of the territory (see Figure 11).¹⁴⁰ However, receiving photography or even maps from the AOC, was not the end-stage of the process. In order to transform this geographic data into governmental topography, the material needed to be coordinated with existing topographic documents, annotated with place-names and additional data, and drawn up using the appropriate scales and specifications.¹⁴¹ Although the government had managed to pay for most of the AOC's work from injections of capital towards development, it was still difficult to find the resources to complete the drawing work. The attitude of the Colonial Office towards funding the imperial territories remained firm: they ought to be financially self-sufficient, and the greater part of the costs of generating industry

¹³⁹ 'Annual Report, Survey Department of Northern Rhodesia', 1931, CO799/9, NA UK; 'Annual Report, Survey Department of Northern Rhodesia', 1928, CO799/4, NA UK.

¹⁴⁰ 'Annual Report, Survey Department of Northern Rhodesia', 1929, 345.

¹⁴¹ 'Annual Report, Survey Department of Northern Rhodesia', 1931.

and agriculture should come from private investment.¹⁴² Thus although the ‘routine’ budget of the Survey Department increased during that period, the office was still barely able to keep up with pressing cadastral work, and had little time for more complex cartography. They also regularly complained of the lack of available funds to send drafted maps to the press.¹⁴³ These problems continued to delay the production of the 1:250,000 series in 1935.¹⁴⁴

The lack of quotidian resources to implement the aerial photography becomes more obvious on closer examination of the 1:250,000 mapping produced between 1928 and 1955. Figure 3 shows the distribution of the forty-three map-sheets *produced* by the Survey Department between 1928 and 1955. However Figure 12 shows those which were actually published: G5 (1928); G6 (1934); D10 (1931). The other forty sheets were drawn up, but only available as locally produced prints. Although in the absence of the aerial photography, the annual records of topographic work for the years 1928 to 1935 would have most likely resembled the trailing lines and dots seen in Figure 6, the resultant *published* output generated by five years of aerial photographic work was still sparse.

Looking at the geographical coincidence between aerial photographic commissions and topographic mapping makes it clear that topographic mapping was an adjunct result of the investment of large funds into potentially profitable ventures. Consequently topographic production was subject to the pressures inherent to the structures that organized the passage of capital; first into the mining ventures in the Copperbelt, and then through the aerial photographic company itself. However, this ‘boom’ did not represent the beginning of systematic work. Like the early prospecting of the Concession Companies, the Northern Rhodesian government was not working on documenting its territory from left-to-right, whole-to-parts within the remit of its regular budget. As a result the sheets that were produced, and even more especially the sheets that were published over the following thirty-five years, represent a snapshot of the financial interests that were active during the five years between 1927 and 1931. The regular, “cycle of indifference” was not substantially altered. The mapping of Northern Rhodesia had merely gained *temporary* momentum from aerial photography as a cartographic technology.

¹⁴² Ehrlich, ‘Building and Caretaking.’

¹⁴³ For more on the difference between published and locally printed maps see Chapter Four.

¹⁴⁴ ‘Annual Report, Survey Department of Northern Rhodesia’, 1935, CO799/14, NA UK.

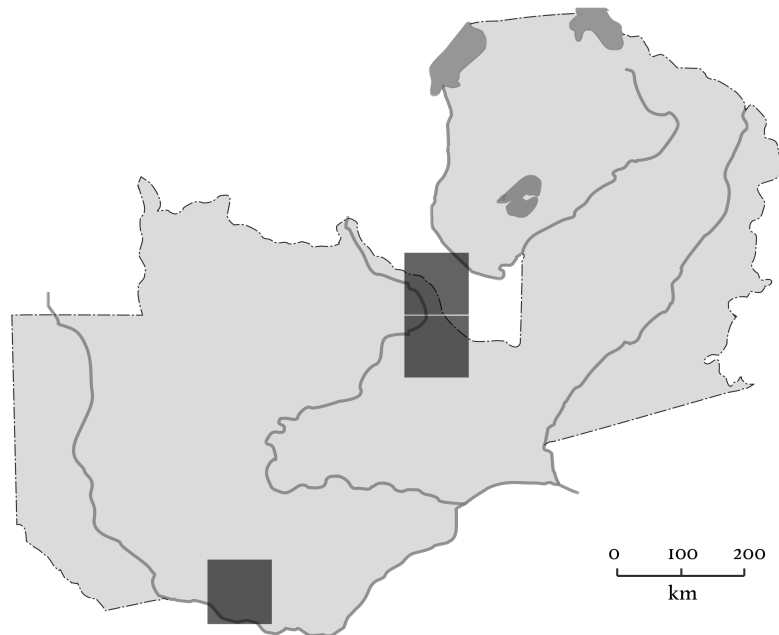


Figure 12: Distribution of map sheets at 1:250,000 published by the Survey Department of Northern Rhodesia, 1928-1955.

Adapted from: Pullan, R. A. *A First Checklist of the Published Maps of Northern Rhodesia, 1890-1949*. Lusaka, Zambia: Zambia Geographical Association, 1978.

Value and rhetoric: ecology and economy as cartographic logics

Having filled out the economic histories that lay behind the production of 1:250,000 topography in Northern Rhodesia, this last section asks, how has a teleological narrative of modern mapping been layered onto this tactical, *ad hoc* series of events? This section broaches this question by comparing the variety of narratives that framed the aerial photography behind the topography in *Block D* (Figure 3) in the 1930s. Firstly, it unravels the separate interests of a triumvirate of colonial presences in Northern Rhodesia; the colonial scientific officers, the colonial secretariat and the AOC. Secondly, it allows us to see the role the AOC played in shaping the value of ‘inscribed’ territory for both the scientists and secretariat of Northern Rhodesia. That role demonstrates, yet again, the company’s adaptability; this time revealing their capacity to sell the same work within a number of different rhetorical registers. Finally, it returns to the theoretical constructs of governmentality, inscription, and centralised power that predominate in scholarly accounts of cartography today.

In recent histories that have addressed aerial photography in Northern Rhodesia the AOC usually features as a tool—innovative and clever, but fundamentally inert—that state scientific experts worked to their own ends. The scientific experts, on the other hand, are credited with using both the content of the images and the techno-rhetoric of aerial photography to promote their interest in environmental systems and relations. This confusion can be seen in how the work of Ray Bourne is narrated. Bourne was an envoy of the Imperial Forestry Institute, sent by the Colonial Office to Northern Rhodesia in 1928 to investigate the timber potential of the expansive forests in the colony. Peter Adey describes him as driving the use of aerial photography in Northern Rhodesia for forestry, a means for the Northern Rhodesian government to open the territory up “to the distanced gaze for the imposition and projection of power and reach”.¹⁴⁵ In Helen Tilley’s *Living Laboratory*, Ray Bourne “seized the opportunity of demonstrating the value of employing aerial survey”.¹⁴⁶ Elsewhere in *Imperial Ecology* (2001), Peter Anker linked Bourne’s presence to the goal of establishing clear political boundaries.¹⁴⁷

Although Bourne was enthusiastic about aerial photography, in his own words it ‘happened’ that the AOC was in the field carrying out the project for the RCBC. Yet he has consistently been seen to epitomise the proactive state inscription of natural resources and territory. We can see from the previous sections that these narratives displace both the primacy of the copper industry in bringing the AOC to Northern Rhodesia, and the energetic propagation of aerial photography by the AOC themselves. Those authors have also mis-assigned the agency of colonial scientists *within* government. The history of the mapping from air photography in *Block D* gives us an insight into the failure of the rhetoric of rational resource management to vanquish short-term tactical attitudes to resource exploitation.

Block ‘D’

The aerial photography behind the maps of *Block D* resulted from work carried out for the Agricultural Survey Commission in 1929.¹⁴⁸ The Commission was assembled to consider how the farmland alongside the line of rail should be distributed to settler farmers. This allocation had, (somewhat like the early prospecting) been proceeding in

¹⁴⁵ Adey, *Aerial Life*, 86.

¹⁴⁶ Tilley, *Africa as a Living Laboratory*, 144.

¹⁴⁷ Anker, *Imperial Ecology*, 83.

¹⁴⁸ Pullan, ‘The History and Use of Aerial Photography in Zambia.’

a relatively *ad hoc* manner. The outcome, it was suggested in 1926, was detrimental both to agricultural production and to colonial societal fabric.¹⁴⁹ As the mining industry grew rapidly at the end of the decade, this problem gained a further intensity; food supplies needed to be secured for the miners.¹⁵⁰ The Commission was keen to discover “the best manner in which [the land] should be divided into farms of economic acreage,” primarily in relation to transport and hydrography.¹⁵¹ A strip of aerial photography that ran fifteen miles each side of the railway was provided by the AOC to assist them in this task.

In 1931, a second set of aerial photographs of railway-belt land was produced. This was not a commissioned project, but an initiative of the AOC themselves. Captain Charles Robbins, an employee of the AOC, carried out the air and groundwork single-handedly.¹⁵² The project was intended to extend the market for the AOC’s work by proving the potential of aerial photography for the classification of soil types. It was recorded that Robbins felt that “the local authorities, particularly the Agricultural Survey Commission were not making full use of the air photographs available”.¹⁵³ As a result Robbins was “determined to show the possibilities of such a method conducted exclusively by his company”, which was described as “a freak performance for demonstration purposes, and, as such the most remarkable one-man effort I have ever studied”.¹⁵⁴

The illusion that this was innovative government science, rather than a theatrical sales endeavour, was deliberately fostered by the AOC. They astutely called the project an “experimental aerial ecological survey”.¹⁵⁵ Robbins’ account of the project published in the *Journal of Ecology* follows a strategy that the AOC used elsewhere in their publicity: framing experimental projects as a successful response to pre-existing

¹⁴⁹ ‘Annual Report, Survey Department of Northern Rhodesia’, 1926.

¹⁵⁰ Governor of Northern Rhodesia, ‘Governor’s Report to Colonial Office, “Land Settlement in Northern Rhodesia”’, 8 April 1929, MAG2/7/3, NAZ.

¹⁵¹ Chief Secretary, Northern Rhodesia to Deputy Commissioner, Trade and Information Officer of Great Britain, ‘Land Settlement Survey Underway in Northern Rhodesia’, 26 September 1930, MAG2/9/1, NAZ.

¹⁵² Charles Robinson Robbins, ‘Report on an Experiment in the Classification of Land with the Use of Aerial Photographs’, 1932, MAG2/9/3, NAZ.

¹⁵³ Ray Bourne to Under Secretary of State for the Colonies, ‘Comments on the Experimental Ecological Aerial Survey’, 14 August 1933, MAG2/9/5, NAZ.

¹⁵⁴ Chief Agriculturalist, Northern Rhodesia, ‘Memo on Captain Robbins’ Survey for the Secretary of Agriculture’, 6 April 1932, MAG2/9/1, NAZ.

¹⁵⁵ Robbins, ‘Report on an Experiment in Land Classification.’

government demand.¹⁵⁶ Thus, Peter Anker and Helen Tilley have read the ‘ecological’ in bolder terms than is perhaps just, when they set the use of air survey within the narrative of the growth of ecological attitudes within colonial science.¹⁵⁷

Robbins’ exercise shows that the AOC were keen to extend their services to the interpretative aspect of aerial photography, but the company were following this ambition through in a number of ways. They were also increasing in-house expertise, and building a network of contacts within the fields of forestry, geology, and “general economic development”.¹⁵⁸ The interdisciplinarity of the AOC’s product was more usually promoted as an ‘economic survey’ than an ecological one.¹⁵⁹ Their eagerness to promote their services via the organs of scientific societies was matched or exceeded by their activity in responding to debates about the role of colonial resources in solving British unemployment questions. According to the AOC, aerial photography could increase understanding of those resources, decrease the risk to those considering emigration, and decrease the cost of trade through a better siting of production and transport infrastructures.

For example, in 1930, in response to an imperial report on the scale and structure of the political units of East Africa, Herbert Crosthwait, Director of the AOC prepared a paper for the Royal African Society, expounding the value of an “economic survey, for which maps are necessary”, and without which potential projects would founder in “imperfect and ill-digested information”.¹⁶⁰ ‘Economic survey’ was a term that could be applied to just about any of the work that the AOC were commissioned to do, and was generally used to emphasise the reconnaissance aspect of the air photography over that of providing detailed or precise measurements. Most importantly, it was a more flexible term than the ‘ecological’ survey. It could cede non-problematically to less rigorous epistemological principles.

The topographic outcome between 1928 and 1955 (Figure 3) reinforces the case that the patterns of the ecologists’ interests and priorities had little influence on Northern

¹⁵⁶ C. K. Cochran-Patrick, ‘Aerial Reconnaissance Mapping in Northern Rhodesia’, *Geographical Review* 21, no. 2 (1931): 213–20; Charles Robinson Robbins, ‘Northern Rhodesia; An Experiment in the Classification of Land with the Use of Aerial Photographs’, *The Journal of Ecology* 22, no. 1 (1934): 88.

¹⁵⁷ Anker, *Imperial Ecology*; Tilley, *Africa as a Living Laboratory*.

¹⁵⁸ ‘A New Air Survey Contract in Northern Rhodesia’, *Flight*, 27 December 1929.

¹⁵⁹ ‘Air Surveying and Its Development: Aircraft Operating Co.’s Pioneering Work’; ‘A New Air Survey Contract in Northern Rhodesia’; H. L. Crosthwait, ‘Aerial Survey of East and Central African Territories’, *African Affairs* XXIX, no. CXVI (1930): 333–42.

¹⁶⁰ Crosthwait, ‘Aerial Survey of East and Central African Territories’, 333–334.

Rhodesian policy more broadly. ‘Economic’ rather than ‘ecological’ thinking won the day. The government scientists in Northern Rhodesia built most of their knowledge from decades of traverses by foot and automobile.¹⁶¹ Elsewhere in the colony, when scientific officers attempted investigations, they did not have even provisional base maps and had to sketch their own *ad hoc* substitutes.¹⁶² It was the skill of the AOC to be able to marry the contradictory positions represented by the rhetoric of holistic decision-making frameworks and scientific planning, and the reality of government interest in visualising isolated, profitable areas. The ‘economic survey’ of the AOC, was (in the words of Captain Robbins) in fact offering the possibility to, “*Eliminat[e]... those areas which... were of lesser economic interest... [confining the] labours of expert investigation to those areas more likely to yield profitable results [so that each would receive] attention in direct proportion to its importance*”.¹⁶³

It could perhaps be expected that twentieth-century cartography might compound rather than alleviate ‘uneven development’. However, in the case of Northern Rhodesia, insufficient analysis of the difference between the values of the ‘ecological’ and ‘economic surveys’, and the failure of existing studies to identify the influence of commercial interests in shaping cartographic production, have obscured this perspective. As a result the rhetoric of the importance of holistic territorial visualisation to rational resource management has been taken somewhat too seriously.

Governmentality and the ‘economic survey’

Historical studies of cartography in ‘action’ often focus on its prohibitive tendencies.¹⁶⁴ That is to say, they focus on the way that mapping can produce ontological categories that eliminate particular modes of thinking or possible actions. The tendency is to situate colonial mapping within the conceptual parameters of what Foucault would describe as the ‘disciplinary state’.¹⁶⁵ Thus the scholarship often characterises colonial mapping within projects with two exemplary ‘disciplinary’ characteristics: a will to omniscience (authority that attempts to see everywhere), and the direct control of a

¹⁶¹ L. T. Wigg, ‘Vegetation-Soil Map of Northern Rhodesia’, *Empire Forestry Review* 28, no. 1 (1949): 43–48.

¹⁶² J. D. Martin, ‘Summary of Work: Mankoya and Lealui Districts. Forestry Officer for Barotseland.’, 12 July 1939, SEC1/975, NAZ.

¹⁶³ Robbins, ‘Report on an Experiment in Land Classification.’ (emphasis added)

¹⁶⁴ Blomley, ‘Law, Property, and the Geography of Violence’; John W. Donaldson, ‘Pillars and Perspective: Demarcation of the Belgian Congo–Northern Rhodesia Boundary’, *Journal of Historical Geography* 34, no. 3 (2008): 471–93; Miescher, *Namibia’s Red Line*.

¹⁶⁵ Michel Foucault, *Discipline and Punish: The Birth of the Prison* (London, UK: Vintage Books, 1977).

population (coercion and punishment for uncooperative attitudes). This has been tempered by other cartographic scholars (usually focusing on more contemporary projects) who see the performative qualities of mapping as more productive, that a map can serve as a projection for what that piece of territory can 'do'.¹⁶⁶ If considered within this end, maps may, then, be considered more as tools to "craft...intelligible fields for governmental intervention and...make certain 'deficiencies' emerge as improvable".¹⁶⁷ Within this context a map serves as the basis for harmonising imagined futures and creating shared definitions for resources.

In some senses these two positions can be seen as two sides of a coin. Both forms of intervention were considered part of the remit of colonial government in Africa: caretaking and building.¹⁶⁸ Or, as Sally Frankel summarised in 1938, "Constructive change is the fundamental task of colonial statesmanship. It involves a dual function: that of protection, and that of calling forth the power of self-exertion".¹⁶⁹ When mapping is considered within the goals of building or 'calling forth the power of self-exertion'—a framework of productivity—then an attitude of positive selection is emphasised. Within this framework we can see the emergence of differing values, and assessments of what was necessary and what was unnecessary in order to achieve a specific outcome.

This alternative perspective, to consider an 'economic' logic behind colonial cartography sits uneasily with how we understand state observation techniques to be deployed within the model of a disciplinary state. It does not even sit well in how we might understand governmentality. Within Foucault's original classification, governmentalist states use observation to decide the appropriate level of state intervention.¹⁷⁰ Here we see somewhat the reverse. We can empathise with the Directorate of Colonial Surveys after the Second World War, when they regretted

¹⁶⁶ James Corner, 'The Agency of Mapping: Speculation, Critique and Invention', in *Mappings*, ed. Denis Cosgrove (London, UK: Reaktion Books, 1999), 213–52.

¹⁶⁷ D. Asher Ghertner, 'Calculating without Numbers: Aesthetic Governmentality in Delhi's Slums', *Economy and Society* 39, no. 2 (2010): 210.

¹⁶⁸ Ehrlich, 'Building and Caretaking.'

¹⁶⁹ Frankel, *Capital Investment in Africa*, 9.

¹⁷⁰ Michel Foucault, *Security, Territory, Population: Lectures at the College de France, 1977–1978* (Basingstoke, UK: Palgrave Macmillan, 2007); Thomas Osborne, 'Security and Vitality: Drains, Liberalism and Power in the Nineteenth Century', in *Foucault and Political Reason: Liberalism, Neo-Liberalism and Rationalities of Government*, ed. Andrew Barry, Thomas Osborne, and Nikolas S Rose (Chicago, IL: University of Chicago Press, 1996), 99–122.

that topographic surveys had *followed*, rather than *preceded*, development.¹⁷¹ The three published sheets indicated in Figure 12 were the visible manifestation of the larger cartographic economy. They represent the threshold at which a large-scale distribution of topographic mapping became desirable. When historians of cartography turn to British Africa they need to put firmly aside the lessons about the organisation and control of colonial territory that have been drawn from the cartographic history of India. Making parallels to Matthew Edney's account of a centrally organised, sequentially planned (if not executed), and above all hierarchical, cartographic project obscures more than it reveals.¹⁷²

This topographic threshold is a good indicator of the 'importance' of an area of territory to the Northern Rhodesian government, however that importance was almost always determined *before* detailed geographical knowledge of the area was gathered (and under fairly aleatory circumstances). This attitude of the government towards inscription (rapid response to likely prospects, high investment in isolated areas) is tellingly reminiscent of the early prospecting tactics of the Concession Companies. If we see survey work as "financed by pledging the future," as Worthington suggested in 1938, then the 'pledge' made by Northern Rhodesia resembles more closely the promise made by a company to its shareholders, than that of a state to its citizens.

Conclusion

The history of the British colonial effort to 'unfold' territorial potential has traditionally been told using different vocabularies depending on the focus of the historical investigation: tales of the colonial state describe the success and failure of 'planned' development'; tales of colonial private enterprise describe the loss and gain from 'speculation'; and tales of colonial science describe shifting scales of 'experimentation'. This chapter has offered the opportunity to reconsider how these modes describe the ties between territory, time, and value. It reunites them within the model of the 'cartographic economy'.

Detailing the influence of investment, risk, and time pressure on the production of Northern Rhodesian topography in *Blocks A, B, C* and *D* exposes the levels of complexity that are disguised by the idea that topographic maps cohere to 'one map of one territory'. We can see that colonial investment in cartography was dramatically altered by access to capital through the new loans—money that entered and left the

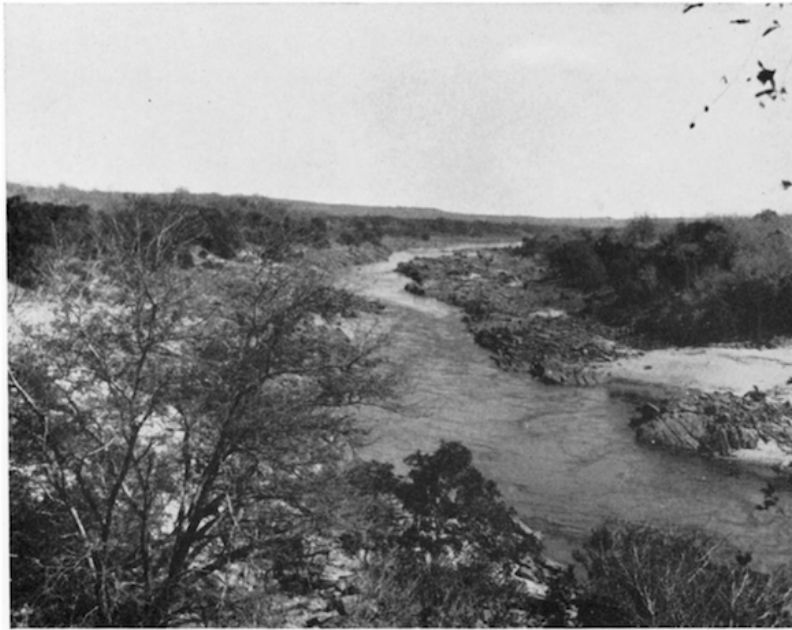
¹⁷¹ 'Annual Report, Directorate of Colonial Surveys', 1947, OS46/2, NA UK.

¹⁷² Edney, *Mapping an Empire*.

territory in different quantities and under different rhythms than the regular revenue of taxation. The presence of the AOC, and their active association of their technologies of visualization to a 'window of opportunity' changed the patterns of collaboration, and the density of detail in colonial geographic knowledge. The investigations of the Concession companies illustrates this most clearly of all, as the bounds of territory, the investment required and the expected period of return of cartography were brought sharply into focus as a result of the intervention of London high-finance.

The model of a cartographic economy delivers four conclusions that are occluded by earlier studies. First of these is that the short period between 1927 and 1931 represents a transient moment during which topographic mapping was produced as the result of temporary circumstances that united different groups with divergent interests. Second is that the influences on the production of topography in Northern Rhodesia were relatively decentralised. Third, the value of governmental topography was not fixed, but could be 'produced' through various mechanisms—including the imposition of timeframes on resource exploitation, or the availability of technologies. Those timeframes could be manipulated in favour of those who profited from mapping projects. Finally, focusing on governmental scientific offices (including cartographic ones) might tend to discover an ambition to produce complete and homogeneous territorial representations. Yet what we have learned from more rounded histories of colonial agricultural science or anthropology applies equally to colonial knowledge of territory: colonial epistemological positions were operated within tactically by a variety of parties. Cartographic heterogeneity was more than an incidental effect of colonial rule.

**3 / Scale, visibility, and value in the
colonial cartographic economy**



Flat country near the entrance of the gorge

C. P. A. S.

Figure 13: The Gwembe Valley near the Kariba Gorge



The Kariba Gorge, looking upstream

C. P. A. S.

Figure 14: The Kariba Gorge looking upstream

The Gwembe Valley as documented by C. P. A. Sharland.

From: John Keigwin, "The Cambridge Expedition to the Zambezi Valley, Southern Rhodesia, in 1934," *The Geographical Journal* 86, no. 3 (1935): 252-62. Photographs between pp. 254-255. Reproduced with the kind permission of Wiley International.

This chapter continues to consider the economics of colonial cartography, but takes a rather different perspective than the previous one. Instead of considering the investment in cartography across the entire colony, I examine the allocation of resources and expertise to one site in Northern Rhodesia. This site, the Gwembe Valley, was firmly below the ‘topographic threshold’ for most of the four decades covered in this thesis. Yet to be below the threshold of organised scientific topography did not mean a total *absence* of colonial mapping of the Valley; rather it meant the area was the subject of erratic, disorganised, and hybrid forms of cartography. This chapter analyses the nature and purpose of this panoply of cartographic interventions, and the patterns of their production over time.

Considering the diverse forms of mapping of this one site exposes five key aspects of the colonial cartographic economy. Firstly; different offices of the colonial government were interested in different aspects of the physical and social geographies of the valley. Secondly; those offices had different resources available to them for the visualisation of the terrain. Thirdly; those interests were answered (and not answered) by a diverse set of cartographic technologies and labourers. Fourthly; even at this local level the governmental habit of allaying and deferring the costs of mapping was only disrupted by moments of heightened capital investment in the land. Finally, and crucially; the summation or collection of this hotchpotch of cartography of the valley over time resembled a palimpsest more closely than an archive.

The Gwembe Valley is a section of land that runs alongside the Middle Zambezi. The name indicates a stretch of territory on the north bank of the river about 320 km long and bound at each end by deep gorges. Figure 13 and Figure 14 give some sense of the variety of environments in the valley. The difference in altitude from the ridge of the escarpment to its base at the Zambezi is about 2000m, and so the valley slopes very sharply towards the river. Some areas are flat and seasonally flooded, other areas rocky and steep. This combination of soil and drainage patterns, with higher temperatures than in other parts of the region means that the valley is not especially hospitable as a human habitat and has historically been sparsely populated.

As we saw in the previous chapter, colonial topographic surveys *followed*, rather than *preceded* development, so when, in 1948, Gwembe’s District Officer described it as a “depressed area,” this meant, almost by default, that the valley would be

cartographically impoverished.¹ By 1955, although fragments of topography were accumulating, the Gwembe Valley had still never been completely mapped at any scale by a single authority. The pieces of cartography that were produced did not ‘stack’ neatly and were certainly not co-ordinated. In that year, work on a dam began at the mouth of the Kariba Gorge, (that furthest downstream) to produce electricity through a hydroelectric scheme. By 1959 much of the valley had disappeared underwater. The valley met a more dramatic fate than most areas of rural Northern Rhodesia did under colonialism. Nonetheless it serves as an excellent exemplar of the typical relationship between the colonial evaluation of territory and colonial visualisation of territory. We will explore that relationship in the Gwembe Valley; but the conclusions carry for large portions of Northern Rhodesia; sparsely populated areas of no immediate economic potential to the colonisers.

The first section of the chapter addresses how cartography is usually considered to meet the wide range of interests in territory that are held by governments. The second section examines how map production in Northern Rhodesia was determined by the cost and availability of technologies, as well as skilled and unskilled labour. In the previous chapter I demonstrated that topographic output was shaped by innovation, high-capital technologies, and private investment. Here we will see that more mundane material, social and political conditions also shaped the colonial cartographic economy. The third section examines how labour and technologies were applied in attempts to generate a colonial ‘spatial order’ in the valley. It asks *what* the layers of cartography rendered visible and to *whom*. Finally, the chapter examines a short-lived project from the 1950s, which promised to unite what had been previously been disparate forms of geographical knowledge and attention, but created only a temporary harmonisation of colonial interests and experts.

Scale, and the spatial conceptions of colonial occupation

After Northern Rhodesia, Southern Rhodesia, and Nyasaland became the Central African Federation in 1953, the survey officers from the three previously independent territories gradually began examining existing practices and thinking about rationalising their cartographic work. In a report on that process, the Southern Rhodesian Surveyor General indicated, somewhat wistfully, the scales of mapping within which the Ordnance Survey had inscribed the United Kingdom. The whole of that country was mapped to a scale of 1:62,500, almost all of it to 1:10,560, and all

¹ ‘Annual Report, Directorate of Colonial Surveys’, 1947; District Commissioner, Gwembe, ‘Annual Report from Gwembe District to the Provincial Commissioner’, 1948, SP4/12/40, NAZ.

areas other than mountain or moorland at 1:2,500 (See Appendix 1 for examples of mapping that approximate these scales). These figures, he claimed, showed “the comprehensive range of maps required under modern conditions of civilisation”.² His framing of the ideas of ‘totality’ and ‘modernity’ in a single sentence, provides a good illustration of colonial ambitions for cartography (and many contemporary ones). However, the Surveyor General was pointing to the contrast between the UK and the Federation, and implicit in his assertion, that the Federation whilst not comprehensively mapped, was not yet either fully modern.

In developing a critical perspective from which to understand the concept of a ‘comprehensive range of maps’, Matthew Edney has sought to make explicit the existence of ‘modes’ of cartography.³ For Edney, different modes, or different ways of “acting cartographically” are developed by a community in relation to a particular scale of objects or interests in their environment. As he describes it “each spatial conception—property, place, territory, region, cosmos, oceans and so on—entails a particular way of managing the world’s complexity, and so particular strategies for envisioning and representing it”.⁴ This model of ‘cartographic modes’ that cohere to differing spatial conceptions, raises a further question: maps are ‘required by modern civilisation’, but to what purpose? Mark Monmonier’s analysis of changes in cartographic technology over the twentieth century answers this question by considering, in turn, the use of maps in location and navigation, in boundaries and surveys, in land cover inventories, and as decision support systems.⁵ He explores how these different contexts have prompted technological change. Movement in the field, the identification of sites on the global graticule or other cartographic grids, notation, calculation, and reproduction were activities that were, at turns, materially or intellectually challenging.

Monmonier’s suggestion that these different purposes can be resolved within the same basic framework is indicative of another aspect of contemporary mapping that Edney has explored. Edney argues that these different modes came to be seen as combinable

² Surveyor General, Southern Rhodesia, ‘Appreciation of the Mapping and Survey Position in the Federation’, 1956, MM1/2:3, NAZ.

³ Cartographic ‘modes’ and ‘spatial conceptions’ are themes explored by Edney in: Matthew H. Edney, ‘Mapping Parts of the World’, in *Finding Our Place in the World*, ed. J. R. Akerman and R. W. Karrow, Jr. (Chicago, IL: University of Chicago Press, 2007), 117–57; Edney, ‘The Irony of Imperial Mapping’; Edney, ‘Cartography Without “Progress”.’

⁴ Edney, ‘The Irony of Imperial Mapping’, 17.

⁵ Monmonier, *Technological Transition in Cartography*.

in a *particular* manner within the project (from the late eighteenth century onwards) of *cartographie universelle*.⁶ During this period regional descriptive geographies, cadastral land surveying, military topographic work and marine charting ‘collapsed’, resulting in a conflation of their different instrumental and intellectual functions.⁷ These were then brought effectively under the purview of a single cartographic system. Within this single system, the variety of purposes for mapping was supposed to be addressed through changes in map scale and minor variations in emphasis. The diversity of maps were then brought into a *hierarchy*, within which the most universal and ‘scientific’ (geodetic measurement) was supposed to serve as the basis for progressively more detailed and localised cartographic forms.⁸ The provision of topography at different scales was (and is) intended to transcend different modes, and instead provide a form of representational ‘zooming’ that serves multiple ends.⁹

We are however starting from the Gwembe Valley, which lay more or less completely below the topographic threshold between 1923 and 1949. In the absence of this topography, substitute documents were produced for the purposes of governance that looked very different from what we consider to be typical state mapping. These documents were created in a tension between the cost of different technological solutions, the minimum representational requirements, and a means of production that achieved sufficient accuracy or authority for its purpose, a status I call ‘good-enough’. Since these maps were not rigorously referred to the principles of *cartographie universelle* they tend to reveal their mode (and sometimes the less-than-comfortable accommodation of more than one mode) more explicitly.

So what were the purposes of colonial cartography and appropriate topographic scales as seen from the metropole? The Colonial Survey Committee (CSC) was formed in 1906 to address the problem of producing maps of empire. The Committee—initially made up of three representatives; one from the Colonial Office, one from the Ordnance Survey and one from the Topographical Section General Staff—discussed the question and came up with solutions that we would probably find familiar. The Empire, the CSC decided, needed maps to:

⁶ Edney, ‘The Irony of Imperial Mapping’, 42.

⁷ *Ibid.*, 43.

⁸ Edney, *Mapping an Empire*, Ch. 1.

⁹ Note: this photographic metaphor is not exactly appropriate for cartography, as changing a map’s scale involves the reselection of notable features, and reorganisation of the symbols and script to suit.

Define the exact limits of national territory, to show the areas and villages under the rule of native chiefs, they are essential for land registration and settlement, for the allotment of mining and forest concessions, and for the organization of internal communications. Of their necessity the experiences of the army in South Africa afford an eloquent testimony; and even the conduct of a “small war” or a police expedition is much simplified by the existence of reliable maps of the scene of operation.¹⁰

The cartographic historian Jeffrey Stone, in his account of British mapping of Africa, suggests that the purposes identified by the CSC were followed through to some extent sequentially. He identifies three main phases characterised by the purpose that mapping fulfilled in relation to colonial administrative activity.¹¹ Stone’s sequence works as follows. The first phase of conquest and organisation saw intense cartographic activity as administrative maps were drawn up by local officials and military envoys in order to organise and distribute their presence across the colonised domain. This was followed by a second phase of relative tranquility in which only cadastral mapping was pursued with any vigour. During the final phase (nascent in the late 1930s but realised only after 1945), maps were produced within a more intense interest in socio-economic development as exemplified by the creation of a new imperial agency, the Directorate of Colonial Surveys.

What Stone’s sequence suggests (but is not analysed) is that within colonial government, the institutional hierarchies and distributions of cartographic production did not replicate those structures as they were in the UK. In Britain, geodetic, trigonometric, and topographic mapping were carried out by the same agency, whilst private surveyors executed cadastral work. This was not the case in Northern Rhodesia. In Northern Rhodesia, topographic work was considered to be the responsibility of the local survey department, but ‘outsider’ metropolitan parties almost always carried out the few instances of trigonometric work in the colony.¹² The transferral of the metropolitan ‘system’ to Northern Rhodesia seems further confused when considering the other contributors to governmental mapping, and the range of motivations they brought to the projects. Whilst in the UK private rather than state

¹⁰ Colonial Survey Committee, *The Surveys and Explorations of British Africa: The Annual Report of the Colonial Survey Committee* (London, UK: H.M.S.O., 1906), 3–4.

¹¹ Stone, *A Short History of the Cartography of Africa*, 107.

¹² Colonial Survey and Geophysics Committee, ‘Memorandum: Geodetic Work in Africa’, November 1937, OS1/62, NA UK; J R Smith, ‘The Backbone of Colonial Mapping in Eastern Africa’ (International Symposium on ‘Old Worlds-New Worlds’: The History of Colonial Cartography 1750-1950, Utrecht University, Utrecht, The Netherlands: ICA-ACI, 2006).

agents were responsible for marking out and dividing property, in Northern Rhodesia cadastral survey was largely carried out by the government's Survey Department. Topographic work was, therefore, often a by-product of cadastral records, producing further unorthodox relationships (from a metropolitan point of view) between the collection of geographical detail, and the scales of mapping.¹³ Importantly for us in following chapter, cartography was also undertaken by district administrators simultaneously to the fulfilment of their other duties.¹⁴ This mapping was tied to the administrators' goals and spatial vision. Then, yet further pieces of mapping were commissioned in the context of resource appraisal, communications planning or political decisions at a higher level; the upper echelons of colonial government or even the Colonial Office, London. The values and categories of these different groups were certainly not identical.

Thus although to some extent the hierarchy of cartographic values was inherited from the UK, it was not reproduced institutionally within the colony. Here, cartographic practices crossed-over and influenced each other in different ways. Each of the cartographic 'contributors' had visions of the colony that they wished to promote, each had differing access to (and interest in) the technologies of territorial visualisation. Stone assumes that these diverse interests could be resolved in mutually acceptable forms of cartography; he holds a belief in the potential, if not the reality, of *cartographie universelle* within the colony. In fact, I will show, there were differences, oppositions, and fundamental incompatibilities in both the epistemologies and goals of these groups.¹⁵

The model of the cartographic economy allows us to see how the differing 'spatial conceptions' of colonial occupation were neither (as the CSC hoped) served by a single scaled set of cartography, nor, as Stone argues, emergent through a diachronic typology. The following sections will show that they ought instead to be seen as separate realms of activity that were pursued simultaneously in different sites. These different cartographic realms employed different tools, different labour forces, and

¹³ W. E. Fairweather and J. C. Stone, *A Colonial Surveyor at Work: The Field Diary of W.G. Fairweather, Assistant Surveyor*, Northern Rhodesia Government, 1913-1914 (Aberdeen, UK: University of Aberdeen, African Studies Group, 1993).

¹⁴ Stone, 'The District Map.'

¹⁵ J. C. Stone, 'Imported Technology for Alien Purposes: The Case of the Land Surveyor in North-Western Rhodesia', in *Experts in Africa: Proceedings of a Colloquium at the University of Aberdeen, March 1980*, ed. J. C. Stone (Aberdeen, UK: Aberdeen University African Studies Group, 1980), 29-42; Stone, 'The District Map'; J.C. Stone, 'The Compilation Map: A Technique for Topographic Mapping by British Colonial Survey', *The Cartographic Journal* 21, no. 2 (1984): 121-28.

defended different kinds of order against different contestations. In order to explore the connections between documentation, colonial governance and visualisation, I will first summarise the forces that shaped the availability of technicians and technology for the making of maps in Northern Rhodesia.

Cartographic labour, site, and scale

The location and cost of cartographic labour

I wonder if you like the African as well as I do. He has great possibilities it seems to me, and on the West coast I have seen him turned into a very good surveyor with the consequent possibility of making a good 1-inch map at something like £1 a square mile. With a white staff, including its pay, its pension and its leaves, the cost would probably be five to six times as much.¹⁶

The size and shape of the cartographic workforce for British colonial Africa was constrained by three interdependent questions; the availability of skilled labour, the cost of manual labour, and the political status of the worker. Following the initial decision not to fund or organise survey at an imperial level, responsibility held at a local level, and had to be met from local funds.¹⁷ This had a huge impact on colonial survey over following years, since it meant that the allocation of resources for cartography happened locally, and those decisions were embedded in local values. This was an underlying principle in the cartographic economy.

The policy that located cartographic responsibility in the colonies, also meant that the technologies and experts were decentralised. In order to produce maps, skilled labour and technical devices largely had to be ‘imported’ to Northern Rhodesia, and then to the sites to be mapped. It is evident from the surviving invoices and administrative requests that this process was an expensive and often thankless task.¹⁸

High transportation costs came in part from the distance between land-locked Northern Rhodesia and the nearest African seaports. In part they came from its lack of internal transport infrastructure. They were also due however, to specific local conditions. A key problem was the persistence of a variety of diseases across swathes

¹⁶ H. S. L. Winterbotham to Brigadier H. A. Walker, “Africans in Survey (ii),” November 4, 1930, CO820/8/8, NA UK.

¹⁷ McGrath, *The Surveying and Mapping of British East Africa 1890 to 1946*.

¹⁸ See for example: Senior Agricultural Research Officer to Secretary for Agriculture, ‘Draft Estimate: Ecological Survey (provisions for Shipments)’, 11 October 1928, MAG2/7/3, NAZ; Provincial Commissioner, Mongu to Director of Civil Aviation, ‘Supplies for the Runway Project’, 16 March 1953, BSE1/10/31, NAZ.

of Northern Rhodesia that prevented regular use of the horse or camel.¹⁹ A solution to this problem was found in human portage. We saw how, in 1927, the arrival of the aeroplane in Northern Rhodesia was assisted by a great deal of manual labour (Figure 5), but long after that time books, gramophones, typewriters, chairs and cookware were being transported across the colony by large groups of Africans. This solution was far from ideal for the execution of colonial survey work. Although portage formed an important part of local economies in particular areas of Northern Rhodesia, the manpower was not consistently available (depending on the prevalence of other waged labour and also the success of harvests); it required sourcing (and transporting) food supplies for large groups of men, and it was subject to various forms of employment regulation. These costs were a necessary additional expense for Northern Rhodesian survey projects.²⁰

However, the Northern Rhodesian government had further problems in bringing together survey teams. One was that it did not seem to have been able to offer very appealing terms to technical experts. In the first years of colonial occupation the region was not considered sufficiently healthy for a permanent white community.²¹ Later, the growth of the mining industry induced white technical experts to move to the colony (often not from Britain, but rather South Africa or other colonial settings).²² The growth of the Survey Department prior to the Second World War was shown in Table 1. That expansion, however, does not reflect an increasing availability of skilled labour. On the contrary the expansion of the mining industry increased the competition for the limited number of scientific and technical experts in the territory. Technical scarcity was felt in every domain, from botanists, to typists, even mechanics. In the 1950s the RAF's No. 82 Squadron complained bitterly that, "the lack of personnel trained in motor transport repair in Northern Rhodesia was 'an

¹⁹ Gewalt, 'People, Mines and Cars.'

²⁰ Ibid. See also, for example: W. G. Fairweather to District Officer, Ndola, 'Reconnaissance of the Border', 6 August 1926, SEC3/291, NAZ; W. A. Kaye to Director of Water Development and Irrigation, 'Visiting Gypsum Deposits: Supplies', 3 February 1949, MM2/1/108, NAZ; MacDonald, *Mapping the World*, 67.

²¹ Slinn, 'Commercial Concessions and Politics During the Colonial Period the Role of the British South Africa Company in Northern Rhodesia 1890–1964', 369.

²² Nicolaus, Selection Trust Manager, Northern Rhodesia to London Office, Selection Trust, 'Recruitment Policy', 20 January 1928, ST/G/1, LSE; Ian Phimister, 'Proletarians in Paradise: The Historiography and Historical Sociology of White Miners on the Copperbelt', in *Living the End of Empire: Politics and Society in Late Colonial Zambia*, ed. Jan-Bart Gewalt, Marja Hinfelaar, and Giacomo Macola (Leiden, NL: Brill, 2011), 141–60.

embarrassment', as airmen had to be diverted from their work to carry out...repairs".²³ There were also regular problems in sourcing even the most mundane technologies involved in survey work such as typewriters, trucks, or even petrol. Some items were available from suppliers in South Africa, but many more had to be sourced directly from Britain.²⁴ Supply problems regularly led to projects of all kinds being delayed and abandoned.

It must be imagined that the increased import costs reduced the purchasing power of the Survey Department's already straitened budget for equipment; repair and calibration took a great deal of time. The purchase of three 'Tavistock' theodolites (and getting them working in a satisfactory manner) was discussed over three *years* of departmental reports.²⁵ These frustrations did not prompt technological innovation in cartography (of the nature that Monmonier describes), but rather solutions that were local and make-do. In particular survey costs were mitigated through an increasing division of labour. This was a broader phenomenon in the twentieth century, as cartographic processes became automated.²⁶ However, a key local difference lay in the employment of Africans, and particular racial distributions of mapping work.

Racialised divisions of labour were envisaged for the mapping of Africa from the very beginning, particularly by virtue of comparison to the British mapping of India. Colonel Sir Thomas Holdich, Superintendent of Frontier Surveys in India and later President of the RGS, had suggested since the 1890s that the vast quantity of survey work to be done in Africa would necessarily require the recruitment and training of natives.²⁷ The system that was proposed first followed the apparent desire of the colonisers to construct a stratified colonial society based on a racialised class system,

²³ 'Colonial Survey Operations: East Africa', 1951, AIR14/3914, NA UK.

²⁴ Anglo-Belgian Boundary Commission to Messrs Cook, Troughton and Simms, Johannesburg, 'Tracing Paper (quality S117)', 14 January 1929, SEC3/291, NAZ; Director of Agriculture to Commissioner for Lands, Mines, and Surveys, 'Perogallic Printing Linen', 6 February 1940, MAG/2/9/8, NAZ; District Commissioner, Mongu-Lealui to Government Printer's Office, Northern Rhodesia, 'Survey Supplies', 23 July 1954, BSE1/10/31, NAZ.

²⁵ 'Annual Report, Survey Department of Northern Rhodesia', 1930, 433, CO799/7, NA UK; 'Annual Report, Survey Department of Northern Rhodesia', 1931, 477; 'Annual Report, Survey Department of Northern Rhodesia', 1932, 482, CO799/11, NA UK.

²⁶ McHaffie, 'Towards the Automated Map Factory.'

²⁷ T. H. Holdich, 'African Boundaries, and the Application of Indian Systems of Geographical Survey to Africa', *Proceedings of the Royal Geographical Society and Monthly Record of Geography* 13, no. 10 (1891): 596; T. H. Holdich, 'How Are We to Get Maps of Africa?', *The Geographical Journal* 18, no. 6 (1901): 590.

with white aristocrats, a “yellow” middle class, and black working class.²⁸ In the first years of colonial rule in central Africa, three Indian Surveyors were recruited to work in the British Central Africa Protectorate.²⁹ The deployment of members of the Indian Survey appears to have been technically successful, but socially less so, and the experiment only lasted for six years between 1895 and 1901.³⁰

In 1929, Harold St John Winterbotham was sent out on behalf of the Colonial Survey Committee to tour the survey departments in British Colonial Africa. By that time the employment of Indians no longer appears to have been proposed. The favoured future for survey turned instead to educating Africans in survey technique.³¹ However, this solution was not universally acceptable. Some saw difficulties arising from a general lack of exposure of the African population to European civilisation (comparison was made to the longer history of European presence in the Gold Coast, and the success in that location of training African surveyors).³² Others, more pragmatically, considered that it was simply a case that Northern Rhodesian Africans had an insufficient level of primary education.³³ Still others, simply that it would be “against the spirit of the government”.³⁴

Regardless of the official discourses surrounding imperial survey, Africans had inevitably already recruited for skilled work. Surveyors at work in Northern Rhodesia from the turn of the century onwards needed help in the field, and Africans with the relevant skills were recruited *ad hoc*. In the words of Divisional Surveyor D. S. Cleak the colonial surveyor set out to “find his own native...who appeared to have a commanding manner with his fellows, and who was clean and respectful”.³⁵ Across various types of work that involved native ‘teams’, the use of the colonial term *capitao*

²⁸ H. A. C. Cairns, *Prelude to Imperialism; British Reactions to Central African Society, 1840-1890*, (London, UK: Routledge, 1965).

²⁹ Martin, *Maps and Surveys of Malawi*.

³⁰ Ibid.

³¹ H. S. L. Winterbotham, ‘Reports on Survey Departments (collated)’, 1929, CO323/1041/10, NA UK.

³² H. S. L. Winterbotham to Brigadier H. A. Walker, ‘Africans in Survey (i)’, 28 September 1929, CO820/8/8, NA UK.

³³ D. S. Cleak, ‘The Training of Africans for Survey in Northern Rhodesia’, *Survey Review* 3, no. 21 (1936): 413–17.

³⁴ H. S. L. Winterbotham, ‘Memo to Surveyor General, Southern Rhodesia: Survey in Southern Central Africa’, 1929, CO323/1041/10, NA UK.

³⁵ Cleak, ‘The Training of Africans for Survey in Northern Rhodesia’, 413. See also the diary of C. W. G. Stuart (NAZ) on his relationships with African staff recruited for fieldwork in the Copperbelt.

indicated an overseer, although this ‘overseeing’ often involved a diverse set of tasks including translation—not just between English and one local language, but sometimes across several.³⁶ These *capitaos* were also often involved as chainmen, and supervising the cutting of lines in the bush, and the erecting of the survey beacons.³⁷ On at least one occasion in 1935, the Survey Department experimented with employing educated children.³⁸ A group of children who could, “read, write, and understand a rather complicated programme,” were trained and “duly sent out into the bush with a gang of helpers”.³⁹ This failed (although disaster was reported to have been “narrowly avoided”) because, as the Survey Director noted with a colonial-technocratic disregard for life, it was, “impracticable to expect such youngsters to live on hill-tops for any length of time”.⁴⁰

In parallel to this, after Winterbotham’s 1929 tour, the Northern Rhodesian government took up his recommendations to formally train Africans in a variety of technical survey fieldwork tasks. An initial technical training programme based on military educational practices was established, and by 1931 the Survey Department considered themselves to have met with a certain success. The departmental annual report identified three men that they described as the, “intelligent and well-educated type of native” that were “capable of carrying out on their own much of the donkey work, which takes up a large proportion of the surveyor’s time in the field”.⁴¹ In 1936 they were performing compass traversing with chain and cyclometer, measuring buildings in relation to plot boundaries, and several had also taken up correspondence classes.⁴² The recruits had achieved the level that Winterbotham described as a, “lower-grade-craftsman type of surveyor”.⁴³

The Africans working in the survey office were surely not unaware that their services to the Government were “a great saving on their part and... worthy of a proportionate

³⁶ Gewald, ‘People, Mines and Cars’, 24.

³⁷ ‘Annual Report, Survey Department of Northern Rhodesia’, 1931, 498; Acting Chief Surveyor, A. D. Hamilton, ‘Report on the Setting up of a Training School for African Surveyors’, 20 October 1944, SEC3/296, NAZ. See more on the informal employment of African assistants in Chapter Five of this thesis.

³⁸ ‘Annual Report, Survey Department of Northern Rhodesia’, 1935.

³⁹ *Ibid.*, 341v.

⁴⁰ *Ibid.*

⁴¹ ‘Annual Report, Survey Department of Northern Rhodesia’, 1931, 498.

⁴² Cleak, ‘The Training of Africans for Survey in Northern Rhodesia.’

⁴³ Winterbotham to Brigadier H. A. Walker, ‘Africans in Survey (i).’

augmentation of remuneration”.⁴⁴ This gave them some leverage. The most basic form of that leverage was electing to work elsewhere. In 1931 already the Survey Office worried that the salary they were constrained to offer under Civil Service regulations would not be sufficient to tempt educated candidates to undertake technically difficult, and physically challenging work.⁴⁵ The men with the levels of education that the government required had been trained in mission schools, and alternative employment included work as teachers, grocers, and technicians. However, these young men also represented an educated, mobile population who had, to varying degrees, taken on a cosmopolitan lifestyle, including exposure to Pan-African literature and politics. The huge expansion of mining in the Copperbelt in the late 1920s meant that demand for clerical work in the North of the territory had suddenly increased and the literate African employees in the South found they had leverage to increase their rights and their rates. The founder-chairman of the Civil Servants’ Association, Lawson B. Chipolle, was a veteran of the Survey Department (working there between 1901 and 1928).⁴⁶ Economic leverage was gradually transformed into more coordinated political leverage.

The opportunity for Africans to take up skilled positions was augmented by the continued absence of white survey expertise during the 1930s, but the most dramatic absence of technically trained ‘European’ men in Northern Rhodesia (and, therefore, the most radical social transformation of the workforce), was caused by the Second World War. As the white men of Northern Rhodesia volunteered, were conscripted, or (in the case of foreign nationals), put into camps, the authorities turned to both white women and African men to staff their offices. Indeed, in the Survey Department white women and black men “more than proved their value...during the war years when the attenuated European staff were unable to undertake extensive fieldwork”.⁴⁷ At the end of the war, many of these lost their positions and relative authority, but it had been

⁴⁴ From the Minutes of the First Annual General Meeting of the Native Civil Service Association, NAZ (archive reference unknown) cited in D. J. Cook, ‘The Influence of Livingstonia Mission upon the Formation of Welfare Associations in Zambia 1912-31’, in *Themes in the Christian History of Central Africa*, ed. Terence O. Ranger and John C. Weller (Oakland, CA: University of California Press, 1975), 110.

⁴⁵ ‘Annual Report, Survey Department of Northern Rhodesia’, 1931, 498.

⁴⁶ Cook, ‘The Influence of Livingstonia Mission upon the Formation of Welfare Associations in Zambia 1912-31’, 113.

⁴⁷ Acting Chief Surveyor, A. D. Hamilton, ‘Report on the Setting up of a Training School for African Surveyors.’

proved that these cheaper forms of labour could do the tasks that they had previously been considered incapable of.⁴⁸

The effects of wartime social disruption on bureaucratic structure were compounded by the expansion of colonial government in the post-war developmentalist drive. The new attitude towards imperial resource management was manifested in a more widespread data collection, increased experimental work, and more frequent reporting. This, it has been observed, resulted in a substantial expansion of colonial technical departments.⁴⁹ This expansion was reflected in the Survey Department of Northern Rhodesia, which was now being called on to provide cartographic support for scientific studies, the demarcation of African land tenure and township plots, and extensive new public works in addition to the cadastral and topographic work they were already responsible for. The difficulty the Survey Department had in finding qualified employees did not decrease in the post-war years, even with a large new influx of white population. The department continued to record their distress at the shortage of suitable candidates in almost every annual report. The situation was so bad that, in 1950, they reported themselves to be delighted in having for once succeeded in hiring a surveyor who *did* have both theoretical and practical training.⁵⁰

Yet the implementation of developmentalist ideas, brought on the need for the Survey Department to respond to more rapid territorial change and produced a greater demand for mapping. In the absence of ready-trained white male survey practitioners, the result was a further expansion and diversification of the workforce. By the mid 1950s, the Survey Department had increased dramatically from the fourteen-person team inherited from the BSAC in 1924.⁵¹ In 1955, it employed thirty-six staff purely carrying out clerical work, had a reprographic department staffed entirely by women, and occupied three “Lady tracers”.⁵² Particularly notable, however, was the expansion in training programmes and technical employment for Africans.

⁴⁸ Chief Secretary, ‘Circular: War-Time Staffing Procedures, for AO Provincial Commissioners’, 13 February 1942, WP1/14/1, NAZ.

⁴⁹ Anthony Kirk-Greene, ‘The Thin White Line: The Size of the British Colonial Service in Africa’, *African Affairs* 79, no. 314 (1980): 25–44; Bonneuil, ‘Development as Experiment’; Clarke, ‘A Technocratic Imperial State?’; Tilley, *Africa as a Living Laboratory*.

⁵⁰ ‘Annual Report, Survey Department of Northern Rhodesia’, 1950, CO799/28, NA UK.

⁵¹ ‘Annual Report, Survey Department of Northern Rhodesia’, March 1925, 536.

⁵² ‘Annual Report, Survey Department of Northern Rhodesia’, 1955, 2, CO799/35, NA UK.

Northern Rhodesia had already instituted specialist schools for training Africans in agriculture and forestry and the suggestion of a formalised training programme for African surveyors re-emerged in the 1940s. The graduates were originally to be concentrated in the survey department itself, but it was rapidly decided that there was demand across a variety of government technical offices, as was reported in 1944:

The original intention was to turn out one hundred surveyors (inclusive of wastage) over a period of eight years, but a reference to some of the ten-year departmental plans clearly shows a demand for a considerable increase in the number"⁵³

The school, which was approved, generated a growing community of African 'Assistant' Surveyors that worked across the colony, within a variety of institutions. This expansion of the pool of African survey technicians, represented significant saving on the costs of cartography for the colonial government. Training an African 'Assistant' Surveyor for two years cost less than a quarter of the annual salary of a European surveyor. Once qualified, these surveyors earned around ten per cent of the salary of their European counterparts.⁵⁴ By 1953, there were 132 African Surveyors employed across a number of government departments.⁵⁵

Increased interest in imperial development also generated other mechanisms for improving cost-efficiency in survey however. Lord Hailey and Worthington's reports on African development fed renewed discussions about colonial mapping in a variety of metropolitan circles.⁵⁶ The Royal Society's report on geodetic mapping filed to the Economic Advisory Council was particularly influential provoking support for an imperial cartographic institution.⁵⁷ The result was that during the years of conflict of the Second World War the Colonial Office reversed the decision to decentralise responsibility for colonial mapping. Cartography was considered, for the first time, as an intrinsic part of the general costs of economic growth in the empire. The Directorate of Colonial Surveys (DCS), created in 1946, was an imperial headquarters

⁵³ Acting Chief Surveyor, A. D. Hamilton, 'Report on the Setting up of a Training School for African Surveyors.'

⁵⁴ The mid-point salary for a Divisional Surveyor in 1950 was £950. Training an African Assistant Surveyor cost £200. The annual salary of an African Surveyor was around £100.

⁵⁵ 'Annual Report, Survey Department of Northern Rhodesia', 1953, 4, CO799/34, NA UK.

⁵⁶ Hailey, *An African Survey. A Study of Problems Arising in Africa South of the Sahara*; Worthington, *Science in Africa*.

⁵⁷ Royal Society, 'Report to the Economic Advisory Council on Geodetic Work in the Empire' (London, UK, April 1936), OS1/62, NA UK; Colonial Survey and Geophysics Committee, 'Memorandum: Geodetic Work in Africa.'

for topographic survey.⁵⁸ This new institution, rationalised practices by sending surveyors to follow field seasons from one climatic zone to another.⁵⁹ By 1950 the DCS had thirty-nine field surveyors, producing data in combination with aerial photographic teams.⁶⁰ It gathered all the tracing, draughting and printing expenses into one budget. A new central staff in Greater London—largely British teenagers, working alongside a much smaller number of veteran military cartographers—mapped the world.⁶¹

The DCS had the means to enrol industrial-scale production methods, and industrial scale instruments (planes and stereographic plotters) that were well beyond the budget of the individual colonies such as Northern Rhodesia. They could work much more rapidly. Yet though it might seem that this new imperial organisation would have transcended the local cartographic economy, this was not the case. Responsibility for cadastral survey was retained by the Northern Rhodesian government, and the Survey Department continued to manage its costs by devaluing certain tasks and assigning them to women and Africans. As will be explored below, the DCS added further layers to the cartographic workforce with different qualities and capabilities rather than unifying the task of colonial mapping.

This brief summary of the nature of the cartographic workforce, demonstrates how the specific environmental and political environment of Northern Rhodesia conditioned the relative costs of survey work. The cost of instruments and experts was radically increased by the distance of the colony from the sites of production of instruments and sites of European technical training. Manpower was required not only for technical work but as a substitute for motor transport. The lack of European technicians prompted the training of African employees, but the boundaries between unskilled and skilled assistants were socially demarcated in a context that was racially fraught. All these factors altered the nature of survey work in the colonial setting.

These differences manifested in the way ‘modes’ of survey (see Edney, above) were married within the remit of single individuals or projects. Now that the basic structure of the cartographic workforce has been outlined, we can consider how that workforce

⁵⁸ ‘Annual Report, Directorate of Colonial Surveys’, 1946, OS46/1, NA UK.

⁵⁹ ‘Report on a Visit to the Directorate of Colonial Surveys by the Organisation and Methods Representatives of H. M. Treasury.’, 1949, OD6/3, NA UK.

⁶⁰ ‘Annual Report, Directorate of Colonial Surveys’, 1949, OS46/5, NA UK.

⁶¹ ‘Annual Report, Directorate of Colonial Surveys’, 1946.

was deployed, and how specifically colonial combinations of cartographic modes emerged.

The value of expertise, the exercise of authority, and colonial cartographic 'modes'

The peculiar combination of cartographic 'modes' in Northern Rhodesian governmental mapping was the result of a number of forces on the cartographic economy. These forces can be categorised in three ways. The first category is the most straightforward: those situations where a simple link can be made between a lack of funds and the need to fulfil specific tasks. The second category represents more complex situations where a feedback effect between the colonial *means* for producing cartography and the eventual output can be demonstrated. I will focus on that category in this section, and consider the consequence of the division of labour in colonial survey (described above) on the nature of the maps that were produced. Having established these, I will then go on to describe a third category of forces that influenced colonial cartographic production that came from localised map use.

The number of cases where simple arithmetic determined the nature of governmental cartography in Northern Rhodesia is very small.⁶² The problem of colonial cadastral survey, is the most obvious. In Britain, except for brief attempts at reform in the nineteenth and twentieth century, cadastral survey was supervised by the government, but was executed by private sector surveyors.⁶³ In Northern Rhodesia, such private licensed technicians were rarely available.⁶⁴ As a result the survey department had no choice but to double up its work in this respect. This situation made it necessary for each individual surveyor in the small department to be able to carry out both cadastral and topographic work. When a surveyor was sent out to a particular area, it was probably often an obvious solution to combine both activities in a single trip. This resulted in governmental topographic mapping that, unlike in Britain, also bears

⁶² This is, however, given to be the general causal explanation for the state of mapping in British colonial Africa see this thesis Ch. 2, 54.

⁶³ Kain and Baigent, *The Cadastral Map in the Service of the State*, 262–63.

⁶⁴ Between 1932 and 1950 there was at most one private surveyor available to carry out property surveys. At times there were more licensees in the territory, but these were all employed directly by mining or railroad companies. See the Annual Reports of the Survey Department (NA UK CO799).

witness to the boundaries of private property.⁶⁵ Figure 15 (see also Folded Map No. 1) from the topographic series begun in the 1920s, is an excellent example of this.

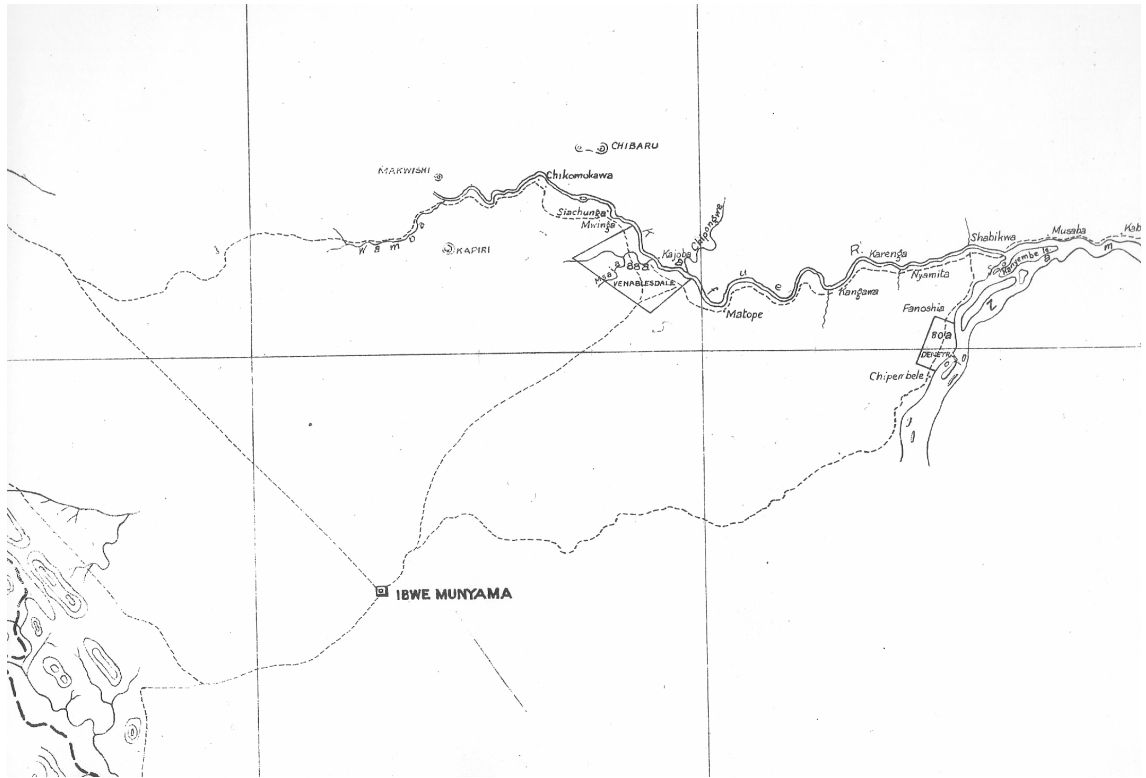


Figure 15: Detail from NW21: Chilanga, Provisional Topographic Series at 1:250,000

This section of the map shows part of the Gwembe Valley. Farm 88a (Venablesdale) lies on the banks of the Zambezi. Farm 80a (Demetra) lies on the Zambezi. Topographic detail is accumulated *around* demarcated property, which is also indicated on the map. See also Folded Map No. 1.

Chief Surveyors' Department, 'NW21: Chilanga', Northern Rhodesia Provisional Series, 1:250,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1920. Held at RGS mr Zambia G.7. Not reproduced at full size. See Folded Map No. 1 for full size reproduction.

Other qualities of the colonial cartographic economy have more complicated origins. The lack of trigonometric survey in the colony, for example, could be attributed to the absence of sufficiently skilled employees and equipment within the Northern Rhodesian Survey Department. Yet from in the 1930s, the Department was *equipped* for such work. Following a project led from London in 1931-32, further nascent trigonometric projects within the colony were regularly proposed, delayed then apparently cancelled. Only one stint of work was carried out in 1935-36.⁶⁶ It seems safer to say that trigonometric survey was prioritised much less in Northern Rhodesia

⁶⁵ In the UK the Ordnance Survey indicates the physical manifestation of property boundaries such as hedges, ditches and walls on its large-scale maps. These are not however, legal definitions of property. In Northern Rhodesia, the bounds of property that are indicated on maps such as Figure 15 would not necessarily have been visible in the landscape. The demarcation of property boundaries is dealt with more thoroughly in Chapter Five.

⁶⁶ 'Annual Report, Survey Department of Northern Rhodesia', 1932, 488; 'Annual Report, Survey Department of Northern Rhodesia', 1935, 336; 'Annual Report, Survey Department of Northern Rhodesia', 1936, 304v, CO799/15, NA UK.

than in the UK, rather than to offer a directly financial explanation for the lack of this work.⁶⁷

Even more complex was the way in which the locally defined political value of the survey experts shaped the Northern Rhodesian cartographic economy. An increase in staff in the Survey Department, did not symmetrically increase the kind of survey work that was produced, and to understand this we need to interrogate the role of both expertise and *authority* in mapping.

By the 1940s, when an African Survey School was being proposed in Northern Rhodesia, the services provided by the African members of the Survey Department were already considered to be on a par with those offered by Europeans:

On looking round the country at large, I find that outside this department and the corresponding departments on the Copper Mines there is not even an European who could undertake the highly technical services at present being carried out by these Africans.⁶⁸

By the 1950s, the Survey School graduates were trained to carry out even more technically difficult work, including levelling and soil survey, the use of logarithmic and trigonometric tables, and theodolites.⁶⁹

‘European’ surveyors, on the other hand, did not necessarily have a clearly defined education. The realities of survey in Northern Rhodesia seem very distant from the discussions about survey training that were taking place at the RGS at the turn of the century.⁷⁰ The first Chief Surveyor of North Eastern Rhodesian, Otto Beringer, was self-taught.⁷¹ The following Director of Surveys, William Gemmel Fairweather was described as a “man of self-won knowledge”, who was, as a result, “a little touchy on technical matters”.⁷² L.W.G. Eccles, the third Director of Surveys was a university graduate (degree unknown), yet we see from an account of a survey project in 1913,

⁶⁷ From the moment the DCS began to work in the colony, almost all of this work was taken on by their surveyors, (and post-1955 more was done under Federal supervision).

⁶⁸ Acting Chief Surveyor, A. D. Hamilton, ‘Report on the Setting up of a Training School for African Surveyors.’

⁶⁹ Ibid.; ‘Survey Equipment for African Assistant Surveyors: Provincial Office, Mongu-Lealui’ 1950, BSE1/10/31, NAZ; District Commissioner, Mongu-Lealui to District Commissioner, Kalabo, ‘African Surveyor- Mulope Singundumbwa’, 28 July 1951, BSE1/10/31, NAZ.

⁷⁰ Collier and Inkpen, ‘The Contested Nature of Surveying.’

⁷¹ Martin, *Maps and Surveys of Malawi*.

⁷² Winterbotham, ‘Reports on Survey Departments (collated).’

that he was still learning the most basic survey techniques even after a full year of employment in the department.⁷³ Thus the survey training received by African recruits from the 1930s onwards, would have meant they had relative technical parity with their European colleagues (if anything many of the African Assistant Surveyors were *more* professionally qualified).

This fact betrays the complexity hidden in a statement—regularly made—that African survey recruits allowed white surveyors to be ‘freed up’ for ‘more important’ work. But if colonial European surveyors were not being ‘freed up’ to perform more technically difficult work, then for what? Firstly, for managerial duties. The logistical complexity of the survey department increased throughout the 1930s much more rapidly in the 1940s. Managerial responsibilities were rewarded more highly than the technical ones, a fact that is reflected in the changing ratio between the wages of the head of the Survey Department and an ordinary European surveyor. In 1925, an ordinary surveyor earned seventy per cent of the salary of the head of department. In 1950, he only earned thirty-four per cent.⁷⁴

Another distinction between the tasks assigned to African and European surveyors was also related to the question of authority: not who could carry out surveys but who *ought* to be allowed to do so. The Survey Department were aware that this was a complex issue. The department’s annual report for 1936 cited an extract from a Northern Rhodesian newspaper as indicative of their dilemma: who would accept the ‘figures’ of black survey staff?

A few men have complained rather bitterly today of a gang of natives surveying a portion of ground on the borders of Ndola.... The Black North. Britain with her out of works. Northern Rhodesian with her small quota. Surely the time wasted in a futile attempt to teach natives to survey could be better spent in teaching our own young people how to read and write. Who is going to accept the figures of this gang of amateurs whose fathers were not far from the stage of eating one another. It is hoped that the Ndola Municipality wont [sic].⁷⁵

The question of authority had featured implicitly from the earliest discussions about training indigenous staff members. In his assessment of the capacities of colonial

⁷³ Fairweather and Stone, *A Colonial Surveyor at Work*, 12.

⁷⁴ The Colonial Office Lists show this trend growing for survey department salaries, in the years between 1925 and 1950.

⁷⁵ Article from February 11, 1936, quoted in Cleak from an unknown ‘local newspaper edited and owned by Europeans’. Cleak, ‘The Training of Africans for Survey in Northern Rhodesia’, 416.

survey department Winterbotham had advocated a military-style survey education for Africans, in part because that was his own background, but also because he considered it to be an environment that fostered the moral characteristics of duty and self-discipline.⁷⁶ In addition, he suggested that African members of the survey department should wear uniforms because “they must enter private property”.⁷⁷

The anxiety of the author of the newspaper extract about ‘accepting the figures’ of the African survey team came from two separate concerns. The first was the displacement of potential employment for white Europeans. This is a core theme in the history of Northern Rhodesia, as local attitudes and global markets both determined the relative compensation of black and white workers on the Copperbelt and the location of the ‘colour bar’.⁷⁸ The African survey staff, with an expertise close to that of engineers, represented a threat to the white mining community in Ndola.

The second was more closely linked to perceived reliability (and honesty) than to accuracy. The author of the public complaint was from the Copperbelt, a region in which the difference of a few hundred metres in the demarcation of ‘private property’ could represent hundreds of thousands of pounds worth of ore deposit. Survey provided the legal definitions on which the financial worth of land depended. African surveyors were assigned many forms of large-scale mapping yet it seems that they were not, however, entrusted with the demarcation of white private property.

This was a key differential in how cartographic work was distributed between black and white staff and exposes one of the particularities in the colonial ‘combination’ of cartographic modes and workers. And here, then, the feedback. Due to resource scarcity, white Northern Rhodesian surveyors created topographic maps that doubled as a means to indicate property boundaries (Figure 15). This was a diversion from the usual characteristics of maps in the ‘topographic’ mode in Britain. Black African surveyors, often worked at a larger scale, and in more detail, yet they would *not* be allocated the task of documenting white property. This confined them to a variety of other tasks.

I have identified some of the clumps and coagulations in Northern Rhodesian cartographic economy caused by the difficulty of obtaining technicians and

⁷⁶ H. S. L. Winterbotham to Brigadier H. A. Walker, ‘Africans in Survey (ii)’, 4 November 1930, CO820/8/8, NA UK.

⁷⁷ Winterbotham, ‘Reports on Survey Departments (collated).’

⁷⁸ R. L. Prain, ‘The Problem of African Advancement on the Copperbelt of Northern Rhodesia’, *African Affairs* 53, no. 211 (1954): 91–103; Gann, *A History of Northern Rhodesia*, 361.

technologies. The result was a reorganisation of the traditional hierarchy of European cartographic ‘modes’. However, the material and social possibilities were not the only factors that shaped the colonial cartographic economy. These muddled ‘modes’ were also the result of the *use* of cartography to impose spatial conceptions (after Edney) that were peculiarly colonial. I will now show how these layered scales and forms of vision were manifested in the colonial geographical conceptualisation and management of the Gwembe Valley.

Scale in the field

“District maps were found to be many miles out”.⁷⁹

This section considers how the attempt at applying *cartographie universelle* to Northern Rhodesia was affected not only by local constraints to executing cartography but also by the colonial propositions for territorial occupation and organisation. I argue that the ‘spatial conceptions’ which mapping was to serve, cannot be directly translated from European cartography. There were similarities of course. In Northern Rhodesia, as in European, national boundaries, administrative districts, private property and land use were conceived of as operating within a cartographic framework, but in the colonial context these social geographies were implemented using very different legal and practical mechanisms.

The following section examines how the three phases that Stone identified in his analysis of colonial cartography (establishing jurisdiction, organising property, and promoting development) unfolded in the Gwembe Valley. It uses these phases to analyse the ‘spatial conceptions’ of colonial governance. These spatial conceptions were not, however, addressed by cartography that resembled *cartographie universelle*; the nature of the ‘good-enough’ maps of the valley restricted certain geographical conversations to particular locations. The maps that mediated discussions between the colony and metropolitan agencies such as the Colonial Office and the Empire Marketing Board were radically different than those passed between District Officers or the Agricultural Department and the local chiefs and headmen. The chapter concludes with a revelatory incident in which the multiple cartographic layers (and, therefore, views) of the valley temporarily coincided in a single project.

I will demonstrate that although colonial action in the valley was conceived from a worldview that framed space cartographically, the ways in which cartography really enabled colonial rule were not the ways that the actors anticipated, or that we might

⁷⁹ ‘Annual Report, Survey Department of Northern Rhodesia’, 1938, 188v, CO799/18, NA UK.

easily recognise. The limitations on mapping in Northern Rhodesia that I have described altered the possibilities of colonial territorial visualisation, and simultaneously, the demands of colonial rule distorted standard metropolitan cartographic forms.

Jurisdiction as a spatial concept: mapping the 'district'

In describing boundary making as the motivation for the foundational phase of colonial cartography, Jeffrey Stone reveals his commitment to the concept of juridical spaces as key to colonial territoriality.⁸⁰ This position has been more explicitly advanced by Jeffrey Herbst, who has argued that a conception of power as control over an extended space defines European colonialism.⁸¹ Seeking control over space, Herbst argues, was not common in Africa, because, “not surprisingly, African conceptions of power reflected their states’ capabilities and the particular material environments”.⁸² In sparsely inhabited territory, land was not a contested resource. To Africans power was understood as control over population, and attempts to organise that population were made through the mechanisms of allegiance and obligation.

These differences seem worthy of consideration, but require significant fine-tuning. Herbst’s categorisations have recently been contested by scholars who argue that certain African polities did have geographically conceived jurisdictions.⁸³ To this must be added the caveat that the Northern Rhodesian colonial authorities did not always operate particularly tight internal or international boundaries. Although derived from European standards, colonial space-making was also adapted to accommodate the colonial state’s capabilities and particular material environment of central Southern Africa. Examining the relationship of the map to the history of the administrative organisation of the Gwembe Valley reveals that in the case of this region at least, the relation between administrative boundaries and the map was largely more symbolic than geographic. It also exposes the tensions arising from colonial attempts to create a ‘modern’ spatial order at a local level, whilst simultaneously relying on indigenous models of cooperation and authority.

⁸⁰ Stone, *A Short History of the Cartography of Africa*, 107.

⁸¹ Herbst, *States and Power in Africa*.

⁸² *Ibid.*, 45.

⁸³ Camille Lefebvre, ‘We Have Tailored Africa: French Colonialism and the “artificiality” of Africa’s Borders in the Interwar Period’, *Journal of Historical Geography*, Feature: French Geography, Cartography and Colonialism, 37, no. 2 (2011): 191–202; Hiribarren, ‘From a Kingdom to a Nigerian State.’

The validity and stability of district boundaries, depended a great deal on their saliency within the larger geopolitical entity of 'Northern Rhodesia'. It must be observed, from the outset that this larger entity was not, itself, especially stable. It was created through negotiations and treaties that were consolidated on the basis of fairly short-term trading and political relationships between Europeans and various African groups. Its autonomy was regularly under negotiation, with a top-down idea from London that it might be more rationally organised within East Africa, and permanent pressure from many white settlers that it be merged with Southern Rhodesia to form a united territory. These different conceptions of Northern Rhodesia's 'place' amongst its neighbours affected internal organisation of the territory, and the choice of sites for tax and magisterial centres, as the first annual report of the Public Works Department explained:

During the regime of the BSAC Co. all construction was rightly regarded as more or less of a temporary and experimented nature, for until the country was fully settled and developments began, it was impossible to tell what the needs of any locality were, or where the eventual and permanent Bomas [District Offices] would be situated.⁸⁴

The smaller districts and sub-districts of the territory had varying levels of stability. Some boundaries remained relatively intact through the years of colonial rule, other regions were prone to regular re-organisation. Southern Province is one such area and Gwembe District, a case in point.

⁸⁴ 'Annual Report, Public Works Department of Northern Rhodesia', 29.

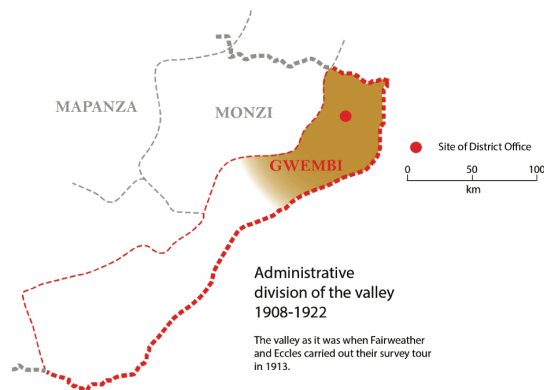
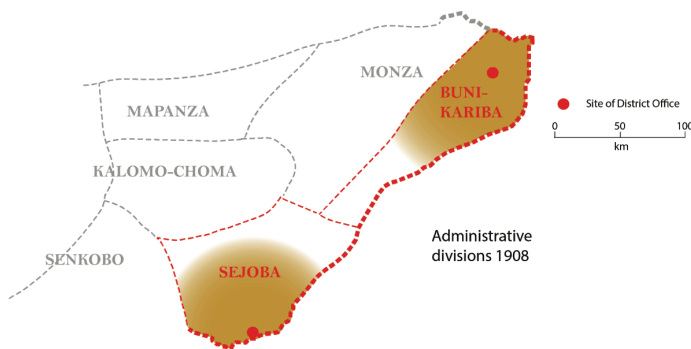
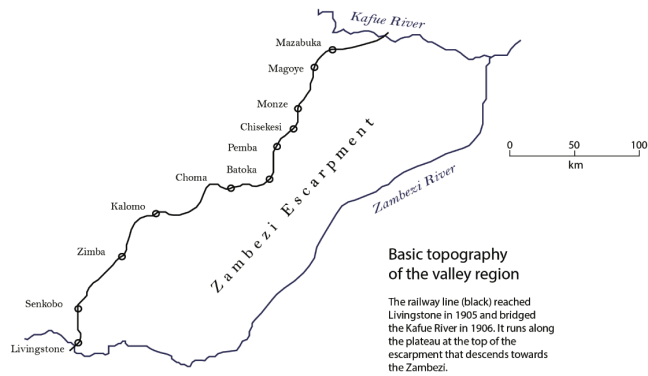


Figure 16: Changing administrative divisions in the Gwembe Valley (i)

This figure shows the basic geography of the region and the first two sets of district boundaries. The boundaries indicated in the figure are extremely approximate, traced from a variety of hand-drawn maps, and published maps at small scales. The orange shading indicates the area within of 100 km of the administrative centre.

Sources:

Lee, T. J. *Provisional Map of Northern Rhodesia*, 1:2,000,000. Edinburgh, UK: W. and A. K. Johnston, (manuscript annotation showing districts from which African labour was recruited in 1911 and 1912. 1908. NA UK MR 1/1830.

“Batoka,” no scale. Hand-drawn c. 1911. NAZ Digitised Maps 1097.

A Guide to the Administrative Boundaries of Northern Rhodesia (Stone, 1979)

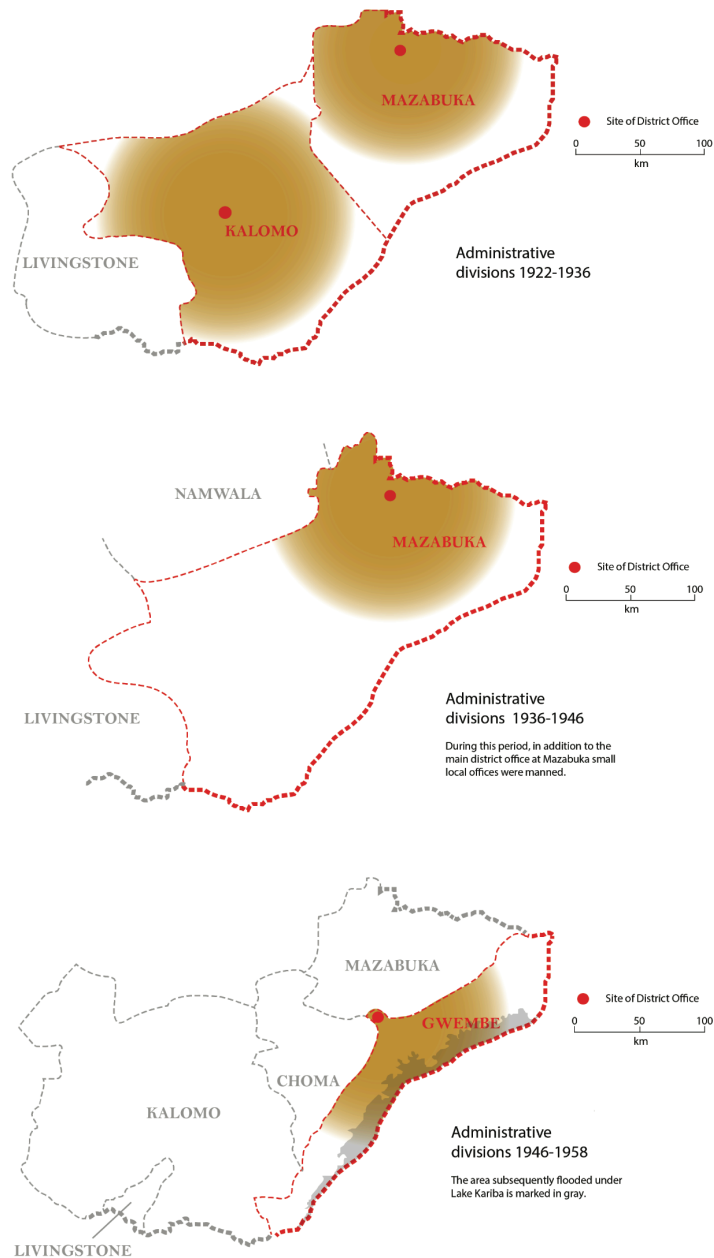


Figure 17: Changing administrative divisions in the Gwembe Valley (ii)

This figure shows three further sets of district boundaries. The boundaries indicated in the figure are extremely approximate, traced from a variety of hand-drawn maps, and published maps at small scales. The orange shading indicates the area within of 100 km of the administrative centre.

Sources:

“Sketch Map of Kalomo-Guimbi,” 1 inch to 4 miles. Sunprint of hand-drawn map, n.d. NAZ Digitised Maps 538

“Mazabuka District,” Land Commission Maps, 1:500,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1946. University of Columbia, Burke Theological Library, [UTS] Maps (Non-Circulating) Africa 35

‘Federal General Election Districts’, 1:3,000,000. Salisbury, Southern Rhodesia: Commission Appointed to Divide the Territory of Northern Rhodesia into Electoral Districts, 1958. Maps.c.518(1).95.2, University of Cambridge, Library.

A Guide to the Administrative Boundaries of Northern Rhodesia (Stone, 1979)

Even a rapid scan of Figure 16 and Figure 17 reveals the extent to which the geographies of governance in the valley were unstable. The boundaries and administrative centres shifted five times in fifty years, often relocated by more than a hundred kilometres. The first administrative unit 'Gwembe' was created in 1908 from the amalgamation of Sijoba and Kariba sub-districts.⁸⁵ Gwembe remained an administrative entity from its creation until 1922, when it was divided between the neighbouring districts of Mazabuka and Kalomo. These districts were combined in 1936, at which point both Gwembe and Kalomo came under the authority of Mazabuka.⁸⁶ During the late 1930s, and the early years of the Second World War, no colonial officials were posted in the area, and it was managed from the plateau. A reinstated Gwembe District was, however, only being held up by wartime paralysis, and within the first months of 1946 was already registered in the Northern Rhodesian Government Gazette.⁸⁷ From 1946 it remained a coherent administrative entity until the disruption and reorganisation caused by the flooding of the valley in 1959.⁸⁸

Simultaneously to the changing location of administrative boundaries, the precision with which they were delineated was also changing. Generally, precision increased over time, as a more detailed geographic framework allowed administrators to site and represent the district limits more accurately. However there were competing factors at work in the organisation and re-organisation of the administrative areas. Changing modes of governance affected the objects of interest to the administrator. The African population as a colonial 'object' was conceived in very different ways under the BSAC, under the philosophy of 'indirect rule' and in a developmentalist mode. These frameworks determined the level of detail at which boundaries were recorded (and the most appropriate form through which to represent them).

Returning to the definition of Gwembe District in 1908 gives an indication of quite how vague administrative boundaries were in the early years of colonial rule. It reads as follows:

⁸⁵ Stone, *A Guide to the Administrative Boundaries*, 24.

⁸⁶ *Ibid.*, 26.

⁸⁷ *Ibid.*

⁸⁸ JoAnn McGregor, *Crossing the Zambezi: The Politics of Landscape on a Central African Frontier* (Woodbridge, UK: James Currey, 2009).

From the centre of the Kafue Gorge, in a straight line in a S. Westerly direction to the Muluwe River, where the Kafue-Ibwe Munyama road crosses it. Then continuing in a straight line to a point on the Musea river at the crossing of the Ibwe Munyama-Magoye path on that river.

From the Musea to the top of the escarpment dividing the Native Districts Mapanganzia and Chimata, along the top of the escarpment still in a southwesterly direction to a point south of Kamba Hill where the three Districts, Kalomo, Magoye, and Guimbi meet. From there the escarpment divides Kalomo and Guimbi, the boundary line passing to the north of Choba (Siamsiana) to a point on the Zambezi about 20 miles upstream from Sijoba. From the downstream to the Kafue-Zambezi confluence and up to the Kafue River to the point of commencement.⁸⁹

A comparison between this definition and the earliest published 1:250,000 maps of the valley is interesting because the two documents are not reciprocally informative (see Figure 15, and Folded Map No. 1). The boundary as described in the ‘schedule’ of 1908 cannot easily be traced on the map. This is partly because few of the features named in the boundary schedule are represented on the map (seek out in vain the Muluwe River, Musea River or any ‘Native Districts’). This is also, however, because other references such as, “a point south of Kamba Hill”, or “a point on the Zambezi about 20 miles upstream from Sijoba”, are too imprecise *to have been recorded cartographically*. As a result the 1908 boundaries, we must conclude, were based on knowledge held uniquely at the District Office. They were simply not intelligible to a distanced authority and not compatible with the existing (or any), cartography. The articulation of these boundaries if they were passed to higher levels of government (the primary source for the record is the District Notebook, which remained firmly *in-situ*) would have been purely for symbolic purposes as it could not be coordinated with other information.⁹⁰

This seems symptomatic of the (dis)functionality of early cartography. Across Northern Rhodesia, even by 1913, the sites of the District Offices had not necessarily been located on the existing maps of the region.⁹¹ The colonial administration also struggled to pass on information effectively between its separate branches. Stone lays great emphasis on the cartographic contributions of the District Officers in the first years of administration, but it seems that mapping was only occasionally embraced

⁸⁹ Stone, *A Guide to the Administrative Boundaries*, 24.

⁹⁰ ‘District Notebook- Gwembe District Vol. 1’, p11, NAZ.

⁹¹ Steele, Chief British Commissioner, Anglo-Belgian Boundary Commission to Chief Surveyor, Northern Rhodesia, ‘Map of NW Rhodesia’, 26 August 1923, SEC3/291, NAZ.

with real enthusiasm at a local level. Where the District Officers did contribute detail and corrections to published maps, the survey office did not always consider their work to be sufficiently accurate, and sometimes simply ignored the information they received. In any case the depth of geographical knowledge held by the District Officers should not necessarily be overestimated. A letter of 1936 from the District Commissioner of Namwala District (adjacent to Gwembe) reveals a remarkable level of confusion in respect to district topography:

I have to inform you that I think the Julwe Lagoon is in your District. I have not visited this part of the country myself, but messengers tell me that this...was transferred to Magoye. I think this was about the year 1915 or 1916.⁹²

It is important, however, not to overstate the real relevance of maps to boundary discussions. Neither the scale, detail, nor accuracy of existing maps were sufficient to guarantee that each party could 'see' any boundary lines being discussed. After being requested to verify a boundary definition, the District Commissioner for Kalomo complained that he could not "trace clearly the Nakachanga River on any map in this office".⁹³ He suggested that unless his colleague had a better idea of the course of the river, that it would be safe to, "draw the boundary line 'in a straight line' from its source to the Railway Mile peg 1111 ½".⁹⁴ The substantial *differences* between the maps that were available meant that they invited as much dissent as agreement. Later in that same discussion another District Commissioner remarked that he was "not quite sure where Makonka's village is. On my maps it is shewn on east of Mutama to north of Katimba". In the margin, one unidentified reader has annotated "Makonka is an area only".⁹⁵

A map of district jurisdiction that was centrally produced in the early years shows smooth curved green lines on maps almost empty of topographical detail (see Figure 18). Such maps clearly reflect the disconnection of those imagined units from the physical geography of the colony, as well as hubris about the possibility of their realisation. In reality the boundaries were practically impossible to pin down.

⁹² District Commissioner, Mazabuka to Provincial Commissioner, Southern Province, 'Boundary Definition (ii)', 19 October 1935, SP4/12/10, NAZ.

⁹³ Provincial Commissioner, Southern Province, 'Circular: Boundary Definition (i)', 21 May 1935, SP4/12/10, NAZ.

⁹⁴ Ibid.

⁹⁵ District Commissioner, Mazabuka to Provincial Commissioner, Southern Province, 'Boundary Definition (ii).'

The local officers were aware that amongst the Tonga people in their district there was not a strongly-defined political hierarchy, as could be seen amongst the Lozi or the Bemba. In 1948, the District Officer described them rather as “a number of co-equal chiefs”.¹⁰² The relationships between chiefs in the valley were not only based on direct familial lines but also pragmatically on best-fit solutions to political problems. Family units and even larger groups were also not static. Although African society in the valley became more geographically fixed during the twentieth century, there was fairly continuous movement in response to climatic and environmental conditions.¹⁰³ To formalise these social groupings was to ossify processes that were fluid and ongoing. Asserting linear breaks between villages and groups might even entail the dissolution or complete restructuring of a political authority:

Chief Siowi and some of his villages have gone to live in Mwanachingwala's country, others of his (so called) people are the six Batwa villages mentioned. I have, however, found out that Siowi's chieftainship only dates from the arrival of the Government and I am afraid that as he now has no country and his people have scattered he will lose his Chieftainship unless he goes to the Kafue River and is made Chief of the Batwa (he is a mixture of Batwa and Sala) or goes to Lusaka District. That is a matter that can be gone into later. It is possible that 'a country' might be found for him in Namwala or Lusaka.¹⁰⁴

The spatial consequences of the chiefs' claims could not necessarily meet the cartographic ideal of clean lines. The logic of the map was incompatible with the logic of ethnic authenticity.

The use of pseudo-ethnic categories to define 'Native Authorities' added a further pressure to the cartographic definition of administrative units.¹⁰⁵ Layers of authority emerged as 'federations': groups united to pay tax and receive judicial authority.¹⁰⁶ The geographies of these federations also needed to be co-ordinated with the routes of movement and trade within the valley. To local officers it did not make sense to

¹⁰² 'Gwembe District Tour Report 1947', SP4/2/26, NAZ.

¹⁰³ Godfrey Haamweela Nachitumbi Haantobolo, 'Ecology, Agriculture and Proletarianization: A Study of the Sinazongwe Area in the Gwembe Valley of the Southern Province of Zambia: 1900 to 1989' (University of Zambia, 1991).

¹⁰⁴ District Commissioner, Mazabuka to Provincial Commissioner, Livingstone, 'District Boundaries (i)', 16 June 1936, SP4/12/10, NAZ.

¹⁰⁵ 'Native Authorities Order in Council', Northern Rhodesia Government Gazette (Northern Rhodesia, 1929), CO670/5, NA UK.

¹⁰⁶ Provincial Commissioner, Southern Province to Chief Secretary, 'District Boundaries and Native Authorities', 13 April 1937, SP4/12/10, NAZ.

separate the places where people paid tax from the sites they already journeyed to for other business. At times these needed further co-ordination with epidemiological cordons.¹⁰⁷ Attempts to account for all these factors within a single solution were pursued with more or less vigour at different moments. Under certain circumstances disunity was treated with indifference: "It was and is immaterial that one or two villages might be on the wrong side of the boundary".¹⁰⁸ On other occasions elaborate zigzags in the boundary were suggested as a compromise, as is evidenced by the variety of lines suggested between Mazabuka and Kalomo Districts in Figure 20. Lived patterns and habit tugged at the elasticity of these administrative divisions to produce problems that were addressed only slowly and re-emerged regularly.

The fallibility of ethnic categories was not the only impediment to the cartographic organisation of administrative units; there were other factors to be taken into consideration when trying to square this circle. In the puzzle of creating geographical units for administration, imperial policy and local contexts had to be balanced with the existing practices and resources of the colonial government. The territorial government aimed to create districts that had (where possible) some equivalence in size and population.¹⁰⁹ More pragmatically it was important that the geographical scope of the district allowed for travel throughout on a sufficiently regular basis.¹¹⁰ The definition of boundaries also, therefore, depended on the activities of its staff and the colonial routes within the district, as one officer explained:

I am pleased to note that you have made allowance for a Guimbi [Gwembe] Boma [office] above the escarpment, though the actual boundary of the 'bulge' would have to await choice of the new Boma site which again should be near a practicable route down to the valley.¹¹¹

¹⁰⁷ District Commissioner, Mazabuka to District Officer, Kalomo, 'Mazabuka-Kalomo Boundary', 31 March 1936, SP4/12/10, NAZ.

¹⁰⁸ Ibid.

¹⁰⁹ District Commissioner, Mazabuka to District Officer, Kalomo, 'District Re-Organisation (vii)', 25 March 1944, SP4/12/10, NAZ.

¹¹⁰ A memo by the Secretary of Native Affairs, May 1928 is cited in Stone, *A Guide to the Administrative Boundaries*, xiii.

¹¹¹ District Officer, Kalomo to District Commissioner, Livingstone, 'District Re-Organisation (v)', 24 March 1943, SP4/12/10, NAZ.

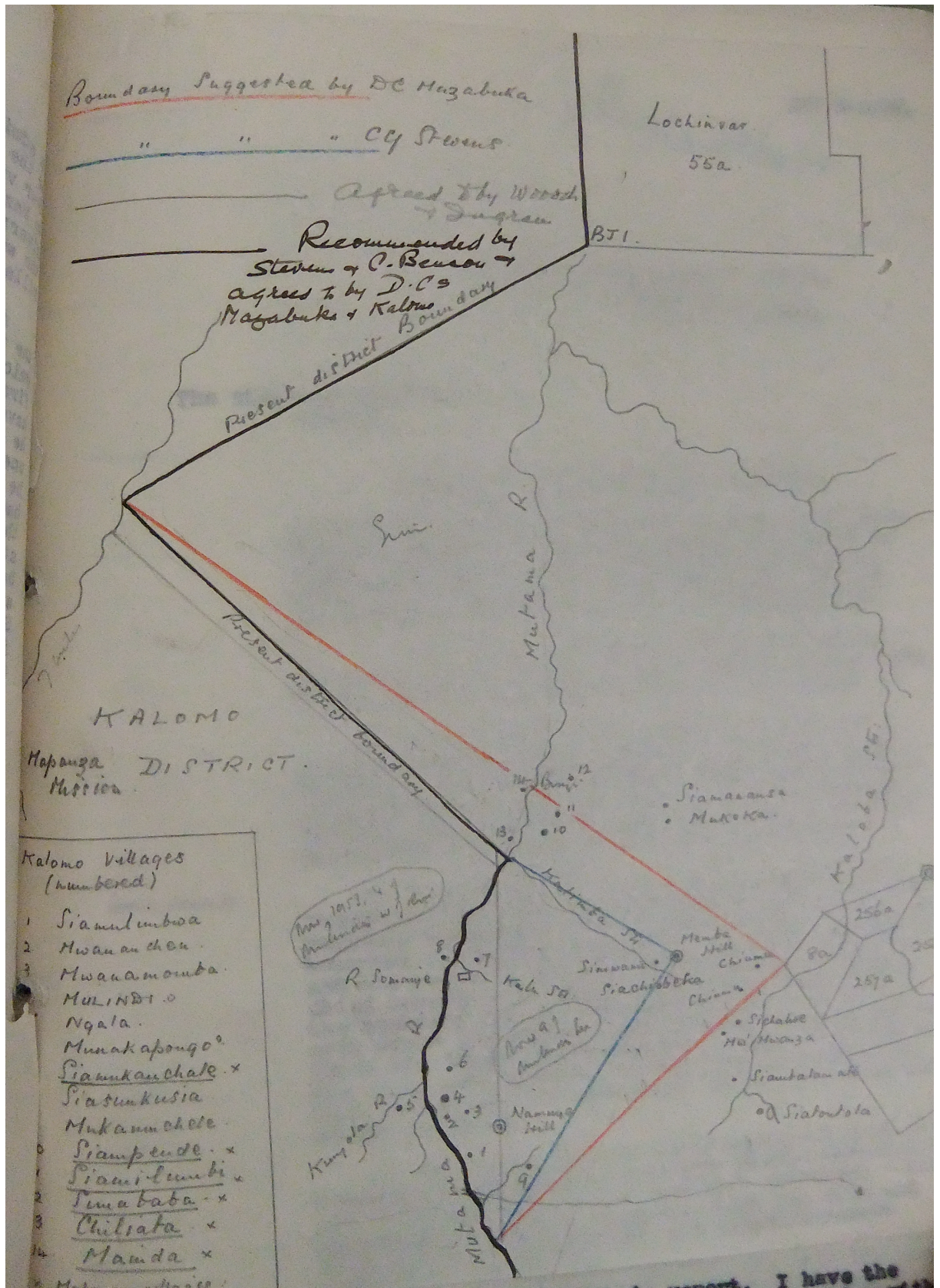


Figure 20: Resolving administrative logic. An attempt to reorganise district boundaries on the lines of ethnic groupings.

District Officer Mazabuka/District Officer, Kalomo. 'Mazabuka-Kalomo District Boundary'. Hand-drawn, 1936 (Enclosed in report following meeting, March 21). SP4/12/10, NAZ. Not reproduced at full size. It was not possible to reach the National Archives of Zambia to gain permission to reproduce this material. The author considers that this use falls under the category of fair dealing.

Appropriate district boundary making also required consideration of the staff who could be filling the post. This meant taking into account a variety of factors such as the suitability of a particular office for accommodating married officers, its isolation from other social and commercial contact, or the degree of cooperation necessary with adjoining districts.¹¹² In the valley in particular, working as a government officer meant more severe conditions and isolation. It was often hard to ‘hold’ colonial staff there (both European and African) to the point that one local officer wrote in 1940 that, “we should never keep a ‘foreigner’ in Gwimbe”.¹¹³ Solving these problems simultaneously pushed at easy boundary definitions to such an extent that one was described as looking, “like an unfinished sketch of a camel” (Figure 21).¹¹⁴

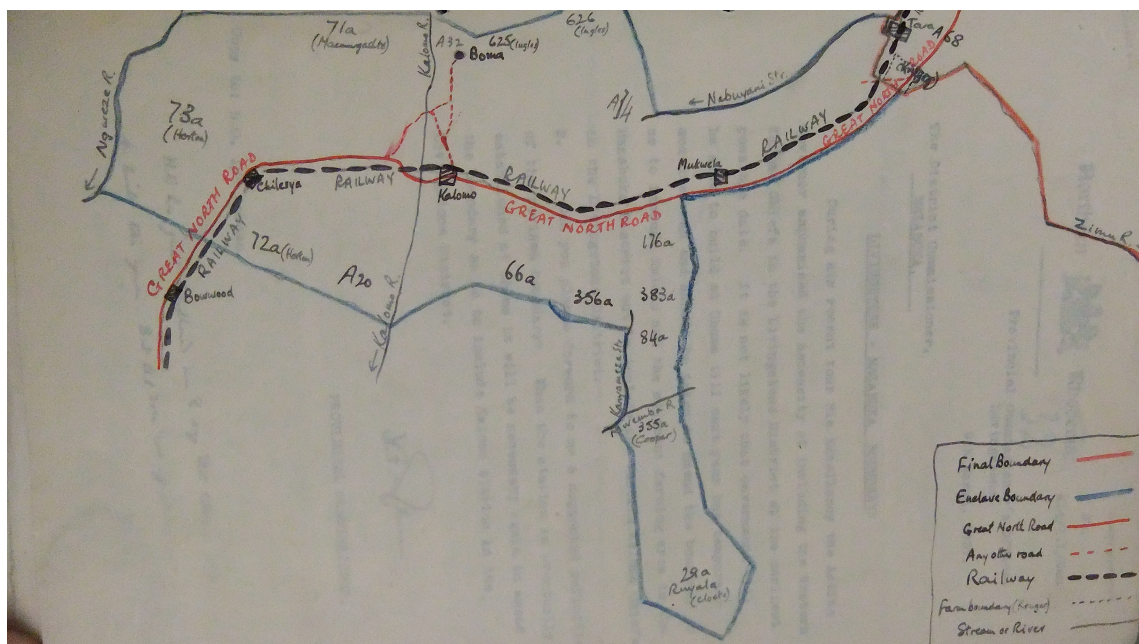


Figure 21: The ‘unfinished sketch of a camel’ resulting from attempts to resolve colonially defined ethnic groupings with other forms of administrative logic

District Officer in Charge, Kalomo. ‘Livingstone-Mazabuka Boundary’. Hand-drawn, 1937. (Enclosed in letter to Provincial Commissioner, Livingstone March 12). SP4/12/10, NAZ. Not reproduced at full size.¹¹⁵

The balancing of these different factors raises the question of the priority of African habits and desires or colonial ‘will’ in the production of an administrative cartography.

¹¹² Provincial Commissioner, Southern Province to Chief Secretary, ‘District Boundaries and Native Authorities’; District Officer, Kalomo to District Commissioner, Mazabuka, ‘Merging Districts’, 13 January 1942, SP4/12/10, NAZ.

¹¹³ District Officer, Kalomo to District Commissioner, Kalomo, ‘District Re-Organisation (iii)’, 30 August 1940, SP4/12/10, NAZ.

¹¹⁴ District Officer Kalomo to Provincial Commissioner, Southern Province, ‘Proposed Boundary (enclave Solution)’, 12 March 1937, SP4/12/10, NAZ.

¹¹⁵ It was not possible to reach the National Archives of Zambia to gain permission to reproduce this material. The author considers that this use falls under the category of fair dealing.

In the midst of these complex negotiations, did the logic of the map override situated considerations of daily life in Southern Province? In some cases colonial ‘cartographic’ logics seem to be favoured, and the resettlement of villages and reorganisation of African political authority was advocated, such as in the case of Chief Siowi. He and some of his villages posed an inconvenience to a proposed boundary and it was suggested that, “if [he] cannot go back to his original home on the Kaleya farms, or will not go on the Kafue River, I think his chieftainship must cease”.¹¹⁶ In other cases it seems that the administration were unwilling –or unable– to persuade chiefs to move home or change their allegiances in order realise more rational administrative units. One District Officer wondered if villages, “would think it worth while to adhere to a boundary so made”.¹¹⁷ This attitude persisted through into the 1940s, “It would be somewhat disconcerting after putting new boundaries up to Government to discover that some of these people would prefer to join the Plateau Tonga and it might be a safeguard to get their definite assurance beforehand”.¹¹⁸

In the event, in the Gwembe Valley, for a long time, the Native Reserves were not strictly policed. Correspondingly, the cartography did not need to evidence a strong articulation of rights to land. The first serious attempt to make coherent calculations did not come until the 1942 under a Land Commission that investigated land use across the entire colony. That commission found 16,300 Africans living outside the defined reserves in Mazabuka District.¹¹⁹ The result of the investigation was the creation of the new territorial category of ‘Native Trust Land’ and a lower tolerance of squatters.¹²⁰

A further result was a series of maps that began to approach an adequate geographical delineation those areas (Figure 22).¹²¹ These maps were published at 1:500,000 (see Appendix 1 for an example of mapping at that scale), and therefore failed to meet standard scale for an ‘administrative’ map of 1:250,000. More crucially, the loose sketching of the rivers and the form-lines of the hills indicate that the boundaries were

¹¹⁶ District Commissioner, Mazabuka to Provincial Commissioner, Livingstone, ‘District Boundaries: Chief Siamusonde’, 16 June 1936, SP4/12/10, NAZ.

¹¹⁷ District Commissioner Kalomo to District Commissioner, Mazabuka, ‘Boundary Definition (i)’, 1 August 1935, SP4/12/10, NAZ.

¹¹⁸ District Officer, Kalomo to District Commissioner, Livingstone, ‘District Re-Organisation (v).’

¹¹⁹ Kenneth Powers *Vickery, Black and White in Southern Zambia: The Tonga Plateau Economy and British Imperialism, 1890-1939* (New York, NY: Greenwood Publishing Group, 1986), 194.

¹²⁰ *Ibid.*, 195.

¹²¹ Land Commission, *Report of the Land Commission* (Northern Rhodesia: Government Printer, 1946).

not drawn against accurately measured geographical features, even on this map. Nonetheless, these were the first series of official District Maps drawn up by the Survey Department.



Figure 22: Extract from the Land Commission cartography, 1946

This map of Mazabuka District was published as part of the Land Commission report issued in 1946. The green areas indicate Native Reserve land, and the orange areas indicate the new 'Native Trust' land. This extract shows the same area in the Gwembe Valley around Ibwe Munyama that is depicted in Figure 15 the extract from a 1920s topographic map).

"*Mazabuka District*," Land Commission Maps, 1:500,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1946. Held at University of Columbia, Burke Theological Library, [UTS] Maps (Non-Circulating) Africa 35. Not reproduced at full size.

Jeffrey Stone made the reasonable claim that administrative cartography was a priority for the colonial government in Northern Rhodesia. He suggested that it was prioritised because of the imperative to locate and enumerate the local population for the purposes of both taxation and policing the colony.¹²² Yet, the evidence describes years of ignorance and miscommunication about the administrative districts. The survey department made demands from District Officers to define boundaries to particular levels of precision, but did not provide the material on which they could be represented. Investing time and resources in producing accurate mapping might have seemed ill-advised in the face of indecision about the how the Province should be organised, and also given the relatively inconstant location and structure of the social life in the valley. Nonetheless, if the first 'phase' of colonial cartography was supposed allow the foundation of effective administrative organisation, then this left the valley sorely wanting.

¹²² Stone, *A Short History of the Cartography of Africa*, 107.

In the interim, the geographic features that determined these boundaries (the siting of villages and cultivation, the domains of particular chiefs and headmen, routes through the district, and even accurate location of the district offices) were not inscribed in ways that could be read from the colonial or imperial centre, or even a neighbouring district office. It was difficult to reach agreement and features sometimes only recognised if two sides of a dispute travelled to the site in under discussion. The available cartography could orientate perspectives, but firm decisions would regularly require ratification or elaboration of detail in the field. The maps of the Gwembe Valley therefore played a very different role than the one we imagine for twentieth-century colonial cartography. It was rarely possible to use them to resolve decisions about colonial spatial orders from a distance.

Property as a spatial concept

In contrast to the demarcation of administrative boundaries, the delineation of private property was considered much more urgent, but it was not very much more organised. As I demonstrated, the white cadastre was the basis for the collection of the geographic data that featured on government maps of rural areas. By the 1950s, a division of labour had emerged that reflected the different ‘colours’ of property; a division that was also reflected in the nature of the map-documents on which property was recorded. Considering the gradual production of white and black titled property provides us with the most striking illustration of how governance was recorded at different scales.

Whilst certain general policies regarding land were decided in the metropole, the detail was very much in the hands of the local Colonial governments. Deciding on the ways and means to document and enclose land was the prerogative of the government of each individual colony. In the very first years of colonial rule, the personal judgement of the chief administrators of ‘North-Eastern’, ‘North-Western’ and finally ‘Northern’ Rhodesia played a pivotal role.¹²³ Land grants to white settlers were few and *ad hoc* until in 1906 the Administrator published a pamphlet that outlined the procedure, and the prices, for European occupation of land in his jurisdiction.¹²⁴

So in the very earliest years of the colony, occupation was not necessarily structured through clear or consistent documentation. It was only in 1908 that the BSAC began to assess claims and deal with European ‘squatters’. The dispossession and

¹²³ Vickery, *Black and White in Southern Zambia*, 76.

¹²⁴ *Ibid.*

resettlement of Africans as a result of the expansion of white property was approached in a similarly unsystematic manner.¹²⁵ As we saw in the previous chapter, by the late 1920s these processes were still largely unplanned.¹²⁶

The map *NW21: Chilanga* (Folded Map No. 1; see also Figure 15) demonstrates the disorderly expansion of property around the rail line at the top of the valley. It also gives strong visual evidence for the divergence of interest between the land on the plateau and the land that sloped down towards the Zambezi. The clusters of straight-sided farms, numbered and named, overlay much richer detail of both relief and hydrography. Even at this scale, we see a reproduction of the principle examined in Chapter Two where we saw that the production of topographic map-sheets clustered around areas of financial investment. Here we see that the production of topographic detail, even on a single sheet, might follow the same pattern.

Also noteworthy, however, is the relationship between the scale of the map (Folded Map No. 1 / Figure 15), and the size of the properties that it depicts. The map was drawn up at 1:250,000 (see Appendix 1 for an example of mapping at that scale). Venablesdale was approximately 5,000 acres, Demetra Farm approximately 1,300 acres. In Britain in the 1920s, only three per cent of farms were larger than 300 acres.¹²⁷ It would have been impossible to delineate British farms on a map at this scale. It was only the *scale of colonial land tenure* that made it possible to plot property boundaries on maps at the scale assigned for *colonial administrative* mapping.

NW21: Chilanga from 1920 might have been the precursor to later cartography on which where property slowly edged east and south across the map and into the valley. But it was not. Between 1939 and 1951 those notebooks record a total absence of white population in Gwembe District aside from the administrative officers themselves. By 1951 there were more permanent residents in two Christian missions, and from that time on there were several temporary groups of white experts and entrepreneurs: geologists, public works officers, and the managers of a new large farmed sugar estate. Prior to the construction of the dam, however, the maximum

¹²⁵ Ibid., 77–78.

¹²⁶ See the ‘Agricultural Survey Committee’ (previous chapter)

¹²⁷ GB Historical GIS and University of Portsmouth, ‘England and Wales through Time | Agriculture & Land Use Statistics | Sizes of Farms as Reported by the Agricultural Census.’, *A Vision of Britain through Time*, accessed 16 July 2015, http://www.visionofbritain.org.uk/unit/10001043/cube/AGCEN_FARMSIZE_A_GEN.

white population was sixty, and it decreased rapidly after the flooding of the valley.¹²⁸ By virtue of the prioritisation of property mapping, the valley—where there was no obvious indicators of settler interest—remained uncharted.

Black occupation of land in the valley was only barely visible on the 1:250,000 map. In contrast to the large rectilinear shapes of white property, rural villages were indicated only by dots (see for example Siachunga, Mwinga and Matope around Venablesdale in Figure 15). More detail about the geographies of black land use and occupation was more often available through lists of families, or taxpayers than in graphic form. This policy was certainly driven by the mobility of agricultural practices in many areas of Northern Rhodesia, but it draws attention to the fact that the population, rather than land was the primary category of governmental concern in the colony.

The colonial state's geographical interest in the valley took a new form in the 1930s, with the growth of townships and titled black property. Those living in townships represented a community who were more likely to be part of a local wage-labour system (rather than subsistence farmers) and the organisation of these spaces brought new forms of regulation.¹²⁹ In industrial areas, townships were forming on private land, elsewhere Government Townships housed those working as clerks, grocers, or labourers around larger colonial centres. These sites *were* documented cartographically, as the assignation of plots at specific sizes and for specific purposes were recorded as part of the cadastre.¹³⁰

In Southern Province, townships accumulated faster along the rail-line than in the valley, but in Gwembe District two had been officially designated by 1947. Gwembe Township was gazetted in 1947. A second township at Chirundu Bridge, the crossing over the Zambezi into Southern Rhodesia, was gazetted the same year.¹³¹ In the townships, cartography more often determined layout than was used to ratify existing occupation. Here, as elsewhere however, there was little policing of those projected spatial orders. African Assistant Surveyor Muzamai Matayo, for example, was

¹²⁸ 'District Notebook- Gwembe District Vol. 1.'

¹²⁹ Eccles, Acting Director of Survey and Lands to Chief Secretary, Northern Rhodesia, 'Registration of Plots in Private Townships', 29 August 1935, ML3/4/2, NAZ.

¹³⁰ The spatial organisation and records of these sites have been read as a very careful form of political control. James Ferguson, *Expectations of Modernity: Myths and Meanings of Urban Life on the Zambian Copperbelt* (Berkeley, CA: University of California Press, 1999); Garth Andrew Myers, *Verandahs of Power: Colonialism and Space in Urban Africa* (Syracuse, NY: Syracuse University Press, 2003).

¹³¹ 'District Notebook- Gwembe District Vol. 1', 165.

frustrated by the lack of conformity shown by those who were supposed to be to 'living' out his measures:

Last year in May I marked out 70 plots, 70 x 60 feet and instructed every member of the town to build up a nice Kimberley brick house... If strong orders are not going to be imposed on these people, I am pretty sure that there will no houses throughout the year. In all respects the people seem to be satisfied with those pole huts.¹³²

There was also an example of a kind of land-holding considered exceptional (in fact largely discouraged) by the colonial government, and therefore subject to particular scrutiny: settled farming by African farmers.¹³³ From the 1930s onwards anthropologists and agriculturalists had been studying *types* of African land tenure but the government did not generally consider the systems worthy of documentation at an individual level.¹³⁴ Through a variety of contingencies, in Southern Province, including in the Gwembe Valley, a number of areas existed for which individual Africans staked a permanent claim. One such area was Venablesdale (indicated as '6' on the Land Commission Map, Figure 22).

Figure 23, from 1951, is an example of the more detailed mapping of these areas. Keemba Farm was not in the Valley but on the plateau behind the rail-line. Keemba Farm was cultivated by Africans, not in the Valley but on the plateau behind the rail-line. The map is however, indicative of the qualities of the remaining archived cartography of the African Asst. Surveyors. It is typical in its scale; at 1:24,000 more than ten times greater than Figure 15. It is typical in its aesthetics: drawn and annotated by hand, the text added without stencils or type, all of which serve as visual indicators that belie the level of accuracy to which they have been produced. It is also typical in having been filed in the District Notebook (accompanied by a report); remaining *in* the local office.

¹³² Matayo Muzamai, African Assistant Surveyor to District Commissioner, Mazabuka, 'Survey of Magoye Township (i)', 26 May 1953, SP4/12/62, NAZ.

¹³³ Groups living in Rusholme, Mujiga and Venablesdale Farms and other locations in Southern and Central Province were the subject of regular reporting in the 1930s by the Native Affairs Department 'Annual Report Native Affairs Department of Northern Rhodesia', 1935, CO799/14, NA UK; H. Vaux, 'Unusual Aspects of Native Land Tenure in Mazabuka District', *Northern Rhodesia Journal* 2, no. 2 (1953): 18–27.

¹³⁴ Celebrated examples include: C. G. Trapnell and J. N. Clothier, *The Soils, Vegetation and Agricultural Systems of North Western Rhodesia*. (Lusaka, Northern Rhodesia: Govt. Print., 1936); Audrey Isabel Richards, *Land, Labour and Diet in Northern Rhodesia: An Economic Study of the Bemba Tribe* (Oxford, UK: Oxford University Press, 1939); Max Gluckman, *Economy of the Central Barotse Plain*, Rhodes-Livingstone Papers No. 7 (Livingstone, Northern Rhodesia: Rhodes-Livingstone Institute, 1941).

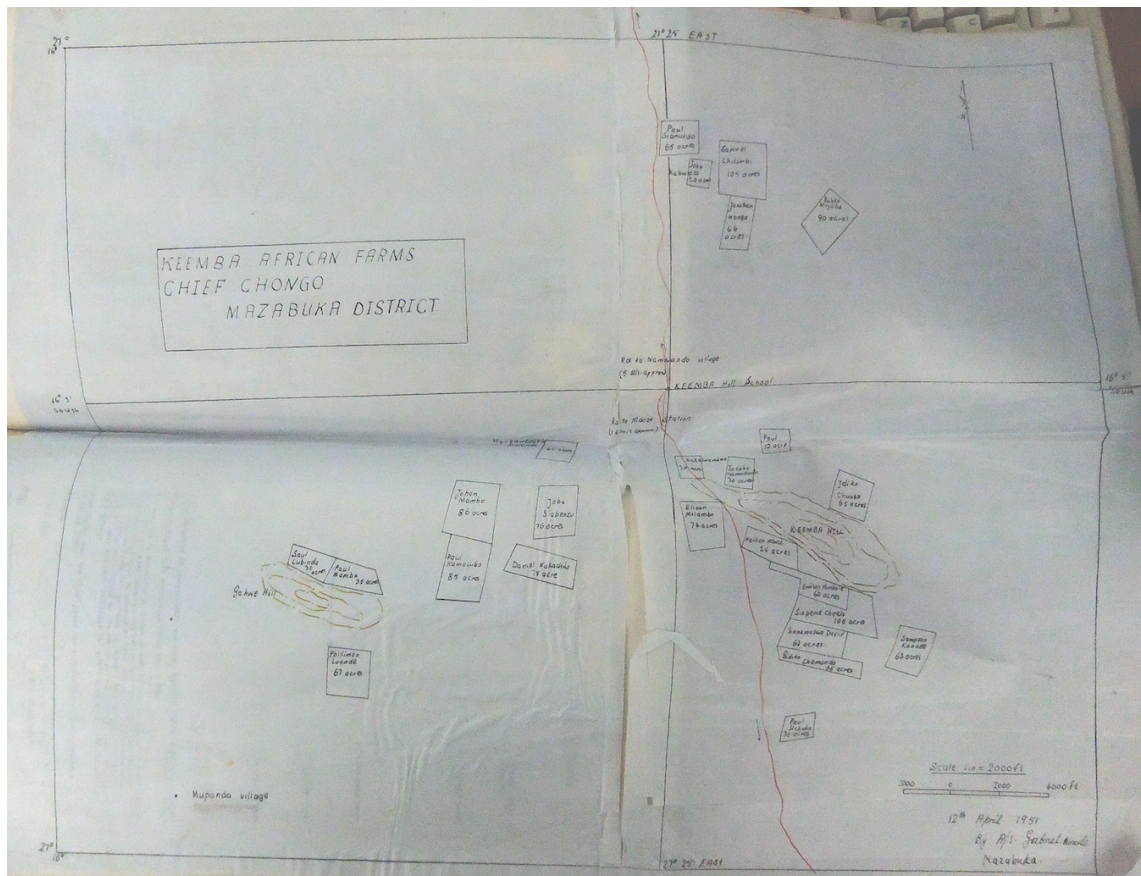


Figure 23: Keemba Hill Survey, a typical example of maps produced by African Assistant Surveyors from the late 1940s and 1950s

Gabriel Nonde. *Keemba African Farms, Chief Chongo Area, Mazabuka District*, 1 inch to 2000 feet. Hand-drawn, April 12, 1951. Inserted into Mazabuka District Notebook Vol 1. p. 301, NAZ. Not reproduced at full size.¹³⁵

White farms were sufficiently large for it to be possible to inscribe them onto the smaller scale topography drawn up by the Northern Rhodesian Survey Department. Their cadastral outlines were transferred to registers and a cumulative archive. This map of African property by an African Assistant Surveyor at a very large scale was not transferred onto other maps or kept as systematic records in the survey department. Instead it was locally drawn and traced, possibly circulated in small numbers, but remaining a discrete layer. It was not combined with or set into more general geography of the territory.

To return to Jeffrey Stone's sequence, then, the history of cadastral mapping in Gwembe generates problems for the concept of an increasing resolution of colonial vision of Northern Rhodesian territory through the 'cadastral phase'. Administrative mapping had not provided tightly defined spaces in the valley prior to settlement. In the Gwembe Valley the almost total absence of alienated property, meant that the

¹³⁵ It was not possible to reach the National Archives of Zambia to gain permission to reproduce this material. The author considers that this use falls under the category of fair dealing.

cadastral 'phase' did not produce a second parsing of the valley's landscape. The cadastral survey of 'Venablesdale' and 'Demetra' farms that is evidenced on the 1920s topographic map (Figure 15) produced islands of crisp documentation in the colonial cartography of the valley. In the absence of further estates in their environs, those farms remained unanchored to anything other than the basic physical features of their immediate surroundings. From the late 1930s onwards, the production of new categories of property happened simultaneously with the production of new categories of surveyor. Black property and black technicians both had a lower value. The records of African settlement required much larger-scale maps of smaller sites, but these were not collected into organised central records.

Development as a spatial concept

The final phase in Stone's sequence is that of cartography for development, one that really took hold from the end of the Second World War.¹³⁶ This is the most convincing of the categories in his sequence and marks the strongest obvious change in colonial attitudes to cartography. In the colonial context, development was a primarily economic goal and was, therefore, intricately linked to the 'improvement' of the land and people; largely through the instigation of a cash economy and forms of private ownership. However, in the post-war version of colonial development, the government demonstrated a new concern to stimulate and enable that process. This was to be achieved through the imposition of new material and social structures.¹³⁷ The imagining of these structures represents a third 'spatial conception' of colonial territory.

There were three main ways in which territorial development strategies were linked to geographical documentation: the construction of public works, (and in particular the development of infrastructures for transport); providing support for cash cropping; and enabling extractive industries.¹³⁸ The required cartographic work was—depending on the task in hand—executed by surveyors of the Northern Rhodesian Survey Department, the regionally distributed African Asst. Surveyors, or the teams of the DCS. In some senses, the full cohort of cartographic labour was dedicated to development. Additionally new systems of reporting were *intended* to

¹³⁶ Stone, *A Short History of the Cartography of Africa*, 107.

¹³⁷ Bonneuil, 'Development as Experiment'; Joseph M. Hodge, 'British Colonial Expertise, Post-Colonial Careerism and the Early History of International Development', *Journal of Modern European History* 8, no. 1 (2010): 24–46.

¹³⁸ 'Gwembe District Tour Report 1947.'

stack in a scalar manner (with information sent from the District Officer to the Provincial Commissioner to the Governor and, from there, to the Colonial Office). But the forms of knowledge at each level were not entirely compatible, and there was no graphic system that matched these scalar levels of governmental vision. This phase still resulted in the production of 'layers' of cartography rather than an integrated cartographic 'system'.

Given what I have shown so far of the mapping of the valley, it is clear that there was not a great deal of documentary support for planning development up until the late 1940s. This lack of documentation was not, however, obviously a problem since there was not a strong policy or a great deal of political will to carry out active development projects up until that point. As we have seen, the BSAC did not have a committed policy on how to extract profit from their chartered administration and were primarily responsive to locally perceived needs; an attitude later justified by the Public Works Department:

Under these circumstances, everything that could possibly be done without was omitted. The Boma [District] officials organised the work in their districts and the PW Dept officials were regarded as workmen called in to their assistance. The Plan worked economically and well, but conditions have now altered and permanent work has begun and it is time Standards were created.¹³⁹

In the 1920s, with the accession of Crown control over Northern Rhodesia, the Public Works Department and Lands Department faced new regimes of accountability that prompted some new consideration about their role in development, but their perspective was still quite closely tied to the expansion of a settler presence. A lands officer visited the valley in 1924—the first year of Crown rule—and decided that the area close to Venablesdale and Demetra Farms represented, “a reasonable promise of bringing several thousand acres of excellent lands, under irrigation from the waters of the Kafue River”.¹⁴⁰ Yet that value could not be realized “under the present conditions of absence of transport facilities by rail or road”.¹⁴¹ Even in the areas of the valley closer to the rail line, decisive intervention in land-use was inhibited by discussions about the creation of Native Reserves. These discussions had begun before 1924 and

¹³⁹ 'Annual Report, Public Works Department of Northern Rhodesia', 1925-6, 382. CO799/2 NA UK.

¹⁴⁰ 'Annual Report, Lands Department of Northern Rhodesia', 1924, 42, CO799/1, NA UK.

¹⁴¹ Ibid.

were ongoing in 1927, now with the advice of a Commission.¹⁴² Without obvious profit-making opportunities, decisions had to be achieved with the cheapest possible documentary solution (or none at all).

During the 1930s, as the reserves were outlined, and no infrastructure was generated to link the valley floor with the rail-line, the ‘development’ efforts of the District Officers were restricted to half-hearted interventions to ensure food supply, or, fairly regularly, attempting to stem disaster borne of increasingly erratic harvests.¹⁴³ In 1934, and again in 1943, the Northern Rhodesian Agricultural Department stated that the only real solution to this problem would be large-scale resettlement—moving villages away from exhausted soils.¹⁴⁴ The proposed resettlement required a level of geographical knowledge that was never reached, and so it could not be organised.¹⁴⁵ Without cartographic documentation that could provide environmental overviews, colonial agricultural improvement was tackled at the small-scale, such as the emergency distribution of famine rations, construction of village granaries, and the promotion of particular root crops.¹⁴⁶ In a tragic pastiche of cartography ‘following’ development, District Officer Macrae, working in Gwembe in the 1930s, found that famine relief work actually afforded him the opportunity to carry out the topographic mapping of the reaches of the District less known to the colonial government.¹⁴⁷

By the 1940s the lack of mapping was categorically discouraging further work that would generate more knowledge. A number of potential mineral sites were being considered but prospectors found planning exploratory visits rather difficult. They regretted that no government information was available. In 1948 a query to the local District Officer about minerals in the valley led to an apologetic response: “It is in an area which was not covered by the geological survey carried out by the Concession

¹⁴² ‘Annual Report, Native Affairs Department of Northern Rhodesia’, 1926, 478, CO799/2, NA UK.

¹⁴³ Haantobolo, ‘Ecology, Agriculture and Proletarianization: A Study of the Sinazongwe Area in the Gwembe Valley of the Southern Province of Zambia: 1900 to 1989.’

¹⁴⁴ District Commissioner, Gwembe, ‘Annual Report from Gwembe District to the Provincial Commissioner.’

¹⁴⁵ ‘Gwembe District Tour Report 1948’, SP4/12/29, NAZ; Thayer Scudder, *A History of Development in the Twentieth Century: The Zambian Portion of the Middle Zambezi Valley and the Lake Kariba Basin* (Worcester, MA: Institute for Development Anthropology, Clark University, 1985), 12.

¹⁴⁶ Scudder, *A History of Development in the Twentieth Century*.

¹⁴⁷ Stone, ‘The District Map’, 112.

Companies and so does not appear on any of the geological maps in my possession".¹⁴⁸ Other prospectors regretted the lack of roads (which meant the sites were inaccessible during the rains and therefore meant that their journeys necessitated portage).¹⁴⁹ Access was further complicated by the shortage of food in the area. Provisions had to be found for the full trip, since no food was available en-route in the local villages.¹⁵⁰ These visits and inquiries seem not to have made much impact cartographically in the first instance (geological information about the valley was not published until 1957).¹⁵¹ A vicious circle had formed between the lack of infrastructure in the valley and the lack of visibility of the valley to the government.

A change in British attitudes towards empire was in the air from the late 1930s, when Lord Hailey was dispatched to report on the political and economic futures of the African territories.¹⁵² This change reflected a new more centralised, unified perspective on imperial resources, and it began to exert effect on Gwembe District in 1943, when it produced its first 'five year plan'.¹⁵³ This new plan led to the enactment of new infrastructure projects in the valley, but these took place with crude cartographic support, or without any at all. By 1950 irrigation works had been completed around the site of Gwembe District Office with the assistance of a water engineer, but the rest of the valley was awaiting attention from the Department of Water and Irrigation.¹⁵⁴ A new road was finally constructed that connected the Gwembe District Office with the lower valley. This was partly based on survey; in 1947 officials from the Roads Department had planned part of the route as far as Chief Munyumbwe's village (twenty-one miles).¹⁵⁵ The route for the remaining fifty-six miles of road needed to

¹⁴⁸ District Officer, Mazabuka to Chief Secretary, 'Gypsum Deposits', 24 May 1948, MM2/1/108, NAZ.

¹⁴⁹ W. A. Kaye to Director of Water Development and Irrigation, 'Visiting Gypsum Deposits: Supplies.'

¹⁵⁰ Kaye to Director of Water Development and Irrigation, 'Gypsum Deposits', 3 February 1949, MM2/1/108, NAZ.

¹⁵¹ H. S Gair, Department of Geological Survey, Northern Rhodesia, 'The Karroo System and Coal Resources of the Gwembe District - N.E. Section, Northern Rhodesia' (Lusaka, Northern Rhodesia: Dept. of Geological Survey, 1957).

¹⁵² Hailey, *An African Survey. A Study of Problems Arising in Africa South of the Sahara*.

¹⁵³ Scudder, *A History of Development in the Twentieth Century*, 13.

¹⁵⁴ 'Gwembe District Tour Report 1950', SP4/12/31, NAZ.

¹⁵⁵ 'Gwembe District Tour Report 1947.'

reach the valley floor was “found with the aid of Headman Siatwinda”.¹⁵⁶ This stretch was hoed by communal village labour, without survey.

As I outlined above, the ‘developmentalist’ attitude was also having an effect on cartographic policy at the highest levels of government, and resulted in the creation of the DCS. Within three years of its institution, the DCS, had produced topographic mapping of the Gwembe Valley at 1:50,000 (Figure 24). (See Appendix 1 for an example of mapping at that scale). This was not, however because the organisation began with the least cartographically ‘known’ areas of empire. Its services had to be requested on a project-by-project basis. Colonies had to make their case as clients. The final decision on priorities now lay with the Colonial Secretary.¹⁵⁷ Various organisations turned up with their shopping lists, and put different forms of pressure on the colonial governments. British colonial Africa was described by a member of the institution as:

A happy hunting ground for experts from the Overseas Food Corporation, the UN Food and Agriculture Organisation, forestry institutes and mining companies... Colonial governments were anxious to get funds for any project... and saw the lack of mapping as a barrier.¹⁵⁸

The decision for the RAF to photograph the Gwembe Valley, and the stereographers at the DCS to set to tracing it out was not, therefore, because it had been so sorely neglected to present, but because it happened to fall along the potential route of the planned (but never constructed) Sinoia-Kafue rail-line. This is typical of the scale of the topographic projects that were awarded by the DCS—and of the ‘scale’ of the spatial conceptions that framed them.

The topographic work of the DCS also operated in an entirely separate framework of expertise and authority. The authority of the DCS maps was generated by the personality and institutional affiliation of its top-ranking staff, but also from the concentration of cutting-edge cartographic technologies—both aerial and land-based—that were organised from the metropole. However since the topographic detail of their maps was derived *entirely* from aerial photography, and with little or no reference to existing colonial maps, the result was map sheets of almost purely

¹⁵⁶ Ibid.

¹⁵⁷ Colonial Office, *Central Organisation for Geodetic and Topographical Surveys in the Colonial Empire* (London, UK: H.M.S.O., 1946), 10.

¹⁵⁸ MacDonald, *Mapping the World*, 43.

physical geography. The DCS maps were almost devoid of the names of rural settlements or homesteads, of even hills or rivers. The extract of a DCS map of in Figure 24, describes the same area, Ibwe Munyama that is depicted in Figure 15 (at a much larger scale). A comparison of these two maps gives a sense of just how little coincidence there is between their contents.

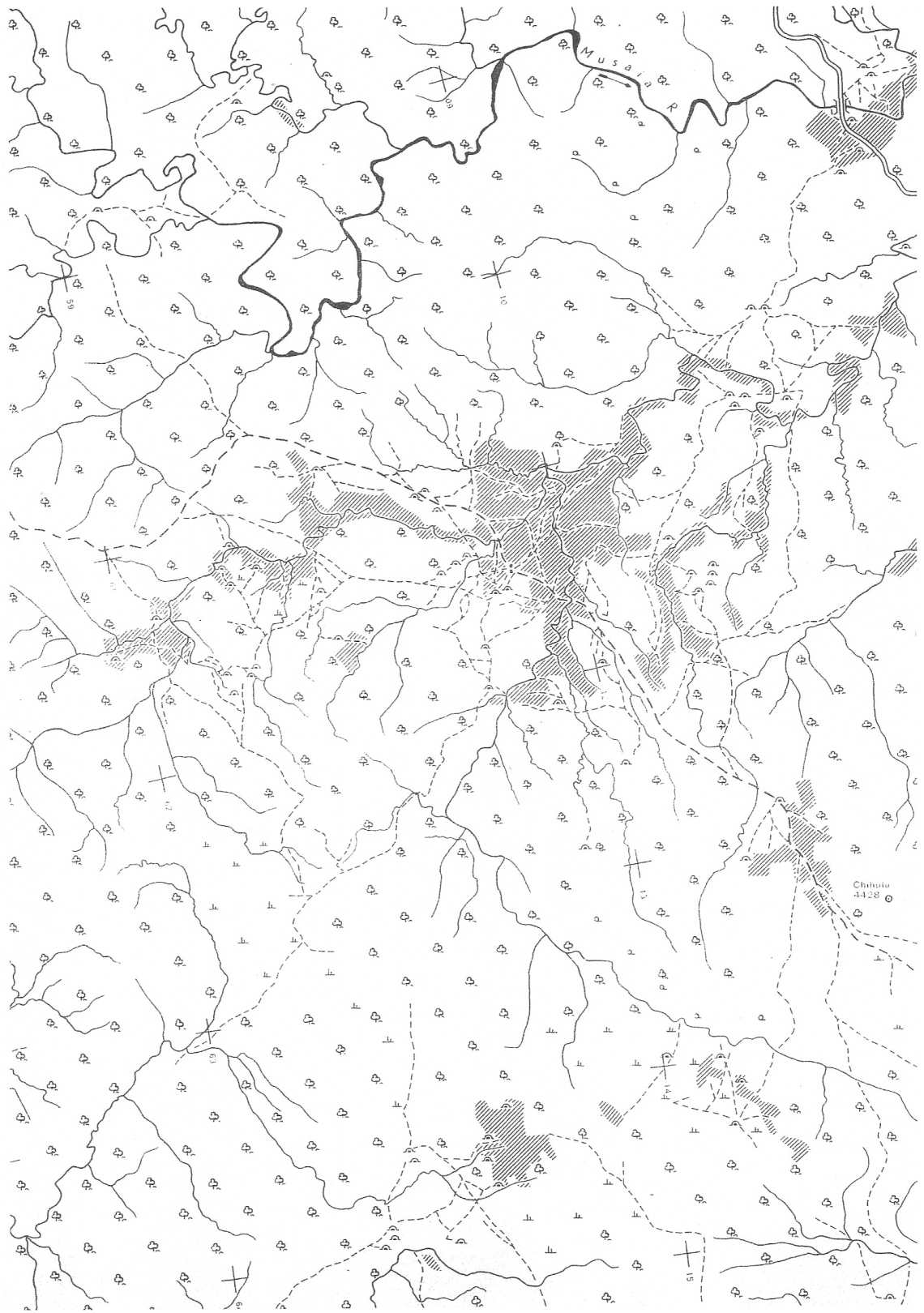


Figure 24: Section of Sheet 1628 NW2 showing the location of Ibwe Munyama (the administrative office indicated in Figure 15)

Directorate of Colonial Surveys, "1628 NW2," Northern Rhodesia Preliminary Plots (D.C.S. 24), 1:50,000. London, UK: Directorate of Colonial Surveys, 1949. Held at RGS mr Zambia G.2..
 Reproduced at full size.

The history of the mapping of the valley gives us further cause to believe that there were conditions that needed to be met in order for the Northern Rhodesian (and, indeed, imperial) state to consider a centralised visualisation to be necessary. This, it seems, was true for investment in high-capital cartographic technologies such as aerial photography, but also for projects that required a salaried white surveyor to be sent to a particular location. Those conditions might have been situations that were either particularly threatening or promising to the colonial governments goals.

It is clear that little of life as it occurred in the valley was deemed sufficiently disruptive to require centralised monitoring. Changes in the organisation of customary power, or the shifting of African gardens and villages, were not considered worthy of detailed documentation. Likewise smallholdings for cash-crop production, the insufficiency of water on the valley slopes, or the loose structure of the local soils, were not considered to be worth any kind of centralised geographical record. ‘Good-enough’ manuscript and sketch maps were deployed *ad hoc* to record transactions or exchange opinions. But where these *were* drawn up, it was by less prestigious members of the cartographic workforce, or those (such as the District Officers) who were outside it altogether. The modes of cartography that in Europe stacked so neatly, were disordered.

This was taken for granted in colonial Northern Rhodesia. As Jeffrey Stone has pointed out, compilation was a key methodology for colonial mapping.¹⁵⁹ Bringing together documents that had been intended to chart a railway-line, describe a river, or to roughly record ethnic-distributions was difficult. Yet this was all that was available. One of the first surveyors in the colony makes it clear that it involved a great deal of judgement on the part of the cartographer. He described his attempt to unite material into the first Provisional Map series at 1:250,00 (see Folded Map No. 1 / Figure 15). It was, he said:

Like a jigsaw puzzle, except that none of the pieces quite fitted, and we had to make adjustments according to the probabilities of error in each of the components used.¹⁶⁰

Although for the historian the ‘error’ in the maps is less of a problem than an interpretative access point, retrospective comparison of the cartography of the valley

¹⁵⁹ Stone, ‘The Compilation Map.’

¹⁶⁰ Hazard, ‘Recollections of North-Western Rhodesia in the Early 1900’s (Part II)’, 54.

from the early twentieth century creates a similarly cryptic effect. Despite the fact that this was an area 'known' and administered by colonial authorities, there is an almost insoluble gap in the layers of records. The early cartography that focused on human geography offers very few clues (sections of rivers, or estimated river courses, tracks, or hills in form lines) to the location of sites within their physical environment. The elaboration of trigonometrically tied topography by the DCS created the potential for the largely social geographies of Northern Rhodesia inscribed by the white surveyors and the African Assistant Surveyors to be more accurately tied to their location, and to be coordinated more systematically. It could have harmonised existing and ongoing work into a *cartographie universelle*. But this does not seem to have been the case. The later cartography drawn from aerial photographs is rich in detail but has no toponymy that would serve to cross-reference the sites in earlier records.

As a consequence the DCS maps covered over, rather than built on the work of the white Northern Rhodesian surveyors. The African Assistant Surveyors operated below—rather than within—the new general schema that had been established for the valley. Forty years of colonial cartographic endeavours resulted in maps that served to *reinscribe* the Gwembe Valley in different ways, rather than producing a co-ordinated accumulation of knowledge of the territory. The colonial cartographic economy generated a palimpsest rather than a combinable, cumulative archive.

While this twenty-first century historian has had access to maps produced and distributed during long periods and across diverse spaces, this was not the case for colonial occupants of the valley itself. For the best part of five decades, the imposition of colonial rule on the valley was attempted without detailed maps to hand. In 1948, the fragmentary mapping can be seen as parallel to the perceived hold of modernity on the valley. The District Officers of Gwembe were concerned that creating an apparent homogeneity between the valley and other parts of the colony through shared forms of reporting and representing would actually be destabilising. Real advancement, they suggested, would require the balance of 'knowing' historical precedent and personal intervention, on which their spatial order in the valley was founded:

There is a very real danger that, if the pace is forced to obtain a show of territorial uniformity, then such 'development' in the Gwembe will be as the house built upon sand.¹⁶¹

¹⁶¹ District Commissioner, Gwembe, 'Annual Report from Gwembe District to the Provincial Commissioner.'

However, in the end, at least briefly, the diverse layers of mapping and geographic knowledge of the valley were brought together in a project that aimed to produce 'conditions of modern civilisation' in the valley. The discussions about how to gather the necessary cartographic data for that project allow us to pin down the differences in the scalar vision of the organisations involved, but also make a direct comparison of the financial cost of enrolling different forms of cartographic labour. Yet more or less as the District Officers predicted, those layers of cartographic labour were not permanently united in the service of a coherent land-use registry. As we will see, they dispersed in the wake of that project; traces of a fleeting contact with high-capital investment, that rapidly disappeared, as if built on sand.

Scalar intersection?

In 1951, Mr Stanley Cooke, of Rhodesia Sugar Refinery Ltd., had made his way over to Gwembe from the Southern Rhodesian bank of the Zambezi. He already held sugar plantations on that side and had shown interest in extending his holdings across the border.¹⁶² For the following few months, the Survey Department received requests for consultation from the Agricultural Department and the Secretary of the Executive Council. This period of consultation is revealing. Planning for the Sugar Scheme united three colonial spatial conceptions of the valley that were previously considered separately: interest in administrative governance, property and economic development. In the process of carrying out a pilot project, the various forms of cartographic labour we have described were mobilised in a coordinated way for the first time. At least some portions of the valley would be raised above the 'topographic threshold'. However, the attempt to harmonise the qualities of the diverse cartographic workforce, to exploit each to their best purpose, and to generate systematic knowledge of even this small section of the colony was beset with difficulties.

Prior to beginning formal discussions, Stanley Cooke and the Member for Agriculture and Natural Resources had made a trip down the valley's slopes, taking along with them some air photographs taken in 1949 by the Rhodesian Royal Air Force, and agreed that the project was worthy of consideration.¹⁶³ The Secretary for Agriculture began to put together a report, arguing the case for the plantation. The potential profit (nebulous, but the project was described as a 'million pound venture') must have seemed assured because it was agreed that the pilot scheme for the venture would be

¹⁶² Member for Agriculture and Natural Resources to Director of Surveys and Lands, 'Proposed Sugar Factory Scheme at Chirundu', 6 June 1951, MM3/1/2, NAZ.

¹⁶³ Ibid.

financed almost entirely by the government, to the sum of £25,000.¹⁶⁴ Letters and contracts circulated while they agreed the details.

At least four geographical issues required clarification. First: within the lower slopes of the valley, where would the plantation be best situated? Answering this required a contoured topographic map in order to determine how the existing gradient, dips, and ridges of the land would favour conditions for sugar.¹⁶⁵ Second: was how best to bring water to this potential plantation? Fairly intensive irrigation would be necessary, and three possible solutions were under consideration.¹⁶⁶ Perhaps boreholes might produce a sufficient flow. Possibly they could pump water uphill from the Zambezi. More likely seemed the suggestion that they could bring the water across and downhill from the Kafue River, an important tributary running into the Zambezi just further downstream. How far exactly was the Kafue River from the proposed plantation? (How long would any irrigation channel need to run?) How much lower exactly was the Zambezi? (How many metres would the pump need to pull the water up the slopes of the valley?)¹⁶⁷ Third: once that site was decided upon, survey would be required to plan irrigation channels through the plantation itself. Finally, it was necessary to make a prediction about the relationship this plantation might have with the local population. Was a sufficient workforce available locally? How would they feel about the alienation of the land?

The answers to these last questions were not available from any records held centrally by the government. Reference had to be made to the archives of the local District Officers, their reports and notebooks. Opinions were recruited, letters exchanged, and it was decided that on balance, the sugar plantation could be staffed and that it would be of net benefit to the economy in the valley. In fact, to the Northern Rhodesian government the project appeared to be (at last) a solution to the low employment rate and lack of 'development' in the district.¹⁶⁸

¹⁶⁴ Director of Surveys and Lands to Member for Agriculture and Natural Resources, 'L.24', 23 June 1951, 24, MM3/1/2, NAZ; 'Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka', 13 July 1951, MM3/1/2, NAZ.

¹⁶⁵ Director of Agriculture to Stanley Cooke, 'Reply to 102/51 and 113/51', 5 July 1951, MM3/1/2, NAZ.

¹⁶⁶ Acting Director, Water, Development and Irrigation to The Member for Agriculture and Natural Resources, 'Sugar Area', 3 August 1951, MM3/1/2, NAZ.

¹⁶⁷ Acting Director, Water, Development and Irrigation to Director of Surveys and Lands, 'Response to L24', 12 July 1951, MM3/1/2, NAZ.

¹⁶⁸ Director of Surveys and Lands to Member for Agriculture and Natural Resources, 'L.24', 24; 'Gwembe District Tour Report 1950.'

Type and Year	Cost
African Labourer Annual Wage Cost 1951	£30
DCS annual expenditure on RAF flights and photography, 1949	£70,000
Northern Rhodesia Survey Department annual revenue from survey, 1950	£5,118
Gwembe Sugar Plantation estimated total cost of pilot scheme 1951	£25,000
Gwembe Sugar Plantation estimated cost of trial survey 1951	£5,000
Survey project Magoye Township (Matayo 1953)	£13
Annual Native Tax Revenue Gwembe District from population of 40,000, 1950	£2,896
Annual Native Authority Revenue Gwembe District (% of Native Tax), 1950	£2,022

Table 2: Survey labour cost comparison, Gwembe Sugar Scheme project¹⁶⁹

Defining the possibilities within the physical geography of the valley, would it seemed be more complicated. The cost of different kinds of surveys had to be ascertained. It needed to be decided what work could be done simultaneously.¹⁷⁰ The results of other research (such as the cost of different the different irrigation proposals) would also affect the type of survey required. There was also the question of the appropriate scale for new mappings. The Northern Rhodesian Director of Surveys had suggested that 1:10,000 maps would be most suitable for a reconnaissance map that could be used to locate the plantation.¹⁷¹ (See Appendix 1 for an example of mapping at that scale). Such a map would require contouring work either to be carried out fully in the field, or in combination with aerial photography. However, in the case that the contours were calculated from aerial photography, stereographers would require a relatively dense set of control points to match the images to ground data. Measuring these control points would still require personnel on foot, in the field.

In the first discussions several proposals were mooted, and the Director of Agriculture was enthused:

Private surveyors in the Lusaka area would charge 10/- per acre for contour survey work—but the Director of Surveys and Lands might be able to go about it possibly using some of his

¹⁶⁹ ‘Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka’; ‘Report on a Visit to the Directorate of Colonial Surveys by the Organisation and Methods Representatives of H. M. Treasury.’; ‘Annual Report, Survey Department of Northern Rhodesia’, 1950; ‘Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka’; Director of Surveys and Lands to Member for Agriculture and Natural Resources, ‘L.24’; Matayo Muzamai, African Assistant Surveyor to District Commissioner, Mazabuka, ‘Survey of Magoye Township (ii)’, 3 June 1953; ‘Gwembe District Tour Report 1950.’

¹⁷⁰ Director of Surveys and Lands to Member for Agriculture and Natural Resources, ‘L.24.’

¹⁷¹ Ibid.

African trainees who may well be capable of doing all that under European supervision... I propose to estimate on the basis of 5/- per acre for 10,000 acres or £2,500. Six months would probably be required for this work.¹⁷²

The response from the Director of Surveys and Lands was more hesitant. He felt that the reconnaissance area should be much larger, at least 20,000 acres, and that this survey would have to be carried out separately from a detailed mapping of a chosen site.¹⁷³ It looked as though employing African Assistant Surveyors would be the cheapest means of carrying out the work. They were certainly up to the technical difficulty of the jobs, both the initial topographic survey, and the subsequent levelling of the chosen site, and even if three African Surveyors were employed for eight months, the skilled labour would have cost less than £250 (See Table 2). The Survey Department could not, however, spare their staff for that long, and that option was ruled out.¹⁷⁴ Nonetheless, the Northern Rhodesians were still optimistic that the DCS would agree to prioritise the Sugar Scheme and coordinate planes from the RAF. Although it was felt that it was excessive to ask the RAF to cover the whole project, they were asked to provide a small section of extra photography.¹⁷⁵ This would mean several thousand pounds of air survey would be completed at no cost to the government at all. It would instead be subsidised by the Colonial Development and Welfare Fund.

Surveyors from Southern Rhodesia had been in the valley working on measurements for the Kariba hydroelectric scheme since 1944, so the DCS certainly had some survey material that could assist in charting the physical geography of the area.¹⁷⁶ At the DCS headquarters, 1:50,000 Preliminary Plots of the valley were in progress, and the relevant sheets were, in this case, 'part-contoured'. No. 82 Squadron of the RAF (who were, that June, still flying in the Zambezi valley) had agreed in a flurry of telegrams and urgent letters to provide additional air photographs whilst they were "in the area".¹⁷⁷ However, despite the fact that the *raison d'être* of the DCS was to support precisely such projects as the Gwembe Sugar Scheme their work was technically inadequate to the task.

¹⁷² Director of Agriculture to Cooke, 'Reply to 102/51 and 113/51.'

¹⁷³ Director of Surveys and Lands to Member for Agriculture and Natural Resources, 'L.24.'

¹⁷⁴ Ibid.

¹⁷⁵ 'Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka.'

¹⁷⁶ 'District Notebook- Gwembe District Vol. 1.'

¹⁷⁷ 'Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka.'

The DCS had, for some time, been balancing the competing priorities of rapid coverage, accuracy, and scale in their topographic output. By 1951 they had, for several years, been working from vast quantities of aerial photographs with very little ground control.¹⁷⁸ The DCS had developed mathematical innovation in the process of computing fieldwork data precisely to resolve this problem.¹⁷⁹ Their new mathematical methods allowed them to extend the 'spread' of each field measurement, to link a wider area of photography to fewer coordinate points.¹⁸⁰ Following requests from the Northern Rhodesian government, the DCS sent the few measurements of that area that they had on file over to Northern Rhodesia by airmail.¹⁸¹ Due to their mathematical innovation to improve efficiency, however, the DCS measurements included fewer control points than would normally be expected. They were not only insufficient in number. The Chief Computer in Tolworth, Mr Brazier, was doubtful that the DCS control points would be accurate enough to produce.¹⁸² In a strange scalar effect, the topography that the metropole was producing specifically for development purposes, still did not have a sufficiently high resolution of geographical information for this fairly typical development project.

In the end, the pressure of time and the larger budget that could be liberated for such an economically promising project meant that all the restrictions and weaknesses within the existing cartographic workforce could be sidestepped. A combination of technologies and cartographic expertise was deployed. The Survey Department had received a small amount of photography from the RAF.¹⁸³ The Survey Department itself provided some height data.¹⁸⁴ The rest of the ground control would be sub-contracted to a private firm. It seemed that it would be possible to hire the Air Survey Company of Rhodesia Ltd., (ASC). The ASC had existing contracts with the Northern Rhodesia government to carry out air survey planned for that year, and so the

¹⁷⁸ 'Annual Report, Directorate of Colonial Surveys', 1949.

¹⁷⁹ H. H. Brazier and V. A. Williams, 'The Adjustment of a Block Aerial Triangulation Evaluated with the Wild A5', *The Photogrammetric Record* 1, no. 4 (1954): 5–19.

¹⁸⁰ 'Annual Report, Directorate of Colonial Surveys', 1949.

¹⁸¹ Brazier, Chief Computer, Directorate of Colonial Surveys to Director of Surveys and Lands, 'Gwembe Sugar: Coordinates', 25 June 1952, OD6/360, NA UK.

¹⁸² *Ibid.*

¹⁸³ Officer Commanding, No. 3 Air Navigation School, Thornhill to Lands Department, Northern Rhodesia, 'Aerial Photography', 23 November 1949, MM3/1/2, NAZ; 'Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka.'

¹⁸⁴ 'Sugar Plantation Scheme: Minutes of a Meeting Held at Lusaka.'

Gwembe Valley could be added to their contracted schedule of work.¹⁸⁵ All this would be co-ordinated by the Survey Department.

A comparison of the costs of the different solutions for providing the mapping for the Sugar Scheme, demonstrates the extent of the 'gaps' between the available budgets for survey, and the different forms of cartographic labour. The Northern Rhodesian government hired the ASC Ltd. to carry out the topographic reconnaissance, for £2,745.¹⁸⁶ The further survey work on the ground to mark the boundaries of the site and the irrigation channels on the ground was covered by a private survey firm, at a cost that was estimated at £500 per month over six months, totalling approximately £3,000.¹⁸⁷

The cost of subcontracting the aerial photography and mapping to the ASC Ltd. (£2,475) was less than maintaining a large team of manual labourers in the field with European survey experts (estimated at £5,000).¹⁸⁸ However that small strip of twenty-four square miles of cartography still cost more than the salaries of thirty African Assistant Surveyors for an entire year (£2,400). ASC Ltd. mapping also cost more than the income of the Native Authorities for whole of Gwembe District for 1951 (£2,022). The Native Authorities budget (gathered from a population of 40,000 valley dwellers) would be subsidising agricultural and educational development in the valley, work that would have gone largely undocumented, and barely visible to the central government.

¹⁸⁵ Director of Surveys and Lands to General Manager, Air Survey Co., 'Air Survey Work for Northern Rhodesia', 5 December 1952, MM3/1/2, NAZ.

¹⁸⁶ 'Gwembe Sugar Scheme Allocation', 15 December 1952, MM3/1/2, NAZ.

¹⁸⁷ Director of Surveys and Lands to The Member for Agriculture and Natural Resources, 'Reply to Minute No. R/0268', 31 August 1951, MM3/1/2, NAZ.

¹⁸⁸ For the sources of the figures in this paragraph see Table 2.

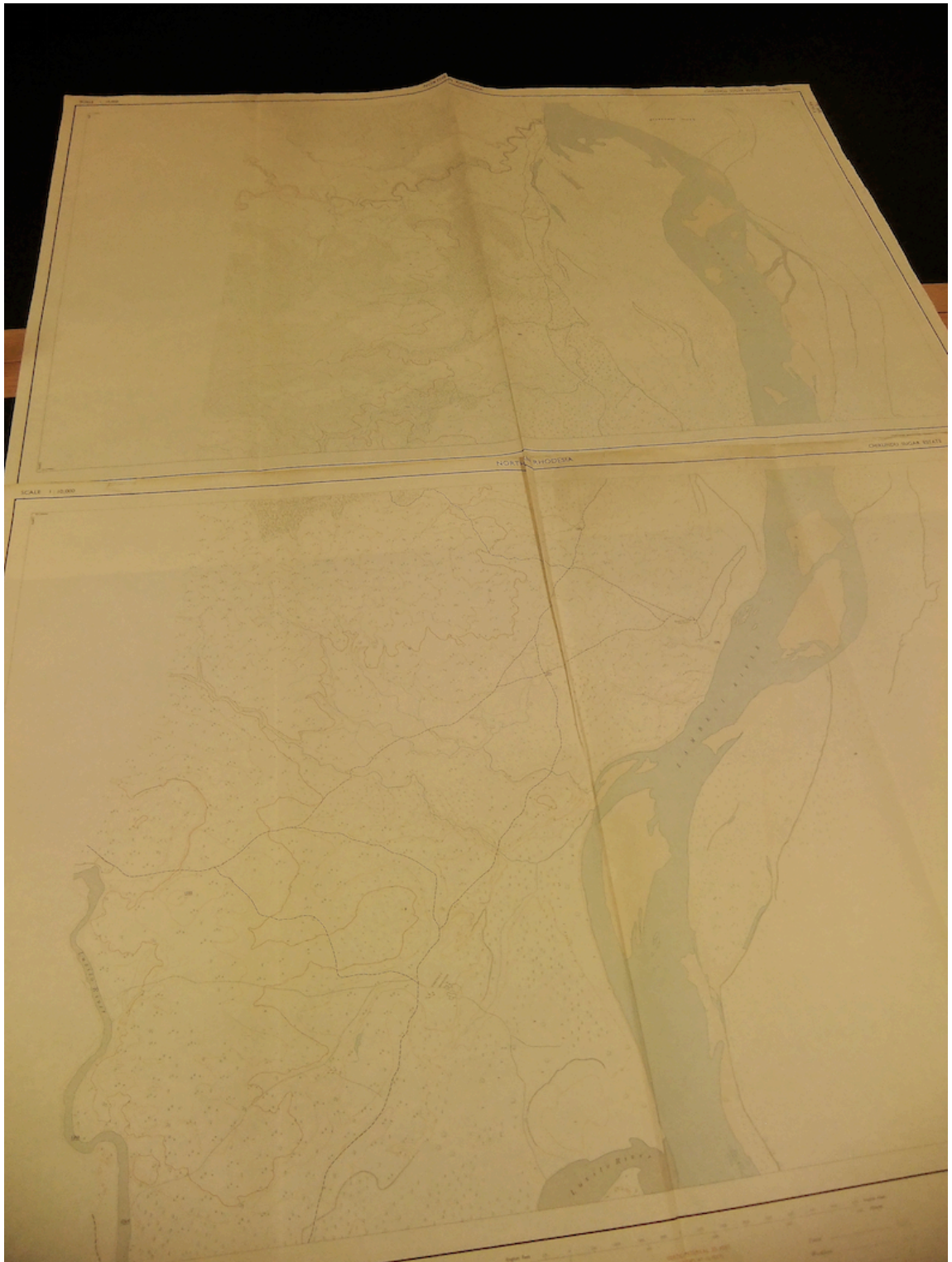


Figure 25: Two sheets of the Chirundu Sugar Estate mapping, archive view

This photo shows two of the five sheets that make up the Chirundu Sugar Estate series. The end of the detail at the left-hand side of the sheets indicates the limit of the twenty-four square mile strip of riverbank that was of interest to the investors.

Air Survey Co. of Rhodesia Ltd., "*Northern Rhodesia: Chirundu Sugar Estate*," 1:10,000. Lusaka, Northern Rhodesia: Government of Northern Rhodesia, 1952. © The British Library Board, Maps Y.1204, Photograph: author.

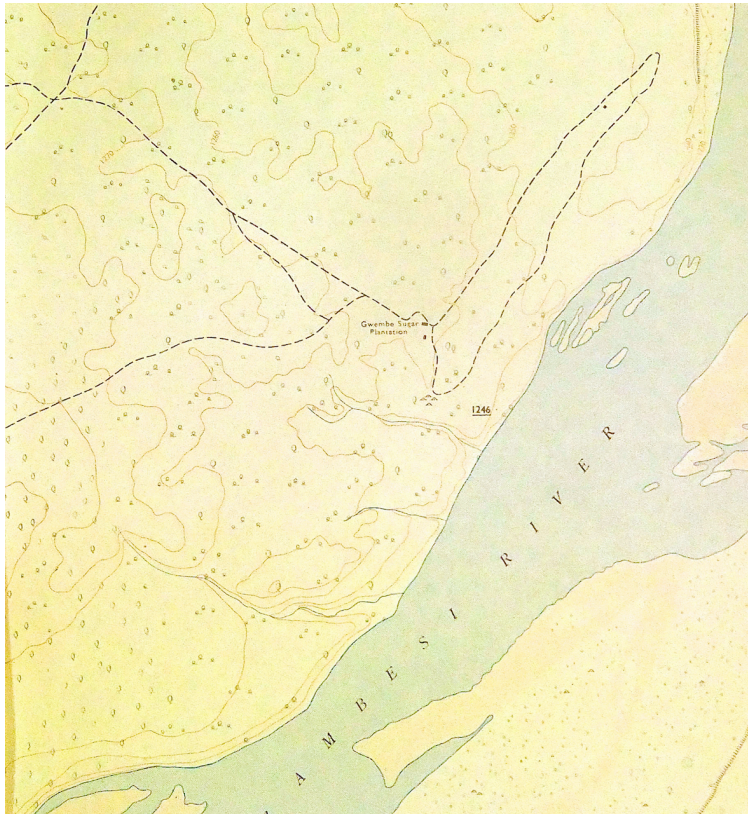


Figure 26: Chirundu Sugar Estates (detail)

This section of the map clearly shows the four-colour printing and detailed contouring that were exceptional in cartographic representations of the Gwembe valley.

Air Survey Co. of Rhodesia Ltd., “Northern Rhodesia: Chirundu Sugar Estate,” 1:10,000. Lusaka, Northern Rhodesia: Government of Northern Rhodesia, 1952. © The British Library Board, Maps Y.1204, Photograph: author. Not reproduced at full size.

The outcome of the data collection for the Sugar Scheme was piecemeal mapping work at large scales. These new map sheets documented twenty-four square miles of the valley in great detail: an area that was wholly unexceptional, *except* that it had been mentioned in connection with a *plan* for a plantation. (See Appendix 1 for an example of mapping at 1:10,000 scale). However its connection to this capital-intensive plan made the results—unlike the work of the African Asst. Surveyors—radically visible at the colonial centre.¹⁸⁹ The ASC mapping was reproduced in more than fifty copies, and was distributed across multiple departments.¹⁹⁰

Despite all the survey work, and the £25,000 invested by the Northern Rhodesian government, the pilot project at Chirundu did not eventually blossom into full

¹⁸⁹ Evidenced also by the presence of these maps in metropolitan collections today. Air Survey Co. of Rhodesia Ltd., ‘Northern Rhodesia: Chirundu Sugar Estate’, 1952, Maps Y.1204, British Library; Air Survey Co. of Rhodesia Ltd., ‘Northern Rhodesia: Chirundu Sugar Estate’, 1952, Maps.Area.E43:12(03), National Library of Scotland; Air Survey Co. of Rhodesia Ltd., ‘Northern Rhodesia: Chirundu Sugar Estate’, 1952, G8564.C44s10.A4, Library of Congress.

¹⁹⁰ Director of Surveys and Lands to Director of Agriculture, ‘Copies of the Gwembe Map Sheets’, 12 December 1953, MM3/1/2, NAZ.

production. The first soil survey met with disappointing results.¹⁹¹ In considering the original, and alternative sites the government was also legally required to negotiate the alienation of the sugar estate from Native Trust Land in the valley.¹⁹² This process was apparently too slow for Stanley Cooke who re-located his equipment back across to the other side of the Zambezi.¹⁹³ The Northern Rhodesian government now owned fantastically detailed mapping of an area of Gwembe District that would not be of particular import in the near future (Figure 25 and Figure 26).

Visibility and permanent invisibility: removing Gwembe Valley from the map

The prospect of far more drastic change was, however, looming over the lives of those in the Gwembe valley. The scale of the planned Kariba project dwarfed every other environmental and social intervention that the valley had yet seen. It was to be the biggest hydroelectric scheme in world history: a dam 128m high that would create a reservoir 281 km long and up to 32 km wide.¹⁹⁴ The planning for the dam had been a complex part of inter-territorial negotiation. Northern Rhodesia had favoured another site for hydroelectric power, but Southern Rhodesia had pushed for the Kariba site since it sat on their border and would therefore be under their shared control.¹⁹⁵

In the context of this project, territorial knowledge was translated into a quantitative framework that attempted to coordinate social and physical geographies of the entire valley for the first time. Vast resettlement would be necessary. To make this feasible the Northern Rhodesian government hoped to use knowledge of the soil quality and cultivability of the remaining, un-flooded areas of the valley (even if the extent of flooding was only very loosely determined at that point). The aerial photographs and DCS maps certainly represented some potential for this work, but in the absence of any other topographic representations that could serve this purpose, the Survey Department had limited options but to hope for the best. So, whilst the DCS

¹⁹¹ Director of Agriculture to Member for Agriculture and Natural Resources, 'Soil Assays: Gwembe', 11 January 1956, MM3/1/2, NAZ.

¹⁹² 'Meeting to Discuss the Gwembe Sugar Scheme', 8 October 1956, MM3/2/1, NAZ.

¹⁹³ Scudder, *A History of Development in the Twentieth Century*, 44.

¹⁹⁴ D. A. Howarth, *The Shadow of the Dam* (New York, NY: Macmillan, 1961), 2.

¹⁹⁵ Scudder, *A History of Development in the Twentieth Century*, 28.

considered it “possible” that they would have whole area covered at 1:50,000 “before the necessity of a population shift arises”, it was fairly imperative.¹⁹⁶

In preparing for the inundation, the topographic data (gathered by the surveyors from Southern Rhodesia and from the UK who had been pacing through the valley since 1944, and from the planes that been flying overhead) was being used to calculate the subsistence of future populations in ways that are easier to recognise as ‘modern’.¹⁹⁷ The typical acreage of land required to meet the food needs of a family was assessed. Those values were used to ascertain whether new sites were sufficient for the current population. Standardised values were given to the existing property ‘improvements’ in order to provide the displaced Africans with compensation (for cleared land, for huts, for livestock, and for the loss of agricultural production during the time of the move).¹⁹⁸ These needed to be accounted for, measured, and enumerated. Many consider that in the event the Northern Rhodesian government simply failed to make these calculations or future provisions for the resettled population with any degree of accuracy or sensitivity.¹⁹⁹ Certainly, having only piecemeal records of the human geography of the valley from the last half-century, the plight of the dispossessed was far easier to ignore.²⁰⁰

In the history of the valley this was a violent interruption. In the context of this chapter, it remains as more of a coda. Cutting a few years short of the climax of the dam, and the more plentiful scholarship that relates it, was a deliberate strategy. The political, social, and material drama of the hydroelectric scheme is a history of exception. Breaking away at the failure of the Gwembe Sugar Plantation gives a far more representative picture of the cartographic history of the rest of rural Northern Rhodesia: where the coincidence of different layers of geographic knowledge and spatial conceptions of territory, and a unifying governmental cartography has only ever been momentary.

¹⁹⁶ D.S. Cleak, Survey Office to Secretariat, ‘Kariba & Kafue Hydro Electric Power Schemes: Effects on the Gwembe Valley’, 25 April 1952, MM3/1/2, NAZ.

¹⁹⁷ Haffner, *The View from Above*.

¹⁹⁸ Howarth, *The Shadow of the Dam*, 70.

¹⁹⁹ Julia Tischler, *Light and Power for a Multiracial Nation: The Kariba Dam Scheme in the Central African Federation* (Basingstoke, UK: Palgrave Macmillan, 2013), 59, 68–9.

²⁰⁰ And may in part account for an unshackled romanticisation of the ‘primitive’ nature of its inhabitants during the debates about Kariba. McGregor, *Crossing the Zambezi*, 105.

Conclusion

This chapter has begun the work of interrogating the forces that shaped the governmental cartographic economy; through a reconstruction and analysis of the cartographic workforce, their deployment, and the multiple 'spatial conceptions' inherent to colonial governance in Northern Rhodesia. It has revealed that map production was not co-ordinated either logistically or conceptually. Maps were not produced according to the cartographic ideal (whole to part, geodetic to cadastral). They were not produced in order of the perceived logic of statehood (Stone's sequence of administrative, cadastral, and development mapping). The maps designed to suit different realms of colonial interest were carried out simultaneously, and more or less haphazardly. This led to a frustration of the stated desire to 'stack' or rationally accumulate geographical information within a *cartographie universelle*.

That ambition was further frustrated by patterns of value within the cartographic economy that determined what could be seen and by whom. The model of the colonial economy has also focused our attention on the ways in which the division of labour in Northern Rhodesian cartography was accompanied by the assignation of forms of value to mappers and their maps. The localised availability of technologies and technicians led to localised associations and disassociations between cartographic skill and authority. The choice of labour and technical form of the maps were, therefore, highly indicative of the importance given to an area by the local, colonial, or imperial centres of administration. This 'lumpiness' of cartographic modes, made it yet harder to bring colonial cartography in line with metropolitan ideals. That 'lumpiness' remained even after the institution of the DCS and the centralisation of scientific cartographic authority in London.

I have demonstrated, as in Chapter Two, that Northern Rhodesian cartographic production was not an underfunded version of a metropolitan system. Whilst scarcity of technologies and techniques created problems for colonial mapping, the Northern Rhodesian cartographic economy was further defined by a local *response* to those problems. The unusual distribution of cartographic labour made 'modes' of cartography less obviously compatible. Little effort was expended on archiving and co-ordinating locally held geographic knowledge.

Even more fundamentally, in this chapter I have begun to identify a mismatch between the modes of cartography developed in Europe, for European conditions, and the scale of political, social and economic geographies in Northern Rhodesian conditions. The

consequences of this for how we understand the relationship between documentary circulation and political authority are explored further in Chapters Four and Five.

In this chapter we have largely considered how cartography framed colonial activity in rural districts of Northern Rhodesia; its success and failure to serve colonial categories of rule and order. The following chapter continues to investigate the *use* of colonial maps but takes the opposite perspective. It examines the passage of paper into a(nother) rural district office and considers how this piecemeal, fragmented cartography offered from the district officers' point of view. It takes the materiality of cartographic documents and the daily routines in the office as evidence to consider how maps were deployed, not only in hybrid or *ad hoc* forms, but also in conjunction with other entirely *non*-documentary strategies for colonial administration. In doing so, it digs deeper into the relationship between the circulation of geographical knowledge and the imposition of political authority as seen from an outpost of empire.

4 / Maps and mobility in the peripheral imperial archive

“Maps... too often a source of trouble and annoyance”¹

¹ Edward Stanford, *A Jubilee Catalogue of Maps, Atlases, & Books* (London, UK: Edward Stanford, 1902), 93.

Introduction

Mongu-Lealui was a district in Northern Rhodesia, roughly equivalent to today's Mongu District in the Western Province of Zambia. This particular colonial administrative unit was the site of the chief city of the region, Mongu, and the locus of the Barotse royal government. As I outlined in the introduction to the thesis, in 1953 the administrative office for Mongu-Lealui held forty map sheets.³ Some of these maps showed the district as a few centimetres framed in a small-scale representation of southern Africa. Some of the maps were large-scale, but with scant topographical detail. One map showed a township. The remainder of the indexed maps were outlines of specific features: road systems, rivers, canals, or the floor plans of buildings.

This index, and much of the history in this chapter, was found in the folder BSE1/10/31, in the National Archives of Zambia. BSE1/10/31 holds the 'Survey and Maps correspondence' for the District Office of Mongu-Lealui (in today's Western Province, Zambia), collated between the years 1944 and 1960. This folder could be considered an unusual choice of focus since it contains no maps itself. It is also partial, offering only a fragment rather than a systematic record of events and procedures. Nonetheless, it offers an invaluable starting point to consider the paper trails and dead-ends, circuits, and lost causes, that make up the cartographic history of that local office.⁴

Folder BSE1/10/31 centres our attention on the experience of cartography at the 'periphery' of colonial rule. This perspective offers us several insights on the colonial cartographic economy. Firstly, it allows us to consider Mongu-Lealui District Office as a form of 'local' imperial archive with differing cartography than that held at the imperial centre. Secondly, the letters held in BSE1/10/31 emphasise the material conditions of possibility for that local cartographic archive at Mongu-Lealui. The processes of map creation, reproduction, storage, transmission and use—in Northern Rhodesia more broadly, and Mongu-Lealui specifically—were limited by material factors that we will explore. Thirdly, the file offers us the means to consider the 'flow' of cartography' through the office and the diversity of sites in which the coordination of various kinds of cartography did (and did not) take place. Finally, BSE1/10/31

³ 'Index to District Maps.'

⁴ It could very reasonably be argued that the history of the cartography of Mongu—and Western Province more generally—present a special case due to its particular political and environmental circumstances (I have done so elsewhere). However, the levels of geographic knowledge held at Mongu-Lealui are strongly paralleled in other rural districts. It is sufficiently similar to allow for its story to be representative of a larger picture.

allows us to understand something of the practices that prompted and framed the value of maps in the District Office on a day-to-day basis.

The argument made in this chapter marks a significant divergence from typical analysis of the role of cartography in colonial governance. As we will explore in more detail below, the production of maps is held to give a colonial authority knowledge of its territory at a distance.⁵ The time and space of ‘knowledge’ are removed from the messiness of the terrain to a secure site of authority. The authority can then anticipate problems and make informed decisions without being immersed in the field, or as Bruno Latour once described that process, the field can be ‘acted on from a distance’.⁶ By focusing in on the role of cartographic documentation at the site which is in fact the field—that is-supposed-to-be-acted-upon—the chapter short-circuits some of the questions of distanced observation and action taken for granted in current models for cartography and governance. It offers a new way of understanding what maps meant as embedded within the daily life of colonial Northern Rhodesia.

Circuits and archives

This chapter treats the 1953 Map Index (Figure 27) as an entry-point for considering the nature of a peripheral imperial cartographic archive. In doing so, it draws extensively from the rapidly expanding literature on the archive as a material and theoretical object of study. I focus on the section of that literature that treats the material qualities of the archive by interrogating documents as artefacts that are embedded in administrative practices.⁷ In contrast to the previous chapter that considered the success and failure of maps to represent and reveal the objects of colonial governance, here I will explore colonial cartography from a more performative perspective. In contrast to literature that seeks to explain how

⁵ Scott, *Seeing Like State*; Jordan Branch, ‘“Colonial Reflection” and Territoriality: The Peripheral Origins of Sovereign Statehood’, *European Journal of International Relations* 18, no. 2 (2012): 277–97; Branch, *The Cartographic State*.

⁶ We have seen in previous chapters that maps did perform this task in the context of Northern Rhodesia; in how the Copperbelt was manifested for the London board of directors of the Selection Trust (Chapter Two), or in the construction of the Kariba Dam (Chapter Three). However, this perspective on the power of cartography has already been subject to some qualification in this thesis, and here we will develop our critique further. Latour, *Science in Action*, see esp. 219–220.

⁷ Bruno Latour, ‘Circulating Reference’, in *Pandora’s Hope: Essays on the Reality of Science Studies* (Cambridge, MA: Harvard University Press, 1999); Carolyn Steedman, *Dust* (Manchester, UK: Manchester University Press, 2001); Ann Laura Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense* (Princeton, NJ: Princeton University Press, 2010); Hull, *Government of Paper*; Ben Kafka, *The Demon of Writing: Powers and Failures of Paperwork* (New York, NY: Zone Books, 2012); Sellers-García, *Distance and Documents at the Spanish Empire’s Periphery*; Lisa Gitelman, *Paper Knowledge: Toward a Media History of Documents* (Durham NC: Duke University Press, 2014).

knowledge *is able* to travel, this chapter asks a more straightforwardly geographical questions: *where* did maps travel? And what other kinds of circulations did they replace?⁸

Within the new paradigm of the ‘archival turn’ (and before it under the older rubric of ‘institutional history’), it has been revealed that the compilation and publication of African maps happened at a variety of sites. The metropole cannot be seen as a single centre of calculation for African geographical knowledge, but rather as home to sometimes collaborating, sometimes competing institutions, as studies of the War Office, the Royal Geographical Society, or the Royal Empire Society, newspapers and map publishers have revealed.⁹ The circulation of colonial cartography has begun to be interrogated as moving in networks that are modelled in ways that Chambers and Gillespie have succinctly described for the networks of imperial knowledge; not a wheel with metropolitan bodies or patrons at its hub, but a “polycentric communications network,” with multiple layers of authority and interaction.¹⁰

However, despite this differentiated and nuanced approach to the metropole, the conceptual binary of metropole–periphery is still powerful in cartographic history as can be seen in Matthew Edney’s recent argument that imperial mapping must be read as ironic.¹¹ For Edney, metropolitan mapping had no methodological or conceptual difference from the cartography done ‘at home’ in European nation states. He claims that imperial maps were characterized instead by a peculiar uni-directional mobility; imperial maps were those that left the territory for (almost) exclusive consumption by metropolitan eyes. In the previous chapter I demonstrated the ways in which the modes of colonial cartography differed from those produced at the centre. But here we will focus on the second half of his claim- that of uni-directional mobility.

In setting up this model, Edney is contrasting a metropolitan white population, and a colonised black population, which racially differentiates the mappers and the map

⁸ David N Livingstone, ‘The Spaces of Knowledge: Contributions towards a Historical Geography of Science’, *Environment and Planning D: Society and Space* 13, no. 1 (1995): 5–34; James A. Secord, ‘Knowledge in Transit’, *Isis* 95, no. 4 (2004): 654–72.

⁹ A. Crispin Jewitt, *Maps for Empire: The First 2,000 Numbered War Office Maps, 1881–1905* (London, UK: British Library, 1992); Collier and Inkpen, ‘The Contested Nature of Surveying’; Peter Whitfield, *The Mapmakers: A History of Stanfords* (London, UK: Compendium, 2003); Akerman, *The Imperial Map*; Prior, ‘British Cartographic Representations of Africa c.1880–c.1915.’

¹⁰ David Wade Chambers and Richard Gillespie, ‘Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge’, *Osiris*, 2nd Series, 15 (2000): 223; Ruth Craggs, ‘Situating the Imperial Archive: The Royal Empire Society Library, 1868–1945’, *Journal of Historical Geography* 34, no. 1 (2008): 48–67.

¹¹ Edney, ‘The Irony of Imperial Mapping.’

readers—at the imperial centre—and the ‘mapped’ in the periphery. This chapter restores some of the more ambiguous layers of movement and knowledge by considering the reading and reception of cartography by white administrators, *in situ*, in the colonial ‘field’. This position allows us to see not only where metropolitan organisations were drawing geographic data towards them, but also the circulation and redistribution of that data within the colonies themselves.

This study corrects a total absence of study of colonial cartography and its mundane materiality within the British African colonies.¹² Building on the previous chapter, an understanding of local resources and practices allows us to interrogate the asymmetry between the resources for map production and the cartographic aesthetics available in colony and metropole. Moreover, it allows to see the multi-directionality of cartographic circulation even here at a peripheral ‘node’ of the network. All these serve to return the diversity of perspectives and values that shaped the broader cartographic economy and expand our historical understanding of the mechanisms of colonial rule.

It is now commonplace not to treat the archive as static or to take its form for granted. The process of archiving is seen as embodying dynamic acts of ‘sorting’ and differentiating, rather than responding to essential, eternal categories.¹³ Yet studies of governance still tend to see the predominant mode of the archive as one of expansion. Research into governance in a more ethnographic vein, has served to critique that attitude and reveal situations in which an archive fails to achieve the ambitions of its creators, or is constrained by competing authorities.¹⁴ Here, I will pursue that ethnographic approach. I will consider the motivations for ‘pulling’ geographic information from, and ‘pushing’ geographic information into the Mongu ‘archive’; and also the material conditions of possibility by which these documents were structured.

In considering the parameters of the peripheral imperial archive, I draw strongly on ethnographic studies of cartography, but also ethnographies of paperwork more broadly. Matthew Hull’s *Government of Paper* (2012), and Lisa Gitelman’s *Paper Knowledge* (2014), both consider the role of paper itself (rather than representations on

¹² See for example: Elizabeth Edwards, *Raw Histories Photographs, Anthropology and Museums* (Oxford, UK: Berg, 2001); Giorgio Miescher, Lorena Rizzo, and Jeremy Silvester, *Posters in Action: Visuality in the Making of an African Nation* (Basel, ZW: Basler Afrika Bibliographien, 2009); Stoler, *Along the Archival Grain*; Sellers-García, *Distance and Documents at the Spanish Empire’s Periphery*.

¹³ Michel Foucault, *The Archaeology of Knowledge* (London, UK: Routledge, 2002); Stoler, *Along the Archival Grain*.

¹⁴ Hull, *Government of Paper*.

the paper) in producing documentary effects.¹⁵ These studies share similar concerns to historical investigations of performance in exploration and fieldwork, or of the symbolic capital of graphic representation in the colonial project.¹⁶

Hull however, takes this approach a step further away from the idea of documents in a scheme of organised abstraction, evidence and testimony. Firstly, as he explains, because documents do not only report ‘up’, but function down below.

The maps most significant to the development of Islamabad- the blueprints of houses, markets, mosques, and sectors- are also down below, in the realm of practice, on planners’ desks on the walls of police stations, stuffed in files, clipped to petitions, even in the cabinets of well-connected villagers. These maps do not stand over against a reality they represent. Rather they are entangled in the prosaic practices through which the city is planned, constructed, regulated and inhabited.¹⁷

Hull argues that the paths of paper documents, “often differ from formal organisational structures” and, as a result, “draw people into different practices”.¹⁸ For Hull, this multi-directional mobility is caused by the possibility for documents to fulfil multiple roles; not only the simple movement from one ‘regime of value’ to another but often simultaneously.¹⁹ The history of the Mongu-Lealui cartographic archive will lead us to support Hull’s position.

This chapter also demonstrates, however, that to fully make sense of the logic of an archive or documentary record, we need to consider it in relation to rival other-than-documentary strategies. Thomas Richards has extended the concept of the imperial archive to mobile individual agents with his model of state nomadology.²⁰ This model, conceived in relation to Kipling’s novel of colonial espionage, *Kim* (1901), was designed in response to the problem that colonial surveillance was working across distances and terrains so vast and diverse “that they could not be occupied or

¹⁵ Ibid.; Gitelman, *Paper Knowledge*.

¹⁶ Lynette Schumaker, ‘A Tent with a View: Colonial Officers, Anthropologists, and the Making of the Field in Northern Rhodesia, 1937-1960’, *Osiris*, 2, 11 (1996): 237–58; Miles Ogborn, ‘Writing Travels: Power, Knowledge and Ritual on the English East India Company’s Early Voyages’, *Transactions of the Institute of British Geographers* 27, no. 2 (2002): 155–71; Felix Driver and Luciana Martins, *Tropical Visions in an Age of Empire* (Chicago, IL: University of Chicago Press, 2005).

¹⁷ Hull, *Government of Paper*, 212.

¹⁸ Ibid., 18.

¹⁹ A Appadurai, *The Social Life of Things: Commodities in Cultural Perspective* (Cambridge, UK: Cambridge University Press, 1986); Hull, *Government of Paper*, 58.

²⁰ Richards, *The Imperial Archive*, 23.

obliterated”.²¹ This led to an itinerant form of surveillance, with circulating agents (such as the character Kim) that Richards describes as a “procedure without territory”.²² This form of surveillance Richards still associates with the archival impulse. We will explore whether the connection between the district map and the cyclical movement of district officers supports this vision of imperial knowledge practices.

In brief, the chapter will aim to understand this peripheral archive not only in terms of what it is, but what it is not; what is present, but also what is absent. Reading absence from fragments of historical record requires a particular attention to the nature of the historical material. Having outlined how this chapter is theoretically informed, I will describe the strategies for drawing these interpretations from the archival matter.

Tracing the sites and passage of colonial cartography

As in the case of posters, photographs, or library books, thinking about the circulation of maps in the past often requires making inferences from their location in the present.²³ In the case of Mongu-Lealui, we are lucky to have a snapshot from 1953, which allows us to then to trace where those documents have ended up in the present day. Some of the cartographic material present in 1953 has appeared, or is duplicated in archives in London. Other items have not travelled further than Northern Rhodesia since their retirement. Finally, it means determining which documents on the list had a value that was conceived to be so locally confined, that they escaped archiving at all.

Looking at the maps themselves, however, is insufficient for understanding map use. Along with its ‘index’, the folder BSE1/10/31 is unusual in providing us with intimate access to the processes of choosing, copying, moving, sorting, and storing of maps in Northern Rhodesia. Entitled simply ‘Survey and Maps Correspondence,’ it contains just that: the correspondence from the District Office of Mongu-Lealui (Barotse Province) for the years 1944 to 1960. The range of genres within the correspondence is large. Many of the letters refer to the activities of the African Assistant Surveyors, in particular their postings, equipment, and pay (see Chapter Three). Another significant portion of the letters were those relayed between this local administrative

²¹ Hull, *Government of Paper*, 58.

²² *Ibid.*, 23.

²³ Innes M Keighren, *Bringing Geography to Book: Ellen Semple and the Reception of Geographical Knowledge* (London, UK: I.B. Tauris, 2010); Miescher, Rizzo, and Silvester, *Posters in Action*; John Tagg, ‘The Pencil of History: Photography, History, Archive’, in *The Disciplinary Frame: Photographic Truths and the Capture of Meaning* (Minneapolis, MN: University of Minnesota Press, 2009), 209–34.

office and the Northern Rhodesian Survey Department with requests for information from both parties, or instructions from the latter. A further (and, for this chapter, most pertinent) portion of the correspondence concerns the production, passage, and reproduction of the maps themselves. The map index itself suggested the three themes that structure the chapter, but the details emerged from these further exchanges. The exchanges have further been used to interrogate Jeffrey Stone's introduction to a particular genre of colonial cartography: the 'District Map'.²⁴ All these were then contextualised within the autobiographical accounts of the daily business of district officers, both at their desks and in the 'field'.²⁵

The first section of this chapter investigates the material geography of the archive itself. *'Cartographic matter and the local imperial archive'* explores the nature and the sites of the technologies for reproducing and accumulating geographic information. The second section examines the District Office as a site of confluence of different colonial networks interested in the collection and dissemination of geographical knowledge. *'Mobility of data: pushing and pulling through multiple circuits'* demonstrates that the patterns of available cartography resulted not only from the success and failure of these networks to collect data, but also from their particular strategies to achieve circulation of their cartographic production. Following the circulation of data through various paths between Northern Rhodesia, Southern Rhodesia, South Africa, and sites in the metropole shows crosscurrents and doldrums in perhaps unexpected areas.

The final strand of enquiry was born from the hierarchy inherent in the storage of the archived maps. Which of them were folded away and which were on view, and possibly in use? Prominent on the wall was the 'District Map'. This item Jeffrey Stone calls "ubiquitous", an item of "standard office furniture" in these administrative outposts. Yet, for most of the colonial period this was not document that was officially produced or monitored. As we saw in the previous chapter, the Survey Department did not produce 'District Maps' until 1946, and even then not for all areas. As I also described in Chapter 3, existing published maps of many parts of the colony (including Mongu-Lealui) were a parody of the map; a sheet of paper predominated by blank space and

²⁴ Stone, 'The District Map.'

²⁵ The fortuitous nature of this archival research must be acknowledged. BSE1/10/31 was already particularly rich file. The district officer in Mongu-Lealui between 1953 and 1954, Ian Mackinson was author of some of the more revealing correspondence in the file and a keen cartographer. Not only had he published an autobiographical account, but he and his wife also agreed to talk to me.

crudely sketched rivers. So what kind of map was this District Map on the wall? Who had drawn it, and above all, what purpose did it serve?

Circulating referees: locating objects and subject in Mongu Lealui poses that question by seeking *direct* evidence of the District Map. However, it also outlines the use of the map in juxtaposition with the practice of ‘touring’. This has required seeking clues in anecdotal evidence, looking at fragments of record, supplementing them with informal discussion, autobiography, and, to a certain extent, extrapolating behaviours. From these fragments, however, it has been possible to compare the mobility of the officers through their districts, with the collection and storage of geographic data within their own ‘local archives’, and the flow of data outside the district. This comparison offers us a rich reward, in explaining how governance could be performed with the handful of maps in the index of 1953, or even how they could be functionally ‘replaced’.

Cartographic matter and the ‘local’ imperial archive

Making room for maps

Maps, compared to other bureaucratic documents, are large, unwieldy, and complicated; it is hard to ‘make room’ for them. For those in charge of their care—as even the map publishers Stanford acknowledged in 1902—they are “too often a source of trouble and annoyance”.²⁶ Northern Rhodesia was, particularly in comparison to the imperial metropolis, vast and sparsely populated, but making room for maps was nonetheless still somewhat difficult. Matthew Hull coined the term ‘paperwork ethics’ to describe “the specification of the care and duties owed to different genres of documents”.²⁷ Despite the potential scarcity or political import of maps, in Northern Rhodesia the flourishing of the cartographic economy seems to have been impeded by the practical question of extending ‘care and duty’ to oversized pieces of paper. ‘Troubles’ occurred at every stage of the life-cycle of a Northern Rhodesian map: from making room for the technological and material resources involved in its production and reproduction, to finding appropriate spaces for the map itself. As we will see, these issues bore on the quantity, and quality, of maps produced, and their passage through the colony.

These constraints were, perhaps, felt most keenly of all in the Survey Office itself. Despite the availability of land, the construction of accommodation considered suitable

²⁶ Stanford, *A Jubilee Catalogue of Maps, Atlases, & Books*, 93.

²⁷ Hull, *Government of Paper*, 10.

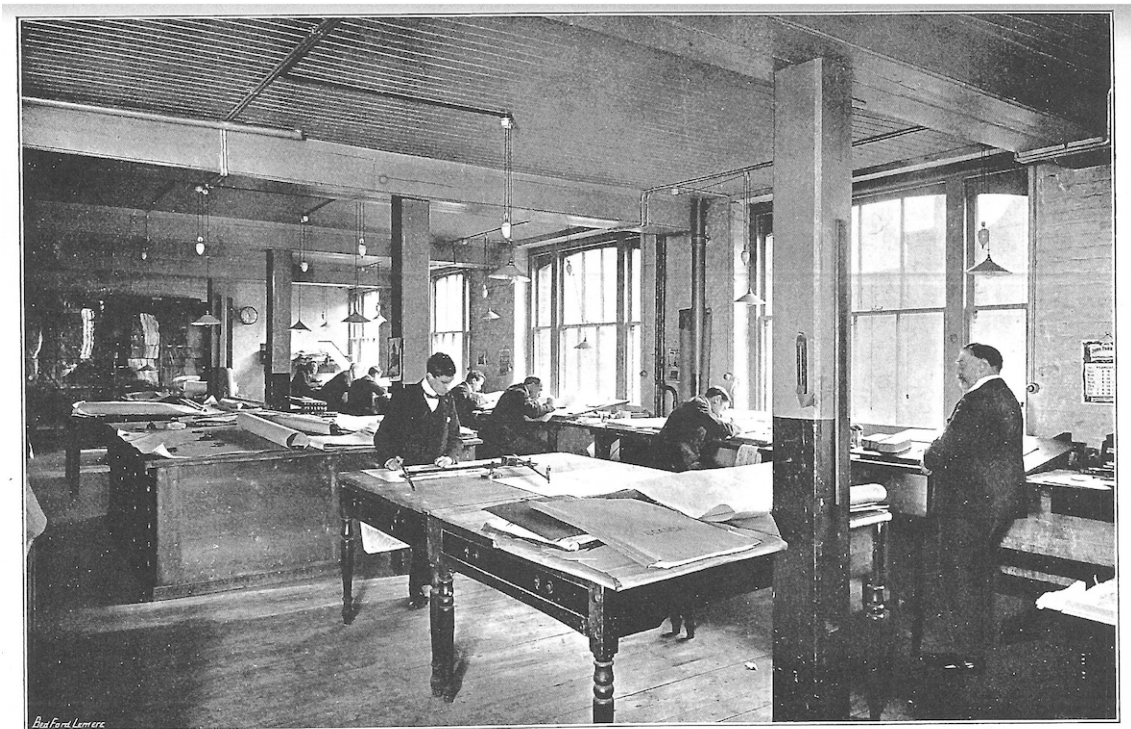
for European office work stretched the colonial administration's meagre budget. This was true from the very earliest full administrative report in 1925, and their complaints echoed through into the 1930s as the Survey Department made repeated calls for resources to extend their offices, often making reference to the particular difficulties of drawing and reproducing maps in confined spaces. In 1926, they celebrated the building of a small plan room that "made a little extra floor space in the Drawing Office," although even after that extension to their facilities, "when dealing with plans," they did not have "the space to manipulate same".²⁸ Between 1924 and 1930 the Director occupied a room "in which there [was] not even space enough for a table on which to display an ordinary sized plan". There was also very little tranquillity because "one person moving about [was] sufficient to shake the whole floor," a problem that was "not conducive to good draughtsmanship".²⁹ As the survey department set up regional sub-offices, the surveyors in these outposts in turn faced cramped and awkward conditions, sometimes using domestic spaces for office work, or tin and brick 'huts'.³⁰

Although no photographic evidence of the government survey department remain, we can imagine that the drawing and reproduction of maps was carried out in spaces that bore little resemblance to the cartographic offices of the metropolitan organisations for which we do have visual evidence, such as the Ordnance Survey, the Royal Geographic Society, or Stanford Map Publishers (see Figure 28 and Figure 29).

²⁸ 'Annual Report, Survey Department of Northern Rhodesia', 1926.

²⁹ Ibid.

³⁰ 'Annual Report, Survey Department of Northern Rhodesia', 1931.



12, 13, & 14, LONG ACRE, LONDON, W.C.

DRAUGHTSMAN'S ROOM ON THE SECOND FLOOR. HERE ORIGINAL MAPS ARE COMPILED AND DRAWN; ORDNANCE MAPS PREPARED FOR VARIOUS PURPOSES; AND THE GENERAL WORK OF A DRAWING ESTABLISHMENT CARRIED ON.

Figure 28: The draughtsmen's room at Stanford's

From: Edward Stanford, *A Jubilee Catalogue of Maps, Atlases, & Books* (London, UK: Stanford, 1902), 64. Image courtesy of Cambridge University Library.



Figure 29: The Map Room at the RGS

Anon., 'New Map Room, Lowther Lodge', (c.1930), Photograph, rgs025962. Image courtesy Royal Geographical Society (with IBG).

The users of the maps at the District Office in Mongu-Lealui, seem also to have been hard-pressed to find specialised storage for their cartographic material, and were forced to organise it in improvised circumstances. Seven maps are listed as being on the wall (see Table 3), a fact that might imply they were regularly consulted, although this was not necessarily the case, as we will explore. Clearly no plan-chest existed for the remaining cartography in the District Commissioner's Office, because twenty of the documents are described as 'rolled'.

<p>Maps on the wall of the District Commissioner's Office, Mongu, June 1953</p> <p>1. Map of "Rhodesia and the Adjoining Territories" at 1:3,000,000 Published annually by the British South Africa Company, London. Possibly 1946 edition, requested 29th May 1946.</p> <p>2. Mongu-Lealui Topographical and Vegetation Sunprint of map created by the Forestry Officer J.D. Martin, August 1939. Requested 21st April 1952.</p> <p>3. Mongu and Senanga Topographical and Vegetation Sunprint of the map created by the Forestry Officer J.D. Martin, August 1939. Requested 21st April 1952.</p> <p>4. Mongu-Lealui District by Stephen It seems likely that this is an orthographic misattribution, and that it was created by G. R.R. Stevens, District Commissioner (and his brother) during 1930.</p> <p>5. Namushakende Development Centre Area Map created by African Assistant Surveyors, Mongu-Lealui (either Malope Singundumbwa/Henry Matondo), at some point between 1950-1952.</p> <p>6. Mongu-Lealui Map of Lilalo No details.</p> <p>7. Mongu Township Map created by European Surveyor D. S. Cleak, 1938.</p>
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Table 3: Maps on the wall of the District Commissioner's Office, Mongu-Lealui.

As described: "Index to District Maps." June 10, 1953, BSE1/10/31, NAZ.

Additional information from: District Commissioner, Mongu to Resident Mining Engineer, British South Africa Company, 'The British South Africa Company Map', 29 May 1946, BSE1/10/31, NAZ. J. D. Martin, 'Summary of Work: Mankoya and Lealui Districts. Forestry Officer for Barotseland.' 12 July 1939, SEC1/975, NAZ; District Commissioner, Mongu-Lealui, 'Copies of Martin's Maps', 21 April 1952, BSE1/10/31, NAZ. Martin, 'Summary of Work: Mankoya and Lealui Districts. Forestry Officer for Barotseland.' District Commissioner, Mongu-Lealui, 'Copies of Martin's Maps.' 'Annual Report, Survey Department of Northern Rhodesia', 1930, CO799/7, NA UK. District Officer-in-Charge Namushakende to District Commissioner, Mongu-Lealui, 'African Surveyors at the Namushakende Development Centre', 16 January 1951, BSE1/10/31, NAZ. 'Index to District Maps', 10 June 1953,

Many of the maps listed in the 1953 index (Figure 27) were recent productions and it was apparently the first time that a cataloguing endeavour had been required (which was also 'disordered' from the start by multiple numbering systems).

Moving Paper

Throughout the colonial period, the District Office in Mongu was producing and reproducing its own maps, only some of which ever left the administrative office, even as a copy. This local office was also, therefore, in charge of managing a local, modest stock of materials for producing these. Nineteenth- and twentieth-century explorers were given advice on what writing, copying, and duplicating materials to take with them on their travels.³¹ In 1911, Harford-Battersby recommended that a traveller should take a metal box file "Quarto size... [to hold] a copy of everything that he writes and several copies of the most important documents. He should keep with him at least two of each in separate boxes, so that if one is damaged or lost the other may be preserved".³²

One would, then, perhaps, imagine that the bureaucratic leviathan of the Colonial Office would have been assiduous in providing its overseas representatives with the materials to rigorously document their travail. However, the correspondence about paper in BSE1/10/31 and elsewhere in the National Archives of Zambia reveal it to be a relatively elusive commodity in all its forms and variations, whether printing cloth, tracing, drawing, squared, or photographic paper. The government was far from munificent in supplying the material for the cartographic inscription of its territory. This produced a local material economy that is reflected in the peripheral archive.

One key way in which the paper economy affected the number of maps in the District Office was that the office had to pay for any maps it requested *from its own budget*.³³ If the quantity of copies required was small, then the territorial survey department might consider covering costs, but for larger projects the charges were passed back to those

³¹ E. A. Reeves, *Hints to Travellers, Scientific and General* (London, UK: Royal Geographical Society, 1906); Charles Forbes Harford-Battersby, *Hints on Outfit for Travellers in Tropical Countries*, 2nd edition (London, UK: Royal Geographical Society, 1911).

³² Harford-Battersby, *Hints on Outfit for Travellers in Tropical Countries*, 43.

³³ District Commissioner, Mongu to Director of Survey and Lands, 'New Map of Mongu- Expenditure', 4 January 1954, BSE1/10/31, NAZ.

making the request.³⁴ In the case of inter-departmental projects (local agricultural development or similar) disputes about who carried financial responsibility for mapping and map reproduction created a trail of correspondence that could circulate through several offices before an official would sign them to his 'vote'.³⁵ If the work was being executed centrally, then not only would the District Offices have to pay *post hoc*, but sometimes arrange for the necessary materials to arrive at the Survey Department before the work would take place. So, for example, the Survey Department requested that the District Office in Mongu make an order for photographic paper to be delivered to the territorial survey office so that the surveyors in Livingstone could produce new copies of the maps Mongu-Lealui required.³⁶

Equally, local offices were not always supplied with paper from the territorial government stocks. Central territorial stocks of materials for specialist mapping purposes did exist (with either the survey office or the government printers depending on the substrate required).³⁷ However, diverse departments regularly had to place their own orders directly from the suppliers, sometimes via the Crown Agents, often from South Africa, but later in the period more frequently from Southern Rhodesia.³⁸ Unsurprisingly, this system led to the circulation of multiple sets of envelopes and packages. The colonial mail service seems to have been dealing with a constant flow of bureaucracy about paper; orders to suppliers, indentures, invoices, bills of payment, in

³⁴ Acting Director of Lands and Surveys, 'Circular: Survey Requirements', 21 November 1950, BSE1/10/31, NAZ.

³⁵ For example the production of the new map of Mongu in 1954, see; District Commissioner, Mongu-Lealui to Director of Surveys and Lands, Northern Rhodesia, 'Funds for the District Map (i)', 26 November 1953, BSE1/10/31, NAZ; Director of Surveys and Lands, Northern Rhodesia to District Commissioner, Mongu-Lealui, 'Funds for the District Map (ii)', 12 September 1953, BSE1/10/31, NAZ. See also the correspondence about supplies between the Survey Department and the scientific departments, see for example: Assistant Conservator of Forests, Northern Rhodesia to Acting Chief Secretary, Northern Rhodesia, 'Copies of Zambesi Saw Mills Concession Map', 6 September 1934, SEC1/952, NAZ.

³⁶ Director of Surveys and Lands, Northern Rhodesia, 'Circular: Map Reproduction', 8 June 1955, BSE1/10/31, NAZ.

³⁷ District Commissioner, Mongu-Lealui to Government Printer's Office, Northern Rhodesia, 'Survey Supplies.'

³⁸ Lieut.-Col. Clough to Messrs Cook, Troughton and Simms, Johannesburg, 'Paper Supplies for the Anglo-Belgian Boundary Commission', 14 January 1929, SEC3/291, NAZ; Trapnell, Colin to Director of Surveys, Northern Rhodesia, 'Map Supplies: Ecological Surveys (i)', 30 October 1934, MAG2/9/6, NAZ; Ellis Allen Ltd. to Director of Agriculture, Northern Rhodesia, 'Drawing Supplies', 1 November 1939, MAG2/9/6, NAZ; Director of Agriculture, Northern Rhodesia to Commissioner for Lands, Mines and Surveys, Northern Rhodesia, 'Printing Linen', 6 February 1940, MAG2/9/8, NAZ; District Commissioner, Mongu-Lealui to Government Printer's Office, Northern Rhodesia, 'Survey Supplies.'

addition to the required paper itself. This led to mishaps and delays, problems that often went unnoticed for months, and were resolved even more slowly.³⁹

In sum, the circulation of the material basis for cartographic work was not free flowing. One should not imagine the colonial government distributing blank sheets so that the topography of the colony could be sketched in. Access to pens, ink, and paper had to be fought for. The circuitous routes by which these media arrived, and the expenditure of energy of the logistics of obtaining them, were likely to have dampened the enthusiasm of many potential contributors to the cartographic inscription of the colony.

In addition to problems of supply and demand, paper was also more vulnerable in the particular environmental conditions of 'tropical' colonies. Paper did not necessarily follow its 'proper' (temperate) habits and different precautions were required in using and storing the material. An early surveyor working in Northern Rhodesia in 1914 recalled errors creeping into his work "owing to varying humidity affecting the paper".⁴⁰ The best solution he found was "glueing the paper very firmly to the board with a strong paste".⁴¹ The disagreeable action of paper in humid environments was the subject of discussion amongst colonial surveyors in *Empire Survey Review*.

Distortion would be particularly detrimental to cartographic procedure where the expansion or contraction of map documents could have legal ramifications. W. S. Maddams from the Survey of Ceylon claimed that tropical climates distorted tracings too much to handle multiple sheets. Gold Coast Colony Surveyor F. C. Blake disputed that Maddams' claim carried across all tropical locations. In the Gold Coast, Blake emphasised, it was dust rather than moisture that produced difficulties in the map production process.⁴² In Northern Rhodesia, further problems were caused by paper 'predators' such as white ants, an insect that posed a threat to cellulose products of all kinds, and particularly to paper.⁴³

³⁹ Trapnell, Colin to Director of Surveys, Northern Rhodesia, 'Map Supplies: Ecological Surveys (ii)', 6 August 1935, MAG2/9/6, NAZ; Provincial Commissioner, Barotse to District Commissioner, Mongu-Lealui, 'Survey Equipment: Delivery', 15 June 1951, BSE1/10/31, NAZ.

⁴⁰ Hazard, 'Recollections of North-Western Rhodesia in the Early 1900's (Part II)', 53.

⁴¹ Ibid.

⁴² F. C. Blake, 'Map Reproduction In the Tropics', *Survey Review* 3, no. 20 (1 April 1936): 347–50.

⁴³ C. J. Hazard, "Recollections of North-Western Rhodesia in the Early 1900's (Part II)" 4, no. 1 (1954): 53.

Above and beyond budgetary and environmental hazards, maps were also subjected to rough handling. The ethical commitment to them does not seem to have been strong. Most of the maps published by the Survey Department were produced on a linen-backed paper, which created a more durable and transportable (immutable) product. Yet, even in the twentieth century, the colonial mail services were not always getting large rolls or sheets of paper to their destinations intact. In December 1953, the District Commissioner of Mongu-Lealui made a rather mournful request to the Survey Department that they please send their maps the 360 intervening miles by airmail, “as by surface means the maps take a considerable time and arrive in a crumpled condition”.⁴⁴ The maps were being transported using systems that were clearly not designed for the easy circulation of cartography. The lack of special effort and attention was indicative of their low value.

Map production in Northern Rhodesia: local conventions and constraints

The specific social, environmental, and technological conditions of Northern Rhodesia also affected the kind of maps that were produced in the colony. We have already seen some of the constraints that operated on map production. Firstly, extant convention and metropolitan policy dictated the scale of the maps that were to be produced (and subsequently the number and size of sheets necessary to complete a series)(Chapter 3). Secondly, economic interests affected the budget that would be made available for each cartographic project (Chapter 2). However, other factors affected the predominant conventions of Northern Rhodesian cartography.

The first of these was local demand for maps in particular formats from the general public. Whilst the Northern Rhodesian survey department does not seem to have been particularly responsive to the cartographic requirements of its administrators, the provision of maps demanded by the general public was an issue that was regularly raised in annual reports. These demands were of varying nature. Some were explicitly promotional. In 1905 and in 1910, the earliest surveyors of Northern Rhodesia produced maps of the Victoria Falls to be included in two publications: *Guide to the Victoria Falls*, and *Information for Tourists and Sportsmen*.⁴⁵ Maps were produced with the aim of attracting settlers, such as the map included in *Handbook to Northern*

⁴⁴ District Commissioner, Mongu-Lealui to Photographer, Department of Surveys and Lands, Northern Rhodesia, ‘New Map of Mongu’, 31 December 1953, BSE1/10/31, NAZ.

⁴⁵ Pullan, *A First Check List of the Published Maps of Northern Rhodesia, 1890-1949*, 15; ‘Map of the Victoria Falls, on the Zambesi River, Rhodesia. ([With] “Guide to the Victoria Falls”).’ (London, UK: British South Africa Co., 1905); *Rhodesia: Information for Tourists & Sportsmen*. (London, UK: British South Africa Co., 1910).

Rhodesia of 1922.⁴⁶ Other maps served specific uses within Northern Rhodesia itself; reprints of the 1:1,000,000 were created in 1926 due to public desire for a map on which they could see the new large concessions.⁴⁷ Some maps served multiple purposes. The following year, the Survey Department invested time and resources in the creation of a 1:4,000,000 'hand' map that showed the entire territory on a single sheet, as a convenient product for tourists and merchants, and also for, "official reports where larger maps too cumbersome".⁴⁸

This demand was tempered by the Survey Department's ability to command resources. The printing of a batch of maps required a significant outlay that was rarely available within the departmental budget (for example, they could only afford to publish fifty copies of the "important" 1928 map mentioned above).⁴⁹ As we saw in Chapter Three, most sheets from the second 1:250,000 series of the territory drawn up during the 1930s seem to have remained unpublished.⁵⁰ The sale of departmentally produced maps did not serve to recover the funds spent on them. In 1930, the cost of a single sheet of any of the available series (1:250,000; 1:1,000,000; or 1:4,000,000) was approximately three shillings.⁵¹ The Survey Department reported the sale of 827 individual sheets to the public. The £135 19s 1d that was accrued through this activity would have barely reimbursed the Department's expenditure on office furniture that year.⁵² Far more income was generated from the sale of survey deeds and titles (in the same year the Department received £661 8s 4d in Registrar's fees). Perhaps even the internal economy of the Survey Department goes some way to explain why cadastral work was consistently prioritized in the territory.⁵³

In the long 'dry' period of the 1930s, when the Survey Department did not produce new sheets of its own topography, it could still compile maps for other, financially better-endowed organisations. As a result, it was responsible for the production of 140

⁴⁶ J. C. C. Coxhead, ed., *Northern Rhodesia: A Handbook* (Livingstone, Northern Rhodesia: Government Printer, 1922).

⁴⁷ 'Annual Report, Survey Department of Northern Rhodesia', 1931.

⁴⁸ 'Annual Report, Survey Department of Northern Rhodesia', 1927.

⁴⁹ 'Annual Report, Survey Department of Northern Rhodesia', 1928, 19.

⁵⁰ Stone, *A Short History of the Cartography of Africa*, 129.

⁵¹ In fact the 1:1,000,000 series was sold in 4 sheets. Price 15s. per set or by post 17s 6d.; the 1:250,000 at 2s. 6d. per sheet and the 1:4,000,000 at 2s. 6d. as listed in, 'Map Sales (advertisement)', Northern Rhodesia Government Gazette (Northern Rhodesia, 1930), CO670/5, NA UK.

⁵² 'Annual Report, Survey Department of Northern Rhodesia', 1930, 16.

⁵³ *Ibid.*, 200.

copies of a special map of the Victoria Falls produced for delegates to the Imperial Press Conference (Figure 30).⁵⁴ In that same year, the Department also compiled various maps for the Empire Exhibition in Johannesburg, and produced a series of 'Air Maps' of the territory for a private organization, the Beit Trust, that was funded by direct subsidy.⁵⁵

The constraints to publication did not, however, only come from penny-pinching on paper, or reduced annual budgets. The expense of cartographic production was greatly increased by the general scarcity in Central Africa of the technologies and materials required for map publication. The Northern Rhodesian survey department was advised to establish a printing section in 1929 when Harold St. John Winterbotham was sent by the Colonial Survey Committee to inspect the territory.⁵⁶ Winterbotham's advice was that the print section of a colonial Survey Department should employ at least four Europeans (one machine minder and prover, two draughtsmen with the ability to work on zinc, and a photographer), together with the assistance of two or three Africans. This advice was well received by the Survey Department, yet the Northern Rhodesian government did not install lithographic printing facilities until 1958.⁵⁷

As a result, prior to 1958 the maps that are described as published by the Northern Rhodesia survey department were merely drawn up in the office in Livingstone (or later Lusaka). The 'fair copies' would then be sent elsewhere for engraving and printing. Often this work was contracted out either to the Government Printers in Pretoria (South Africa), or to organisations in London via the Crown Agents. From 1931, Northern Rhodesia's more prosperous neighbour Southern Rhodesia had the requisite facilities and was more regularly commissioned to carry out the work.⁵⁸ Outsourcing map printing to organisations beyond the colony disrupted workflows in the production of maps. The report of the Northern Rhodesian survey department of

⁵⁴ 'Annual Report, Survey Department of Northern Rhodesia', 1931.

⁵⁵ Ibid.

⁵⁶ Winterbotham, 'Memo to Surveyor General, Southern Rhodesia: Survey in Southern Central Africa'; 'Annual Report, Survey Department of Northern Rhodesia', 1929.

⁵⁷ 'Annual Report, Survey Department of Northern Rhodesia', 1929, 433; W. F. J. Hobbs, 'The Story of the Government Printing Department', *Northern Rhodesia Journal* V, no. 4 (1964): 366.

⁵⁸ 'Annual Report, Survey Department of Northern Rhodesia', 1929; Pullan, *A First Check List of the Published Maps of Northern Rhodesia, 1890-1949*.

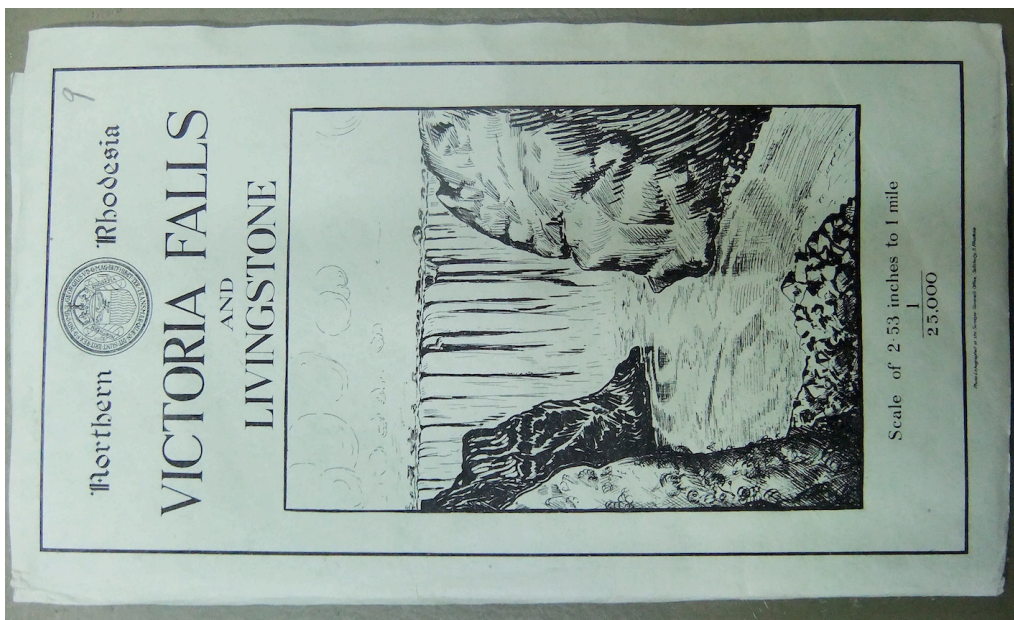


Figure 30: Victoria Falls and Livingstone, 1:35,000, 1933

This map produced at 1:25,000 is an example of the occasional publications of the Survey Department. It is an exceptional item in their catalogue of maps by virtue of being a colour lithographic print.

R. T. Hockey, "Victoria Falls and Livingstone," 1:25,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1933. CO795/63/12, NA UK. Reproduced under license from NA UK. Photograph: author.

1931 suggests the geographic distance between the draft copy, and printing machines inhibited the ease and rapidity of revising and reprinting maps.⁵⁹ Ideally, it had been advised that the whole operation—from drafting to printing—should be in the same building to allow for rapid resolution of doubts and misunderstandings.⁶⁰ As with the sourcing of instruments, transmission of drafts, proofs, and prints across long distances by rail and steamer introduced long delays. To combat this problem, the Survey Department relied heavily on temporary expedients. This included ‘over-printing’ by letterpress when changes occurred before maps could be redrawn or published.⁶¹

Later in the colonial period, other ‘distances’ appeared in the cartographic process. From its founding in 1946, the maps created by the Directorate of Colonial Surveys were published and distributed from London (see Chapter Three). Finally, the affiliation of Northern Rhodesia into the Federation of Rhodesia and Nyasaland in 1953, created a further distance between the territory itself and the sites where cartography was organised.⁶² When Northern Rhodesia became a sub-office with more limited autonomy, its cartographic production was constrained within yet another network. The Southern Rhodesian survey office in Salisbury became the Federal Office and assumed responsibility for coordinating and distributing the metropolitan colonial cartography.⁶³ All these disjunctures between sites of decision-making, drafting, and printing were reported as disruptive to a projected fluency in the cartographic representation of the territory.

Localised media forms

The material conditions for map publication were extremely unfavourable, and yet, of course, within the Northern Rhodesia government at least *some* duplicate and bespoke maps and plans were considered necessary for its daily work. Bridging the demand

⁵⁹ ‘Annual Report, Survey Department of Northern Rhodesia’, 1931.

⁶⁰ Winterbotham, ‘Memo to Surveyor General, Southern Rhodesia: Survey in Southern Central Africa.’

⁶¹ Director of Agriculture and Director of Surveys and Lands, Northern Rhodesia, ‘Maps: Ecological Survey Report’, 7 December 1936, MAG2/9/6, NAZ. See overprints on

‘Northern Rhodesia Showing Provincial Boundaries’ (Northern Rhodesia: Northern Rhodesia Survey Department, 1930), nr Zambia S/G.1, RGS.

⁶² Surveyor General, Southern Rhodesia, ‘Appreciation of the Mapping and Survey Position in the Federation.’

⁶³ Federal Survey Department, Federation of Rhodesias and Nyasaland, ‘Circular: Map Stocks’, 13 January 1958, BSE1/10/31, NAZ.

from government offices, with the few sheets of published mapping prompted a variety of local solutions. Many of these resulted in adaptations to received metropolitan conventions. Depending on the task, and on the quantities of copies required, maps were sometimes replicated by hand (tracing), sometimes by sunprint.

The Northern Rhodesian survey department was more than a century behind the Ordnance Survey in its reliance on mechanical scale drawing tools. Even in 1931, the Survey Department felt that only Europeans could carry out tracing work, so this was a costly exercise. The Department deployed an Eidograph in 1930, and noted the purchase of a new pantograph in 1934.⁶⁴ There was also mention of an 'Opalograph' in 1930 that produced copies of drawings through a wax imprint process, although it was decided that this device was of limited value for drawings with fine lines (Figure 31).⁶⁵ However, as F. C. Blake emphasised in his 1936 contribution to the *Empire Survey Review*, in reality it was neither published maps nor hand-tracings that constituted the bulk of cartographic material in the hands of colonial survey departments, particularly in the tropics.⁶⁶ As is demonstrated by the figures of Table 4, the most common form of document produced by colonial Survey Departments was the 'sunprint'. Sunprints accounted for 49.5% of the graphic output of the Northern Rhodesian Survey Department in 1932, and 68.2% in 1955.

Returning to Figure 27, which shows the full list of maps held in the District Office at Mongu, it should be noted that the greater portion of the documents there are neither strictly speaking maps, nor published documents. The archives suggest that these would have been tracings or sunprints (and more likely the latter). If we consider those maps displayed on the wall in the District Commissioners office (Table 3) we know that at least two of them—(2) and (3); but probably also two more—(4) and (7); were sunprints.⁶⁷

⁶⁴ 'Annual Report, Survey Department of Northern Rhodesia', 1930; 'Annual Report, Survey Department of Northern Rhodesia', 1935; Ian Mumford, 'Lithography, Photography and Photozincography in English Map Production before 1870', *The Cartographic Journal* 9, no. 1 (1972): 30–36.

⁶⁵ 'Annual Report, Survey Department of Northern Rhodesia', 1930, 433.

⁶⁶ Blake, 'Map Reproduction In the Tropics.'

⁶⁷ Throughout this section, and beyond, I will refer to this entire genre of maps as sunprints. The term sun-prints in fact covers a variety of similar techniques. These are variously known as blueline, dyeline, whiteprints, ozalid, diazo, etc. See: Cook, 'The Historical Role of Photomechanical Techniques in Map Production.'

Year	Revenue from sales of published maps		No. of printed maps sold or issued	No. of local prints produced	No. of tracings and drawings produced	Total documents (inc. tracings, plans, diagrams etc.)
	Sales to public	Value of maps issued to gov. depts.				
1926	£102:18:8	*	*	*	*	*
1927	£78:15:0	*	*	600	95	*
1928	£74:5:6	£39:10:6	*	>500	634	> 1,134
1929	£146:4:5	£96:9:9	1,313	870	> 151	*
1930	£135:19:1	£247:7:6	827	1,583	*	*
1931	£122:2:6	£401:9:3	657	1,243	470	2,370
1932	£89:4:4	£695:0:0	1,112	2,395	1,329	4,836
1933	£81:10:10	£860:0:0	1,271	2,803	*	*
1934	£67:0:0	£706:0:0	1,124	1,520	749	3,393
1935	£58:5:8	£536:11:3	441	1,920	673	3,034
1936	£157:0:0	£113:0:0	1,444	1,646	627	3,717
1937	£122:0:0	£590:0:0	1,455	1,974	672	4,101
1938	£196:0:0	£967:0:0	1,015	2,267	1,225	4,507
1939-1944	No data available for these years					
1945	£75:17:0		1,267	1,104	400	2,771
1946	£127:0:0	-	1,867	2,216	1,058	5,121
1947	£234:0:0	-	1,944	3,621	1,355	6,920
1948	£161:0:0	-	1,878	3,582	1,253	6,686
1949	£283:0:0	-	2,991	4,703	1,377	9,071
1950	£323:0:0	-	3,736	7,158	2,045	12,939
1951	£298:0:0	-	3,260	7,880	1,928	13,068
1952	£347:0:0	-	3,664	13,140	2,769	19,573
1953	£432:0:0	-	5,160	11,161	2,306	18,627
1954	£352:0:0	-	4,010	17,337	2,737	24,084
1955	£436:0:0	-	7,136	20,876	2,619	30,631

Table 4: The media of map reproduction in Northern Rhodesia 1926-1955

The table shows the predominance of sunprints and tracings in the government's cartographic output. Sunprints accounted for 49.5% of their production in 1932, and 68.2% in 1955.

These figures all from the Survey Department Annual Reports, CO799, NAUK.



Figure 31: The Opalograph

This technique for document reproduction was better suited to general office work than cartography, yet the Northern Rhodesian Survey Department experimented with the device in a bid to improve their map reproduction.

'*Opalograph Reproducing Apparatus*', Cover of brochure enclosed in letter from Sales Manager, McGarry and Cole, to Crown Agents, 1929. CAOG12/121, NA UK. Reproduced under license from NA UK.

The sunprint was a chemical reproduction process, or perhaps more correctly *processes*, since it was carried out using several techniques that all relied on exposure by sunlight. The process was similar to that for blueprints, but using slightly different chemicals and a white paper base. These prints, although widespread and by far the most commonplace media for the geographic information circulating in the colonial context, have not, apparently, received any study at all. It seems that the procedure was also too mundane to feature in departmental reporting: the exception is a note that a thirty-year-old, hand-printing frame was replaced by a pneumatic one in 1930.⁶⁸

One key characteristics of the Northern Rhodesian sunprint was that it was invariably monotone. This fact had a huge impact on the aesthetics of colonial cartography.⁶⁹

⁶⁸ 'Annual Report, Survey Department of Northern Rhodesia', 1930, 433.

⁶⁹ It was possible to overlay prints using different colours but I have only seen monochromatic prints in the archive. Blake, 'Map Reproduction In the Tropics.'

This inability to use multiple colours for local cartographic work meant that, regardless of scale, the possibilities for layering information on the Northern Rhodesian colonial maps were significantly reduced. This technical constraint was felt not only by the Survey Department, but also by the local officials who sent documents and sketch maps up to them. Tracings sent to the department “if colours should be required”, had to be carried out in particular tones. This palette, the Survey department emphasised, did not include “blue, green, purple or carmine”. Instead, the lakes, rivers, forests, marshes, ridges, pools, and fields of the colony were to be represented by “black, yellow, orange or brown” that all became shades of a single tone.⁷⁰ These muted colours persisted even in the maps that were later produced by the Directorate of Colonial Surveys. Their maps of Northern Rhodesia that appear from the late 1940s onwards did follow other more familiar metropolitan aesthetic conventions (and were lithographically produced), but nonetheless were often still only in black, or black and brown. In 1949, the Survey Office returned a map to a District Officer whose colours had been brutally reduced to those tones: “I regret that it is quite impossible to reproduce a map in colour in this office... As you will see some colours print better than others, I would be glad, if in future, all maps were drawn in black”.⁷¹

Interestingly these restrictions were not appreciated by colonial society at large. Many of the contributors of geographic information were loathe to renounce their affiliation to the map conventions that they had learned from published metropolitan cartography. It seems likely that they shared the general definition employed in 1905, by the Director of the Ordnance Survey:

The ideal topographic map should be printed in colours; and, further, the following colours are almost universally employed: - Blue for water, green for woods, brown for contours, and black for lettering and for the graticule. Shades of brown or grey are commonly used for the representation of hill features on the layer system.⁷²

The maps of the Directorate of Colonial Surveys met with similar complaints in the 1940s, as its Director observed wryly:

⁷⁰ Acting Director of Lands and Surveys, ‘Circular: Survey Requirements.’

⁷¹ Director of Surveys and Lands to District Commissioner, Mazabuka, ‘District Map Mazabuka: Copies’, 19 September 1949, SP4/12/10, NAZ.

⁷² C. F. Close, ‘The Ideal Topographical Map’, *The Geographical Journal* 25, no. 6 (1905): 633.

It is becoming all too clear that many others are unable to read any but the sort of maps they have been brought up on in this country. So, in future, more maps will appear with watercourses in blue, even though no water has run down them since the Flood and they could not possibly be mistaken for anything else if printed in black.⁷³

But those colourful ideals were not compatible with the reality of Northern Rhodesian technologies. Thus, even in 1954, the District Officer of Mongu-Lealui, Ian Mackinson, was still dreaming of a more rainbow cartography of the world he presided over: “At a later date, if and when the Survey Dept ‘goes Federal’ the combined resources of the cartographers of Central Africa may produce a map in colour for us!”⁷⁴

It is interesting that the prevalence of sunprints and tracings, versus published maps, produced by the territory is not reflected in the proportion of historical literature devoted to each type (which in the case of sunprints, is practically nil). Although the sunprints were invaluable within the territory as a means of exchanging and updating cartographic and other visual forms of geographic information, they were not given a high ‘imperial value’. The predominant medium for cartography was functional, instrumental, rather than fulfilling purer representational objectives, and did not meet the aesthetic norms for cartography that were inculcated in imperial citizens. It is quite possible that this made them seem less valuable, which, in turn, contributed to the lack of ‘ethical commitment’ to these documents.

Considering the ‘room’ for governmental maps of Northern Rhodesia (the aesthetic lenses through which they were imagined; the material resources brought into play to produce them; the mechanisms for their circulation; and the ways in which they were ordered and housed), has already begun to reveal something of how that cartography was valued. Other institutions and agencies with influence in the territory did, however, have access to recruiting sources of knowledge, more powerful mechanisms for distributing cartography, and could conform to expensive aesthetic traditions. This is explored further in discussing some of the ‘alternative’ cartographic networks that reached Mongu, manifest in BSE1/10/31.

Mobility of data: pushing and pulling through multiple circuits

The Map Index at Mongu-Lealui suggests that there were a number of alternative circuits at work in Northern Rhodesia; that geographic knowledge did not always pass through the Survey Department before travelling elsewhere. The first category of

⁷³ MacDonald, *Mapping the World*, 48.

⁷⁴ Ian Mackinson to R. W. Steel, ‘Colour Map at 1:250,000 (iii)’, 27 October 1954, BSE1/10/31, NAZ.

circuits considered is that of the imperial scientific societies; focusing here on the British Association for the Advancement of Science (BAAS) and the Royal Geographical Society (RGS), in particular. A second category was the geographic knowledge collected and distributed by imperial private enterprise bodies. These had different resources and leverage to push and pull geographic knowledge (framed in different worldviews) in and out of the local administrative offices. Both circuits resulted in cartography that was very different from governmental production. They evidence different patterns of distribution, and, therefore, reached Mongu-Lealui through different means. The peripheral imperial archive was a node in a range of imperial cartographic economies.

Imperial science: drawing from the periphery

The district officers recruited to colonial Northern Rhodesia were, to some extent expected to be sources of scientific information for the government. Or, at least, they were expected to be able to report coherently on demography, ethnography and environmental conditions at their posting. The training that District Officers received to achieve those ends varied throughout the colonial period.⁷⁵ It has been suggested that it reflected metropolitan expectations about the conditions of service across the Empire, rather than local concerns. It also reflected the nature of the new recruits to the colonial administration. As a rule, these were young graduates, who were then put through a three-month to eighteen-month 'colonial' coda to their university education before being sent out to their post. Effectively the colonial administrative training was a crash course in certain aspects of 'tropical' living, although it was always more academic and theoretical than practical.⁷⁶ In the early years, the cadets received introductions to law, hygiene, and African languages. Latterly, after the Second World War, the metropolitan course focused on colonial history and economics, law and anthropology.⁷⁷

The training of early recruits also included basic surveying, and when they arrived in Northern Rhodesia, this apprenticeship was then consolidated by two or three days more work at the Survey Department itself.⁷⁸ Map work was given up after 1945, and

⁷⁵ See: Kirk-Greene, *On Crown Service*; Anthony Kirk-Greene, *Symbol of Authority: The British District Officer in Africa* (London, UK: I.B.Tauris, 2006).

⁷⁶ Kirk-Greene, *Symbol of Authority*, 44.

⁷⁷ *Ibid.*, 49.

⁷⁸ This activity is reported in the Survey Department Annual Reports until 1931. *Ibid.*, 43.

already by 1936 field-surveying was seen (at least by some) as “a relic of the times disappearing but not yet gone for good, when departmental specialists were few on the ground and a DO [District Officer] with the time and inclination could carry out his own programme of public works”.⁷⁹ In the interim years the course still included field engineering and surveying (although apparently not always rigorously).⁸⁰

The training programmes suggest, therefore that district officers were expected to be able to produce cartography as a means to describe their jurisdiction and index its features. Despite this, survey does not seem always to have been clearly prioritised, either at a high-level or by the district officers themselves. This was, perhaps, due to disinterest, lack of skill, or discouragement at the materials available to them. Perhaps the fragments of mapping, such as those we saw in Chapter Three, were sufficient, or (as I will explore) because the structuring of their work that made cartography irrelevant. Nonetheless, there are also clear examples of cartographic endeavours that went well beyond the call of duty. Stone notes that some officers purchased their own instruments privately and carried out extensive documentation of their juridical domains.⁸¹ Despite there being no clear reward for careful mapping within the colonial administration—or stricture for failing to comply—enthusiastic district officers could advance their offerings and receive recognition for their work beyond the territorial Survey Department. In submitting maps and geographic accounts to metropolitan organisations (largely learned societies), the local knowledge of the colonial administrators would become imbricated in different sets of interests and forms of representation.⁸² These groups can loosely be described as ‘pulling’ geographic testimony towards them, and in particular cases outlined below, they were actively doing so.

The extensive role of learned societies in the ‘opening up’ of Africa in the nineteenth century has been demonstrated.⁸³ Groups of private individuals, within the umbrella of civic, scientific organisations, sponsored, accompanied, ratified, and celebrated the work of explorers and military expeditions. Recent research has revealed more about contributions, in the twentieth century, of high-ranking government officials of

⁷⁹ John Morley, *Colonial Postscript: The Diary of a District Officer* (Oxford, UK: The Radcliffe Press, 1992); cited in *Ibid.*, 52.

⁸⁰ *Ibid.*, 49.

⁸¹ Stone, ‘The District Map’; Stone, *A Short History of the Cartography of Africa*, 122.

⁸² Prior, ‘British Cartographic Representations of Africa c.1880–c.1915.’

⁸³ Driver, *Geography Militant*.

various kinds. These public officers submitted their official work to one agency (the War Office or Colonial Office), whilst their work as private individuals was disseminated via others. Amy Prior has dissected the quality and quantity of the contributions Sir Harry H. Johnston made to a variety of metropolitan cartographic agencies.⁸⁴ John Donaldson has noted that those responsible for the cartography within the remit of Boundary Commissions were often invited to present detailed accounts of their fieldwork at the RGS; these included botanical, zoological, and anthropological observations.⁸⁵

In addition to cataloguing the work of eminent colonial officials, the twentieth-century RGS was also a sorting house for geographic knowledge from less prestigious levels of colonial government, and amongst these District Officers. A number of Northern Rhodesian papers were published by the RGS especially in the 1920s and the 1930s.⁸⁶ These varied in nature, but were almost always primarily accounts of physical geography (in particular waterfalls at various locations in the colony).⁸⁷ A very few treated human geographical aspects of the territory.⁸⁸

⁸⁴ Prior, 'Publishing Histories of Imperial Cartography.'

⁸⁵ Donaldson, 'Marking Territory', 116. See for example F. F. R. Boileau and L. A. Wallace, 'The Nyasa-Tanganyika Plateau', *The Geographical Journal* 13, no. 6 (1899): 577–621; R. G. T. Bright, 'The Uganda-Congo Boundary Commission: Summary Report', *The Geographical Journal* 32, no. 5 (1908): 488.

⁸⁶ F. H. Melland, 'The Kasempa District, Northern Rhodesia', *The Geographical Journal* 54, no. 5 (1919): 277–88; Farquhar B. Macrae, 'Unrecorded Waterfalls in the Livingstone District, Northern Rhodesia', *The Geographical Journal* 76, no. 1 (1930): 59–63; Farquhar B. Macrae, 'More Unrecorded Waterfalls in the Livingstone District of Northern Rhodesia', *The Geographical Journal* 78, no. 1 (1931): 53–55; Farquhar B. Macrae, 'The Lukanga Swamps', *The Geographical Journal* 83, no. 3 (1934): 223–27; F. B. Macrae, 'Some Notes on Part of the Gwembe Valley in Northern Rhodesia', *The Geographical Journal* 91, no. 5 (1938): 446–49; Vernon Brelford, 'The Chishimba Falls in Northern Rhodesia', *The Geographical Journal* 86, no. 4 (1935): 356–57; W. V. Brelford, 'Making an Outlet from Lake Bangweulu in Northern Rhodesia', *The Geographical Journal* 106, no. 1/2 (1945): 50–58.

⁸⁷ Macrae, 'Unrecorded Waterfalls in the Livingstone District, Northern Rhodesia'; Macrae, 'More Unrecorded Waterfalls in the Livingstone District of Northern Rhodesia'; Brelford, 'The Chishimba Falls in Northern Rhodesia.'

⁸⁸ John Keigwin, 'The Cambridge Expedition to the Zambezi Valley, Southern Rhodesia, in 1934', *The Geographical Journal* 86, no. 3 (1935): 252–62.

connection with the interests of Section E of the British Association for the Advancement of Science (BAAS). Charles Withers observes that in the nineteenth century, BAAS Section E grants ran parallel to those given by the RGS and were largely for exploratory work or primary topography.⁹⁰ However, from the 1920s, Section E was funding fewer of these, and more frequently investing in smaller scale, thematic projects. These corresponded to efforts to produce a really “scientific geography”, that would do more than the descriptive work of cartography.⁹¹ It hoped, rather, to “reveal patterns and causal relations” between environmental factors, disease and human society.

In seeking to build this new African geography, the BAAS also used information that was derived locally from the District Officers, although under a rather different regime than that of the RGS. Section E had demonstrated commitment to the project of creating human geographies of the tropics since the meeting in Oxford, in 1926, but there was a lack of available information.⁹² In his presidential speech to Section E of 1934, Alan Ogilvie stressed the attention that the specially formed Committee had given to solving this problem. His solution for a co-operative geography was one that did not use the model of civic reward for personal contribution (as exemplified by the RGS), or the hierarchical networks of imperial scientific institutions. Within Section E’s recent experimental project, the Committee had instead recruited District Officers as the best available ‘experts’ on the populations within their areas of jurisdiction, both statistically and qualitatively, through the form of a questionnaire. This seemed promising as, after all, this genre of knowledge fit more squarely into the core daily routines of district administration—counting heads for taxation and intervening in local conflict—than making topographic measurements did. The BAAS questionnaire contained nineteen questions and was distributed across British colonial Africa. Ogilvie reported in 1934 that they received one of their most comprehensive responses from Northern Rhodesia. Thirty of thirty-two districts had sent responses, including Mongu-Lealui whose details were returned by J. F. Warrington.⁹³ The aggregate

⁹⁰ Charles W. J. Withers, *Geography and Science in Britain, 1831-1939: A Study of the British Association for the Advancement of Science* (Manchester, UK: Manchester University Press, 2010), 77.

⁹¹ *Ibid.*, 78; Tilley, *Africa as a Living Laboratory*, 60.

⁹² A. G. Ogilvie, ‘Co-Operative Research in Geography; with an African Example’, in *Report of the Annual Meeting, 1934 (104th Year)* (London, UK: British Association for the Advancement of Science, 1934), 101.

⁹³ *Ibid.*, 102.

report contained a wealth of information, over 200,000 words of new and rich detail about the region.⁹⁴

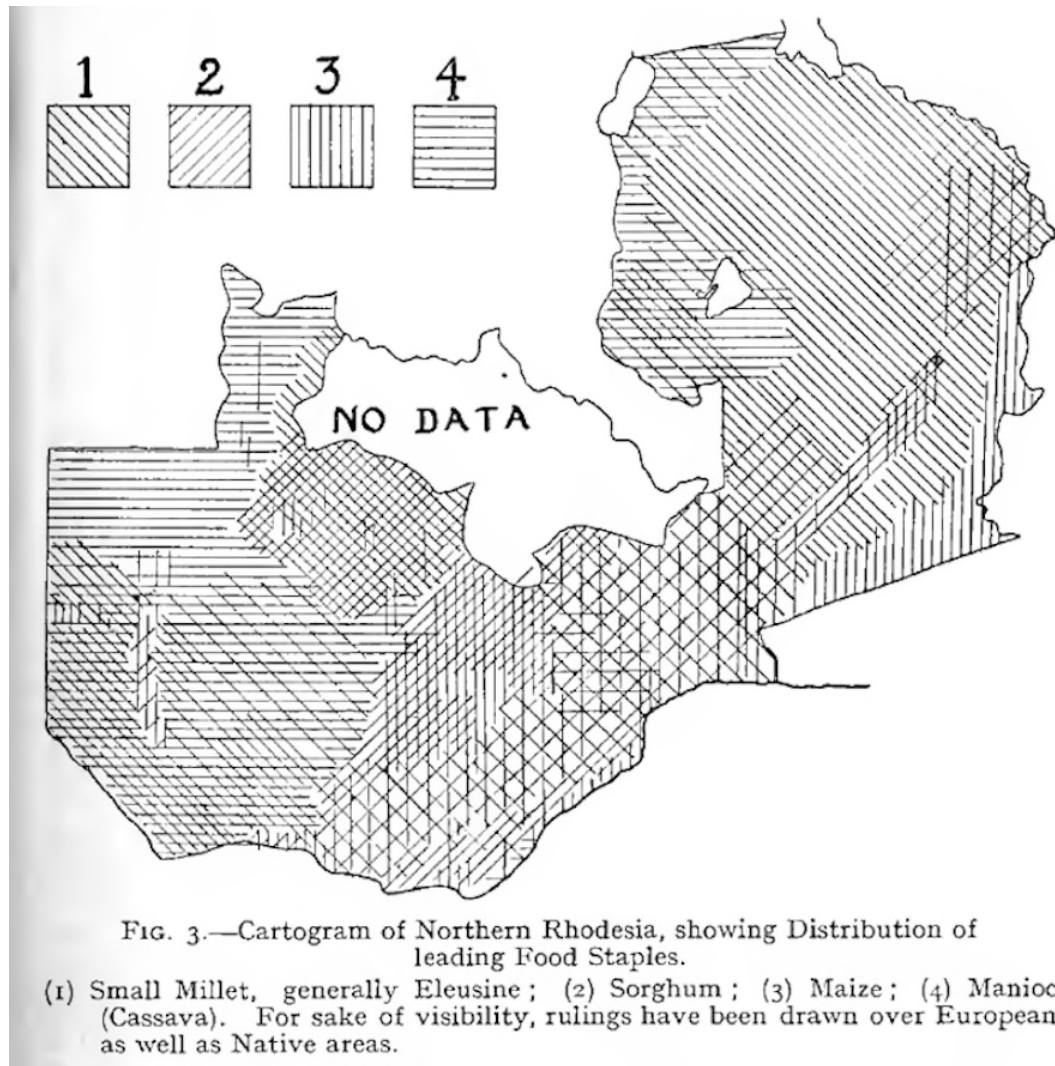


Figure 33: Cartogram of Northern Rhodesia: distribution of leading Food Staples

From A. G. Ogilvie, "Co-Operative Research in Geography with an African Example," in *Report of the Annual Meeting, 1934 (104th Year)* (London, UK: British Association for the Advancement of Science, 1934), 115.) Reproduced under a Creative Commons license <http://creativecommons.org/licenses/by-nc/3.0/> from <http://www.biodiversitylibrary.org/item/96081>

Figure 33 shows some of the cartographic results of this particular investigation. The group had received results sufficient to compile some basic spatial comparisons—'cartograms'—that gave an overview of patterns of social practices, and environmental conditions in the region⁹⁵. However, in presenting this research Ogilvie admitted that these cartograms suggested greater levels of knowledge about the physical environment in Northern Rhodesia than was *actually held* in any single location.

⁹⁴ Ibid.

⁹⁵ Ibid., 103.

It is a matter for regret, on the other hand, that we possess insufficient material from which to construct an adequate account of the physical geography of this region... The map is a compilation, with no real representation of relief, for stringent financial resources have hitherto prevented the undertaking of regular surveys... There are no satisfactory general treatises either upon the soils or upon the natural vegetation... Observations of temperatures are annually reported from some fifty stations. Thus, with the exception noted, the physical setting, in which human existence is now so minutely described, still remains somewhat obscure.⁹⁶

Through the RGS and through the BAAS (in addition to what filtered through the Survey Department of Northern Rhodesia), the local experience of the District Officers was being channelled into different metropolitan cartographic modes (topographic and scientific-geographic) in the metropole. However, knowledge that was holistic at its source ‘on the ground’ with the District Officers, was only moving from the local site in a fractured and dislocated manner. So, although both the RGS and BAAS were attempting to integrate local colonial knowledge about Northern Rhodesia within the framework of *cartographie universelle* (within which objects, environments and social action were layered over a mathematical base) they failed, left with pieces that could not be properly reconciled.

From the history of this map we can observe in colonial governance an attitude that Helen Tilley has commented on; that intervention trumped representation.⁹⁷ Despite Ogilvie’s enthusiasm for the ‘co-operative’ project, and the high level of Northern Rhodesian participation, it was considered by the territorial-level authorities in Northern Rhodesia that the formal collection of human geographic data by District Officers would “demand time and thought... more profitably expended on their ordinary duties”.⁹⁸ The Northern Rhodesian government was cartographically indifferent. The value given by imperial agencies to particular modes of cartography was not reflected in policies at a territorial level. To be valued within the daily life of the colony, cartography needed to fulfil obvious useful purposes. As a result, the traditional progression from topography to the layering over of ‘scientific geographies,’ was also being thwarted in Northern Rhodesia itself.

⁹⁶ Ibid.

⁹⁷ Tilley, *Africa as a Living Laboratory*, 277.

⁹⁸ E. H. Jalland, Acting Secretary for Native Affairs to the Chief Secretary, “The African Research Survey,” May 9, 1934, SEC1/1727 NAZ. Cited in: Ibid.

Pushing towards the centre

So, whilst metropolitan organisations were not always successful in ‘pulling’ data from colonial administrators, self-initiated ‘pushes’ from the field towards centralised authorities were not always successful either. This is illustrated very clearly by one incident in Mongu District: Ian Mackinson’s attempt to update the topography on his arrival as District Officer in 1953.

It seems very likely that Ian Mackinson drew up the *Index to Maps* in BSE1/10/31 (Figure 27) in the process of collecting potential sources for his own new map. A series of letters to the survey department that endured more than a year record Mackinson’s effort to get all the available existing data in the colony, and items (2) and (3) in Table 3 suggest that he succeeded at least in part.⁹⁹ With these documents in hand and the assistance of his colleague Colin Rawlins, Mackinson drafted the map over a long period, using, in Mackinson’s words, “a considerable amount of time, both official and my own”.¹⁰⁰ The result—Figure 34 (and Folded Map No. 2)—was the first topographic map of the District that had been produced since 1930 (item (4) in Table 3). Mackinson’s map represented the most sophisticated cartography of the district produced at that point. It should be remembered that its quality (both in measurement and aesthetics) reflects Mackinson’s particular skills and expertise. He was a trained pilot and geography graduate.¹⁰¹ In other districts, where officers were not as expert, or as motivated, the ‘district maps’ were likely to have been very much more crude. Even here there is no relief, and for an outsider (despite the key) it is very difficult to tell which of the villages have more or fewer than 100 inhabitants.

⁹⁹ District Commissioner, Mongu-Lealui, ‘Copies of Martin’s Maps’, 21 April 1952, BSE1/10/31, NAZ; District Commissioner, Mongu-Lealui to Photographer, Department of Surveys and Lands, Northern Rhodesia, ‘New Map of Mongu.’ Martin, ‘Summary of Work: Mankoya and Lealui Districts. Forestry Officer for Barotseland.’; District Commissioner, Mongu-Lealui to Provincial Commissioner, Barotse Province, ‘Mongu Aerial Survey’, 24 July 1948, BSE1/10/31, NAZ.

¹⁰⁰ District Officer, Mongu-Lealui to District Commissioner, Mongu-Lealui, ‘Loss of Draft Map’, 14 January 1955, BSE1/10/31, NAZ.

¹⁰¹ Mackinson, *Footprints in the Dust*.

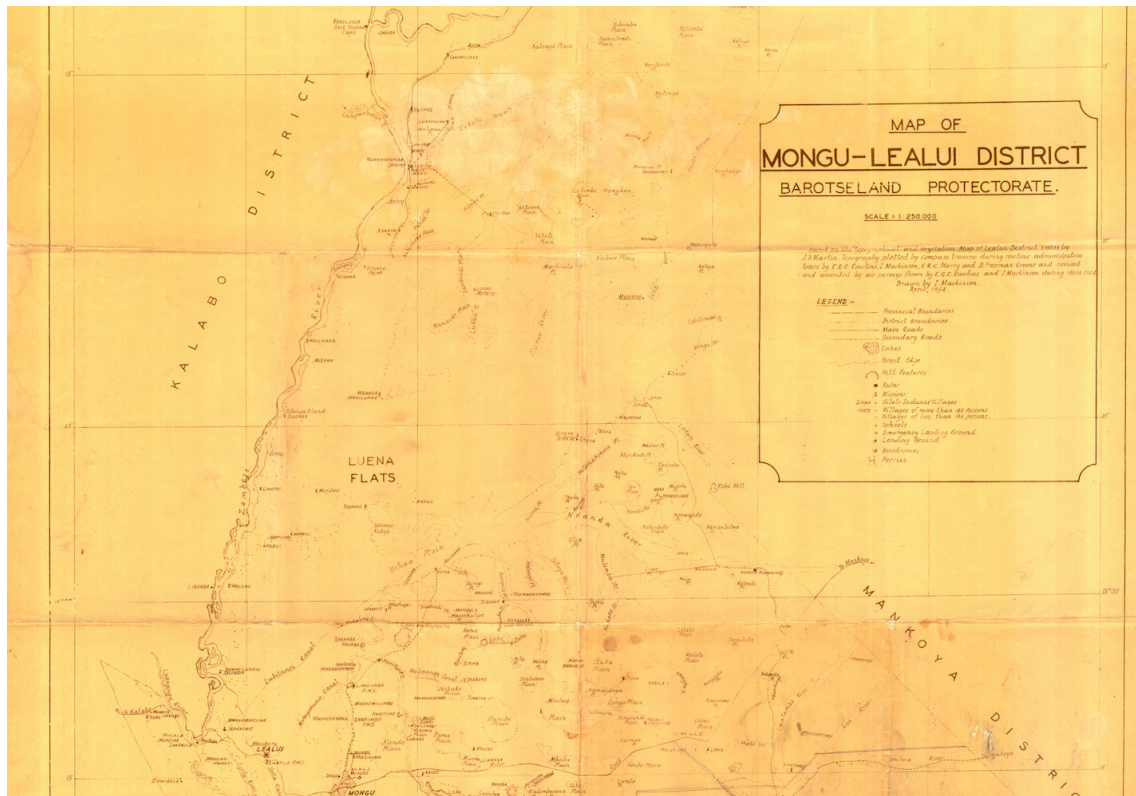


Figure 34: Ian Mackinson’s Map of Mongu-Lealui.

Ian Mackinson et al., “*Map of Mongu-Lealui District, Barotse Province*”, 1:250,000. Sunprint of hand-drawn map, 1954. Author’s own collection, reproduced with kind permission from I. Mackinson. Not reproduced at full size. See *Folded Map No. 2* for full reproduction.

The Map Index gives us a sense of what Mackinson’s map might have replaced.

‘Steven’s’ District Map on the wall of the District Commissioner’s Office in 1953

(Table 3) was—whether an original or a locally traced copy—a geographic document that had seen no major changes since 1930, (more than twenty years previously).

Mackinson described the existing District Map on his arrival in Mongu as showing “the boundaries, the major rivers, including the Zambezi, the location of Mongu township, and very little else”.¹⁰²

The draft of this map was lost en-route to the Survey Office at Livingstone, later that year.¹⁰³ This mishap was met with complacency by the Survey Department, but considerable frustration by Mackinson (though in terms of restrained civility).¹⁰⁴

¹⁰² Ibid., 108.

¹⁰³ District Officer, Mongu and Mr Mitchell-Higgs, ‘Loss of Tracing’, 14 January 1954, BSE1/10/31, NAZ.

¹⁰⁴ District Officer, Mongu-Lealui to District Commissioner, Mongu-Lealui, ‘Loss of Draft Map.’

SENANGA.

14th July, 1954.

R.W. Steel Esq., M.A.,
School of Geography,
OXFORD.

Dear Mr. Steel,

Very many thanks for your letter of 29th June, 1954. I did receive your letter of 8th April, but soon after, I was transferred to the neighbouring District of Senanga, from where I am now writing. However I am in close touch with the District Commissioner, Mongu about the map.

In reading the reply of the Alden Press, which you kindly quoted, I am beginning to have doubts about the project.

Firstly the map, or "key drawing" we have produced comprises 4 sheets, each approximately 4' x 2'9" at a scale of 1:125,000 approx. These are drawn in black ink only, on blue tracing linen. Our object was to get these reproduced on the same scale. However, our Government Survey Department will produce for us copies at a scale of 1:250,000 which could serve as a "key drawing", and which I could colour in the same fashion as we would like our final maps produced. We would then keep the larger scale maps in black and white. I mention this as the quotation of a size 15" x 10" seems to imply that it is thought that we wish for reductions for producing with an article or similar paper. This is not our intention. Field work and occasional aerial inspections, besides normal reference requirements in the office are our three principal needs.

The Northern Rhodesia Government Survey Department will produce copies at scales of 1:250,000, and 1:125,000, but not in colour. The question now seems to be can the Alden Press reproduce, in colour, copies at one or other of these scales? Even if they are able to do this the price might become prohibitive judging by their quotation of £20 - £30 for 50 copies of a size 15" x 10".

The range of colours we had in mind would be as follows:-

- a. Forested areas - LIGHT GREEN
- b. Roads and Airfields - RED
- c. Canals, small streams and forest - plain junction -
BLUE
- d. All printing, villages, Native Courts,
Boundaries, Missions in BLACK and defined by usual
symbols.

In brief, the object of the map, is to bring out clearly the peculiarities of the hydrology of this part of the Zambezi basin - the flooded forest pans, the way their water should flow and the problems of the inhabitants living almost exclusively around these pans. New communications etc., canals and development in general can be better visualized if we can see at a glance the exact nature of this topography, which hitherto, we have been unable to obtain.

If you could approach Mr. Furneaux again in the light of this additional information and obtain his views, I would be very grateful.

Figure 35: Hopes for more colourful cartography. Ian Mackinson outlines his plans for his newly drafted District Map

Letter from Ian Mackinson to R. W. Steel, "Colour Map at 1:250,000 (ii).," July 14, 1954, BSE1/10/31, NAZ. It was not possible to reach the National Archives of Zambia to gain permission to reproduce this material. The author considers that this use falls under the category of fair dealing.

This letter, (Figure 35) date July 14, 1954, is from Ian Mackinson, then District Officer at Mongu-Lealui to Robert Steel at the School of Geography, Oxford. It is part of a series of correspondence between them in which Mackinson had elaborated his plans for the new topographic map of the District. In the face of disregard (lost in the post), and disappointment (no colour printing), about the fate of his endeavour, Mackinson had addressed the possibility of sidestepping the Survey Department and finding satisfactory printing elsewhere. In a series of cheerful letters between Mongu and Oxford, the pair discussed the possibility of producing an integrated map of Mongu-Lealui, that would use better illustrate the relationship between the hydrography, relief, vegetational areas, as well as of course European and African settlements.¹⁰⁵

To this end, they had been investigating the cost of a private edition of the map by lithographers in the UK. Robert Steel had a prior interest in human geography, (social geography in his terms), and particularly in that of the tropics.¹⁰⁶ As editor of the *Transactions of the Institute of British Geographers*, Steel had access to an alternative set of publication resources that could be deployed.¹⁰⁷ The relationship between Mackinson in Mongu, and Steel in Oxford, I argue, should be considered as an informal version of the metropolitan networks. Their attempted collaboration was based on the same sense of civic cooperation and epistemological commitment represented by the learned societies, but was mediated through something more akin to a friendship or loose patronage. Mackinson and Steel hoped that this personal relationship would be able to combine the density of knowledge represented by the discursive, dynamic District Map with metropolitan leverage. They hoped to exploit greater material resources than those locally available to advance a map that could have both local and imperial value.

This flow of cartography outside the official hierarchy is indicative of a locally driven attempt to resolve some of those ‘discontinuities’ in relation to the culture of *cartographie universelle*. It has to be considered as an attempt to ‘push’ cartography out

¹⁰⁵ Ian Mackinson to R. W. Steel, ‘Colour Map at 1:250,000 (ii)’, 14 July 1954, BSE1/10/31, NAZ.

¹⁰⁶ E. W. Gilbert and R. W. Steel, ‘Social Geography and Its Place in Colonial Studies’, *The Geographical Journal* 106, no. 3/4 (1945): 118–31; M. Fortes, R. W. Steel, and P. Ady, ‘Ashanti Survey, 1945–46: An Experiment in Social Research’, *The Geographical Journal* 110, no. 4/6 (1947): 149–77; R. W. Steel, ‘The Population of Ashanti: A Geographical Analysis’, *The Geographical Journal* 112, no. 1/3 (1948): 64–77.

¹⁰⁷ R. W. Steel to Ian Mackinson, ‘Colour Map at 1:250,000 (i)’, 29 June 1954, BSE1/10/31, NAZ.

of Mongu into the wider world that failed. Despite Mackinson's ambition to reach a wider audience, the print run was still going to be too small to justify the costs; at between £20 and £30 for fifty copies, the project was abandoned.¹⁰⁸ "I think all we can do now is have the map reproduced in black and white and colour our own copies. Perhaps, after all this, you might like a copy? It might even have some remote use in your lectures and tutorials on tropical Africa".¹⁰⁹

The mark at the bottom right-hand corner, 'SDT 190', can be read as an indicator that a draft of Mackinson's map did finally reach the Northern Rhodesian survey department.¹¹⁰ Note, the copy is purely a reproduction, the map was not redrawn nor standardised to any departmental or imperial conventions. So, although Mackinson had attempted to side step the Survey Department and circulate knowledge of Mongu more widely, the document remained definitively 'local', geographically and aesthetically.¹¹¹ The indifference of the Survey Department to the loss of the draft between Mongu and Lusaka, and the impossibility of raising funds to publish a copy, are highly indicative of the hugely divergent sets of values at work across different parts of the colonial cartographic economy.

Alternative iconographies

Another document to be considered from BSE1/10/31 also treats an alternative cartographic network. This, our last example of cartography from the peripheral imperial archive at Mongu, provides a contrast to both state and 'scientific' mapping and offers the opportunity to consider yet another separate circuit for cartography. It suggests yet further forms of value that maps might have held beyond their content and different mechanisms for producing the desired 'push' and 'pull'.

A much shorter letter in the file, issued by the Mongu Office makes a request to the British South Africa Company. The officer asks for a copy of the BSAC's map, more particularly their:

¹⁰⁸ This meant each map would cost between 8s and 12s. The cost of printing would be equivalent to an African Assistant Surveyor's salary for three months, or fifteen per cent of the Survey department's total budget for map-printing for that entire year (see Chapter Three).

¹⁰⁹ Mackinson to Steel, 'Colour Map at 1:250,000 (iii).'

¹¹⁰ Stone, 'The District Map', 109.

¹¹¹ The document does not, in fact, exist in any archive, even in Northern Rhodesia. It remained so 'local' that it was circulated between various retired District Officers who had worked in Barotseland, before finally being returned to Ian Mackinson, from whom the author received it in April 2015.

Very good combined map of Northern and Southern Rhodesia. *Most Government offices seem to have a copy* but there is no copy on this station. Have you by any chance a copy which you can spare, and if so would you be kind enough to send it to me for official use here?¹¹²

The map the office subsequently received from the BSAC (or another similar from following years) was also to be found on the wall of the District Commissioner's office in 1953 (Table 3). This, "combined map of Northern and Southern Rhodesia" was produced annually and distributed by the organization.¹¹³ Folded Map No. 3 is an equivalent map from 1935.

As we saw (in Chapter Two), between 1890 and 1924 the officers of the BSAC were the administrative and political representatives of the British in the region. Following negotiations with the British Government after 1924, when Northern Rhodesia became a crown colony, the BSAC retained half of the revenue from land sales and rents, and the full quantity of the revenue from mineral rights, in addition to a large (three-million-acre) estate in the far North of the territory.¹¹⁴ They were also heavily invested in several Railway companies as well as being shareholders in the Concession Companies. As a consequence—well beyond the cessation of administrative responsibility to the Crown in 1924—the BSAC's local Secretary, and Resident Mining Engineer, were important hubs for a great deal of geographic information. The Directors' annual report, issued to the shareholders, therefore, (it would seem quite logically), contained a map that charted the Company's 'possessions' in the region.

A fuller history of the BSAC maps is to be found elsewhere in the National Archives of Zambia in MM2/1/68. This file contains correspondence from the BSAC regarding the distribution of their annual maps, along with other requests to the Company for geological or geographical information, between 1936 and 1954.¹¹⁵ The folder reveals that as a rule the Resident Mining Engineer's office seems to have held up-to-date

¹¹² District Commissioner, Mongu to Resident Mining Engineer, British South Africa Company, 'The British South Africa Company Map.' (Emphasis added).

¹¹³ The reports (and some of the maps) for 1929 -1955 are held in Zambia Consolidated Copper Mines Archive (hereafter ZCCM) 19.2.2B.

¹¹⁴ Although as a result of the negotiations of 1890 between the BSAC and Lewanika, the BSAC did not hold any rights over Barotseland (and therefore Mongu). This was maintained throughout the colonial period. John S. Galbraith, *Crown and Charter: The Early Years of the British South Africa Company* (University of California Press, 1974).

¹¹⁵ The file only contains that correspondence which was copied to the Department of Mines ('Surveys, Lands and Mines' then later just 'Mines') during those eighteen years.

copies of all the topographic maps published by the Northern Rhodesia Survey Department.¹¹⁶ The BSAC offices also had tracings of maps received directly from the mining companies themselves that carried information generally outside public circulation.¹¹⁷ Occasionally the letters indicate that the local Company office received maps published by other organisations such as a *Wall Map of Africa* published by Philip and Son, or a *Map of the Copperbelt* published by the Roan Selection Trust.¹¹⁸

The BSAC were not only passive collectors of this data; it all fed into compiling and maintaining their own maps. This can be seen, for example, from a corrected copy of their annual map received from Hamilton, Government Surveyor, in 1937.¹¹⁹ On another occasion, the Resident Mining Engineer requested that he should be allowed to keep three copies of an older map that had additional information annotated onto it (regarding a Concession area) that he wished to keep for reference.¹²⁰ In principle, the local BSAC office seems to have acted as a collection point. Fresh information was then forwarded up to Head Office in London, to their ‘mapping expert’ for compilation and preparation for publication in the house-style.¹²¹

MM2/1/68 suggests that the BSAC and the Northern Rhodesia Survey Department therefore shared a great deal of their cartographic content. Yet despite this data overlap, the BSAC maps evidence significant differences. Their maps bring into prominence the features of the territory that were of specific interest to the BSAC—or again as per Edney, their ‘scale-dependent spatial conception’—in their commercial

¹¹⁶ See for example: Resident Mining Engineer, British South Africa Company to A. D. Hamilton, District Survey Office, Ndola, ‘Map Amendments and New Publications (i)’, 2 April 1937, MM2/1/68, NAZ; Resident Mining Engineer, British South Africa Company to Director of Surveys and Lands, ‘Maps of Barotseland’, 21 May 1952, MM2/1/68, NAZ; London Office, British South Africa Company to Resident Mining Engineer, British South Africa Company, ‘Maps from the Directorate of Colonial Surveys’, 3 March 1954, MM2/1/68, NAZ.

¹¹⁷ Local Secretary, British South Africa Company to Resident Mining Engineer, British South Africa Company, ‘Information about Mine Holdings: Map Compilation’, 4 August 1939, MM2/1/68, NAZ.

¹¹⁸ Resident Mining Engineer, British South Africa Company to General Manager, British South Africa Company, Salisbury, ‘A Wall Map of Africa’, 24 February 1955, MM2/1/68, NAZ; Resident Mining Engineer, British South Africa Company to Mr Smith, ‘The Roan Selection Trust Map of the Copperbelt’, 6 December 1952, MM2/1/68, NAZ.

¹¹⁹ Resident Mining Engineer, British South Africa Company to A. D. Hamilton, District Survey Office, Ndola, “Map Amendments and New Publications (i).”

¹²⁰ Resident Mining Engineer, British South Africa Company to London Office, British South Africa Company, ‘Retaining Annotated Copies’, 23 February 1939, MM2/1/68, NAZ.

¹²¹ Resident Director, British South Africa Company to Resident Mining Engineer, British South Africa Company, ‘Map Amendments and New Publications (ii)’, 3 May 1937, MM2/1/68, NAZ.

activities, and to the members of their network.¹²² As Folded Map No. 3 shows, the BSAC maps depict their ‘estate’ writ large; transport and communications networks are given particular visual emphasis. The maps also deliberately spanned several scales, through the use of insets. One inset showed detail of the main copper mines, giving an impression of ground-level activity. The other inset, at a much smaller scale, showed the size of territories against Southern Africa, giving an impression of the vastness of their dominion. The maps were also printed with a table of rail distances between key locations in Southern Africa, and a summary of the BSAC rights in the region (Figure 36). This verbal description altered slightly through the colonial years, but the example from 1935 is fairly typical, in describing what can be ‘seen’ through colour coding on the map.

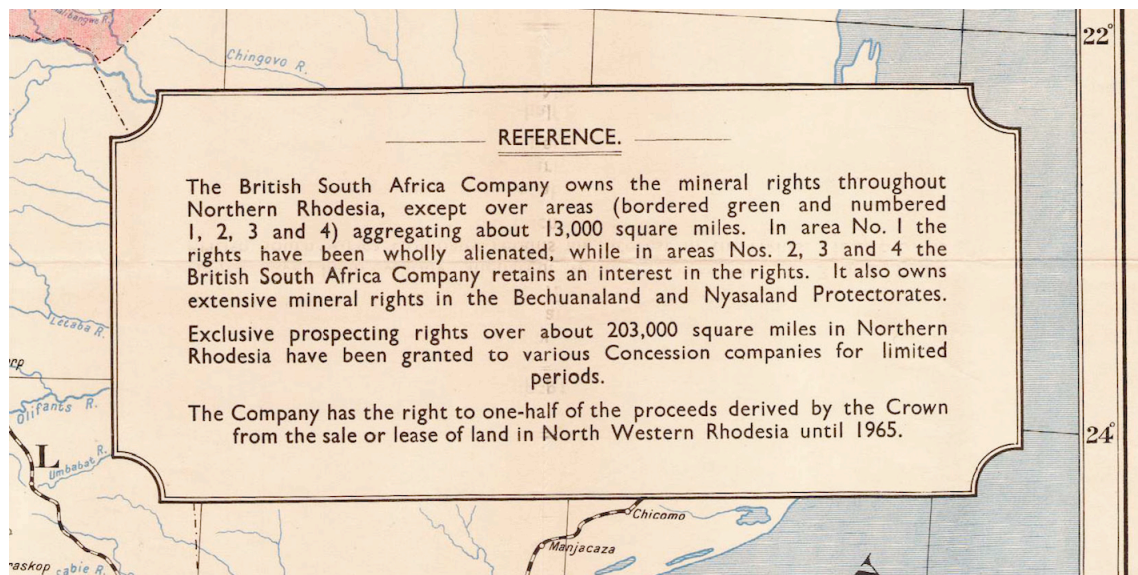


Figure 36: Detail from the BSAC Map of Rhodesia

British South Africa Company, “*Map of Rhodesia and Adjoining Territories*”, 1:3,000,000. London, UK: Waterlow & Sons, 1935. Author’s own collection. Not reproduced at full size.

Most importantly of all, the BSAC annual maps emphasize the totality of a politically fictional territory that the BSAC call ‘Rhodesia’ (Folded Map No. 3 shows it outlined in red or pink, as if a single entity). To a certain extent, this cohesion of Northern Rhodesia and Southern Rhodesia as a unified territory represents an echo of the ambitions of the BSAC in the late nineteenth century (which were thwarted on several accounts). Although never achieved *de facto*, ‘Rhodesia’ does, nonetheless, accurately represent the zone of influence of the company on the region into the twentieth century.

¹²² Edney, ‘Field/Map: A Historiographic Review and Reconsideration’, 446.

Another difference between the BSAC maps and those of the Northern Rhodesia government was the pattern of their circulation. Ostensibly they were created as a reference document within shareholder reports. Few of their shareholders would have been resident in Northern Rhodesia itself, and yet the maps seem to have achieved wide circulation within the territory, including the copy on the wall in the District Office, Mongu. They were printed on very thin, fragile paper (unlike the heavy linens and thick papers of the government maps), but it seems that this quality might have allowed them to travel more quickly, more cheaply, and with less concern over their loss. Letters to the BSAC office suggest that the maps were distributed from the Resident Mining Engineer's office for use as a rough guide for prospective mineral hunters, as the maps demarcated areas that were, or were not, open for making claims.¹²³ They seem, however, also to have been ubiquitous in government offices (as the District Commissioner of Mongu suggested in his letter of 1946). Records show that requests for copies were granted to all the District Offices in Southern Province in 1939; to the District Commissioner of Chingola in 1940; as well as, of course, to Mongu-Lealui.¹²⁴ Further copies were distributed directly to Northern Rhodesian officials in various capacities.¹²⁵

Whilst the circulation of the BSAC maps in the territory (at an estimate of 50 to 100 copies a year) happened in smaller quantities than that of the Survey Department's cartography (Table 4), the BSAC map was significantly more eye-catching. Rhodesia was represented in vivid multi-colour from 1910.¹²⁶ Compared to the monochrome government maps on the wall in the office in Mongu its colour would have been striking. It seems likely that the map's familiar metropolitan aesthetics, its 'imperial' style, was probably the reason it was given priority of place on that wall over the government Survey Department's 'hand map' at similar scale.

¹²³ Chief Clerk, British South Africa Company to S. D. Nel, Esq., 'Areas Open to Prospecting (i)', 21 March 1939, MM2/1/68, NAZ; Resident Mining Engineer, British South Africa Company to J. D. Davidovics, 'Areas Open to Prospecting (ii)', 7 May 1949, MM2/1/68, NAZ.

¹²⁴ Provincial Commissioner, Southern Province to District Commissioners, Southern Province, 'British South Africa Company Map of Rhodesia', 3 March 1939, SP4/12/16, NAZ; District Commissioner, Chingola to Resident Mining Engineer, British South Africa Company, 'Request for a Copy of the Map of the Rhodesias', 27 August 1940, MM2/1/68, NAZ; District Commissioner, Mongu to Resident Mining Engineer, British South Africa Company, 'The British South Africa Company Map.'

¹²⁵ Local Secretary, British South Africa Company to Resident Mining Engineer, British South Africa Company, 'Distribution of the 1939 Map', 15 March 1939, MM2/1/68, NAZ.

¹²⁶ W. H. Mercer and A. E. Collins, *Colonial Office List for 1910: Comprising Historical and Statistical Information, Respecting the Colonial Dependencies of Great Britain* (London, UK, 1910).

A final difference between the BSAC cartography and that produced by the Northern Rhodesian government lies in what (for want of a better word), I will describe as their 'vitality'. This is connected in part to their high production values and use of colour, but also due to careful management of what today we would call corporate 'image' on the part of the BSAC. Although maps (per sheet) were expensive to produce at the numbers required by the Survey Department, the BSAC could, through economies of scale, afford to produce hundreds of copies and distribute them at no charge to the recipients. It was, however, a gesture that was carefully controlled. Each year, the head office in London sent word through its local offices in Northern Rhodesia that the offer of the current year's map, came with the request that the previous year's map be destroyed.¹²⁷

The maps had less obvious epistemological value than the government maps did, and were of low material value being on only a fragile paper support. Yet through their colour, and their regular replacement, they must have added a sense of dynamism, of modern values where they were fastened to the wall. Compared to the faded reproductions of decades-old monochrome maps, the BSAC map would have had the feel of momentum and vitality. Through their deliberate harnessing of 'informants', and the availability of capital to produce their maps, the BSAC succeeded in creating an alternative (and possibly more predominant) cartographic iconography for Northern Rhodesia, that imprinted (or overlaid) their corporate ambitions onto the self-image of the colony, even in remote rural administrative offices such as Mongu where their interests and interventions, were comparatively weak. Their maps pushed and pulled through the colonial cartographic economy by virtue of their material qualities.

An analysis of the cartographic circulation through the peripheral imperial archive reveals the mechanisms that supported and inhibited the sharing of geographic (especially cartographic) data across larger imperial networks. It allows us to make the observation that the colonial government was as much a bottleneck for this information as it was a conduit. The endeavours of the BAAS were curtailed by a government policy about the work of district officers. The Survey Department was not certainly exigent in co-ordinating cartography: Ian Mackinson's case shows quite how disinterested the department could be. In the final section of this chapter, I will consider in more detail what that might mean.

¹²⁷ Provincial Commissioner, Southern Province to District Commissioners, Southern Province, 'British South Africa Company Map of Rhodesia.'

Circulating referees: locating subjects and objects in Mongu-Lealui

In this section I propose that understanding the colonial cartographic economy at Mongu-Lealui, requires framing mapping within a larger set of activities. The circulation of geographic knowledge through cartography should be held in comparison to the embodied circulation of the colonial administrative agents. The elements of both these circuits were described using a language of scarcity. An absence of maps was lamented, and, as Anthony Kirk-Green has aptly formulated, “a thin white line” of colonial staff managed vast territories.¹²⁸ As I suggested earlier in the chapter, Tilley has argued that we see action being favoured over the collection of data in British colonial Africa; intervention as being consistently favoured over representation. For the colonial government in Northern Rhodesia, the time of its officers was better spent in their “ordinary duties” than in generating knowledge. It seems that situated forms of power and knowledge were being advocated over synoptic ones.

This section asks what that attitude meant at a local level. How was it possible for a district staff totalling no more than a handful of men to govern an area the size of a small European state if they had no map of it? A detailed understanding of map-use in the district offices was by far the hardest information to obtain from the archives. As we will see, much of the daily practice has to be inferred from the anecdotal evidence and much of it comes from the personal diaries of district officers. Although slight, the evidence strongly suggests that the role of the District Map was not so much transmitting knowledge beyond the district, as organizing activity within the district. The anecdotes add up to a convincing argument. In outlining the way in which this worked, I will focus in particular on the connections between two bureaucratic tools used in district administration; the District Map and the ‘tour’.

Documenting the Tour

Returning to Ian Mackinson’s map of 1954 (Folded Map No. 2) the document itself gives us some initial insights into the role it played in district bureaucracy. As the map itself declares, the data was largely collected from “compass traverse during routine administrative tours” and “amended by air survey”.¹²⁹ Mackinson’s autobiography

¹²⁸ Kirk-Greene, ‘The Thin White Line.’

¹²⁹ Ian Mackinson et al., “*Map of Mongu-Lealui District, Barotse Province*”, 1:250,000. Sunprint of hand-drawn map, 1954.

provides more clues as to what these practices actually entailed.¹³⁰ The compass traverse was produced as he and his colleagues moved between villages. As they travelled, they would take a bearing towards an upcoming landmark then measure (with a cyclometer) the distance to reach it.¹³¹ From that landmark the next was set, a bearing taken, and line measured. Whenever a governmental light aircraft arrived in the district, Ian and his superior would use it to fly timed vectors at constant speed, and orientate, check and piece together the information gathered from the foot-traverses.¹³² It was through these improvised methods and much time on foot in the course of 'ordinary duties' that the most sophisticated map of Mongu-Lealui to date was produced. In looking at the map it should be remembered that the distance from Mongu to the furthest reaches of the district (N.E. to Kambwata was more than ninety miles or six days' walk.¹³³ The area of the district was nearly 12,000 square miles, two thirds of the size of Wales. (For an example of 1:250,000-scale mapping see Appendix 1).

In the previous chapter we examined the ability (and inability) of Northern Rhodesian cartography to perform the tasks it was called to serve in creating a colonial spatial order. We saw that in many cases, maps alone were insufficient to bridge misunderstandings, and that very often multiple parties had to meet on-site to resolve doubts and uncertainties. It must also be considered, however, that some maps are not ever intended as permanent evidence to close a debate so much as the starting point for a dynamic discussion.¹³⁴ This, I would suggest, was the case for the 'District Map' in at least two senses. Firstly, they formed the basis of 'live' discussions. One ex-District Officer recollected that "the district map was the prime map, and you would never take a stranger to the printed map to explain anything".¹³⁵ Secondly, they also often seem to have been regularly annotated and informally updated with new information, as District Officers returned from each tour. Later these were traced and

¹³⁰ Mackinson, *Footprints in the Dust*.

¹³¹ *Ibid.*, 108.

¹³² *Ibid.*

¹³³ *Ibid.*, 97.

¹³⁴ B. Orlove, 'The Ethnography of Maps: The Cultural and Social Contexts of Cartographic Representation in Peru', *Cartographica* 30, no. 1 (1995): 29–46; Dora, 'Performative Atlases'; Ghertner, 'Calculating without Numbers.'

¹³⁵ F. B. Macrae, personal communication cited in Stone, 'The District Map', 109.

filed with reports.¹³⁶ In his account of one such tour in 1939, Kenneth Bradley recounts that these annotations could even be humorous: “I noticed on the map which I had with me that some amateur draughtsman had written against a little hill near the village, ‘Lions live here.’ Some successor who had perhaps been kept awake by them, had written underneath, ‘Fancy!’”¹³⁷

In laying out the construction and use of the ‘district map’ we are already exposed to some of the ‘ordinary duties’ of administrative work in the district, being ‘on tour’. Jeffrey Stone has described some of the relationship between district duties and cartography in his analysis of the genre of the District Map. The very first colonial officials had no base map to work with, only sketchy lines, or verbal reports at best. Stone describes the very first administrative officer of Mongu, arriving in 1908, as climbing hills to obtain “a number of observations with a prismatic compass for the compilation of a district map”.¹³⁸ Collecting this information, Stone suggests, was not necessarily driven by the desire to create a cartographic depiction of the terrain, but to provide an overview of the routes taken by the District Officers on their regular tours.

The nature of the district tour varied from district to district, and depended on the policies of more senior officers. On the whole it was a celebrated institution. The principle behind it was one of peripatetic administration, the district officers would count huts, collect tax (entering each of these into registers), hear complaints, propose solutions, and, for the larger part of the colonial period, administer the rule of law. Patterns in touring depended on the geography of the district. They also evolved over the colonial period according to the possibilities presented by technologies of communication. In the early years of the colony, touring was considered to be pretty much *all* of a district officer’s work. In 1919 a district officer remarked that the process of hierarchical reporting encouraged by the introduction of the typewriter had made him more stationary; that the officers were becoming “like accounting, transport or postal clerks”.¹³⁹ The introductions of the motorcar and air travel also seem to have affected the quantity and qualities of the ‘tours’ effected.¹⁴⁰ In Northern Rhodesia, the value of touring was regularly restated by the authorities. A decrease in time spent

¹³⁶ Ibid., 105; Mick Bond, *From Northern Rhodesia to Zambia: Recollections of a DO/DC 1962-73* (Lusaka, Zambia: Gadsden Publishers, 2014), 235.

¹³⁷ Bradley, *The Diary of a District Officer*, 90.

¹³⁸ Stone, ‘The District Map’, 106.

¹³⁹ Gann, *The Birth of a Plural Society*, 103.

¹⁴⁰ Gewald, ‘People, Mines and Cars.’

touring in the 1930s was attributed to staff shortages and a new minimum of 180 days per year. in each district was laid down.¹⁴¹ In 1948 in Mongu-Lealui, the total man-days touring was 191 (calculated at seventeen per cent of administrative work).¹⁴² This was considered insufficient, and again a reflection of the “ever-growing bulk of paper work... which have chained [the officers] to the office chair”.¹⁴³ Over the following years, touring in Mongu generally increased, reaching a maximum of 428 days in 1954, the year Ian Mackinson produced his map.¹⁴⁴

A first question about the intersection between the map and these district administrative duties is that of navigation. How would one set out to tour a district, from arrival, with the barest bones of a map to guide you? Non-cartographic solutions seem to have been easier and more common. A significant number of pages in the District Notebooks from the early years of colonial rule demonstrate the rutter-style jottings that assisted an officer in orienting himself in a new region. Several of these ‘tour guides’ to Barotseland are inscribed in the District Notebook for Mongu.¹⁴⁵ Most of these were created between 1924 and 1926. Some document journeys by land, others journeys along the Zambezi. Those for land journeys consist of lists of villages, with the distances between them as measured by cyclometer.¹⁴⁶ The journeys by barge are measured not in distance but in hours and minutes between points on the riverbank, or sometimes otherwise. “From Sesheke to Katombola is one sleep”.¹⁴⁷ Descriptions of both land and sea journeys give hints to the reader as to how to manage their trip:

Loading up etc. takes a long time, up to 2 hours in the morning. One does best to turn out in time to push off at sunrise. Times vary according to state of the river, the barge, the quality of the crew and the wind.¹⁴⁸

¹⁴¹ ‘Annual Report Native Affairs Department of Northern Rhodesia’, 1938, 225v, CO799/17, NA UK.

¹⁴² ‘Annual Report Department of African Affairs, Northern Rhodesia’, 1948, 67, CO799/26, NA UK.

¹⁴³ Ibid.

¹⁴⁴ ‘Annual Report, Department of African Affairs, Northern Rhodesia’, 1954, 121, CO799/33, NA UK.

¹⁴⁵ ‘District Notebook- Mongu District Vol. 1’, NAZ digitised collection.

¹⁴⁶ Or pedometer perhaps. Stone, ‘The District Map’, 110.

¹⁴⁷ Mongu to Sesheke, Barge and 15 Paddlers, ‘District Notebook- Mongu District Vol. 1.’

¹⁴⁸ Katombora to Mongu, February/March 1924 (flood up), Ibid.

Easy crossing in dry season wide flats on each side of the river.
Flat from Machili to Ngwezi- muddy when wet and lumpy and
bad for cycling or walking when wet.¹⁴⁹

Clearly, however, even these notes *and* a sketched District Map would be insufficient material for an arriving District Officer to have been able to locate all the villages under his jurisdiction and navigate between them.

The District Notebook also offers further insight into how the gap in documentary information was overcome. The key, of course, was to take advice from those who knew the terrain:

Usually one stops for a meal for the paddlers and self after 4-5
hours after that one goes until nearly time to camp and the
Induna advises as to a camping place.¹⁵⁰

In the case of the journey from Katombora to Mongu in March 1924, it was an Induna (local chief) who was giving the anonymous author advice about where to set up camp. More often, however, officers would be guided by the stalwart body of British colonial administration in Africa: the district messenger.¹⁵¹ This was true for the surveyor, C. J. Hazard in 1913, who recorded in his diary that

I asked a messenger at lunch time what time we ought to arrive
at Mkongwe's, our camping place tonight. From the way he
pointed, I judged he thought about 5 o' clock.¹⁵²

District officers were still heavily dependent on the local indigenous colonial agents in 1953. Ian Mackinson testifies that messengers played "an indispensable role in the planning and execution of every tour".¹⁵³ The extent of that dependence is given perhaps more vividly by another telling extract from his autobiography describing life on tour. Mackinson's entourage consisted of up to fifty people, including thirty or so carriers, all of whom were crossing the district on foot.

I suppose, naturally, for the newcomer to this mode of travel,
the obsessive question is always, "How far to the next village or

¹⁴⁹ Sesheke to Livingstone overland, P.E, Hall 1925, Ibid.

¹⁵⁰ Katombora to Mongu, February/March 1924 (flood up), Ibid.

¹⁵¹ Philip Atsu Afeadie, 'Spoken Reminiscences of Political Agents in Northern Nigeria I', *History in Africa* 34, no. 1 (2007): 1-30.

¹⁵² C. J. Hazard, 'Recollections of North-Western Rhodesia in the Early 1900's (Part I)' 3, no. 6 (1954): 526.

¹⁵³ Mackinson, *Footprints in the Dust*, 99.

camp for the night?” As I recall the reply was generally *fa kaufi* but often *kwa hule*. There seemed to the uninitiated and linguistic beginner no intermediate between near or far, although occasionally there would be, “a little bit near or a little bit far”. What we failed to comprehend was that *fa kaufi* and *kwa hule* were terms not describing distance or time *per se* but also the difficulties we would encounter in reaching our destination.¹⁵⁴

These accounts give a remarkably intense idea of what it was like for colonial staff to gradually become familiar with such a vast region of jurisdiction. Both Hazard’s and Mackinson’s testimonies communicate their situated uncertainty as they set out on tour. Each officer was ignorant of both their location within the landscape, and also how long it would take to reach their destination.

The practice of regularly circulating district officers between postings within the colony must have made geographical unfamiliarity an almost permanent condition.¹⁵⁵ Kirk-Greene has drawn our attention to the importance of the district notebook in preserving institutional memory within a culture of regular re-posting.¹⁵⁶ Maps did feature (drawn directly or pasted) in the Northern Rhodesian district notebooks. The examples we saw in Chapter Three, however, illustrate the nature of this cartography: largely amateur sketchings. A District Officer’s district geography could only barely be shored up by the sheet maps. These, it seems, must have served more as a source of reassurance than information. Geographical knowledge was more properly constituted anew every time an agent arrived in the district office. When ‘on tour’, the officers at Mongu were thoroughly immersed in the field, and navigating in an entirely un-modern way. Retrospective notes prompted, rather than described.

Circulating referees

This particular form of governance was highly dependent on existing African systems (even before the formal adoption of Indirect Rule in 1927), and borrowed strongly from African use of the landscape. As one district officer posted to Balovale explained it; people used the paths through the grass and forest made by elephants because people, and elephants, were interested in the same things: food and water, shelter.¹⁵⁷

¹⁵⁴ Ibid., 105.

¹⁵⁵ Kirk-Greene, *Symbol of Authority*, 96.

¹⁵⁶ Ibid., 104.

¹⁵⁷ Conversation with John Hudson, former District Officer. August 27 2013, Lusaka, Zambia.

The diary of Kenneth Bradley, District Officer in Eastern Province in the late 1930s offered a similar opinion:

[Elephants] had walked along our path for a mile or so during the night on their way to a neighbouring water-hole. Or rather we walked along their path, because, as all the world knows, the instinct of elephant for finding the easiest gradient is equal to the skill of any engineer.¹⁵⁸

What neither officer states directly, although it can be inferred, is that the colonial administrators did not travel ‘as the crow flies’ through unpopulated areas, or thicket. Rather, they too followed existing paths and routes through the environment. This was not always a choice but sometimes a necessity. Kenneth Bradley described an attempt at orientation in the Luangwa Valley. It was impossible to leave the path without a “posse of men with axes”, who could clear away “the vegetation of the valley... everywhere in a tangled mat six to ten feet high”.¹⁵⁹ As Karl Offen has described, colonial knowledge was not only shaped by the knowledge of local informants, but also by the colonial reproduction of their embodied social occupation of the terrain.¹⁶⁰

These descriptions rendered by colonial officers of their guided movement in fairly remote and sparsely populated areas offer up most strongly the tension between the District Map (or any map) and the reality of the colonial terrain, which was, at once, uncharted, yet with a vital social geography. That social geography was inscribed in forms of record that were more apt to the experience of district administration; the routes of tours as lists, the counting of heads into registers. It was, as Ian Mackinson himself points out, “a people-orientated pattern of administration, unique to the British Colonial Empire”.¹⁶¹

Managing the internal geography of the district was not performed through a modern, spatialised version of rule—one in which contiguous boundaries of discrete spaces marked out ‘homogeneous’ areas of jurisdiction.¹⁶² The geography of district

¹⁵⁸ Bradley, *The Diary of a District Officer*, 60.

¹⁵⁹ *Ibid.*, 49.

¹⁶⁰ Karl H. Offen, ‘Creating Mosquitia: Mapping Amerindian Spatial Practices in Eastern Central America, 1629–1779’, *Journal of Historical Geography* 33, no. 2 (2007): 254–82.

¹⁶¹ Mackinson, *Footprints in the Dust*, 105.

¹⁶² Elden, *The Birth of Territory*; Branch, *The Cartographic State*.

administration shares almost nothing with the received definition of a 'state-space'.¹⁶³ We should be wary of the extent to which the colony was conceived of 'geometrically' at this local level, the colonial quotidian corresponded much more closely to the *use* of the land, its pre-existing spatial order. This non-cartographic, mobile administrative technique ruptures the association between the centralisation of knowledge and the exertion of power that is implied in Latour's model of the 'immutable combinable mobile'. That model is embedded in a great deal of contemporary literature on the goals and processes of government; but is not valid in this case.¹⁶⁴

We need a different way, then, to understand the 'action' of rule in this case; lack of visibility did not mean isolation or lack of control. For example, although the journeys of these officers were not visible—they perhaps could not easily identify their location—it absolutely does not follow that they were lost. District messengers maintained contact with the office base. Their constant motion delivered instruction, news and advice. Eighty-four such members of staff criss-crossed Mongu-Lealui District in 1955.¹⁶⁵

The circuits in the field were created predominantly, then, by the constant motion of bureaucrats and not by bureaucratic documents. Rule was carried by the physical presence of political agents and effected through constant motion across the territory. This embodied network of communication and control therefore performed a function that cartography has been seen to have *replaced*: the peripatetic monarchies of a pre-territorial Europe.¹⁶⁶ It also bears a much closer resemblance to how African political spatiality has been defined.¹⁶⁷ The district was internally constructed not from circulating references, but through circulating referees.¹⁶⁸

The process strays from Richards' definition of state nomadology as a form of itinerant surveillance.¹⁶⁹ The district officer might then be better seen as an anti-archive than an archive. Although we have seen that some were making informal and formal attempts to generate knowledge of the domains of their jurisdiction, this was not prioritised by

¹⁶³ Brenner et al., *State/Space*.

¹⁶⁴ Latour, *Science in Action*, 223; Sellers-García, *Distance and Documents at the Spanish Empire's Periphery*.

¹⁶⁵ 'Annual Report, Department of African Affairs, Northern Rhodesia', 1955, 113, CO799/35, NA UK.

¹⁶⁶ Biggs, 'Putting the State on the Map.'

¹⁶⁷ Herbst, *States and Power in Africa*.

¹⁶⁸ Latour, 'Circulating Reference.'

¹⁶⁹ Richards, *The Imperial Archive*, 23.

their superiors or the system within which they functioned. Their role was more performative, they were at least as much emissaries as nodes for information collection. At the same time that they counted and listed, they distributed salaries, pronounced decisions, and mediated. They were the eyes and ears of imperial authority, but also its arms and mouths. The District Map did not serve to bear witness to a delimited space of political jurisdiction; it was built from routes, and formed a local graphical register for those journeys.

The question arises as to how deliberate or conscious this substitution might have been. Was touring ever explicitly described as a substitute for cartography? I suspect not. I would argue that this practice scaffolded the colonial cartographic economy. However, it seems more likely to have been a make-do method, one that offered many advantages and simply reduced the need for graphic records. Whilst this position is read, and inferred (as I warned) from fragments of documents, I would argue that it provides a convincing explanation as to why (and how) colonial government might be prepared to invest so little in the visualization of its territory.

Conclusion

In this chapter we have considered the local district office as a form of peripheral cartographic archive. Examining the contents of that archive exposes particular genres of cartography (above all the 'District Map'). In considering how the maps were collected and stored I have shown how colonial cartographic cultures clashed with colonial realities. The ink and paper 'matter' of maps, taken for granted in Britain, were harder to obtain, organise and manage in Northern Rhodesia. As a result the 'sunprint' dominated governmental cartography in Northern Rhodesia; and was seen as a poor cousin to metropolitan publications.

Interrogating the value afforded to maps by different parties reveals mismatches between local (district) and colonial interests and imaginaries for cartography. Indeed, in order to build up a cartographic representation of Mongu it was necessary to side step the Survey Department, as the history of Ian Mackinson's map has demonstrated. The history of this map, in particular, demonstrates an attitude of general ambivalence to geographical knowledge held by the Northern Rhodesian government, an attitude that has been considered typical of colonial governments in British Africa.

The lack of a strong vertical hierarchy for the collection and distribution of geographical data means that alternative circuits become more visible in the history of Mongu's cartographic holdings. We can see how other agencies served to try and pull

and push geographic data through rural locations in the colony, and the strategies that led to their success or failure.

Finally, through sustained attention to what might be considered minutiae—the location of the maps in the office, the paper they were printed on, their annotations—we have been able to contextualise their use within the quotidian practices of district administration. This leads to a more surprising conclusion. The scarcity of maps in the office was not, perhaps, only as a result of the lack of material means to generate cartography. It was also the result of colonial preference for administrative activities that *replaced* the need for hierarchical reporting with a system of governance based on a strong presence in the field. A circulation of bureaucrats eliminated the need for the circulation of bureaucratic documents. The ethics of paperwork was framed by a larger one of colonial intervention.

**5 / The 'indirect map': knowing versus
enacting colonial territory**

Introduction

The previous chapter concluded that the local cartographic archive in Mong-Lealui evidenced different relationships between cartography and colonial administration than we might expect. Cartography is often seen as the paradigmatic technology of a high-modernism; an attitude James Scott defines as “self-confidence about scientific and technical progress, the expansion of production, the growing satisfaction of human needs, the mastery of nature... and above all, the rational design of social order commensurate with the scientific understanding of natural laws”.¹ Yet this thesis has demonstrated that the strategies of colonial rule in Northern Rhodesia differed from those we attribute to a ‘modern’ state in a number of ways. This chapter pursues that question in more detail by analysing how the Northern Rhodesian state monitored changes in land-use over time. By allowing for a looser relationship between the colonial map and modernity, we can begin to see other, more convincing intersections between colonial epistemologies, law, and spatial order.

Within the ‘high-modern’ model of government, the map is seen to serve as a framework for a centralised set of state definitions.² However, for an authority to sustain the capacity to ‘act at a distance’ it needs to maintain control over the relationship of those definitions, and over *change* in the territory. This ‘control’ could be achieved by producing updated maps synchronous to the rate of change in the field. Alternatively, the territory could be policed in such a way that the characteristics depicted on the map were reproduced. Or, as would be more common, the authority might operate a combination of the above.

There are (at least) two characteristics of colonial rule in Northern Rhodesia that affect this model. The first is that under colonialism the vast majority of the people within the territory were not citizens but subjects. That is to say, the state has augmented possibilities to intervene, unfettered, in their behaviours. Increased capacity for state-coercion is often framed as the capacity to more easily enforce ‘rationally’ conceived spatial orders. However, I will demonstrate that such increased capacity might equally offer the opportunity to fully sidestep the need for rational justifications.³ The second characteristic I will consider is the political mode of

¹ Scott, *Seeing Like State*, 4.

² Demeritt, ‘Scientific Forest Conservation and the Statistical Picturing of Nature’s Limits in the Progressive-Era United States’; Whitehead, Jones, and Jones, *The Nature of the State*.

³ On ‘authoritarian high-modernism; see Scott, *Seeing Like State*.

‘indirect rule’. Under indirect rule, the colonial government abdicated the direct policing of peoples in favour of an authority mediated through African political hierarchies. Where colonial power over people and resources was negotiated in situ rather than centrally, through paternalistic rather than democratic principles and was contingent rather than ordered, what was the role of mapping and territorial visualisation?

The chapter treats the question of knowledge, land-use, change, and policing in two separate parts. Part one examines the question at a macro-level by considering the intersection of the interests of private enterprise, state regulators and customary authority in areas of teak woodland in the south west of the colony. I will demonstrate that the contestation of the forests by these competing influences determined how and when those forests were mapped. Part two analyses the quotidian practices of marking out and maintaining the reference points of Northern Rhodesian cartography in the field.

These case studies will bring us to two conclusions. The first of these is perhaps unsurprising: incompleteness in cartographic visualisation was sometimes expedient for the Northern Rhodesian government in the realisation of particular goals. The second is less intuitive: the maintenance of the system of reference between map and field by the colonial government was scaffolded by the colonised themselves. The colonial presence in Northern Rhodesia effected large-scale social and environmental change that the colonial authorities themselves struggled to manage. The inability of colonial authorities to produce and organise cartographic records of that change was countered by enrolling the greater stability offered by indigenous situated power, and indigenous situated knowledge. Through this enrolment colonial territory was *enacted* rather than *known*.

Within scholarship on governance there is generally consensus about the role of the map in the process of organising and policing land use: the production of a framework for a centralised spatial order. Amongst English-speaking scholars this position has gained in popularity in recent years with translations of the writings of both Michel Foucault and Henri Lefebvre from the 1970s.⁴ Whilst the positions of Foucault and Lefebvre were not identical, both authors emphasised the augmented role of

⁴ Foucault, *Security, Territory, Population: Lectures at the College de France, 1977-1978*; Lefebvre, *State, Space, World*.

governments in the late twentieth century in ‘ordering’ society through the control of the spaces of its activities. The Foucauldian term *gouvernementalité*—governmentality—grounds an expanding literature that addresses the rise of the expert, the spatialised network of communications and reporting, and the tension between centralised authority and individual freedom within liberal democracies.⁵ Building on Foucault’s lectures, cartography has been understood to be part of the framework for this form of political rule: to bound the domain of governmental action, to index its resources, and to monitor their circulation, and ultimately to demonstrate to citizens that it is managing national resources on their behalf.⁶ For Lefebvre, maps serve as to abstract and unify space, in ways that then allow its hierarchical subdivision (into either scientific or legal categories). Mapping is one of the mechanisms used by the state to maintain authority over those subdivisions in competition with the rhythm of the market.⁷ From both a Foucauldian and a Lefebvrian perspective, the state’s ‘map’ is characterised as offering a stable framework for activity, flow and change.

This perspective is echoed in literature that addresses the production of state mapping.⁸ In fact, here we see even more clearly how the scientific framework of the state map is taken to be stable, in relation to the changing data that emerge with the evolution of conditions on the ground and the state’s legal apparatus. The historian of cartography Mark Monmonier thus describes the revision of individual sheets of the topographic map of the United States as “the selected replacement of ageing cells”.⁹ James Scott, in describing the cadastral map uses the more elaborate metaphor of

A still photograph of the current in a river...the current is always flowing... Changes are taking place on field boundaries; land is being subdivided or consolidated by inheritance or purchase; new canals, roads and railways are being cut; land use is changing; and so forth. Inasmuch as these particular changes directly affect tax assessments, there are provisions for

⁵ Andrew Barry, Thomas Osborne, and Nikolas S Rose, eds., *Foucault and Political Reason: Liberalism, Neo-Liberalism and Rationalities of Government* (Chicago, IL: University of Chicago Press, 1996).

⁶ Braun, ‘Producing Vertical Territory’; Hannah, *Governmentality and the Mastery of Territory in Nineteenth-Century America*; Demeritt, ‘Scientific Forest Conservation and the Statistical Picturing of Nature’s Limits in the Progressive-Era United States’; Elden, ‘Governmentality, Calculation, Territory.’

⁷ Henri Lefebvre, *The Production of Space* (Oxford, UK: Blackwell, 1991), 357–92.

⁸ Jonathan Murdoch and Nkil Ward, ‘Governmentality and Territoriality: The Statistical Manufacture of Britain’s “National Farm”’, *Political Geography* 16, no. 4 (1997): 307–24; Scott, *Seeing Like State*; Whitehead, Jones, and Jones, *The Nature of the State*.

⁹ Monmonier, *Technological Transition in Cartography*, 84.

recording them on the map or in a title register. The accumulation of annotations and marginalia at some point render the map illegible, whereupon a more up-to-date but still static map must be drawn and the process repeated.¹⁰

Throughout the thesis I have taken cautious note of the use of the imperative in the description of cartographic systems. This chapter is no different. In the citations above cartographic processes are naturalised through the use of metaphor: the “current is always flowing... the map must be drawn”; or the portrayal of the map system as organism. Those metaphors are indicative of the belief that once the difficult work of setting up a body of linked maps and references is finished; the resulting system will be self-evidentially valuable and sustained by state institutions. In using these metaphors the authors disguise the fact that a political authority must decide, over and over again, that the system is worth maintaining. Cloaking that recurrent decision within imperatives, serves to support a particular organisation of language around cartography: the association of mapping authority with *stability*, and the association of the mapped environment with *instability*.

Even colonial governments are associated with stable cartographic frameworks, despite the fact that they are often producing large-scale change. Monmonier and Scott (above) are describing the role of maps in established governments, but the conceptual principles of governmentality tend to be extended to colonial situations, which can lead to confusing paradoxes. Where colonial cartography is portrayed as a tool to produce the forcible enactment of new patterns of land rights over existing territory and populations (and, therefore, a great deal of upheaval), it ought then to be seen as the record of a new, fragile, and contested spatial order. Nonetheless, these colonial orders are conceptually associated with stasis, and the ‘errant’ colonised landscapes with chaos and change.

These conceptual associations in the narrative of colonial governance are born from a specific basis—modernity as *telos*. Although the relationship between governmentality as a political reasoning and colonial rule has long been demonstrated to be complicated, recent studies still seem often to use governmentality as shorthand for the use of calculative rationalities to achieve political control.¹¹ Thus Lindsay Braun’s investigation of cadastral mapping in late nineteenth- and early twentieth-century

¹⁰ Scott, *Seeing Like State*, 46.

¹¹ David Scott, ‘Colonial Governmentality’, *Social Text*, no. 43 (1995): 191–220; Peter Pels, ‘The Anthropology of Colonialism: Culture, History, and the Emergence of Western Governmentality’, *Annual Review of Anthropology* 26 (1997): 163–83.

South Africa, where, he explains, “the state’s aspiration to assay and control grew helically with its capacity to do so”.¹² Vimbai Kwashirai in his study of the forests in Southern Rhodesia assumes that the identification of a resource would be followed rapidly by mapping.¹³ Stephen Legg has asked what the context of colonial India can reveal about population and governmentality.¹⁴

The ‘stability’ of calculative reasoning remains unchallenged where authors focus on the epistemological and technical apparatus of governance. This is because focusing on the centralisation of knowledge (and particularly in our case the production of cartography), can disguise the role of knowledge-production within other mechanisms of exercising power. This can be observed in Raymond Craib’s recent history of mapping in Mexico during the nineteenth and early twentieth century.¹⁵ He recounts the attempts of various regimes to draw and redraw the map of the country: to ‘fix’ previously opaque, localised, communal distributions of resource rights that were otherwise ‘fugitive’. Although Craib describes the ‘fixing’ of Mexico as a fantasy of the state body that could not be met, the failure to impose cartographic systems is seen as a *technical* inability to perform “one of the most fundamental tasks of the modern state: to account for and regulate landed property and assume control over the space of the state”.¹⁶ Thus although various parties despair, abandon, or compromise their cartographic projects, Craib does not offer us insight into the other means through which they then sought to achieve control. Despite the ways in which Craib deconstructs the production of a *Cartographic Mexico*, we do not get to see the manoeuvring of *policy* to overcome those failures. All the manoeuvring is *technical*. As a consequence, Mexico is portrayed as a weak modern state, but the rise of ‘modernity’ in seeking power through knowledge is not challenged.

There are both empirical and theoretical reasons to dispute the dichotomy of stability-state versus instability-African environment in the case of Northern Rhodesia. Theoretically, this implicit re-siting of ‘order’ within the bureaucratic centre, and the ‘fugitive’ or ‘transitive’ within the world of the colonised, reproduces tropes whose

¹² Braun, ‘The Cadastre and the Colony’, 372.

¹³ Vimbai Kwashirai, *Green Colonialism in Zimbabwe, 1890-1980* (Amherst, NY: Cambria Press, 2009), 75.

¹⁴ Stephen Legg, ‘Foucault’s Population Geographies: Classifications, Biopolitics and Governmental Spaces’, *Population, Space and Place* 11, no. 3 (2005): 137–56.

¹⁵ Craib, *Cartographic Mexico*.

¹⁶ *Ibid.*, 2.

asymmetry has been subject to significant critique.¹⁷ Empirically, it is also false. We have already seen that the extent and detail of colonial cartography in Northern Rhodesia was influenced by fluctuating and decentralised forms of investment and enterprise (Chapter Two). Holistic knowledge of the colonial territory within a rationalised (therefore stable), framework was secondary to economic production; the enactment of a colonial economy. We have also seen the practical lack of a complete, or coherent basis to the colonial cartographic archive, and—in our examination of the circulation of maps—that government was carried out through ceaseless motion. This chapter examines yet another way that Northern Rhodesian cartography was determined by the decentralised nature of colonial power: the role of the map where political authority was exercised through the practice of indirect rule.

A recurrent theme in this thesis is that the manpower producing colonial spatial order was “a tiny and foreign minority” ruling “over an indigenous majority”.¹⁸ This imbalance of physical presence in the territory was resolved first informally, then formally, by directing colonial political power through African political hierarchies. From the 1920s, this tactic was expounded as a method: ‘Indirect Rule’.¹⁹ The term Indirect Rule does *not* encompass the system seen in previous chapters, where Africans were recruited as state-agent-employees (whether as messengers, clerks, or surveyors). What Indirect Rule *was*, however, is less clear. A great deal of scholarship has been dedicated to the description of its nature and its variations.

One simple and convincing model characterises the political relationships between colonialists and African authorities as that of patrons and clients.²⁰ This characterisation captures the social and political inequality inherent to indirect rule, but also indicates that political inequality was nonetheless framed within some form of mutual reliance and benefit. The relationship was usually enacted face-to-face, specifically excluding it from James Scott’s definition for modern administrators as being “at least one step—and often several steps removed from the society they are

¹⁷ Edward W Said, *Orientalism* (New York, NY: Pantheon Books, 1978); Mitchell, *Colonising Egypt*; Cooper and Stoler, ‘Between Metropole and Colony: Rethinking a Research Agenda.’

¹⁸ Mahmood Mamdani, *Citizen and Subject: Decentralized Despotism and the Legacy of Late Colonialism* (Oxford, UK: Oxford University Press, 1997), 16.

¹⁹ F. D Lugard, *Representative Forms of Government and ‘Indirect Rule’ in British Africa*, (Edinburgh and London, UK: W. Blackwood & Sons, Ltd., 1928).

²⁰ C. W. Newbury, ‘Patrons, Clients, and Empire: The Subordination of Indigenous Hierarchies in Asia and Africa’, *Journal of World History* 11, no. 2 (2000): 227–63.

charged with governing”.²¹ Indirect rule achieved its aims (to use Kirk-Greene’s terms) through “competence, collaborators, coercion and confidence”.²²

Other scholars have begun to investigate the intersections of power and knowledge under colonial rule in ways that do not reify the stability of the state framework. Arun Agrawal’s masterful study of forest management in India demonstrates that the relationships between knowledge, law, and power within the colonial state were not fixed.²³ In the early years of British rule, the colonial government expected to be able to enforce its land-use policies through the direct use of punishment and violence, but the scale of disobedience made this impossible. This led to an attempt to enact forest policy through self-regulating local forest councils. Agrawal’s conclusion is that the tight study of calculation alone (within which he includes the mapping and accounting of land) is not sufficient to understand colonial governance. Instead we need to consider the role of knowledge within wider sets of colonial political techniques. The inability of the colonial government to enforce “the grand project of central control”, led to the “surer means of intimate regulation”.²⁴ This was “more comprehensive but less costly, more modulated but less visible, more autonomous but more continuous”.²⁵

We will see several aspects of Agrawal’s study have resonance with particular situations in Northern Rhodesia, however there are also significant differences. Agrawal chooses to describe the implementation of decentralised forest management as a ‘governmental’ regime. He suggests that the new forms of forest regulation produce reciprocal or mutual policing by the forest-dwellers, who thus behave following a form of ‘enlightened self-interest’ that has parallels with liberal democracy.²⁶ This characteristic of forest management under colonial rule in India does not transfer so well to the case of Northern Rhodesia, where, as we will see, colonial authority was achieved largely in collaboration with existing African political forms. ‘Interest’ in co-operation with colonial authorities was not distributed evenly through the African population.

²¹ Scott, *Seeing Like State*, 76. Cited in Hull, *Government of Paper*, 35.

²² Kirk-Greene, ‘The Thin White Line’, 38.

²³ Agrawal, *Environmentality*.

²⁴ *Ibid.*, 92.

²⁵ *Ibid.*, 93.

²⁶ *Ibid.*, 95.

Sara Berry's work in West Africa also offers insights into the complexities of balancing the colonial goals of social stability, economic production and rendering a territory 'visible', but in a political context that bears more resemblance to that in Northern Rhodesia. In her study, *Chiefs Know Their Boundaries* (2001), Berry explores the way in which the colonial organisation of African cash cropping in early twentieth-century West Africa was mediated through and alongside the definition of geographical limits to the domains of chiefly authority. Berry notes that this resulted in the channelling of colonial power through quite specific routes. As Mamdani observes, for ordinary Africans this did not necessarily result in an increased 'stake' in resource management. Rather it embedded the day-to-day violence of the colonial system in customary Native Authorities: "the administrative justice and the administrative coercion that were the sum and substance of his authority lay behind a regime of extra-economic coercion... a regime that breathed life into a whole range of compulsions".²⁷ Thus, although the system could be considered more of a client-patron relationship, the burden of co-operation was heavier further down the African political hierarchy.²⁸

It seems that we have drifted away from maps. This is not the case. These studies help us frame two challenges to the typical relationship posited between maps and colonial rule, stability and instability. The first of these is to ask more symmetrically, what changed during the process of producing a colonial territory? And what remained the same? As I showed in Chapters Three and Four, colonial territorial conquest did not necessarily result in the simultaneous reorganisation of political rights and land use—a brand new spatial order on a *terra nullius*. These might, and often did, happen disparately. Berry explains that the reason for enrolling indigenous authorities into colonial processes was precisely that they offered an apparent continuity with a pre-colonial system of land and resource rights. The benefits of obtaining this legitimacy and power were offset by an inherent instability at the heart of colonial (and then postcolonial) government, as the validity of the colonial spatial order was grounded in local social history rather than scientific 'rationality'. The ability of a map to serve as a blueprint for planning or a legal structure, was then tied to its implicit status as a historical record.²⁹

²⁷ Mamdani, *Citizen and Subject*, 22.

²⁸ Newbury, 'Patrons, Clients, and Empire.'

²⁹ Sara Berry, *Chiefs Know Their Boundaries: Essays on Property, Power, and the Past in Asante, 1896-1996* (Portsmouth, NH: Heinemann, 2001), 26.

The second challenge arises from a point on which both Berry and Agrawal agree, that the harnessing of indigenous authority represented an increase in colonial efficiency; but as a result we must conclude an efficient government is not necessarily a more modern one.³⁰ The two case studies below frame these challenges within the context of Northern Rhodesia, by asking (1) what maps ‘do’ within non-modern forms of governance and (2) how non-modern forms of governance affected the construction of the colonial map. In doing so, we break with the assumption that enacting colonial rule required knowing colonial territory.

Part 1: Lines of authority: mapping and action in the teak forests of Northern Rhodesia

Our first case study examines the mapping of the teak forests that grew in the far south west of Northern Rhodesia. Forests have long been the paradigmatic example of state mastery of the environment, and strongly associated with colonialist ambitions, particularly in India.³¹ Scientific forestry is shown to have been the crucible for techniques in monitoring and rationalising resources that were later extended to other phenomena, and which secured the role of the expert in modern government.³² Maps featured heavily in this process; they were used for planning the forest harvest at a detailed level, but also in the conceptualisation of the forests as finite national ‘resources’ to be managed.³³ Studies of scientific forestry tend to agree that statistical and graphical representation of forests eventually dominated arguments over forest resources, until even opponents of ‘rational management’ came to use maps and numbers to argue their case.³⁴ Here, we will observe some colonial parties attempting to use these quantitative techniques to frame political discussion of the Northern Rhodesian teak. However, to understand the eventual outcomes we have to accept that this discourse was, fundamentally, not sufficient to dislodge other perspectives.

The case of the Northern Rhodesian teak forests presents an amendment to the pattern that we observed in Chapter Two, whereby economic activity could be seen as

³⁰ Agrawal, *Environmentality*, 94.

³¹ Scott, *Seeing Like State*; Barton, ‘Empire Forestry and the Origins of Environmentalism’; Agrawal, *Environmentality*; Kwashirai, *Green Colonialism*.

³² Demeritt, ‘Scientific Forest Conservation and the Statistical Picturing of Nature’s Limits in the Progressive-Era United States’; J. M. Powell, “Dominion over Palm and Pine”: The British Empire Forestry Conferences, 1920–1947’, *Journal of Historical Geography* 33, no. 4 (2007): 852–77.

³³ Scott, *Seeing Like State*; Demeritt, ‘Scientific Forest Conservation and the Statistical Picturing of Nature’s Limits in the Progressive-Era United States.’

³⁴ Demeritt, ‘Scientific Forest Conservation and the Statistical Picturing of Nature’s Limits in the Progressive-Era United States’; Kwashirai, *Green Colonialism*.

an indicator for mapping. Vast areas of teak forest were exploited for financial profit, which would lead us to expect to see more detailed cartographic coverage. However no forest inventory for the colony was produced before independence in 1964 and the teak exploitation was only approximately visible to the Northern Rhodesian government.³⁵

Yet the teak industry was very important and created large-scale environmental and social change, from the very beginning of colonial rule. The financial value of Rhodesian Teak (or *mukusi* as it is known in Zambia) was recognised just before the First World War, when it became known that the timber was sufficiently strong and insect resistant to be substituted for steel in the production of railway sleepers.³⁶ Sleepers (and later also mining construction, parquet flooring, and furniture) made *mukusi* extraction a large-scale and profitable enterprise.³⁷ In 1927 (just before the main expansion of copper-mining) the colony's Governor described teak extraction as the territory's premier industry.³⁸ It was also supported by a substantial infrastructure. The industry developed under the aegis of a single company, Zambesi Sawmills (ZSM) that grew rapidly after securing contracts with railway owners across Southern Africa.³⁹ ZSM's first two sawmills were constructed at Livingstone, the town closest to the edge of the *mukusi* forests. From 1934, a third sawmill was in operation at Mulobezi, closer to the heart of the *mukusi* region.⁴⁰ These two sites were joined by a railway system that later connected them to other areas of dense *mukusi* growth. Logging activity reached its peak during the Second World War but the railway continued to expand until 1964, when its longest stretch totalled about 198 miles, at which point it was the longest privately owned railway in the world.⁴¹

³⁵ S. Poso, 'Alternatives for Controlling the Zambian Teak Forests', in *The Zambesi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 205.

³⁶ M. R. M. Chelu, 'Logging and Sawmilling Operations in the Zambian Teak Forests', in *The Zambesi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 342.

³⁷ Calvert, *Sitimela*, 12.

³⁸ From the early 1930s, copper mining replaced timber logging as the most important industry in the colony. *Ibid.*, 19.

³⁹ *Ibid.*, 12. The company was in fact formally dissolved and reformed during the colonial period, organized by a number of controlling interests, and supported by subsidiaries but (aside from a 'bush milling company' Barotseland Saw Mills Ltd. (1963-1967)) there was no *competing* firm at work in Northern Rhodesia.

⁴⁰ *Ibid.*, 20.

⁴¹ J. M. Mulolwa, 'Historical Background of Zambesi Saw Mills Ltd.', in *The Zambesi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 429.

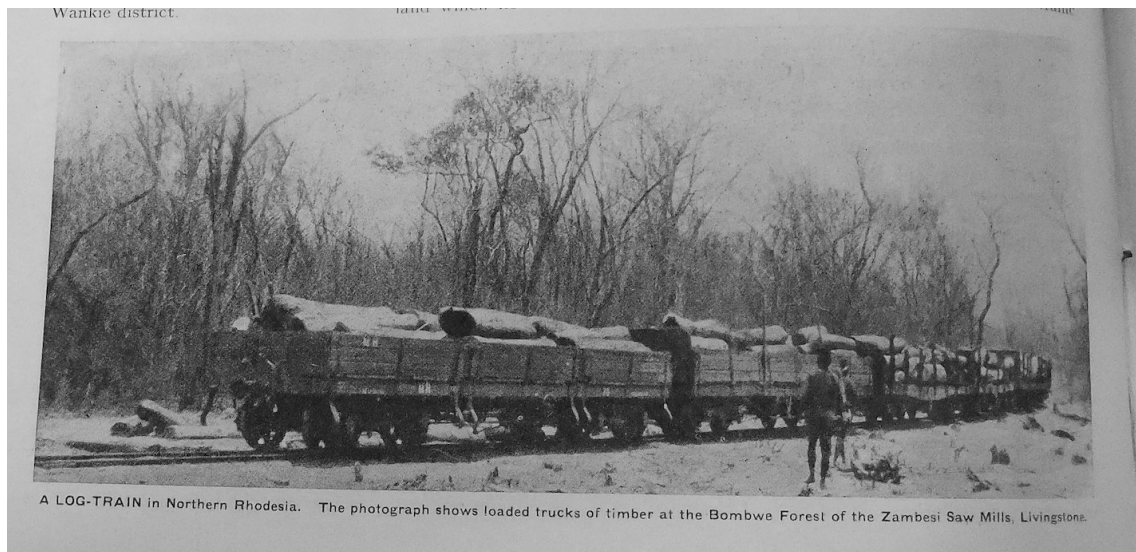


Figure 37: The ZSM rail-line in action in Bombwe Forest in the 1930s

From: Clarence Winchester and Cecil John Allen, *Railway Wonders of the World*. (London, UK: Amalgamated Press, 1935), 874.

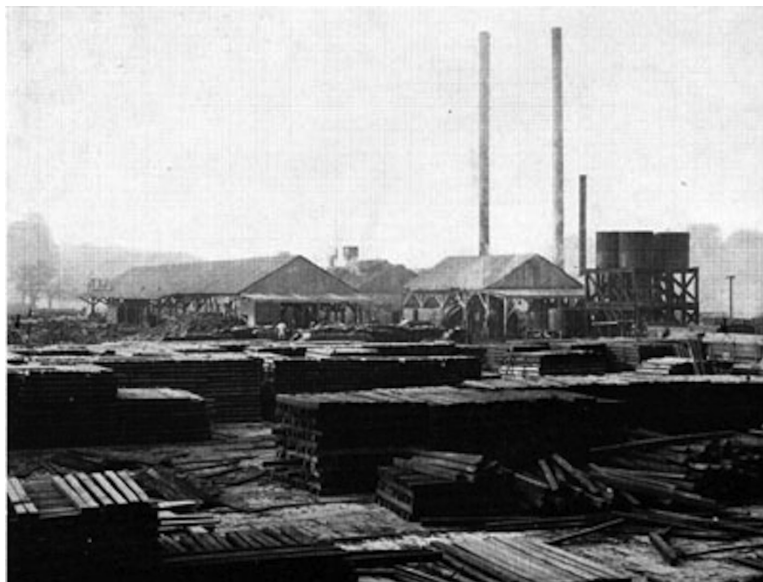


Figure 38: ZSM operations in the late 1950s

Source: Food and Agriculture Organisation of the United Nations, 1986, G. D. Piarc, *Unasylva* Vol. 28 (2), [http://www.fao.org/docrep/r7750e/r7750e05.htm#how to save the zambezi teak forests](http://www.fao.org/docrep/r7750e/r7750e05.htm#how%20to%20save%20the%20zambezi%20teak%20forests).
Reproduced with permission.

To understand why this was the case we need to look into the relationship between visibility and value for the Northern Rhodesian government, the timber extraction company, and the leaders of the African kingdom in which the majority of the forests lay. In particular we need to expand our perspective of colonial government to differentiate between the attitudes of the colonial technical staff and their superiors. We will see that the Governor and the Executive Committee prioritised profit and political expediency (in particular their relationship with customary authority) over 'rational' management of the forest. The acquisition of knowledge about the geography of teak was relegated in favour of these other competing ambitions.

Whose order? Divided authority in the field

The ecological habitat most suited to *mukusi* meant that the locations of its densest growth were largely located within the sphere of influence of the powerful Lozi kingdom. Figure 39 shows the location of *mukusi* growth as it was recorded in 1978. The tree is found across the Zambezi region in an ecological niche connected to the distribution of sandy Kalahari soils.⁴² Teak exploitation began near the line of rail in Livingstone, for practical reasons, but as those forests were progressively cut away from the line of rail, ZSM activity moved westwards towards the Lozi sphere of influence that we will describe using the colonial epithet—Barotseland.⁴³ Understanding the juridical status of the *mukusi* forests in Barotseland, requires a summary of the contingent form of ownership, exploitation rights, and property that emerged as a result of the BSAC negotiations in the 1890s, and formed the basis of colonial rule in Northern Rhodesia.

⁴² J. D. Huckabay, 'The Geography of the Zambezi Teak', in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 9.

⁴³ The name Barotseland, although a colonial transliteration is today taken up by those who wish to emphasise the persistence influence and authority of the kingdom within in contemporary Zambian life. Barotseland and 'Barotse' are used here as the terms employed by the colonial authorities, whose records form the major part of the source material for this chapter.

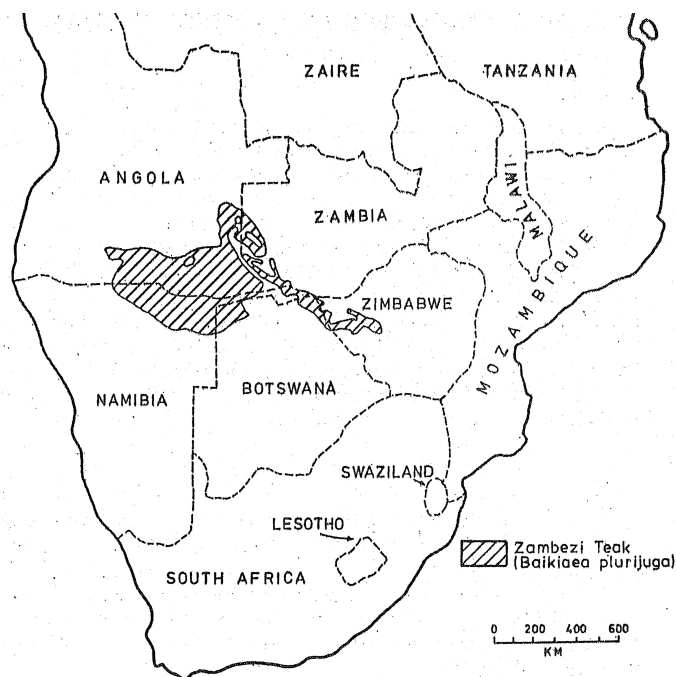


Figure 39: Distribution of Zambezi Teak in Southern Africa (adapted from Werger and Coetzee, 1978)

From: J. D. Huckabay, "The Geography of the Zambezi Teak," in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Dept. in cooperation with FINNIDA/VTT Tech, 1986). Reproduced with the kind permission of J.D. Huckabay.

Some of the earliest maps that depict the teak forest area are those drawn up to demonstrate the extent of a pre-colonial Barotse kingdom. They were produced in the early years of British influence, as first negotiators and then administrators were attempting to carve out their jurisdiction in the region. These negotiations began *after* the European diplomatic negotiations in Berlin in 1884-85, and somewhat unusually the geographical limits to British authority in the region were defined by watershed, or river. The colonial borders with Angola and South-West Africa were to be decided according to the extent of the kingdom of the King (or *Litunga*) of Barotseland.⁴⁴ These discussions resulted in a series of sketched lines on very small-scale maps, circulating between the 'field offices' and London. These show the stages of clarification and taking of positions between the 1880s and 1910s, including Figure 40.⁴⁵

⁴⁴ Zeller, 'Neither Arbitrary nor Artificial'; Gerald L Caplan, *The Elites of Barotseland, 1878-1969: A Political History of Zambia's Western Province* (Berkeley, CA: University of California Press, 1970).

⁴⁵ See: 'Sketch Map of the Barotse Empire, the territory granted to Henry Forbes Julian by the Paramount Chief and Ruler Lewanika, his petty Chiefs and Councillors'. 56 miles to an inch. Hand-drawn, 1888. FO925/431, NA UK; 'Map of the Barotse Kingdom to Accompany the Lewanika Concession showing area and places referred to, London, July 1900', 1:2,000,000. London, UK: Stanford's Geographical Establishment, manuscript annotation marking forest area to be reserved, 1901. MFQ1/645/1, NA UK; 'Map of the Barotse Kingdom prepared to illustrate the case presented on behalf of His Britannic Majesty's Government in the matter of the

Litunga Lewanika negotiated strong terms with the British. In the late nineteenth century, the Barotse kingdom was a major force in the region, based in the flood plains of the upper Zambezi, and built on a complex and varied agricultural system, in addition to pasturing cattle. It had political influence and networks of trade that extended much further beyond.⁴⁶ Lewanika's negotiations with the British were initially intended as the basis of a Barotse Protectorate that he, himself, would lead with British assistance to defend his kingdom against other forces in the region, including the Ndebele, the Boer, and the Portuguese. Lewanika was not operating from a naïve position. The *Litunga* had received Europeans for a number of years who had informed him and educated him in European politics.⁴⁷ The BSAC, keen to occupy the region, but observant of the need for it to be a 'fair' treaty, acceded to many of his demands.

The result of the negotiations was that Barotse authority legitimated British authority over an area covering approximately the space later called North-Western Rhodesia. Within this area, two 'types' of right emerged. In the larger part of the region the British eventually gained the right to create private property and lease concessions autonomously from Barotse supervision. However control in the area where the *Litunga* had more direct influence (Barotseland), the Barotse retained final authority over land rights. No European could lease, buy, or (in earlier colonial years) travel through Barotseland without Barotse consent.⁴⁸

Although neither the location nor the financial value of the teak forests were known to the colonisers at the time, a large portion of the teak forests were included in the land negotiated by the Barotse. Rights to one area of *mukusi* growth in particular (a set of woodlands which came later to be known as 'Yeta's Forests' or the Machili Forests) were specifically demanded by Lewanika in his negotiations.⁴⁹ These were outside the bounds of 'Barotseland' but were requested for the *Litunga's* special use. It seems that this was an extension (or clarification) of patterns of rights that already existed under Barotse law. Forest areas, and specific trees were reserved by the Barotse for a variety

Arbitration between Great Britain and Portugal, (IDWO 1782), 1:2,000,000. London, UK: Intelligence Department, War Office, 1903. MPG1/985/4, NA UK.

⁴⁶ Jack Hogan, "What Then Happened To Our Eden?": The Long History of Lozi Secessionism, 1890–2013', *Journal of Southern African Studies* 40, no. 5 (2014): 907–24.

⁴⁷ Caplan, *The Elites of Barotseland, 1878-1969*; Norman Magnus MacLeod and George Westbeeck, *Trade and Travel in Early Barotseland: The Diaries of George Westbeeck, 1885-1888, and Captain Norman MacLeod, 1875-1876*, ed. Edward C. Tabler (London, UK: Chatto & Windus, 1963).

⁴⁸ Gann, *A History of Northern Rhodesia*; Caplan, *The Elites of Barotseland, 1878-1969*.

⁴⁹ 'Colonial Office Confidential Print A659' (London, UK: HMSO, 1901), CO879/68/2, NA UK.

of purposes within their own economy—as food surety in years of bad harvest, as elephant reserves, and for trees that could serve as royal barges.⁵⁰ The map reporting Lewanika’s request to the Colonial Office uses bold pencil strokes to organise land rights (Figure 40). The boldness of the hand-drawn lines belie (and even disguise) the paucity of geographic knowledge that the British held of the region. The map was of more symbolic than scientific value, as revealed by later discussions over the extent of the forests and the Barotse claim: “It would be advisable”, wrote the Governor of Northern Rhodesia in 1932, “to regard this map as merely illustrative and not as a working plan on which to base surveys”.⁵¹ With neither knowledge of the forests, nor a great deal of interest in them, there was no reason to deny the *Litunga’s* request. However, the emergence of a monetary value to *mukusi* increased the importance of the forests as a bargaining chip in the development of relations between the Barotse and colonial regime.



Figure 40: The emerging definition of Barotseland, and Barotse rights in the region

Map of the Barotse Kingdom to Accompany the Lewanika Concession showing area and places referred to, London, July 1900, 1:2,000,000. London, UK: Stanford’s Geographical Establishment, manuscript annotation marking forest area to be reserved, 1901. MFQ1/645/1, NA UK. Reproduced under license from NA UK. Not reproduced at full size.

⁵⁰ P. W. Matakala, ‘Problems of Forest Extension Work in the Zambian Teak Forests’, in *The Zambesi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 416–27.

⁵¹ Governor of Northern Rhodesia to Colonial Office, ‘The History of the Machili Forests’, 4 January 1932, CO795/53/10, NA UK.

Over the subsequent decades of colonial rule, the teak forests achieved monetary value. The colonial spatial ‘ordering’ of the teak forests was in some sense achieved—by their large-scale exploitation—but was carried out in the field, rather than at a distance. The *mukusi* forests certainly could not be imagined by the colonial authorities (as Kwashirai describes of the teak in Southern Rhodesia) as a *terra nullius*, since the claims of customary authority were writ large in the terms of colonial occupation.⁵² As a result, the divided nature of authority in Barotseland—the constant tension between colonial and customary rule—determined at least in part, the ways in which the teak was imagined and accounted.

Accounting for teak: visibility and value

The first years of teak exploitation took place under the remit of the BSAC. Despite the relatively dismal state of its investment in Northern Rhodesia, the company was surprisingly disinterested in generating profit from timber.⁵³ The first areas of *mukusi* cut out by ZSM were found in areas near Livingstone, outside of Barotse territory. Here, the BSAC had free reign to determine the nature and level of the rates they would charge ZSM, but it seems they were content to get any profit that they could. Here, then, rather than calculating the ‘full’ value of the teak at their disposal, the BSAC asked for a rate per sleeper sold. The satisfaction of this rate required no geographical delimitation on the part of the BSAC, no knowledge of the density of quality of the woodlands. The annual total due from ZSM was in fact calculated by the company themselves, from their sales ledger (Table 5).

In 1924, when Northern Rhodesia was passed over from the supervision of the Chartered Company into that of the Colonial Office, the situation changed somewhat. The colonial government created a Forest Ordinance in 1925, and Northern Rhodesia’s forest official arrived in 1929.⁵⁴ It seems the decision to fund a forest expert was largely due to impulses from London (and more directly the result of the recommendation of the East Africa Commission), but seems to have been supported

⁵² Kwashirai, *Green Colonialism*, 71.

⁵³ This is contrast to the BSAC’s attitude towards timber in Southern Rhodesia, where Kwashirai writes, “The rapidity with which the BSAC surveyed forest resources was testament to their expected commercial value”. *Ibid.*, 75.

⁵⁴ ‘Ordinance No. 21: “The Forest Ordinance”’, Northern Rhodesia Government Gazette (Northern Rhodesia, 1925), CO670/3, NA UK; ‘Annual Report, Department of Agriculture, Northern Rhodesia’, 1929, CO799/5, NA UK.

within the Northern Rhodesian administration.⁵⁵ Under the new Forest Ordinance policy, on Crown land, royalties were charged as a percentage of profit (three per cent) from timber sales.⁵⁶

The new administration also took a different attitude towards the management of the Barotse forests than the BSAC. From 1918, ZSM had been attempting to negotiate the timber rights in the Machili Forest area that the *Litunga* had reserved in 1901. The Barotse had asked the BSAC to act as intermediaries, which they agreed to do for twenty-five per cent of the royalties accrued.⁵⁷ These negotiations were not finalised and were recommenced with the new governor on his arrival in 1924.⁵⁸ The new governor commented to the Colonial Office in London that, “it would be a good thing that a concession should be given to enable these forests to be used. The Chief would get some money out of the forests, and the timber would be put to useful purposes.”⁵⁹ So although the Governor was keen to point out to the *Litunga* that this new administration was not commercial, and that they would not operate a profit on the Barotse forests, he did agree to act as intermediary between the Barotse and ZSM in settling terms for a concession.

After the recommendations made by the East Africa Commission, and a tour by Bourne the forest expert in 1927, and the Northern Rhodesian government recruited their first Forestry Official in 1928.⁶⁰ On the arrival of this officer in the Northern Rhodesia there was little visual documentation to help him imagine his new domain, particularly in the south west of the colony. As we saw in Chapters Two and Three, the vast majority of the topography in the colony was drawn up in the process of demarcating private property or concessions of some kind. West of Livingstone, away from the rail line, there was very little private property, and in Barotseland (for the reasons given above) none at all. One would imagine the Survey Department would

⁵⁵ Great Britain and Colonial Office, ‘Report of the East Africa Commission’ (London, UK: H.M.S.O., 1925), 103, CAB/24/173/54, NA UK; ‘Colonial Office Minutes, 14th April, 1927: Afforestation Policy in Northern Rhodesia’, CO795/13/14, NA UK.

⁵⁶ ‘Ordinance No. 21: “The Forest Ordinance”.’

⁵⁷ Administrator’s Office, Northern Rhodesia to High Commissioner for South Africa, ‘The Agreement between the BSAC and Yeta III’, 25 February 1919, CO417/676, NA UK.

⁵⁸ Governor of Northern Rhodesia to Colonial Office, ‘Meeting with Yeta III’, 18 September 1924, CO795/3, NA UK.

⁵⁹ Ibid. On ‘utility’ see Richard Harry Drayton, *Nature’s Government: Science, Imperial Britain and the ‘Improvement’ of the World* (New Haven, New Jersey: Yale University Press, 2000).

⁶⁰ ‘Colonial Office Minutes, 14th April, 1927: Afforestation Policy in Northern Rhodesia’; ‘Annual Report, Department of Agriculture, Northern Rhodesia’, 1929.

have offered Stevenson the most recent and detailed maps of the region, but these were certainly not at a scale that allowed for the stocktaking of complex mixed woodland. Figure 41 shows the provisional 1:250,000 map, published in 1923, that showed the area where the Machili Forests were located (see Appendix for map scales). Without any documentation to assist him, the new Assistant Conservator of Forests, was obliged to spend his first year in office making a tour of the entire colony, to see the forested regions first-hand.⁶¹

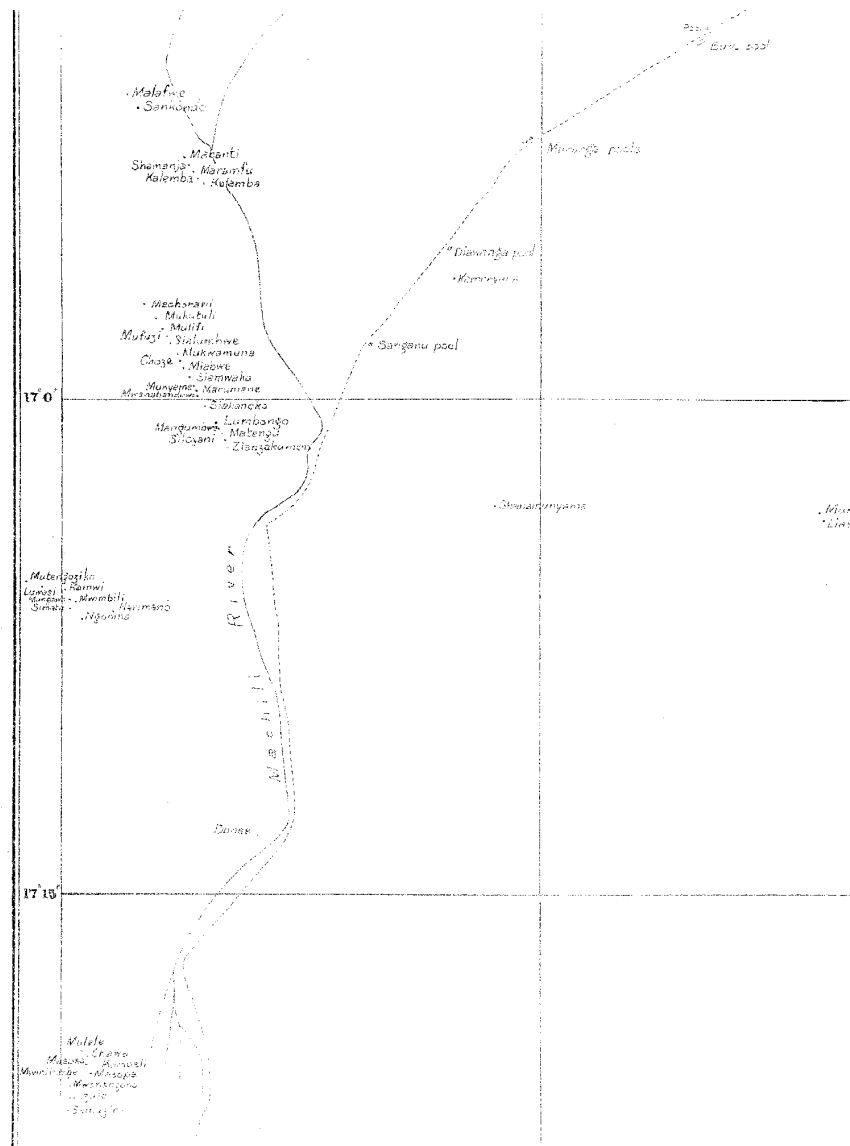


Figure 41: Section of NW25: Kalomo (1923) from the 1:250,000 Provisional Series.

When the first forestry officer Stevenson arrived in Northern Rhodesia, this was the most detailed published map of the region of the site of the Machili Forests. They do not feature on it.

Chief Surveyors' Department, Northern Rhodesia, 'NW25: Kalomo', Northern Rhodesia Provisional Series, 1:250,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1923. Held at RGS mr Zambia G.7. Not reproduced at full size.

⁶¹ 'Annual Report, Department of Agriculture, Northern Rhodesia', 1929.

The lack of knowledge held by the government up to this point contrasts strongly with what ZSM must have known about the forests. Two forms of mapping were essential to their business: detailed stock mapping of the forest and the mapping of transport routes back to the mill. Bringing timber to the sawmill was not an easy task. In the early years of ZSM activity, logs were barged down the Zambezi and drawn by ox, truck, and traction engine up wooden rails to the mill.⁶² The scale of the contract that ZSM signed with Rhodesia Railways in 1924 was such that it could not be fulfilled fast enough by these means. The provision of those sleepers required greater capital, and the creation of a rail line, in the forests, to carry the timber to the mill. The capital (part financial, part material) was provided by Rhodesia Railways themselves who became majority shareholders in ZSM.⁶³

In order to generate profit from these forests, ZSM had to balance the cost of extending the railroad in particular directions, against the density of *mukusi* in particular areas, and the anticipated profit from that yield. Woodland (calculated in cubic feet of wood), was weighed against the terrain over which the railroad would need to run (gradient, surface, river crossings, etc.) which, in turn, would determine the financial viability of particular options. Inevitably, therefore, ZSM sent experts into the forest to create the company's own private cartography. The historian Geof Calvert later praised the accuracy of the company in finding their route. Examining their choice of route for the railway across 'Bovu Vlei' he found that ZSM had succeeded in running the railway on its optimum alignment across almost 36 miles.⁶⁴

⁶² J. D. Huckabay, 'The Exploitation of Zambezi Teak in Zambia', in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 329–41.

⁶³ J. M. Mulolwa, 'Forestry in Zambia's Western Province', in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 431–35; Calvert, *Sitimela*.

⁶⁴ Geof M Calvert, 'The Zambesi Saw Mills Railway', *Rhodesiana*, no. 15 (1966): 15.



Figure 42: The ZSM railway line reconstructed

Geof Calvert's historical reconstruction of the ZSM rail network between 1911 and 1964.

From: G. M. Calvert, "The Zambesi Saw Mills Railway 1911-1964," in *The Zambesi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Dept. in cooperation with FINNIDA/VTT Tech, 1986), 478. Reproduced with the kind permission of G. Calvert.

A fourth map (Figure 42) shows the rail network built by ZSM for teak extraction between 1911 and 1964. The line was built in stages. The first stage ran parallel to the course of the Zambezi from Livingstone, out to the Mapanda Mill and the Malanda Forests. The line extended northwest as it was sent towards other forests with a high density of teak. By the 1940s, further extensions led south back towards the Zambezi (including the Masese Forests described earlier) and almost due north up to Kataba. In each case, as new lines were added, the railroad would be run to the outer limits of the forest and worked 'back' towards the mill. Lines would be cut out, perpendicular to the railroad, and the felled trees dragged back to the engine by cattle. In 1927, the railroad was being lifted up and re-laid at a rate of a quarter of a mile a day as it crept towards virgin forest. The railway, itself mobile and the facilitator of mobility, brought timber

to the mill at Livingstone and later to the mill at Mulobezi, both of which were often operational for twenty-four hours a day.⁶⁵

Yet although there was a great deal of activity in (and mapping of), the forests by ZSM, this was not visible to the government. It is difficult to both indicate the scale of the activity in the landscape, and simultaneously offer an impression of its cartographic ‘invisibility’. The map of the railway line in Figure 42 was constructed, *retrospectively* over some decades, by Geof Calvert, using evidence tucked away in ZSM records, in service staff memories, “archive” files, and “forgotten” map cabinets and from the traces of the railway that were discernable in the forests in the 1970s and 1980s.⁶⁶ In Calvert’s map we see stretches of railway that were never in operation *at the same time*. However, we also see rail lines that would have been seen by forest officers in-situ but were not consistently recorded in ways that made them visible to colonial officials away from the field. In order to understand why this would be the case we need to consider the role of the forests within other larger political and economic negotiations. It was not that the colonial government was completely indifferent to the forests, their future or the potential income from taxation, but it was not always their first priority. The forests were embedded in negotiations over profit, communications, and political sovereignty.

Accounting for teak

The colonial government formally became intermediaries between ZSM and the Barotse *Litunga* in 1926. This stemmed from the 1924 discussions, and was at least in part a conciliatory gesture. The *Litunga* felt that the spirit of his contracts with the BSAC from the 1890s onwards had consistently been infringed, and he was demanding that various aspects of his sovereignty be restored. Simultaneously the colonial government were pushing for the Barotse to abandon the tradition of tribute labour, and trying to find means of compensation for the subsequent loss of manpower.⁶⁷ The concession agreement for Yeta’s Forests that was finalised in 1926, took a completely different attitude to royalties, and the concession was awarded for a fixed sum of £750

⁶⁵ P. W. Matakala, “Problems of Forest Extension Work in the Zambian Teak Forests,” in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Dept. in cooperation with FINNIDA/VTT Tech, 1986), 416–27.

⁶⁶ Calvert, ‘The Zambesi Saw Mills Railway’; Calvert, *Sitimela*.

⁶⁷ Caplan, *The Elites of Barotseland, 1878-1969*, 133; Governor of Northern Rhodesia to Colonial Office, ‘Meeting with Yeta III’; Governor of Northern Rhodesia to Colonial Office, ‘The History of the Machili Forests.’

per year to be paid to the *Litunga*.⁶⁸ The concession was assigned based on the 'natural' bounds of the forests as the limits for the activity of the Sawmills: "Machili Area shall mean and include the Forests known as Lonze Situmpa, including Fundulibona and Luangula including Naluala Forests (hereinafter collectively known as 'Yeta's Forests')." ⁶⁹

This concession was agreed on terms that were highly unfavourable to those who owned the rights to the forest, the Barotse (Table 5).⁷⁰ Like the BSAC administration before, Crown colonial officials were deciding the royalties for teak exploitation without knowledge of the full extent of the concessions they were granting, or the density of the *mukusi* in these areas. The government's view of the forests was certainly not founded on any particular 'spatial order' or rationalised territorial resources, so it could be attributed to naivety. However, given the wider importance of imperial forestry this seems unlikely.⁷¹ Although the Governor emphasised, that the Colonial Office administration were not commercial players, and would not be making a profit from the forests, the Northern Rhodesian authorities had other motives to make such a gift of the teak to ZSM.⁷² At this time the Northern Rhodesian government were expressing paternalistic anxieties about the ability of the Barotse to manage large funds (a £750 annual sum much easier than a percentage or variable royalty).⁷³ They would certainly also have been anxious to see the expansion of ZSM, which was, in 1926, the only industrial establishment in the colony.⁷⁴

⁶⁸ 'Concession Agreement for the Machili Area: Zambesi Saw Mills' 6 October 1926, SEC1/952, NAZ.

⁶⁹ Ibid.

⁷⁰ Martin, 'The Baikiaea Forests of Northern Rhodesia.'

⁷¹ Agrawal, *Environmentality*, 46.

⁷² Minutes of the meeting between the Governor and the *Litunga* in 1924. Governor of Northern Rhodesia to Colonial Office, 'Meeting with Yeta III.'

⁷³ 'Ordinance No. 18: "The Barotse Trust Fund"', Northern Rhodesia Government Gazette (Northern Rhodesia, 1925), CO 670/3, NA UK.

⁷⁴ 'Annual Report of the Governor, Northern Rhodesia, 1926', CO799/2, NA UK.

Date	Location	Concession Rent	Charged as	Measurement derived from	Equivalent per cubic foot in the round	Duration of agreement
pre-1924	North Livingstone, Malanda, Katombora	-	Prepared timber (3d/sleeper)	Mill accounts	0.6d	-
1924 onwards	Malanda, Siburu	-	Net rate of sales (3%)	Mill accounts	0.57d	20 years
1926	Machili Forest	£750 p/a	Single fee	None	0.1d	10 years
1938	Sesheke (i)	-	Cut timber 0.42per hoppus foot	Logs at mill	approx. 0.3d	10 years
1947	Sesheke (ii)	-	Cut timber	Logs at mill	3d	10 years

Table 5: Forms of royalty on the Zambezi teak

The teak forests were licensed to the Zambezi Sawmills through a number of different agreements between the 1910s and 1950s. The means of calculating royalties due varied, but never required detailed geographical information, since measurements were never related to acreage. Instead the government calculated royalties using (i) a single annual fee; (ii) the timber sold (from the account books of the sawmills) or; (iii) the amount of timber extracted as measured at the mill. The information in the table is derived from a variety of sources:

“Annual Report, Lands Department of Northern Rhodesia,” 1924, CO799/1, NA UK; “Sesheke Agreement: Crown, Yeta III, Zambesi Saw Mills,” September 2, 1937, CO795/104/11, NA UK; C. Duff, “Report on the Management of the Teak Forests in Southern Barotseland” (Forestry Department, Northern Rhodesia, 1949), SEC1/975, NAZ; O. S. Mubita, “The History of the Management of the Teak Forest in Zambia,” in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Dept. in cooperation with FINNIDA/VTT Tech, 1986), 43–52.

After the arrival of a third forestry officer, J. D. Martin, to Northern Rhodesia in 1931, the teak forests had a dedicated official.⁷⁵ Martin immediately took issue with the wasteful way in which ZSM was operating, and attempted to get more stringent terms in the negotiation and renegotiation of the concessions that were granted to them.⁷⁶ As we will see, this met with only partial success. With Martin's arrival came attention to an aspect of timber working that had only cursorily been considered until now: the future and regeneration of the forests. The ZSM maps of the teak forests correspond well to the collection of interested, centralised geographical data under the 'high modernist' principles suggested by James Scott, with the aim of "standardisation, central control, and synoptic legibility to the centre".⁷⁷ However, the company's interest in the 'spatial ordering' of a given area was not that of a state's (which would be aiming to achieve the security of the resource over time). ZSM's interest endured only the length of time it took to cut the timber out. The company had detailed cartography of the forests it was harvesting, but no interest in further documentation once the timber was gone. The arrival of a dedicated officer, committed to the principles of forest science, regulation, and the possibility of 'ordering' the future of the forests, now seemed possible for the first time.

Martin's efforts to introduce rational principles and bureaucratic forward-planning to the management of the *mukusi* areas were not, however, supported by other parties involved. Over the following years internal and external experts consistently advised that this should be done, and this policy was gradually implemented across other areas of the colony.⁷⁸ Increasing the visibility of the teak forests would, however, have required dedicating more finances to mapping. Given the profit being generated from teak exploitation, these finances could have been found, but instead both the colonial government and the Barotse government favoured other priorities, two of which we will explore below.

⁷⁵ 'Annual Report, Department of Agriculture, Northern Rhodesia', 1931, CO799/9, NA UK.

⁷⁶ J.D. Martin to Acting Secretary for Agriculture, 'Zambesi Saw Mills- Concessionary Conditions', 15 October 1931, SEC1/952, NAZ; O. S. Mubita, 'The History of the Management of the Teak Forest in Zambia', in *The Zambezi Teak Forests: Proceedings of the First International Conference on the Teak Forests of Southern Africa*, ed. G. D. Pearce (Ndola, Zambia: Forest Department in cooperation with FINNIDA/VTT Tech, 1986), 43–52.

⁷⁷ Scott, *Seeing Like State*, 219.

⁷⁸ Bourne, *Aerial Survey in Relation to the Economic Development of New Countries*; Governor of Northern Rhodesia to Colonial Office, 'Enclosure: Report on Forestry in Northern Rhodesia by the Conservator of Forests, Nyasaland', 4 October 1935, CO795/74/4, NA UK.

Firstly, both the colonial and Barotse authorities were more anxious to garner the short-term benefits of the teak exploitation than to take a longer view. When, in 1934, ZSM applied to extend their concession out from the Machili area across a much larger area of Barotse territory (approximately another 600 square miles), Martin proposed that the signing of the new concession agreement should be delayed for a few months, so that he could begin a basic enumeration of the forests that would come under ZSM control. Martin's plan was to make a basic survey of the extent of the woodland, in order to gauge how much longer the resource could be exploited, and what ought be preserved for the forests to regenerate. This proposal was rejected by both the *Litunga* and the colonial government, for fear of a delay in royalty payments.⁷⁹ The Barotse position can be understood when considering the role of the ZSM activities in their annual income. In 1938, aside from timber royalties this income came from a subsidy by the colonial government (agreed in 1890), mineral rights from the BSAC, taxes, and fines. The timber royalties made up twelve and a half per cent of that total, and since ZSM were the primary employers in Barotseland they would also indirectly contribute a fairly large proportion of the Barotse tax revenue.⁸⁰

The preference of both the colonial and Barotse authorities for short-term income over long-term forest management, was exacerbated by the fact that ZSM were exploiting the teak forests under a monopoly. This monopoly had been unchallenged up until the 1930s, at which point their control over teak extraction gave them a great deal of leverage. The Concession agreement for the extended area was finally signed after three years of negotiation (the Sesheke Agreement) in 1937.⁸¹ Although Martin had succeeded fixing a new form of royalty (cut timber, rather than a low fixed rent which encouraged ZSM to greater efficiency in their production), it was still impossible to increase the royalty to a level that matched even that which was charged for the earliest ZSM concessions in the early years (see Table 5). By Martin's reckoning, the royalty rate on wood cut in the Livingstone Concession in the BSAC era in the 1910s was twice that received on the wood cut in the Sesheke Concession in the 1930s.⁸²

⁷⁹ Mubita, 'The History of the Management of the Teak Forest in Zambia', 47.

⁸⁰ Gluckman, *Economy of the Central Barotse Plain*, 114.

⁸¹ CO799/16 Annual Ag. 11

⁸² Martin, 'The Baikiaea Forests of Northern Rhodesia.'

Attempts to charge a higher rate for the Sesheke Contract were thwarted by ZSM who threatened to close down operations entirely.⁸³

The lack of colonial authority over land-use in Barotseland resulted in a concomitant absence of government or private investment in other economic activities or state infrastructure. Not only was ZSM the only significant employer in Barotseland, the ZSM railway had become the only real transport alternative to canoes on the Zambezi river. Thus the company controlled not only the only source of direct revenue in the region, but also the primary line of communication between Barotseland and the rest of the world.⁸⁴

The fact that the woodlands fell on a territory ruled through a divided authority had other further effects on the deployment of scientific, rational forestry methods. The first of these was financial. From the beginning of operations in the Machili Forests in 1931, the royalties for teak extraction were collected almost entirely on Barotse-held territory. This meant that the revenue to the *government* from timber fell dramatically. The royalties for timber across former North-Western Rhodesia were already split with the BSAC, and barely covered investment in forest mapping or regeneration.⁸⁵ From 1931, in this region, they dwindled rapidly to nothing, and all revenue entered Barotse funds. In 1935, the Forestry Department claimed the timber industry in Northern Rhodesia was larger than that of the rest of East Africa combined. Yet, they pointed out: “although there is a large internal and export trade, the minute department cannot pay its way and the conveniently situated forest resources of the Territory are being wasted at an alarming rate”.⁸⁶

The second problem lay in the ease of implementation of ‘rational’ policy. After the Sesheke Agreement was signed, the new method of collecting royalties produced a significantly larger income for the Barotse than the £750 rent that had been paid previously. However, the jurisdiction over the Barotse funds was still being contested and renegotiated.⁸⁷ For each project in the teak forests, the colonial forestry officers

⁸³ Hugh Macmillan, *An African Trading Empire: The Story of the Susman Brothers and Wulfsohn, 1901-2005* (London, UK: I.B.Tauris, 2005), 320.

⁸⁴ Ibid.

⁸⁵ ‘Annual Report, Lands Department of Northern Rhodesia’, 1925, 332–3, CO799/2, NA UK; Conservator of Forests, Nyasaland, ‘Report on Forestry in Northern Rhodesia’, 1935, 23, CO795/74/4, NA UK.

⁸⁶ ‘Annual Report, Department of Agriculture, Northern Rhodesia’, 1935, 9, CO799/14, NA UK.

⁸⁷ ‘Annual Report Native Affairs Department of Northern Rhodesia’, 1938.

were required to ratify their actions with two sets of authorities, and take part in a debate about the appropriate source of funding.

This can be seen, for example, when in 1937 Martin presented his plans to produce a basic map of the Barotse forest resources to the colonial Provincial Administration for Barotseland.⁸⁸ The approval of this colonial office was required to ratify the expenditure from Barotse funds.⁸⁹ The Barotse authorities themselves then had also to acquiesce. The necessity for passing expenses through two authorities had been a problem for some time. Already in 1931 the Northern Rhodesian Survey Department had suggested that the Barotse authorities should meet the cost of establishing boundaries of forest areas.⁹⁰ Although from 1940 the full total of the ZSM royalties was at the disposal of the Barotse, that total was still divided between different budgets.⁹¹ Through the 1940s and on into the 1950s the issue of trust (and lack of trust) between the Barotse and colonial authorities continued to dominate the discussions about the contribution of different parties in mapping and monitoring the forests, both at that time and in the future.⁹²

Given these restrictions on investment in scientific and 'rationalised' forest management, it is perhaps unsurprising that the most successful method for the forest department to regulate the forest was not through the production of maps, but rather by symbiosis with the existing Barotse political structure. Simultaneous to his campaigns for funds for mapping and visualisation of the forests, Martin was also developing parallel strategies with the Barotse authorities. As we saw earlier, in the late nineteenth and early twentieth centuries the *Litunga* Lewanika had already begun the process of reserving certain forests areas from farming and other kinds of use. Other colonial scientists in Northern Rhodesia have been attributed with great sympathy for the value of African environmental practices.⁹³ It seems fair to attribute a similar level of insight to the Northern Rhodesian Forestry Department.

⁸⁸ Martin, 'Summary of Work: Mankoya and Lealui Districts. Forestry Officer for Barotseland.'

⁸⁹ J. D. Martin, 'Forestry in Barotseland', in *District Commissioner's Conference* (Mongu, 1937).

⁹⁰ Director of Surveys and Lands to Chief Secretary, Northern Rhodesia, 'Forest Boundaries: Zambesi Sawmills', 4 August 1931, SEC1/952, NAZ.

⁹¹ Duff, 'Report on the Management of the Teak Forests in Southern Barotseland.'

⁹² *Ibid.*

⁹³ Henrietta L. Moore and Megan Vaughan, *Cutting Down Trees: Gender, Nutrition, and Agricultural Change in the Northern Province of Zambia, 1890-1990* (Portsmouth, NH: Heinemann, 1994); Tilley, *Africa as a Living Laboratory*.

From his appointment in 1931, Martin worked consistently to develop further legislation and infrastructure *within* the Barotse government to support both increased knowledge and preservation of the forests. This seems to have met with great success.⁹⁴ Using the traditional Barotse hierarchy, local headmen (*Indunas*) were recruited to monitor fire and illegal activity in specific forest areas.⁹⁵ This process that began informally was gradually made more concrete and, from 1936, took the form of a 'Native Forest Service', and new Barotse legislation, which included the creation of 110 forest reserves.⁹⁶ These eventually resulted in an elaborate system of full-time, part-time, and honorary positions.⁹⁷ Unlike the 'ordinary' African Forestry Officers, the Forest *Indunas* extended the work of the forest department, but reported to the Barotse *Litunga*.⁹⁸

As a result, the primary form of colonial 'accounting' of the *mukusi* was not bureaucratic. The accountability of the Barotse forest service to Barotse law and Barotse leadership differentiates it from the situation in Kumaon that Agrawal describes, where local Forest Councils reported back to the colonial state. The Barotse forest officers did not, it would seem, produce extensive reports, descriptions or analysis of their areas. The lines of authority over the forest did not carry information back up to the colonial offices. A bureaucratic 'visualisation' of the forests (that would require mapping, and remapping over time) was substituted by a network of people that would provide the desired *outcome*—the observation of and regulation of behaviour within certain zones of forest.

If we were writing the history of teak extraction from the perspective of the forestry department, we could describe an increasing number of staff and a correspondingly more vigorous attempt to predict and control the forests roughly following that model. Within the Northern Rhodesian government, the forest officers were certainly making the case for the colony to take a modern, state-like attitude towards the documentation and regulation of its resources. Yet their voice was not dominant. The

⁹⁴ Mubita, 'The History of the Management of the Teak Forest in Zambia.'

⁹⁵ Martin, 'Forestry in Barotseland.'

⁹⁶ Mubita, 'The History of the Management of the Teak Forest in Zambia'; Mulolwa, 'Forestry in Zambia's Western Province.'

⁹⁷ Matakala, 'Problems of Forest Extension Work in the Zambian Teak Forests.'

⁹⁸ There were also Africans trained as forest officers that formed part of the civil service, however these were largely deployed elsewhere in Northern Rhodesia. See Forestry Department annual reports from the mid-1930s onwards CO799 NA UK.

colonial government instead secured power and influence in the territory through its interactions with private enterprise and local rule.

If we return to David Demeritt's description of the role of statistics and cartography in enframing North American forestry, we see he suggests "the construction of nature as a territorially delimited quantity of resources went hand in hand with that of the state as the agency charged with conserving them".⁹⁹ In the case of the Barotse teak forests, the identity of 'the agency charged with conservation' was not clearly bounded. The reliance of colonial power on the territorial legitimacy offered by their initial negotiations with Barotse, led to a situation in which they could not easily exert influence over the teak as a resource. The colonial government did not treat the forests as a *terra nullius*. On the contrary, this situation closely matches that described by Berry in West Africa: the use of customary authority to justify colonial action left the state embroiled in ongoing contestation about the distribution of resources. Basing colonial territorial claims on the rights of the Barotse resulted in the forests being the site of complex negotiations. Having no rights to the teak, the colonial government had decreased responsibility.

Enacting colonial territory in the forests was not achieved through mapping. The envelopment of the Barotse *mukusi* forests into the global economy was prefaced by a strong 'enframing' of the value of the teak as a commodity, but not by the production of visual, statistical records of its extent. The possibility of scientific forestry was inhibited because the income from extraction was channelled to (1) private profit and (2) customary authorities. This allowed these other parties to 'frame' the resource. As a result, no territorial delimitation of the resources took place. The existing metaphors for the ways in which states map land use and describe change—a 'still photo of a stream', or the 'replacement of ageing cells'—start to look absurd in relation to our case. The basic framework was never established.

Whilst it was a weak 'modern' state, it was not a weak state. This history of the (non-) mapping of the teak forests could be written as a failure. It *is* possible to see the lack of cartography as a lack of efficiency by colonial authorities, a sluggish attempt at 'state fixation'. When looking at the teak forest through the eyes of the frustrated forestry department this point of view would seem valid. However, I dispute the notion that the Northern Rhodesian government's ignorance about its forest stocks made it a 'weak'

⁹⁹ Demeritt, 'Scientific Forest Conservation and the Statistical Picturing of Nature's Limits in the Progressive-Era United States', 444.

modern state. Without mapping of the forests the colonial government was still achieving some of its key aims—the transformation of the African population into a workforce, producing viable industry, generating taxation on imports and exports, and eventually achieving forest management—all whilst maintaining political stability and the legitimacy of colonial rule.

From the perspective in the field, (the viewpoint of local populations and the thousands of employees at the sawmill—the ‘waterless wilderness’ that succeeded logging activity), the non-bureaucratic, ‘collaborative’ colonial governance of the teak forests represented a radical, transformative regime. Certainly authority and knowledge were not produced by inscription, or gathered to the colonial centre, but colonial ambitions were still *enacted*. Although not using ‘modern’ techniques, it seems that overall the colonial authorities were achieving their aims. They took up strategies in which lines of authority passed through structures outside of a visualised spatial order.

This case study has revealed two key points that contribute to the broader argument of the thesis. Firstly, we see yet again, why attributing the lack of mapping in Northern Rhodesia to insufficient colonial resources fails to address the complexity of the situation. The colonial allocation of resources for mapping and knowing the territory was bound up in larger, more complex questions of investment and imagined futures: in this case the relationship between sovereignty and profit. Secondly, we have shown asymmetry in the way scholarship currently situates cartography within the language of continuity and change. This is borne out in many ways. For instance, colonial change in land-use in the *mukusi* forests was predicated on a continuity that was achieved by harnessing pre-colonial ‘spatial orders’. ZSM’s own maps, which apparently bore the hallmarks of Scott’s ‘high modernism’, did indeed provide a photograph of a moving stream before logging, but were not systematically transmitted to colonial authorities. The company’s subsequent action in the field remained undocumented. No stable legal or epistemological framework was created through which change in the forests could be perceived or monitored by colonial bureaucrats. And to date it never has. So modernity is not (or at least not yet) *telos*.

This first section of the chapter has addressed the ways in which the production of cartography was constrained by colonial reliance on customary authority. The second half of the chapter proposes a further argument; that even in situations where cartography *was* the primary means organising and regulating land-use, success was

still achieved through co-opting customary authority. A lack of resources for mapping was scaffolded by the possibility of recruiting situated labour and localised, embodied memory.

Part 2: The Indirect Map (or how do maps keep their value?)

The opening to Denis Wood's canonical *The Power of Maps* (1992), emphasises that maps *do* work (achieve effects) but also that they do *work*:

Maps sweat, they strain, they apply themselves. The ends achieved with so much effort? The ceaseless reproduction of the culture that brings them into being.¹⁰⁰

However, to add a proviso that Wood explores only briefly later in the book, this 'ceaseless reproduction' sits in constant tension with the temporality of the mapped objects.¹⁰¹ A map maintains its value by continuing to be an appropriate referent for the territory. The connection between the paper and the land needs to be made possible through a consistent set of markers. And as we have already noted, the ceaseless reproduction of a culture through maps requires an authority to make a financial commitment to 'the map' over and over again. This fact was not—as one critic of African cartography noted in the 1930s—always realised by administrators, "the necessity for maintaining a map and maintaining the benchmarks and beacons on the land itself is very commonly forgotten".¹⁰²

Throughout the thesis, I have drawn attention to the contexts for decisions to invest in the *production* of maps. In this final section I will address the methods the colonial government used to stabilise the 'spatial order'; map maintenance.

There are two key sets of actions that assure the map continues to be a valid referent. The first of these is to keep systematic, coherent cartographic records: consistency. The second is the policing of the land so that its 'ties' to the map continue to be identifiable. The standard method of doing this is (as mentioned above), the use of beacons and benchmarks. In the case of early colonial boundary making, this was often sidestepped by using permanent features in the landscape, existing rivers and hills. However, in the case of land *use*, policing also involved the enforcement of behaviours,

¹⁰⁰ Wood and Fels, *The Power of Maps*, 1.

¹⁰¹ *Ibid.*, 81–94.

¹⁰² Worthington, *Science in Africa*, 35.

ensuring that people respected the categories, and rights that the government had determined and recorded.¹⁰³

It was not only that administrations forgot this aspect of cartographic ‘work’. Northern Rhodesian conditions made these tasks significantly more difficult than they were back in the imperial centre. Attempts by the colonial government to secure the consistency of their cartographic record were thwarted by three specific difficulties. The first was a small personnel. The second was the lack of intimate knowledge of the environment. This seems counterintuitive since mapping is precisely supposed to allow for those unfamiliar or at a distance to act, but it will be explained.¹⁰⁴ The third was the sparse population across the territory.

We have seen that, in Northern Rhodesia, knowledge of the territory at a distance was displaced as means of governance by other strategies: acting over knowing. I suggest other ways in which *enacting* colonial rule (in particular the availability of the use of force, coercive and collaborative principles), were used as a substitute for developing more detailed knowledge or more rigorous epistemological practices. This use of ‘force’, included force inflicted on the environment itself: burning and cutting through the vegetation. It also includes the enrolment of those who *did* have intimate knowledge of the mapped locations: the colonised.

Location: MMBA

Although the sensitivity of some colonial scientific officers has recently been rehabilitated by historical scholarship, the wider colonial population was not very sensitive to the specificities of the Northern Rhodesian environment. The common imperial descriptor that housed a complex set of *terra nullius* and ‘wilderness myths’ and that served to describe almost any environment (particularly sparsely populated ones) was ‘bush’.¹⁰⁵ This attitude prevailed in the outlook of some colonial administrators with respect to the terrain in Northern Rhodesia, and of course its influence was felt most strongly in colonial efforts to assign different values and rights to land. Without recognisable indicators, how could the authorities differentiate types

¹⁰³ Blomley, ‘Law, Property, and the Geography of Violence’; Carl J. Griffin, ‘Becoming Private Property: Custom, Law, and the Geographies of “Ownership” in 18th- and 19th-Century England’, *Environment and Planning A* 42, no. 3 (2010): 747–62.

¹⁰⁴ Bruno Latour, ‘Drawing Things Together’, in *Representation in Scientific Practice*, ed. Michael Lynch and Steve Woolgar (Cambridge, MA: MIT Press, 1990), 19–68.

¹⁰⁵ With many thanks to Admire Mseba, who pointed out my own unreflexive appropriation of the term from colonial descriptions of the Northern Rhodesian landscape.

of soil or land, or assess their agricultural potential? How were they to distinguish locations? Vimbai Kwashirai describes how, in Southern Rhodesia, efforts to create a forest stock map were impeded by recruiting unspecialised administrators who had radically divergent knowledges of the flora within their districts.¹⁰⁶ One officer filed this all-too-typically hesitant description of his district: “Forests in the sense of the term are almost unknown...the country consisting of an unbroken continuation of very thick belts of forest and scrub, one might *almost* call them forests, which are to be found practically everywhere”.¹⁰⁷ The colonial archive is replete with descriptions of Northern Rhodesia as monotonous, uniform, mediocre: “one might as well be going round and round the same tree”, as one commentator noted.¹⁰⁸ This perspective was even embedded into the education of prospective colonial officers. In his autobiography, the former District Officer Ian Mackinson recounts the ‘warning’ he received about the environment of his future posting. His teacher hoped they would get used to

Living in a country which he described as MMBA. Responding to our raised eyebrows he intoned “miles and miles of blow all... but I expect you will have a stronger ‘B’ word before long!”¹⁰⁹

The perceived monotony of the vegetation caused some problems for surveyors that we will examine later. It was, however, the gentle slope of the Central African Plateau that caused more technical difficulties for mapping (or, perhaps more accurately, a combination of the low relief and the particular qualities of the vegetation). There were (and are), a number of ecologies in Central Africa, but whether grassland, woodland or wetland almost all feature high vegetation that hinders long views where the terrain is flat.¹¹⁰ ‘View’ was a professional necessity for surveyors, since land measurement is based on the principle of intervisibility. In some places in the colony,

¹⁰⁶ Kwashirai, *Green Colonialism*, 19.

¹⁰⁷ Civil Commissioner to Secretary of the Law Department, ‘Local Forests’, 21 September 1909, GF2/8, National Archive of Zimbabwe. Cited in Kwashirai, *Green Colonialism*, 76. (Emphasis added).

¹⁰⁸ Richmond, J., ‘Wheels in the Bush: 1931’, *Rhodesiana*, no. 15 (1966): 39.

¹⁰⁹ Mackinson, *Footprints in the Dust*, 80. Elsewhere I have heard ‘MMBB’, “miles and miles of bloody bundu”, a moniker expressing identical sentiments! (Discussion with Malcolm Christie, former District Officer, Senanga (April 10, 2015).

¹¹⁰ Governor of Northern Rhodesia to Colonial Office, ‘Telegram: Progress of the Boundary Survey’, 20 April 1926, SEC3/291, NAZ; P. W. Allin to Director of Surveys and Lands, ‘Surveying Forest Boundaries’, 8 April 1931, SEC1/952, NAZ; Member for Agriculture and Natural Resources to Director of Surveys and Lands, ‘Proposed Sugar Factory Scheme at Chirundu.’

this was achieved by triangulating from adjoining hilltops, but natural relief did not always suffice and other measures were introduced.

Describing how this problem was surmounted in Northern Rhodesia, forces us to reconsider the ways in which colonial visibility is usually characterised. John Donaldson's account of the 1911–14 Boundary Survey between the Northern Rhodesia and the Belgian Congo, emphasises the construction of towers in the field by the Commissions. These towers were constructed as artificial points of reference from which to carry out triangulation across areas that were largely swamp. Donaldson associates the perspective from the towers with O'Tuathail's analysis of Mackinder's geopolitical imagination: a panoptically perceived project with a high-altitude way of seeing the worldwide spaces of empire.¹¹¹ This metaphor seems to carry some weight, especially given the colonial cultural imperative to climb hills for pleasure.¹¹² However, in less important and less well-funded Northern Rhodesian surveys, towers were dismissed in favour of cheaper solutions that have fewer obvious parallels with vertical hierarchies or imperial vision.

In regular mapping work, intervisibility was in fact more often achieved through cutting lines *into* the environment, through the trees, grass, and shrubs. These lines were cut to various degrees of accuracy, depending on the kind of survey taking place. In some areas the vegetation was thin enough to make this light work; in others it was not plants but anthills that needed removing to allow lines of sight.¹¹³ The activity is so mundane, and relies on such quotidian skills, that it is hard to find record of it except in account books as 'work done'. However, one possibly unique image of a team of traverse cutters in Northern Rhodesia belongs to documentation of life in the Copperbelt from the 1930s (Figure 43). It shows a group of survey labourers with axes, picks, machetes, and surveyor's wheel.

¹¹¹ Donaldson, 'Pillars and Perspective', 483; Gearóid Ó Tuathail, *Critical Geopolitics* (London, UK: Routledge, 1996).

¹¹² Bradley, *The Diary of a District Officer*; Schumaker, 'A Tent with a View: Colonial Officers, Anthropologists, and the Making of the Field in Northern Rhodesia, 1937-1960.'

¹¹³ Bradford, 'A Three-Million Acre Title Survey'; Ellis et al., 'Exploration'; Fairweather and Stone, *A Colonial Surveyor at Work*.

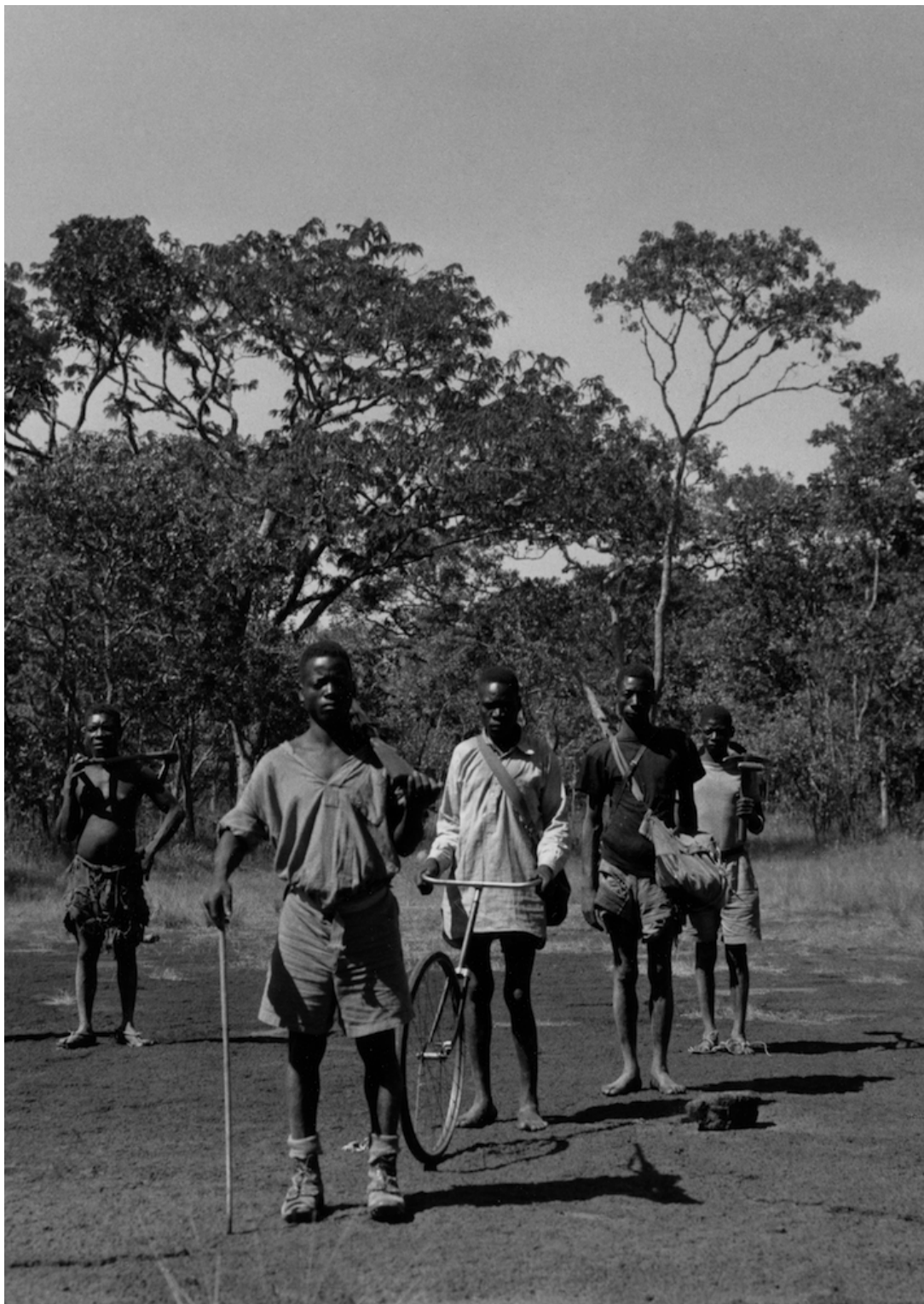


Figure 43: A team of survey assistants in the field in Northern Rhodesia

W. J. Dunstall, "*Traverse line crossing laterite patch. Side outsiders in for photo, N.R.*" 1935. Photograph, rgs017912. Image courtesy Royal Geographical Society (with IBG).¹¹⁴

¹¹⁴ Every possible attempt has been made to trace the copyright holder and to obtain their permission for the use of the material.

This practice of cutting these lines ‘into’ the bush evokes, in itself, a judgement of the value of the environment. The technique was by no means exclusive to Northern Rhodesia, nor is it historic, since it is practiced today. Nonetheless it represents a distinction between British imperial and metropolitan survey practice. An article in the *Empire Survey Review* for 1938 reveals the depths of that difference. The article recounts a daytrip organised by members of the Field Survey Association who were invited to visit the stations of the Retriangulation of Great Britain. In that process, towers had been erected at three of the four key trigonometrical points. Why towers on a well-defined range of hills, the author asked?

The reason is that in England conditions are very different from those which exist say in Anuradhapura, Berbice, or even Kootenay. The hills are in many places capped with woods, perhaps preserved for game, and even if the owners were agreeable to the cutting of lanes through the plantations, in due terms of recompense, the various Societies which exist for the protection of English scenery and amenities would have condemned the proposal by militant decree.¹¹⁵

In colonial survey, towers, it seems, were less commonly used than lanes cut into vegetation. This does not necessarily negate the principles of visibility and dominance that are suggested by Donaldson, but it does provide a picture of imperial surveyors as more embedded and embattled *within* the terrain they were attempting to document.

More importantly, however, we begin to see here how an encultured view of the Northern Rhodesian environment as having (or not having) significant features could affect the process of a map’s production. For the colonialists (even those born in Southern Africa) the British rural landscape was heavy with cultural and social value. If the surveyors’ own aesthetic sense did not prohibit them from disturbing the existing landscape, then they would be forced into negotiation with their peers and superiors, whether estate owners, or other interested parties. Where maps were being drawn up in Northern Rhodesia—where “one might as well be going round and round the same tree”—sightlines could be burned and cut out without disturbing any perceived cultural order, utility, or value. In Northern Rhodesia, those whose ways of life *were* embedded in the landscape were not sufficiently important to hold back the ‘progress’ the map represented. The use of line-cutting in survey indicates a greater power on the part of the surveyors to create spatial orders *ab initio* and to inscribe

¹¹⁵ ‘A Field Survey Association Outing’, *Survey Review* 4, no. 30 (1938): 503.

them on the field than such surveyors would have held in Britain. The construction lines of colonial cartography were etched right into the territory.

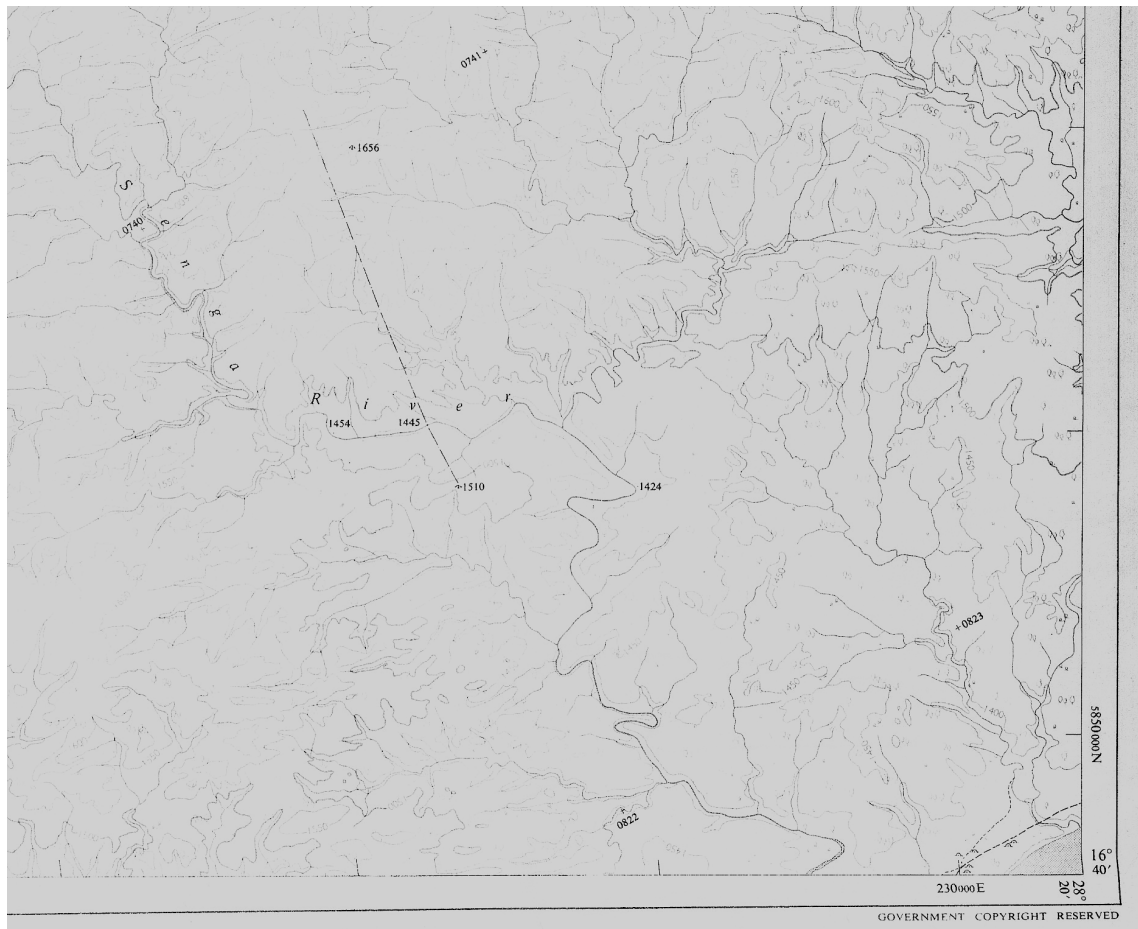


Figure 44: A cut line radiates from a trig-point downwards into the river valley

Air Survey Co. of Rhodesia, "1628-9," Northern and Southern Rhodesia: Zambezi Valley, 1:50,000. Salisbury, Southern Rhodesia: Air Survey Co. of Rhodesia, 1954. Held at RGS mr Zambia S.53. Not reproduced to scale. The author considers that this reproduction falls under the category of fair dealing.

These cartographic 'lines' inscribed directly onto the Northern Rhodesian territory were sometimes extremely long. A large project in North-Eastern Rhodesia required 235 miles of line-cutting to achieve intervisibility.¹¹⁶ The cut-line that was copied over from air photography onto this map of the Zambezi Valley from 1954 was clearly made for the purposes of triangulation and is more than two miles long (Figure 44). This *in-situ* inscription of territory was produced through the recruitment of casual manual labour. The relative cost of labour versus technology in the colony meant that lines were usually cut by groups of locals with very low-tech tools who accompanied the surveyor. On a project in 1931, the Assistant Surveyor P. W. Allin estimated that

¹¹⁶ Bradford, 'A Three-Million Acre Title Survey', 472.

it would take two weeks “to recut the lines...with my present gang”.¹¹⁷ These groups, (who also served as ‘porters’ as we saw in Chapter Three) were retained and released by surveyors as they travelled from district to district. As we have seen, that labour was not always easy to come by, but as surveyors arrived in new areas they could rely on the district officer, and his network of messengers to attempt to recruit local people into taking employment.

This perspective on colonial cartographic practice—breaking up MMBA through the inscription of lines directly onto colonial territory—seems to reinforce the idea of a ‘modern’ *ab initio* spatial order that we have been contesting. Writing lines onto homogeneous MMBA was apparently conceptually easy, and practically inexpensive. However, closer examination of a further implication of the use of this situated labour gives a very different picture.

Maintenance: the ‘situated’ map and the geographies of title

Although drawing up the boundaries for land-use on Northern Rhodesian territory was, it seems, not difficult; ensuring the continued validity of those boundaries was more complicated. Since, for most of the colonial period, and across most of the territory, Northern Rhodesian cadastral surveys could not be checked against geodetic data, the colonial authorities were, by consequence, more reliant on the manifestation of a boundary on the ground, to legitimise their cadastral records. Cutting out lines and inserting boundary posts was one challenge, relocating them was quite another, particularly in an environment seen as bewilderingly ‘mediocre’ and monotonous. As with the measuring of surveys, the solutions for maintaining a map, and its markers in these conditions, were linked not only to the physical qualities of the landscape but also to how the map was embedded within the social environment. The result was a variety of map maintenance tactics and adaptations that departed from ‘European’ techniques.

In theory, all national cadastres function on fairly uniform lines, but in practice much less so. Roger Kain and Elizabeth Baigent have closely studied the emergence of the cadastral map in Europe and the colonies.¹¹⁸ From their account the process of marking up and distributing land could be said to proceed in two different ways depending on whether demarcation of the property *preceded* or *followed* occupation.

¹¹⁷ Allin to Director of Surveys and Lands, ‘Surveying Forest Boundaries.’

¹¹⁸ Kain and Baigent, *The Cadastral Map in the Service of the State*.

The difference was not always clear-cut. In the New World, for example, in the seventeenth century, Kain and Baigent identify the use of both procedures simultaneously: in New England plots were measured and distributed rationally, whereas in Virginia, owners registered titles *post hoc* to land they had already claimed.¹¹⁹ Whereas in the New World the two systems were operating simultaneously under different political authorities, in Northern Rhodesia they were operating simultaneously under the same political authority. The early surveyors in Northern Rhodesia were usually completing two sets of tasks at the same time. Some of the farms being marked out represented the *de jure* realisation of *de facto* acts of appropriation or negotiation that had already happened on an illegal or semi-legal basis. Other lines (indistinguishable on the map) represented the *de jure* anticipation of future properties where farms and plots were being marked out in order to be sold.

There was also general recognition amongst the land staff and the solicitors in Northern Rhodesia that their cadastral system was not ideal. In some British colonies, the right to property was claimed (as in Britain) by holding the title deeds oneself. In other colonies, the extent of all titles and names of their holders were recorded on a central government cartographic index or 'key plan'. However, these two systems required accuracy at different stages and in different documents; the role of the map and plan was very different in each. In Northern Rhodesia the former prevailed until 1944 when a second cadastral system was adopted: the Torrens System. This had been developed in Australasia (i.e., specifically *for* colonial conditions). Under this method, the crucial records were those held at the land registry, and changes in ownership were registered *at that site*. Proof of ownership no longer lay in the information that was held by the owner but was recorded at this central location.¹²⁰ The diverse and changing nature of colonial property records is another indicator that opposing a fugitive landscape to state 'fixity' is inappropriate in this case.

There were further difficulties in maintaining a cadastre in Northern Rhodesia that came from instability in the occupation of property. A common British position in the 1930s was that it was 'impossible' to map property boundaries "for they exist only in the mind".¹²¹ This was true for the British system at that time in which a property

¹¹⁹ Ibid., 265.

¹²⁰ Director of Surveys, Northern Rhodesia, 'Circular to Provincial Commissioners: Land Negotiations (i)', 3 December 1949, SEC1/438, NAZ; Director of Surveys, Northern Rhodesia, 'Circular to Provincial Commissioners: Land Negotiations (ii)', 24 July 1951, SEC1/438, NAZ.

¹²¹ H. L. C., J. E. E. C., and E. M. D., 'Conference of Empire Survey Officers 1931: Report of Proceedings', *Survey Review* 2, no. 8 (1933): 109.

owner received an extract of the 25-inch Ordnance Survey map along with their title deeds on which the dimensions of your property would be indicated. However, there was not necessarily any object 'in the field' that represented where those dimensions began or ended. But, as another observer remarked in 1938, in Britain although property boundaries existed only in the mind, there were nonetheless, "relatively permanent features such as hedges, ditches, and fences to safeguard the rights of the owners".¹²² Infraction of property boundaries would be noticed almost immediately, and any deceit or error would be countered by communal, civic, memory. The paper documents to title, therefore, had a symbolic more than technical role. Regular 'use' of the boundaries, and the maintenance of dividing features were safeguarded by the dense population of the British Isles.

This was not the case in Northern Rhodesia. New farmers often arrived from other parts of the world with just enough money to secure the rent or lease on their property, and without the expertise or the resources necessary to get through the first years of working the land.¹²³ As a result, farmers often abandoned their investments, sometimes temporarily, often permanently. At the other end of the scale were speculative landowners. These were discouraged by the Northern Rhodesian government as they made no contribution to the development of the colony (waiting instead to benefit from the construction of roads, or other infrastructure at others' cost). Yet the government's attempts to use various clauses in rent and leasehold agreements to restrict access to property from both under- and over-capitalised groups were not always successful.

Even where colonial property was continually occupied and worked, the edges of 'owned land' were often distant, and not necessarily contiguous with neighbouring property. Alienated land still counted for only seven per cent of the territory in 1955.¹²⁴ Thus although property owners were responsible for the maintenance of the physical integrity of the boundaries and beacons that demarcated their claim, it could not be guaranteed that anyone *would* carry out those duties. Due to the piecemeal rather than systematic allocation of farmland, the sparse distribution of property, and

¹²² Worthington, *Science in Africa*, 28.

¹²³ Chief Veterinary, Northern Rhodesia, 'European Settlement in Northern Rhodesia', 20 December 1928, MAG2/7/3, NAZ; Anon. (Agricultural Department), 'An Administrative History of the Agricultural Department of Northern Rhodesia.', 1959, NAZ, MAG2/7/3.

¹²⁴ 'Annual Report, Survey Department of Northern Rhodesia', 1956, CO799/36, NA UK.

the financial precarity of farming, it would often be necessary to revive boundaries from decades of neglect¹²⁵

In summary, the Northern Rhodesian surveyors did not have the advantages that British surveyors could draw on to assist in maintaining their 'spatial order'. They could not rely on customary habitual usage of land to prop up claims, and prevent infringement. They did not have the benefit of a well-defined triangulation framework within which boundary coordinates could be located and re-located. Instead they were attempting to structure a cadastral system using unreliable data, over more than 750,000 square kilometres of what they perceived as MMBA. It was therefore necessary to find other solutions.

Cadastral in-situ: materialising property rights

How then did colonial administrators (and landowners) guarantee the integrity of land-use boundaries in the face of these problems? This was a similar struggle to that of maintaining the map reference system and was fought across multiple fronts. The first of these was a material one. The substance and engineering of boundary beacons were regularly discussed in the *Empire Survey Review*, where authors proposed different methods to thwart the action of ants, heat, rain, vegetation, and human 'malice' in tropical colonial environments.¹²⁶ Specific designs were sometimes stipulated within land contracts. For example, the boundaries of the RCBC area (discussed in Chapter Two) were required to be "marked upon the ground by the Grantee by cemented stone beacons at each corner".¹²⁷ By themselves, though, posts, pillars, and monuments of various kinds were somewhat difficult to relocate. As a result, these were usually erected in combination with a system of lines that was (like the traverses already described), etched directly into the vegetation itself. The cemented stone beacons for the RCBC had to be "indicated by straight line cuttings

¹²⁵ Vickery, *Black and White in Southern Zambia*. See also the summaries of completed fieldwork in the Northern Rhodesian Survey Department's annual reports.

¹²⁶ C. O. Gilbert, 'Beacon versus Deed-Plan', *Survey Review* 1, no. 3 (1932): 98–99; W. Maxwell Edwards, 'Relations of Beacon and Deed-Plan in South Africa', *Survey Review* 1, no. 5 (1932): 203–6; D. L. Reid and D. R. Meldrum, 'Survey and Setting out of Townships and Townplanning Lay-Outs', *Survey Review* 2, no. 13 (1934): 395–400; N. B. Favell, 'Ground Marking and Survey Records of an Engineering Construction Scheme', *Survey Review* 8, no. 55 (1945): 30–31.

¹²⁷ Donaldson, 'Pillars and Perspective'; 'Agreement between the British South Africa Company and Rhodesia Congo Border Concession.' 5 June 1929, MM2/1/26, NAZ.

through the bush six yards in width and extending from each beacon for a distance of not less than one hundred yards".¹²⁸

The cut, burnt, ploughed, or 'scoffled' lines that were associated with colonial boundary-making were useful as they also served a second purpose; they created a visual advertisement of the delimitation of land right rights to those who would never see maps or plans.¹²⁹ Property notices circulated in the official *Northern Rhodesia Government Gazette*, and were also posted in the press, the survey offices, or public places.¹³⁰ However, across a territory as large as Northern Rhodesia, this circulation was never going to reach each last person, and certainly very few Africans.

Although these lines potentially created a strong material indicator for the 'map', they would probably require even more intensive maintenance than boundary posts as we can see by returning to the testimony of the Northern Rhodesian surveyor, P. W. Allin. Having described the process of setting his gang to work, he then recounted his effort to relocate boundary lines he had cleared the year before:

Almost everywhere the lines are totally overgrown...which makes them extremely difficult to locate. During the course of my inspection I actually travelled along some ten miles of line and found comparatively little difficulty in following the line when once located. On one or two occasions however, where young trees and undergrowth have sprung up in the bush, we lost the line entirely.¹³¹

In the same manner as the cartographic construction lines, the colonial property map was also reproduced 'on' the landscape through the hiring and re-hiring of local labour. The act of carving and re-carving out vegetation as a means of preserving land rights had a visual component, but at least as importantly (I will argue) it had another aspect. The process of hiring labour to cut these boundaries tied the lines into the *social life* of the territory.

¹²⁸ 'Agreement between the British South Africa Company and Rhodesia Congo Border Concession.'

¹²⁹ Later cut-lines seem to have been preferred because they were visible from the air J. W. Wright, 'Reference Marks in Land Settlement', *Journal of African Administration* 8, no. 1 (1956): 38–45.

¹³⁰ Director of Surveys to Solicitor General, Northern Rhodesia, 'Additional Plots at Ndola', 13 June 1929, SEC1/438, NAZ; Local Secretary, BSAC to Lance I. Kerr, 'Prospecting Areas', 28 April 1939, MM2/1/68, NAZ.

¹³¹ Allin to Director of Surveys and Lands, 'Surveying Forest Boundaries.'

Cadastral in-situ: extra-institutional memory

Conscripting African 'help' to cut boundary lines offered colonial authorities more than labour. It would have reinforced a physical sense of colonial mastery, but co-opting people into this work had an epistemological component. As surveyors passed through each area, the recruitment of local labourers created a pool of 'living' memory with respect to the boundaries that had been imposed on the land.

An example from the early years of survey shows how this worked. On October 29, 1913, William Fairweather set out to survey a farm that was going to be difficult to locate: "long since abandoned, which nobody knows about, even the Native Commissioner of this district not knowing any more than we at the Lands' Office know".¹³² He was, however, able to draw on other resources:

We set off and by about 5pm reached Chiaki's village and after a cup of tea and a smoke I called him up and held 'parley' with him. As a result of the 'indaba' I found that the place was further on, beyond another village, in all about 9 miles from here, but that there was not water, the river having dried up these last few years, and no huts or anything.¹³³

Having made the survey of the abandoned property, set up beacons, and cut the boundary lines, Fairweather summoned Chief Chiaki back to act as witness to the work.

By virtue of having the authority to recruit human labour to *produce* cadastral boundaries, colonial authorities could exploit those same people to scaffold the fragile cadastral record. Assigning a memorial role to local people was a deliberate mitigation of the technical inadequacy of survey practices for Northern Rhodesian conditions. Northern Rhodesian cartography was not, strictly speaking, distancing and centralising, power and knowledge, but rather re-embedding it as 'situated' knowledge in complex ways.

Accounts that describe this use of local African memory are a common occurrence in the larger 'cartographic archive'. We find this same tactic in the planning of the reconnaissance for the Congo-Northern Rhodesia border survey:

There may be difficulty in getting the boys with such short notice, but please do your best... If you can get boys from the Border vicinity it will be most useful and if you can spare a

¹³² Fairweather and Stone, *A Colonial Surveyor at Work*, 15.

¹³³ *Ibid.*

messenger or a good boy who knows the Boundary beacons, so much the better.”¹³⁴

These witnesses ‘recorded’ boundary lines for decades after they were decided, and long after beacons and other forms of inscription were lost to colonial authorities. In 1948 a headman was able to relocate a ‘lost’ boundary and narrate a confusion that had arisen more than thirty-three years before as a District Officer narrated in correspondence over a dispute:

Prior to 1915 an official from Kalomo and an official from Namwala demarcated this boundary with a series of brick and cement beacons. I found Headman Kabanze himself very co-operative. He stated that he himself was one of the carriers travelling with these officials and without his aid I could not have located the beacons as my maps were all out. The beacons located by him are marked A and B on the accompanying sketch map. He explained that the mistake had arisen because after the officials had erected the beacon at B near Kabwe they had lunch just outside Chidskwa’s village en route to erect the beacon at A.

It is necessary to state that the position of these beacons does not correspond with the District Boundary as given in the District Notebook... I can only conclude an error in drafting a description of the boundary.¹³⁵

The evidence of Headman Kabanze was given priority over the graphic record.

Further explanation of the need for situated knowledge, *despite* having maps, is explained in correspondence between engineers in the Copperbelt. One surveyor, Shannon, makes the request that his colleague, Ansell, be allowed to remain with him because “he [Ansell] would know where every survey point was located and would be in a position to give lines for the road etc as well as make any minor alterations. The fact of him having been over the survey and having first hand information of the locality etc., would be invaluable to the Mine”.¹³⁶ This was especially useful because it was difficult to re-identify markers where “one can see little of the country more than 100 ft. off the line”.¹³⁷ It is unsurprising, therefore, that in conjunction with the same project, a new surveyor arrived in 1948 and was delighted to be able to recruit a local

¹³⁴ Fairweather to District Officer, Ndola, ‘Reconnaissance of the Border.’

¹³⁵ District Commissioner, Mazabuka to District Commissioner, Namawala, ‘Boundary Errors’, 31 August 1948, SP4/12/10, NAZ.

¹³⁶ Shannon to Hyam, General Manager, Rhodesia Broken Hill Development Co., ‘Survey Staffing’, 26 October 1939, 2.9.1C, ZCCM.

¹³⁷ Ibid.

African who had worked with a series of surveyors in place over decades.¹³⁸ Any familiarity with the environment, whether developed over months of Copperbelt life, or generations, would assist the incoming expert and prevent him from ‘going round and round the same tree’ in search of earlier survey marks. This case from the Copperbelt reinforces the fact that familiarity with the mapped terrain was not always the domain of the colonised. However, the scarcity of technical experts within Northern Rhodesia that we saw in Chapter Three, and the scale of the territory, meant an excessive reliance on African co-operation.

This practice of enrolling the colonised into the institution of boundaries has important differences to other practices that might be more familiar to British readers. Firstly, this was not a practice born of a situated negotiation that had existed *before* state cartography, like that of beating parish bounds in Britain. Those involved in beating the bounds of a parish had an interest in those boundaries being maintained. Here Northern Rhodesian villagers were being co-opted into the success of a spatial order that was more likely to malign them. Secondly, the role of ‘policing’ boundaries as delegated to villagers and headmen, does not straightforwardly have the same character as the role of ‘guide’ to colonial explorer, or ‘assistant’ to scientific enquiry (exchanges which have been more thoroughly investigated).¹³⁹

We are used, now, to understanding colonial knowledge as having been shaped and mediated by the colonised, acting as brokers, or go-betweens in ‘contact zones’.¹⁴⁰ However, we have largely understood brokers as mediating either colonial understandings of the natural environment of the colonies or colonial understandings of the pre-colonial social worlds. What we are reading about here is an account of something different. Chief Chiaki and Headman Kabanze were being enrolled as a form of extra-institutional memory of the *colonial social world*. Africans were being enrolled to act as an in-situ support (if not a substitute) for the imperial archive.

This role also is of a different character than that assigned to those who were the *employees* of the colonial administrators. African civil servants and messengers were salaried. By contrast, those employed by colonial surveyors to be the living memory of

¹³⁸ Delaney, Surveyor to Hyam, General Manager, Broken Hill Mine, ‘Lunsemfwa Dam: Arrangements’, 4 August 1948, 2.9.1C, ZCCM.

¹³⁹ The role of messengers sits most closely, perhaps, to this, as we explored in Chapter Four.

¹⁴⁰ Kapil Raj, ‘Relocating Modern Mapping’, in *Relocating Modern Science: Circulation and the Construction of Knowledge in South Asia and Europe, 1650-1900* (New York, N.Y.: Palgrave Macmillan, 2007); Simon Schaffer et al., eds., *The Brokered World: Go-Betweens and Global Intelligence, 1770-1820* (Sagamore Beach, MA: Science History Publications, 2009); Driver and Jones, *Hidden Histories of Exploration*.

boundaries as held *in situ*, were recruited through the exertion of political influence via indirect rule. The labour for cutting lines was paid, and in some sense could, therefore, be seen to be voluntary, but this would not be accurate. African accounts of the recruitment of labour for portage and other government work in the early years of Northern Rhodesia are rife with violent coercion, and it was taken for granted that uncooperative behaviour or failure to carry out a task would result in a beating or other form of punishment.¹⁴¹ Accounts of the use of coerced labour in survey work continue into the 1950s.¹⁴²

It was not possible to secure permission to reproduce this image

Figure 45: Chief Nana in the Mining Industry Museum, Ndola

Chief Nkana features twice in displays at the Mining Industry Museum, Ndola. In these displays Chief Nkana is once described as the former owner of Nkana Mine, and once as a surveyor's handman.

Author's own picture, reproduced from displays at the Mining Museum, Ndola.

Mapping was not necessarily entirely without benefit for the Africans involved. The Barotse *Litunga* was apparently pleased to allow his kingdom to be mapped by the

¹⁴¹ Charles Van Onselen, *Chibaro: African Mine Labour in Southern Rhodesia, 1900-1933* (Johannesburg, South Africa: Pluto Press, 1980); Vickery, *Black and White in Southern Zambia*; Fairweather and Stone, *A Colonial Surveyor at Work*.

¹⁴² Matayo, African Assistant Surveyor to Divisional Surveyor, Choma, 'Completion of Mazabuka Township Survey', 12 May 1954, SP4/12/62, NAZ; MacDonald, *Mapping the World*, 67.

explorer Alfred St. Hill Gibbons in 1896.¹⁴³ More speculatively it might be imagined that Chief Nkana—working as a surveyor’s handman in the Copperbelt (Figure 45)—was able to observe at close-quarters the colonial valuation of his customary land. Men such as these, at the higher ranks of African politics, may well have gained from being imbricated in colonial mappings. However, the power of African authorities to command was granted by colonial authorities precisely in order to benefit from that authority in the exertion of colonial will. As we saw above in Mamdani’s description of rural African authorities under indirect rule, “the administrative justice and the administrative coercion...lay behind a regime of extra-economic coercion”.¹⁴⁴ We can call *indirect mapping* the process whereby the systems of cartographic inscription of the territory engaged the extra-economic coercion of the African populace.

The indirect map could be read as a makeshift technical solution for surveyors with small budgets, and large tasks, but that ‘technical’ solution was thoroughly embedded within a political regime. It was predicated on colonial influence over the traditional forms of hierarchy that existed in settlements across the territory. This fact serves to clearly vindicate the interrogation of how social structures keep maps ‘working’. The goal of making apparently uniform cartographic forms ‘work’ in diverse social and environmental conditions is likely to rely on different methods. This changes how we might imagine the ways in which maps are conceived as producing a universal or homogenised geographical ‘holder’ for the state. Although Northern Rhodesian map ‘products’ had, at face-value, characteristics that were shared globally with cadastral, topographic, or thematic maps of other locations, they were embedded *within* Northern Rhodesian society in locally unique ways. The difference in methods deployed in Northern Rhodesia distinguishes maps made in that territory from their counterparts elsewhere in the British Empire.

We can now see the asymmetry that arises from the *telos* of modernity in existing analyses of colonial cartography: the assumption that a fixed framework would hold a flow of data. The cadastral framework for Northern Rhodesia was barely good enough for its purpose, and dependent on pre-colonial socio-political forms for its stability. The production of colonial cadastral cartography was only symptomatic of the *ambition* to produce a centralised, rationalised spatial order, but does not represent the *achievement* of it.

¹⁴³ Alfred St. Hill Gibbons, ‘A Journey in the Marotse and Mashikolumbwe Countries’, *The Geographical Journal* 9, no. 2 (1897): 121–43.

¹⁴⁴ Mamdani, *Citizen and Subject*, 22.

Conclusion

The two case studies presented in this chapter are not alone sufficient to counter the weight of evidence that, during the twentieth century, there was an increasing reliance on centralised expertise and calculation in statehood and that maps became a prominent technology of governance. The case studies do, however, suggest that we cannot simply transfer the mode of political reasoning that Foucault called ‘governmentality’ to the collection of geographical knowledge, or the mapping of territory under colonial rule in Northern Rhodesia. The techniques of the map—as we might call the distanced archive, the cartographic grid, the paper records of property—were only part of the larger set of techniques deployed by the Northern Rhodesian government to maintain authority over its territory. That wider set of techniques was dynamic and responsive and operated a different set of values than those of ‘high-modernism’. This affected the way that change was organised and registered by the state. What was important was not necessarily seen. What was seen did not necessarily endure.

6 / Conclusion

This thesis began by reconstructing the ‘map cupboard’ of the Mongu District Office, as it existed in 1953. Jeffrey Stone’s interrogation of African cartography begins with a similar device, (although an anecdote from his lived experience) describing how, as District Officer in 1959, his colleagues recognised maps as “*potentially* utilitarian documents in the course of day to day duties”.¹ Whereas Stone moved from that anecdote into a general ‘singular’ history of cartography, I have lingered with the local and individual, and critiqued the notion that their ‘potential’ was realised in the colony. The ethnographic approach of this thesis has led to a historical description at a fine-grained level. It might not, therefore, be very surprising that the conclusion of a thesis in this vein is that further scholarship is required that treats twentieth-century colonial cartography with more nuance. However, the contribution of this thesis is more than the accumulation of more historical detail. The perspectives from Northern Rhodesian district offices, from the sites of early farms, from the offices of the mining companies, and from the desks of the photogrammetrists in Greater London disrupt the existing conceptual categories that tie institutional histories of map production to larger narratives describing the role of mapping in colonial governance. By taking these perspectives seriously, the thesis has found new directions for approaching the cartographic representation of land and peoples within global histories of governance. Here, by way of conclusion, I will first summarise the key findings and then step back, outwards from the archive, to outline these new directions.

Empirical contributions and findings

A key empirical contribution of this thesis has been to offer better understanding of the production and non-production of maps. Rather than considering the absence of maps to be the result of insufficient financial commitment by the imperial government, it has explained the presence *and* absence of maps in Northern Rhodesia within the ambitions and interests of several groups. Chapter Two and Chapter Five showed how the production of mapping by the government in Northern Rhodesia was locked in the tension between the desire to produce profit from the colony very rapidly, and more rational holistic resource management procedures. The latter strategy, although

¹ J. C. Stone, *A Short History of the Cartography of Africa* (New York, NY: E. Mellen Press, 1995), i. Emphasis added.

frequently advocated, was rarely chosen—the result being that resource mapping was carried out largely by, and for, private enterprises, such as the mining companies, Zambezi Sawmills, or the prospective sugar business in the Gwembe Valley. The influence of the demands of private enterprise on governmental map production generated a lasting cartographic ‘unevenness’.

Unevenness in the quantity of mapping of different areas was compounded by the hybrid and heterogeneous nature of the cartography. The maps produced by the Northern Rhodesian government did not follow typical divisions between records of the environment as framework (relief and hydrography), the environment as resource (soil, living matter, and minerals), records of land as owned and used, and records of the people inhabiting the colony. Northern Rhodesian topographic mapping did, however, serve as the index or ‘base’ for demographic, cadastral, vegetation, and geological data. That topographic base was, however, often inversely produced *through* the process of collecting specific ‘thematic’ data. This fact led to the compilation of documents into a territorial record united from sources at unusual scales, and following atypical cartographic conventions.

In addition to considering heterogeneity in the maps themselves, we have examined the multiple loops and ‘short-circuits’ in the distribution of cartographic documents. If, following Edney’s example, we place colonial cartography within a framework of readers, readership, knowledge, and power, we need a better term for twentieth-century colonial cartography than ‘ironic’. This model obscures much more than it reveals about the complex patterns of the acquisition of knowledge and lack of knowledge. The colonial map was a different beast than Edney’s description of the imperial map; it did not ‘speak’ only to the centre. We have seen that governmental maps *were* used to argue to metropolitan audiences for the validity of dispossession, against the potential claims of subjugated colonial peoples (Chapter Five). Maps of the colonial borders did address the potential claims of other governmental powers. However, cartography was also invoked by African customary authorities to serve their interests (Chapter Three). If colonial maps spoke to possession and dispossession, they could also speak to repossession.

Maps were also scarce resources that did not always accumulate in the same place. Multiple ‘pathways’ for data were created by the presence and activity of such a variety of cartographic producers. Map documents were transmitted through a diverse range of networks. The private enterprises mentioned above had their own separate circuits of cartographic documents moving from the sites of extraction up to local, regional,

and imperial business headquarters, or all of these. In the District Office of Mongu, we considered the maps produced by the BSAC that were sent in different directions and deployed very different material strategies, than those of the Northern Rhodesian government. Equally, government officials sent maps and geographic information back to diverse organisations within the UK (Ian Mackinson's map of Mongu, being sent to a Professor of Geography at Oxford, for example, or the information sent by District Officers to the British Association for the Advancement of Science). Mapping and geographical knowledge did not always pass through the colonial government headquarters. This fact was not necessarily because information was withheld, but because the government seems to have pursued 'knowing' the colony with less than full vigour, and, as in the case of the teak forests, *chosen* to know less than it might.

The diversity of these circuits compounded the difficulty of reliably organizing cartographic data within a coherent institutional memory. The 'map' and the territory had a complex reciprocal relationship. In Chapter Three we saw the relationship between the use of maps, types of expertise, and the need for precision in the documentation of administrative boundaries. In Chapter Five, we explored the problems of maintaining consistency between the cadastral map of a property and its reality on the ground. The 'personalised' form of governance, represented by the District Officer, meant that a great deal of colonial geographical knowledge stayed at a local level; sketched out on District maps on the wall in a rural office, or embodied within the administrative officers themselves. At times, African chiefs, headmen, or those recruited into survey work, were enrolled into providing support for the fragile link between the map and the land it represented. Authority and institutional memory were produced *between* colonial officers and local elites, in ways that seem to have supported the colonial organization of territory without maps. It is unlikely that this practice was intended as a substitution, but it nonetheless allowed for lower standards of accuracy in notation and recordkeeping, and decreased central organization of cartographic representations.

In sum, what these perspectives show, is that the texture of map production and map use is something very different than might be expected within European civil society. The unity of 'the' colonial map was a thin charade for what was a collection of cartography that was partial (in both senses). It served a variety of masters whose interest in cartography lasted the time it took their projects to succeed or fail. The advent of 'modern' mapping in the post-war period only superficially altered this state of affairs.

Cartography and colonial intervention: can we understand these conclusions as typical for Northern Rhodesia?

The question remains, of course, how far the insights this thesis has gathered from the archival sets it has examined are really typical of general patterns across Northern Rhodesia. As explained in the introduction, the sites and themes discussed here largely reflected the strengths of the remaining archival material in the National Archives of Zambia. As such, they do not reflect any organised 'sampling' of different areas of the former Northern Rhodesia. Further, this thesis set aside the task of considering twentieth-century missionary mapping, and has not explored the vernacular, domestic use of cartography by the white population. However, with some caveats (explored below) the picture drawn in this thesis can, I believe, be seen as representative in important ways. Consider two main factors: the relationship between mapping and resource extraction, and the use of mapping in achieving social control.

The archival evidence clearly demonstrates that the primary cause of cartographic 'unevenness' was the relationship between mapping and resource extraction. This thesis examined different forms of colonial industry, particularly mining in the Copperbelt and forestry in the South West. The cartographic history of the Copperbelt, and the cartographic history of the teak forests, are different but also share some similarities. In the case of the Copperbelt, topographic mapping was collated and stored through some degree of co-operation between the mining companies, the colonial government, and various intermediaries (especially the mining engineers, particularly Anglo-American, and the British South Africa Company, as holders of the mineral rights). The operation of several forms of property rights, the erection of large equipment and infrastructure, the demarcation of large concessions, small 'claims', as well as that of buildings, plots, and compounds, were all activities subject to government involvement. Mapping was carried out regularly and at a large scale. The teak forests, on the other hand, were exploited by a single company, operating on very large concessions, with minimal permanent infrastructure. The Zambesi Sawmills produced detailed maps of the areas they were working, although significantly less geographical information flowed from their offices towards the government. The further investment in mapping a tiny section of the Gwembe Valley for potential sugar production, and the co-option of new resources to achieve it, makes a further compelling case. It is accurate to say for the whole colony that the scale and detail of cartography produced at any given moment in time to describe a specific area bore a direct relation to the level of European economic activity within the mapped area.

Regulating the territory as a whole unit seems to have been, (largely) a secondary consideration within the larger goal generating profit.

So to what extent *was* mapping used as a means to create a colonial social order? How was cartography used in situations where the colonial state felt threatened? Existing studies had revealed quite a high colonial commitment to cartography at borders, or epidemiological cordons.² From this association between cartography and the coordination of defensive action we might have imagined that cartography was deployed more vigorously in the areas of Northern Rhodesia that were populated by societies that might offer a more organised military threat, or by societies that were harder to co-opt into colonial systems. It seems we can dismiss that idea.

Two of the regions of Northern Rhodesia that were examined in detail—Barotseland (Chapter Four) and the Gwembe Valley (Chapter Three)—could be considered as extreme examples of African pre-colonial social organization. The Barotse were a very hierarchically structured society, the peoples of the Gwembe Valley only very loosely so. The relative lack of mapping in each case seems, however, to suggest that in these areas cartography was not a primary tool or justification for intervention into African socio-politics. Maps *were* used to document the reorganization of social groupings (as we saw in the Gwembe valley), yet this reorganization was not strongly constrained to the ‘logic of the map’; rather, officials still struggled to represent their negotiations and decisions cartographically. The government *did* use maps as the basis for crude forms of political-economic calculations (what acreage was needed to support a family, how productive it could be, and so on), however, the in-situ consequences outcomes of these cartographic calculations (such as the demarcation of Native Reserves in 1927), were not strongly pursued.

This is not to say that interventions weren’t made. Legislation regulated movement, social customs, African trade and agriculture for example. District officers, and colonial government scientists, encouraged and discouraged particular behaviours. However, it seems that colonial policy wasn’t conceived of, or organised on the basis of tight, inert spatial structures. In fact, colonial intervention in Barotseland and the Gwembe Valley bears closer resemblance to the description that Timothy Mitchell

² John W. Donaldson, ‘Pillars and Perspective: Demarcation of the Belgian Congo–Northern Rhodesia Boundary’, *Journal of Historical Geography* 34, no. 3 (2008): 471–93; Wolfgang Zeller, ‘Neither Arbitrary nor Artificial: Chiefs and the Making of the Namibia–Zambia Borderland’, *Journal of Borderlands Studies* 25, no. 2 (2010): 6–21; Giorgio Miescher, *Namibia’s Red Line: The History of a Veterinary and Settlement Border* (Basingstoke, UK: Palgrave Macmillan, 2012).

applies to non-colonial social stability: orders *without* frameworks.³ Colonial territorial management in these areas took the form of immersed, contingent action rather than the enactment of master plan for an externalised African lifeworld.

I would suggest that the patterns for colonial state cartography as can be observed in Gwembe, or Mongu could be extended to many other sparsely-populated rural areas of Northern Rhodesia that were not, (whether for reasons of political expediency, physical geography or historical contingency), very amenable to capital investment.⁴ The relationship between the population-as-located/tax-paying and the population-as-a-mobile-workforce was organised so as to prioritise elasticity in the labour market over a uniform social fabric.⁵ The thesis suggests there are strong incentives to better understand the role of territorial knowledge in producing that outcome.

But how far does that lack of ‘framing’ extend to other areas and other colonial socio-economic forms? In some senses, these contrasting interests in territory (the intensity of mineral extraction, and the extensity of African societies) are typical of Northern Rhodesia. However, two other key colonial social forms must be mentioned: the new urban spaces, and African society as it survive in areas farmed by white settlers.

The relationship between mapping, spatial organisation and social control in urban environments has been shown to be very different than in the sites considered by this thesis.⁶ The drive to visualise and control township spaces meshed with the urgent provision of housing and infrastructure for migrant groups, the creation of a working class in which the role of customary authority was shifting and changing, and the formation of African labour movements that were the strongest political challenge to European colonial authority. Here, at least from the 1930s, it seems that a strong spatial framework *was* strategically designed to produce particular kinds of African behaviours. Whether successful or failed, colonial attempts to use mapping to enact

³ Garth Myers, *Verandahs of Power: Colonialism and Space in Urban Africa* (Syracuse, NY: Syracuse University Press, 2003); Timothy Mitchell, *Colonising Egypt* (Cambridge, UK: University of Cambridge Press, 1988).

⁴ The word ‘rural’ used here (and here onwards) used with caution. Jens A. Andersson, ‘Administrators’ Knowledge and State Control in Colonial Zimbabwe: The Invention of the Rural’, *The Journal of African History* 43, no. 1 (2002): 119–43

⁵ James Ferguson, *Expectations of Modernity: Myths and Meanings of Urban Life on the Zambian Copperbelt* (Berkeley, CA: University of California Press, 1999).

⁶ Myers, *Verandahs of Power*.

social control in these sites, are evident in practices that are more familiar to existing scholarship.⁷

To understand the role of cartography in the areas of Northern Rhodesia that were taken up for white farming, I would suggest that further research is required. In these areas, (such as the line of rail seen in Chapter Three), the demarcation of white property and the ‘reservation’ of African land were more pressing issues, and came alongside many other official and unofficial colonial interventions into African lives.⁸ In regions of European agriculture the ambitions of the colonial state were relatively more clearly announced, and more thoroughly planned.⁹ It is likely that the patterns of map production and usage in the District Offices for these areas would bear more resemblance to those in South Africa and Southern Rhodesia where socio-economic racial segregation was pursued more ruthlessly.¹⁰ In Eastern Province, in particular, the policy of reservation also produced more urgent environmental dilemmas for the state.¹¹ Attempts to understand and resolve these dilemmas will likely have generated mapping of quantity and qualities very different from those described in Chapter Three and Four. These narratives need to be sought out in the archive in order to be integrated into the model of the Northern Rhodesian ‘cartographic economy’.

So what then, can be said of the cartographic economy as a whole? If typicality in Northern Rhodesian cartography was measured by its relation to the surface area of the territory, the patterns of mapping described in Chapters Three and Four *could* well be considered thoroughly typical. If one measured typicality in colonial cartography by its effect on the African population in the early twentieth-century, patterns of

⁷ Henri Lefebvre, *The Production of Space* (Oxford, UK: Blackwell, 1991); Nicholas Blomley, ‘Law, Property, and the Geography of Violence: The Frontier, the Survey, and the Grid’, *Annals of the Association of American Geographers* 93, no. 1 (2003): 121–41; Neil Brenner and Stuart Elden, ‘Henri Lefebvre on State, Space, Territory’, *International Political Sociology* 3, no. 4 (2009): 353–77.

⁸ Land Commission, *Report of the Land Commission* (Northern Rhodesia: Government Printer, 1946); Kenneth Powers Vickery, *Black and White in Southern Zambia: The Tonga Plateau Economy and British Imperialism, 1890–1939* (New York, NY: Greenwood Publishing Group, 1986). Alfred Tembo, ‘The Colonial State and Africa Agriculture in Chipata District of Northern Rhodesia, 1895–1964’ (Masters Thesis, University of Zambia, 2010).

⁹ Though few would have described them as consistent or thorough. Edgar Barton Worthington, *Science in Africa: A Review of Scientific Research Relating to Tropical and Southern Africa* (Oxford, UK: Oxford University Press, 1938).

¹⁰ Barry N. Floyd, ‘Land Apportionment in Southern Rhodesia’, *Geographical Review* 52, no. 4 (1962): 566–82; J. Robinson, ‘“A Perfect System of Control”? State Power and ‘Native Locations’ in South Africa’, *Environment and Planning D: Society and Space* 8, no. 2 (1990): 135–62.

¹¹ Leroy Vail, ‘Ecology and History: The Example of Eastern Zambia’, *Journal of Southern African Studies* 3, no. 2 (1977): 129–55.

population density (the growth of urbanity in particular), and the use of cartography in areas with white agricultural economies would likely begin to challenge those patterns. However, historically, as today, various forms of African agricultural society have predominated in Central Africa.¹² These narratives of mapping of Barotseland and Gwembe, recount, therefore, the history of the experience of colonial cartography for the larger part of today's Zambian populace.

In addition we can certainly begin to draw conclusions about the overall *qualities* of the Northern Rhodesian cartographic economy. I have demonstrated that for various reasons, and in a variety of ways, the production and uses of maps were determined more by local conditions than by a centralised framework. The thesis exposes colonial mapping as having been diverse, uneven, and of contested value. In exploring situations that were not strongly regulated by the state the thesis has extended understanding of the relationship between cartography and colonial interventions in sub-Saharan Africa. I set out, for example, the cartographic identity of the 'District' and the 'Timber Concession'. This work complements research that has begun on the historical geography of colonial cadastres, and particularly the farm unit.¹³ It also contributes to the growing literature on the relation of indigenous political systems to large colonial administrative units and international boundaries.¹⁴

As the hybridity of mapping we have seen would suggest, these units and orders emerged differently within the construction of the post-independence state-space than within the European state-space (an aspect explored more thoroughly below). Therefore the success of this analytical perspective in exploring the cartography of Northern Rhodesia brings the possibility of building a far more nuanced understanding of the role of colonial mapping in the complex spatialities of today's Zambia.

¹² In 2010 more the rural population was at 64% nationally, and up to 84% in Western Province. 'Rural Population in Zambia', *Trading Economics*, 2015, <http://www.tradingeconomics.com/zambia/rural-population-wb-data.html>; Freddie Sayi Siangubule, 'Local Vegetation Use and Traditional Conservation Practices in the Zambian Rural Community: Implications of Forest Stability' (Masters Thesis, Swedish University of Agricultural Sciences, 2007), 8.

¹³; A. J. Christopher, 'The Variability of the Southern African Standard Farm', *South African Geographical Journal* 58, no. 2 (1976): 107–17; Peter A. Dewees, 'Trees and Farm Boundaries: Farm Forestry, Land Tenure and Reform in Kenya', *Africa* 65, no. 2 (1995): 217–35.

¹⁴ Hiribarren, 'From a Kingdom to a Nigerian State'; Lindsay F. Braun, 'The Returns of the King: The Case of the Mphedu and Western Venda, 1899–1904', *Journal of Southern African Studies* 39, no. 2 (2013): 271–91.

British colonial Africa

Examining the broader cartographic trends within Northern Rhodesia, leads us to the question of how far these new approaches and perspectives on cartography might be extended to the mapping of the British Empire more broadly. The cartographic ‘condition’ of Northern Rhodesia—characterized by the absence of systematic mapping and a reliance on *ad hoc*, heterogeneous documentation—seems to prevail across British colonial Africa.

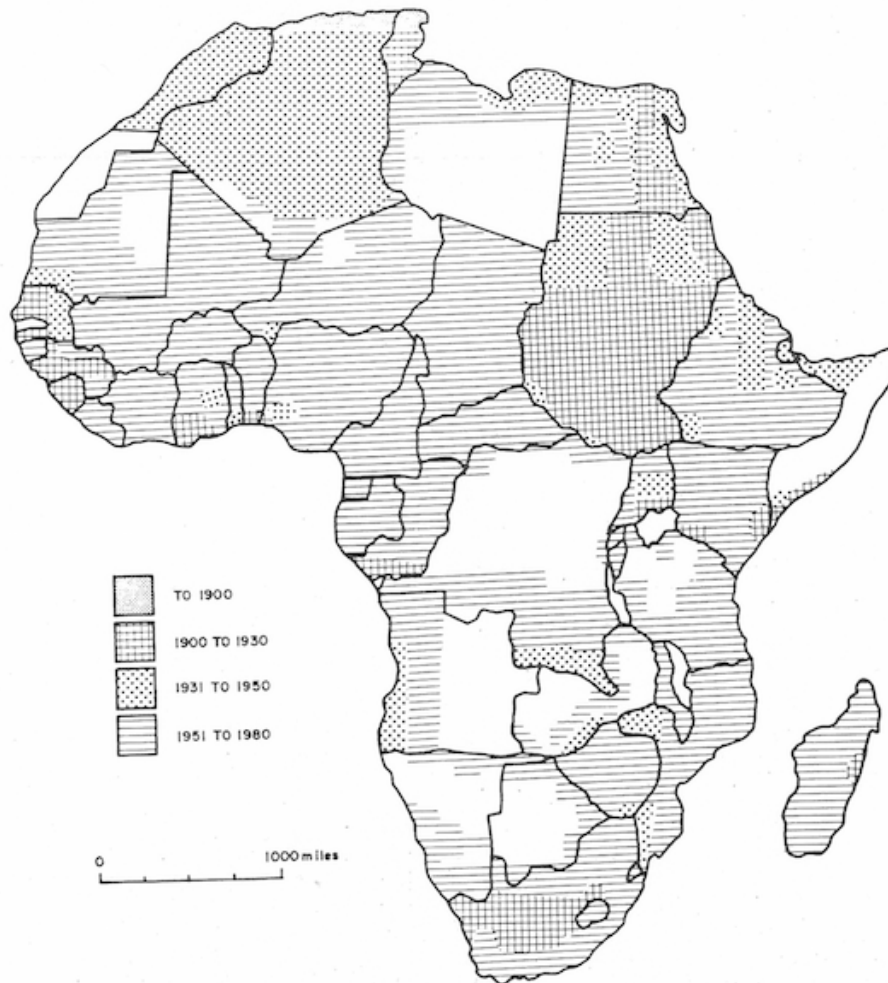


Figure 46: Topographic mapping of Africa, 1900–1980, 1:250,000 and more detailed

From: Mary Lynette Larsgaard, *Topographic Mapping of Africa, Antarctica, and Eurasia* (Provo, UT: Western Association of Map Libraries, 1993). Reproduced with the kind permission of M. L. Larsgaard.

Figure 46 (although not entirely accurate in its historical summary of Zambian mapping) suggests that the value of mapping might have been ‘contested’ well beyond Northern Rhodesia. The figure offers us a view of when 1:250,000 mapping (see Appendix for that scale) was first produced across each part Africa.

What Figure 46 shows is that only very small stretches of British colonial Africa were thoroughly mapped in the very first decades of the twentieth century. Those areas (indicated in the diagram by a grid pattern) were restricted to the Sudan, areas along the west coast of Africa, parts of what are today Uganda and Kenya, and some of South Africa. The figure also indicates, however, that the subsequent accumulation of 1:250,000 cartography of former British African colonies in the following decades was far from rapid. Barely any progress was made before the 1950s. At the institution of the DCS, the Colonial Office stated the brutal statistics. Of an empire that totalled just under 2,000,000 square miles, less than a quarter had been mapped topographically.¹⁵ A further 300,000 square miles had to be considered if the South African High Commission Territories were included (Basutoland, Bechuanaland, and Swaziland). In addition 15,600 miles of primary triangulation was required and 1,700,000 square miles needed secondary control.

The stop-start narrative that the diagram suggests is supported by the accounts submitted by beleaguered government surveyors in the pages of *Empire Survey Review* from its very first publication in 1931, (and particularly in the intermittent annual reviews contributed by the survey departments).¹⁶ Those patterns are also substantiated by the expert overviews that were commissioned by bodies in London and have been cited throughout the thesis.¹⁷

Larsgaard's diagram indicates a period of significant cartographic production between 1950 and 1980, a period when, for the British African colonies, mapping was revived (or kick-started) with the foundation of the Directorate of Colonial Surveys in 1946.¹⁸ We should not assume, however, that, at this stage, mapping became more substantially systematic in its scope. The official historian of the Directorate of Overseas Surveys, Alastair Macdonald, described the cartographic work of the institution in its early years as being driven by competition and chaos, rather than a

¹⁵ Colonial Office, *Central Organisation for Geodetic and Topographical Surveys in the Colonial Empire*, 6.

¹⁶ See for example: J. Clendinning, 'The Year 1930-31 in the Gold Coast', *Survey Review* 1, no. 1 (1931): 35-36; H. E. Bradley, 'The Year 1937 in Nigeria', *Survey Review* 5, no. 31 (1939): 50-56; L. M. McBean, 'Report of the Survey of Southern Rhodesia for 1941', *Survey Review* 6, no. 46 (1942): 496-98; N. B. Favell, 'A Plea for the Expansion of the Scope of the Dominion and Colonial Survey Departments', *Survey Review* 8, no. 59 (1946): 175-83; Ernest M. Dowson and V. L. O. Sheppard, 'Evolution of Land Records', *Survey Review* 8, no. 60 (1946): 202-10.

¹⁷ Winterbotham, 'Mapping of the Colonial Empire'; Worthington, *Science in Africa*; Winterbotham, 'Reports on Survey Departments (collated)'; 'Report on a Visit to the Directorate of Colonial Surveys by the Organisation and Methods Representatives of H. M. Treasury.'; MacDonald, *Mapping the World*.

¹⁸ Stone, *A Short History of the Cartography of Africa*; Olayinka Y. Balogun, 'Surveying and Mapping in Nigeria', *Surveying and Mapping* 45, no. 4 (1985): 347-55.

clear imperial overview: “Territories such as Tanganyika were happy hunting grounds for experts from the Overseas Food Corporation, the UN Food and Agriculture Organisation, forestry institutes and mining companies... Colonial governments were anxious to get funds for any project... and saw the lack of mapping as a barrier.”¹⁹ A more systematic approach coordinated in London did not necessarily produce a more systematic body of cartography for the colonies themselves.

In addition to the unevenness in the extent of the coverage of topographic map production, the hybrid qualities of mapping in Northern Rhodesia are evidenced in studies of other colonial African survey departments. Topographic maps in South Africa were drawn up by the irrigation department; the topographic map of Namibia was driven by cadastral Farm Maps.²⁰ Again, even after centralised co-ordination of some topographic work by the Directorate of Colonial Surveys from 1946, attempts to construct consistent frameworks and conventions were fraught. For example, despite the fact that the three territories of British East Africa had fairly similar environmental and social conditions, an attempt to build a common topographic specification was started in the early 1950s and not completed until ten years later and after heated dispute.²¹

The evidence suggests, therefore, that unevenness and hybridity was typical of cartography across British colonial Africa: the value of mapping was not determined centrally; it was locally negotiated and contested. As a result, the approach taken in this thesis—considering cartography as multi-sited, and interrogating its value—would be useful in elucidating the role(s) of geographical knowledge in colonial governance elsewhere. In the final sections of the chapter, below, I suggest how the theoretical lessons from the thesis might be exploited to that end.

The time(s) of colonial cartography?

An important means of furthering the discussions of the role that mapping played in British African colonies, would be a more complex set of periodisations with which to frame colonial cartographic production. The overview this thesis provides enables us to sketch some conclusions and to outline further paths for research. The secondary literature consulted for the thesis had generally considered the mapping of British

¹⁹ MacDonald, *Mapping the World*, 43.

²⁰ Liebenberg, ‘1:500,000 “Irrigation Map” of South Africa, 1935-7’; Miescher, *Namibia’s Red Line*.

²¹ MacDonald, *Mapping the World*, 96.

colonial Africa within one of two particular historical frameworks. The first of these was institutional, a consideration of the mapping output of particular organisations.²² A second group of literature had begun to consider cartography within the framework of priorities at different points on the ‘timeline’ of colonial rule. Stone describes two key phases of activity: mapping for the establishment of administrative order and, then, a later phase of mapping for development. In Stone’s account for Northern Rhodesia, the first phase runs up to the 1910s (approximately), and the second phase from the change of metropolitan attitude to Empire as represented by the Colonial Development and Welfare Act of 1942.²³ Over the last few years, scholars of African mapping have followed the trend in African history more broadly and begun to consider the cartography of the colonial period within long-durée narratives of land-use and territoriality.²⁴ Drawing from their approach, and charting the *use* of maps more closely, has allowed us a more interesting characterization of those interim years (1910s to 1940s) than just a fallow period for cartography (or, for Stone, ‘tranquility’).²⁵ We have demonstrated that the need for maps was somewhat displaced both by the semi-feudal practice of judicial and administrative tours that were physically carried out by Officers around their district, *and* by their ability to rely on local knowledge as furnished by the messengers and chiefly elite. From this perspective, that ‘fallow’ period for cartography was one in which bureaucratic governance was set aside in favour of the forms of governance engendered by indirect rule. This process certainly requires more study.

But what else might more complex periodisations include? Observing colonial cartographic practice from a wider range of perspectives has allowed us to consider the temporal patterns and obligations affecting a greater range of actors. These have highlighted events, and *courte-durée* sequences, that were of great importance to the cartographic history of British colonial Africa and intersect institutional or political histories. I propose at least three more. Firstly, for example, we have seen that the First and Second World Wars had effects on the cartography of Northern Rhodesia that are not to be measured solely by the production (or non-production) of maps. Wartime investment in military mapping equipment resulted in temporary expansions

²² Collier and Inkpen, ‘The Contested Nature of Surveying’; Collier, ‘The Air Survey Committee and Mapping’; Collier, ‘The Colonial Survey Committee’; McGrath, ‘The Setting For The Work Of The Directorate’; MacDonald, *Mapping the World*.

²³ Stone, *A Short History of the Cartography of Africa*, 104–07.

²⁴ Hiribarren, ‘From a Kingdom to a Nigerian State’; Donaldson, ‘Marking Territory.’

²⁵ Stone, *A Short History of the Cartography of Africa*, 104.

in the availability of cartographic expertise and equipment in the periods following each of the World Wars. However, as we saw in Chapters Two and Three, technology, technicians, and techniques did not ‘trickle-down’ directly through government survey organisations. In the case of the First World War, the effect of surplus post-conflict material and expertise was largely felt through the arrival of aerial photography in the hands of private companies. After the Second World War, cartographic technology and expertise were more formally maintained by the imperial government in the shape of the Directorate of Colonial Surveys. Again, though, these human and technological resources were also the material foundation of the private companies that worked in parallel to (and finally outlived) colonial and post-colonial governmental cartographic intervention by the British government.²⁶ New technologies produced maps with new ‘qualities’ and also new expectations for mapping, both of which played a role in deciding how, where, and when it was beneficial to produce cartography. The distribution of these technologies at different sites, and through different organisations, altered the criteria under which they were deployed.

The second temporal framework that has emerged during the course of this research is that of the individual career. It would have been a different thesis that examined the influence of each of the Directors of Survey between 1915 and 1955. However, their personality, motivations, and attitudes seem to have been significant. In Northern Rhodesia the post was held by only two men between 1920 and 1948: first William G. Fairweather, then L. W. G. Eccles. Both these men were part of a generation of administrators that were hired by the British South Africa Company, rather than the Crown government. The prolonged influence of surveyors from the chartered era through to the mid-twentieth century is, in itself, likely to be significant. Histories that narrate the careers of the District Officers in Northern Rhodesia have drawn strong distinctions between the character of early ‘pioneer’ officers and those of a relatively more bureaucratic era, recruited and briefly trained in the UK.²⁷ Fairweather and Eccles, men of the ‘pioneer’ era, nonetheless guided the Survey Department for almost half of the full period of colonial rule. A second notable ‘phase’ in cartographic careering comes with the post-war cohorts of colonial civil service recruits, many of whom continued to work in government, global governance, or NGOs after independence. Their careers form part of the continuity between colonial and post-

²⁶ MacDonald, *Mapping the World*, 98.

²⁷ Gelfand, *Northern Rhodesia in the Days of the Charter*; Gann, *A History of Northern Rhodesia*.

colonial development practices described by Uma Kothari.²⁸ Thus, the interaction between cartographic biographies and *longue-durée* (trans-regime) cartographic practice begs closer examination.

²⁸ Uma Kothari, 'Spatial Practices and Imaginaries: Experiences of Colonial Officers and Development Professionals', *Singapore Journal of Tropical Geography* 27, no. 3 (2006): 235–53.

Year	Title of Department Head	Director	Major events affecting survey production	Political re-structuring affecting territorial designations
1915	Chief Surveyor (separate of management of Lands) (BSAC)	Otto Beringer (Chief Surveyor in N. E. Rhodesia from 1906)		
1916				
1917				
1918				
1919				
1920				
1921	Director of Surveys and Lands	W. G. Fairweather (worked in the department from 1910-1936)	Initial boom in copper industry	Northern Rhodesia becomes crown colony
1922				
1923				
1924				
1925				
1926				
1927				
1928				
1929				
1930				
1931	Director of Surveys (separate management of Lands)		Great Depression and aftermath	
1932				
1933				
1934				
1935				
1936				
1937	Commissioner for Lands, Mines, and Surveys	L. W. G. Eccles (worked in department from 1912-1949)	Second World War	Commission into amalgamation with Southern Rhodesia
1938				
1939				
1940				
1941				
1942				
1943				
1944				
1945	Director of Surveys and Lands	Sam Turner (worked in department from 1925)	Directorate of Colonial Surveys intervention	Institution of 'Native Trust Land'
1946				
1947				
1948				
1949				
1950				
1951				
1952				
1953				
				Northern Rhodesia joins CAF

Table 6: Mapping and chronologies in Northern Rhodesia, 1915-1955

Thirdly, finding a positive description for the effect of economic interests on cartographic production, has allowed us to connect local histories of mapping to the interests of 'global' corporations and large-scale economic forces. So far, these connections have only been made in the most general of terms. Mike Heffernan has drawn attention to the ways in which imperial-cartography-as-boundary-making was driven by the military protection of competitive economic nationalism in the late nineteenth century.²⁹ Elsewhere, the same phenomenon has been described as the result of the global recession in the 1930s.³⁰ Neither of these have accounted for the cartographic 'filling in' of the bounded politico-economic spaces. I have begun to do so.

The topographic mapping of Northern Rhodesia strongly bore the effects of the development of copper-extraction in the Northwest of the colony. The rise of this industry cushioned the colony from the sharp end of the global recession to a great extent (the survey department felt little direct effect).³¹ The partial insulation from economic recession that was provided by this new industry could be dismissed as exceptional in the periodization of British colonial cartography. However, this Northern Rhodesian atypicality should, in fact, probably be considered *typical*. Each territory within the British Empire saw changing levels of colonial interest and capital investment at different periods (whether for settlement, plantation farming, ranching, or mineral extraction). These changing levels are likely to have produced patterns in mapping that were linked to the prevailing institutional and technological cartographic capacities of the moment of increased influx of capital. Further study to investigate the resonance between the production of mapping across the British African colonies and imperial economic (rather than political) activity would be well merited.

Narratives and values

What is a map worth? In the quote with which I opened the thesis, Hotine (Director General of the Directorate of Overseas Survey from 1946 to 1963) suggested the answer lay somewhere between material considerations and cultural expectations:

²⁹ Heffernan, 'The Politics of the Map in the Early Twentieth Century.'

³⁰ See for example, Neil Brenner, 'Beyond State-Centrism? Space, Territoriality, and Geographical Scale in Globalization Studies', *Theory and Society* 28, no. 1 (1999): 39–78.

³¹ In contrast see the general figures for technical staff in British African colonies. Tilley, *Africa as a Living Laboratory*.

Few... could explain with force and clarity the necessity to map an apparently worthless piece of “bush” *now* in order to get it done in time by painfully slow methods. In time for what?³²

Throughout the thesis we have found new ways to make sense of the divergence between talk of cartographic necessity and conditions under which maps were actually produced. The research has demonstrated that although mapping was considered necessary (broadly), the urgency of a cartographic project depended on both a projected value of a stretch of land, and the time within which that value should be realised. It is with this more subtle understanding of what ‘necessary’ might have meant under different circumstances, that I take one final step out from the archive and critique the theoretical understandings that have typically been used to frame colonial cartography: mapping as a political tool and as the basis for political reasoning.

Recent political theory has emphasized the role of cartography not only in illustrating the rise of the ‘state’ but as one of the conditions of possibility for the emergence of the state as a political form.³³ As Gearóid Ó Tuathail describes it, the state is constituted through cartography ‘in-stateing’ itself in space.³⁴ The emergence of the state has been loosely associated with early modern imperial expansion, which has been described as both a cause and result of cartographic innovation.³⁵ This association between cartography and the state is seen to be reflected by a shift in predominant sites of cartographic production. Through the eighteenth- and early nineteenth- century the centre of cartographic gravity moved from diverse commercial map-houses towards state agencies.³⁶ This shift coincides neatly with phases in political reasoning as identified by Foucault: from eighteenth and early nineteenth century disciplinary forms of rule modelled on the city and authority over individual subjects; towards late nineteenth- and twentieth-century governmental regimes that Foucault characterizes as increasingly bureaucratic and focused on the control of society and territory.³⁷

³² M. Hotine, ‘Survey for Colonial Development’, *Survey Review* 10, no. 77 (1950): 291.

³³ Elden, *The Birth of Territory*; Branch, *The Cartographic State*.

³⁴ Tuathail, *Critical Geopolitics*, 12; Biggs, ‘Putting the State on the Map.’

³⁵ Branch, ‘“Colonial Reflection” and Territoriality’.

³⁶ Branch, *The Cartographic State*, Ch 8.

³⁷ Hannah, *Governmentality and the Mastery of Territory in Nineteenth-Century America*; Barry, Osborne, and Rose, *Foucault and Political Reason*.

Where followers of Foucauldian grand narratives invoke empirical evidence to explain the role of cartography in colonial projects, they often return to a few celebrated examples, notably the mapping of India and the United States of America, where particularly systematic methods and projects were put in place. However, David Scott, Kapil Raj, and others have warned us of the perils of overstating the reach (and even ambition) of colonial governmentality.³⁸ The case of Northern Rhodesia, potentially paralleled across British African colonies, suggests that the oft-cited instances of colonial cartography that support these grand narratives might, in fact, be exceptional.

As we have seen throughout the thesis, the challenges of ‘producing’ a colonial polity, where there was none, was not only met by forcing African people and landscapes into new ‘orders’ that were defined by maps. They were also addressed by stretching colonial cartographic terms and practices to the limits within which they could continue to cohere. The thesis has begun to outline how European cartography might have *failed to be considered effective* for government in Northern Rhodesia by virtue of its technical and epistemological irrelevance to prevailing conditions.

Although it has become commonplace to understand the colonial state as “inherently contradictory” (balancing capital and class, metropolitan and imperial interests, diverse social relations of production and trade, and as predicated on alliances with pre-existing authorities) the influence of these contradictions on the deployment of cartography had still to be considered.³⁹ Yet we have discovered the benefits of framing the history of colonial cartography within these *contradictory and tactical* aims and regimes. And when we cease to constrain the historiography of colonial cartography within the narrative of ‘exclusive states’—for Jordan Branch this frame of reference is valid from the nineteenth-century to the 1980s—we might see alternative or parallel genealogies for the contemporary diversification of cartographic authorship. We can see that project-based, economically interested, ‘stop-and-go’ mapping constituted *the majority* of global cartographic activity in the twentieth century.⁴⁰

The historiography of colonial cartography is of particular importance now, as the global land grab provides new impetus for the inscription of territory and land use,

³⁸ Scott, ‘Colonial Governmentality’; Raj, ‘Relocating Modern Mapping.’

³⁹ Cooper and Stoler, ‘Between Metropole and Colony: Rethinking a Research Agenda’, 20.

⁴⁰ Branch, *The Cartographic State*, 387–388.

and the reorganization and coordination of those inscriptions at a global level.⁴¹ Although the uneven nature of global geographic knowledge is recognised, these processes are still usually predicated on perceptions of ‘normal’ levels of knowledge that remain hegemonic, despite contestation.⁴² For either historical or contemporary cartography to be used as evidence in contemporary debates about ownership of land, use of land, and—in the case of environmental degradation—*responsibility* for land, it is essential to understand the contexts from which broader or denser areas of mapping have emerged. We need to be wary of how the rhetoric of rationality or holism informs our interpretation of apparently centralized and homogeneous statal cartography.

With these in mind, I propose three particular lines of research that appear to need attention. Firstly, how did different forms of settlement and economic expectations for a colony affect its cartographic output? The study of the cadastral map by Roger Kain and Elizabeth Baigent, lays out in exquisite detail the diverse methods and historical conditions within which cadastral mapping developed, however these are united under the umbrella of ‘the state’.⁴³ What vocabulary can we find to differentiate between the hybrid (*de jure* as well as *de facto*) forms of property regime and their effect on cartographic production more broadly? Secondly, can we identify more general patterns in the use of cartography within the political strategies of indirect rule? As mentioned above we have found indicative evidence that links the use of *ulendo* as a political technique and cartographic production, but a great deal more could be learned about the relationship between the institution of the ‘District Officer’ and the texture and grain of geographical ‘inscription’.

The third line of investigation would be to understand the processes through which cartographic documentation became a form of evidence and argumentation that was used by the colonised, particularly in a legal context. In 1949, in a dispute with Chief Muchila, Chief Mapanza asked the District Commissioner, Mazabuka, to “send a Map here, and the District Officer”, so they could “make out the proper boundary” in Kabanze.⁴⁴ Chief Muchila’s men in Kabanze, dissatisfied with the outcome went to

⁴¹ Tania Murray Li, ‘What Is Land? Assembling a Resource for Global Investment’, *Transactions of the Institute of British Geographers* 39, no. 4 (2014): 589–602.

⁴² Laura Silva-Castaneda, ‘In the shadow of benchmarks. Normative and ontological issues in the governance of land’, *Environment and Planning A*, Forthcoming.

⁴³ Kain and Baigent, *The Cadastral Map in the Service of the State*.

⁴⁴ Chief Mapanza to District Commissioner, Mazabuka, ‘Dispute with Chief Muchila (i)’, 30 April 1949, SP4/12/10, NAZ.

consult a solicitor in Livingstone.⁴⁵ A better understanding of the emergence of cartography as a means of arguing customary land claims could, perhaps, contribute to the administration of contemporary decisions.

To conclude: seeing governmental maps as homogenizing a political space prevents us from considering the diversity of purposes they served. It is no longer novel to think of maps as a means of making claims, but we have not, thus far, been sufficiently clear-eyed about the claims that *were* being made by colonial maps. I have framed Northern Rhodesian mapmaking within a broader range of contexts, and from the perspective of a wider group of actors. I have demonstrated that mapping was encumbered with material commitments and cultural significance inherited from the metropole. These sometimes advanced and sometimes hindered colonial ambitions. Such encumbrances were variably adapted and ignored by those in the field, creating highly localised cultures of production and use. By interrogating those cultures within the model of a cartographic economy, and by considering their value, I have shown that maps were often only one of a range of available tools that could be used to gain advantage in dynamic processes; that knowledge was not co-extensive to political authority; and, that in the midst of contestations to achieving socio-economic dominance, particular kinds of territorial *ignorance* were sometimes a more powerful strategy.

⁴⁵ District Commissioner, Namwala to District Commissioner, Mazabuka, 'Dispute Muchila-Mapanza', 6 July 1949, SP4/12/10, NAZ.

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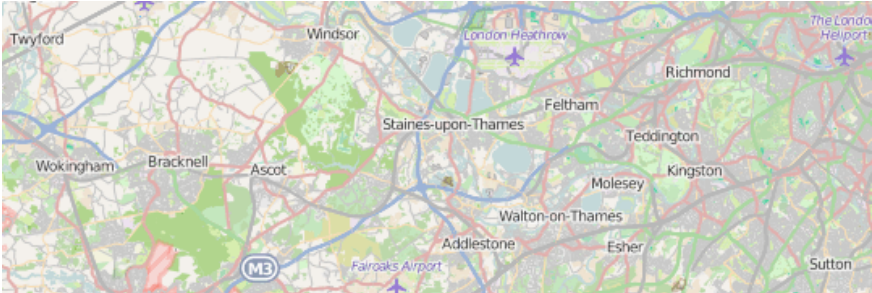
APPENDIX 1: EXAMPLES OF MAP SCALES

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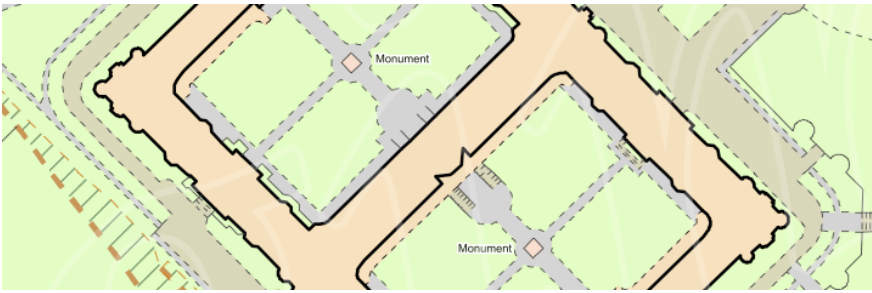
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APPENDIX 2: Folded Map No. 1

Chief Surveyors' Department , '*NW21: Chilanga*', Northern Rhodesia Provisional Series, 1:250,000. Northern Rhodesia: Survey Department, Northern Rhodesia, 1920. Held at RGS mr Zambia G.7.

Found in front pocket.

APPENDIX 3: Folded Map No. 2

British South Africa Company, '*Map of Rhodesia and Adjoining Territories*', 1:3,000,000.
London, UK: Waterlow & Sons, 1935. Author's own collection.

Found in back pocket.

APPENDIX 4: Folded Map No. 3

Ian Mackinson et al., '*Map of Mongu-Lealui District, Barotse Province*', 1:250,000.
Sunprint of hand-drawn map, 1954. Author's own collection. Reproduced with kind
permission of I. Mackinson.

Found in back pocket.