

DESICCATION AND DOMINATION: SCIENCE AND
STRUGGLES OVER ENVIRONMENT AND
DEVELOPMENT IN COLONIAL GUINEA*

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CONCERN about desiccation – the effects of deforestation on climate and soils – was an early and pervasive theme in colonial science, present at the onset of West Africa’s colonial era and with roots in previous centuries.¹ As a set of scientists’ ideas linked to soil and forest conservation policy, the impact of desiccationism was initially muted, struggling unsuccessfully in nascent administrations with more pressing political and administrative agendas. But by the end of the colonial period it can be argued that anxiety about desiccation had become a cornerstone of development practice and state penetration. This article uses a case study to consider the transformation of the status of the ‘science’ of desiccation within colonial development agendas, the responses this transformation eventually provoked and its enduring legacy.

Our reflections here complement what has, in West African studies, become a general consensus about shifts in colonial forest policy. From the outset, many colonial administrations – both francophone and anglophone – were concerned both about the effects of forest loss on climate, hydrology and soils, and about the effects of ‘irrational and wasteful’ exploitation of forest as an economic resource. But early policy imperatives to establish reserves either failed to reach the implementation stage or could not be implemented due to the resistance they engendered, both from populations and indeed from agricultural or political administrations. A significant phase of reservation, at least in West Africa’s humid forest and transition zones, began only in the late 1920s and early 1930s, and was pursued until the mid 1950s by colonial states which increasingly gained the strength to impose unpopular policy despite resistance.² From this perspective, and given that

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¹ R. Grove, *Green Imperialism* (Cambridge, 1995).

² R. Grove, *Ecology, Climate and Empire* (Cambridge, 1997); J. Fairhead and M. Leach, *Misreading the African Landscape: Society and Ecology in a Forest-Savanna Mosaic* (Cambridge, 1996).

nationalist sentiments in pre-independence struggles were often pitted against repressive colonial forest services, it could be hypothesized that independence would bring regimes more responsive to local concerns and more likely to heed resistance. Yet such a view, focusing simply on state capacity in changing political contexts, overlooks qualitative changes in the configuration of science-policy relationships within the state, a reconfiguration that it is necessary to grasp if we are to understand how post-colonial forest policy was less a rupture than a continuation or, indeed, reinforcement.

DESICCATION AND COLONIES IN WEST AFRICA

In the first decades of the colonial period, a particular set of ideas concerning desiccation became firmly established within forestry science and forest policy circles in each colony in humid West Africa. Those involved came to share the general view that deforestation and the de-wooding of savannas led to decreased local rainfall and to disruption of hydrological cycles and downstream water flow. It led to soil degradation, with the loss of vegetation cover and over use leading to reduced organic matter and soil humidity. In response, there was a considerable coherence in policy across the region to reserve upwards of 20–30 per cent of the humid forest as reserves, an amount considered sufficient to stabilize rainfall in these regions, and to site many forest reserves to protect river headwaters or to form a curtain on the northern margins of the humid forest region to protect it from anticipated desiccation and savannisation. That a conformity of analysis and policy aims emerged across West Africa reflected both the adoption of well-established ideas already prevalent outside West Africa and the ‘small world’ of forestry science and policy in the region.

Many of the scientists who came to observe and work in West Africa at the start of the colonial period were already strongly influenced by desiccationist ideas. In his analysis of forest issues in Côte d’Ivoire, Chevalier for example quoted extensively from Poivre’s eighteenth-century assertions that deforestation was leading to desiccation in Mauritius.³ Moloney, in one early influential publication, interpreted phenomena that he considered indicative of deforestation-led desiccation in Sierra Leone, Ghana and Nigeria in the light of Alexander von Humboldt’s early nineteenth-century analysis and the apparent experience of other British colonies with deforestation and desiccation.⁴ Thompson, in his analysis of Ghana, cited a study by Walter on forest cover and rainfall, also in Mauritius.⁵

More significantly, most early British foresters in West Africa had been schooled in the forest departments of India and Burma which, as Grove has

³ A. Chevalier, *Les végétaux utiles de l’Afrique tropicale française : Première étude sur les bois de la Côte d’Ivoire* (Paris, 1909), 4.

⁴ A. Moloney, *Sketch of the Forestry of West Africa with Particular Reference to its Present Principal Commercial Products* (London, 1887), 237–42.

⁵ H. N. Thompson, *Gold Coast : Report on Forests*. Colonial Reports – Miscellaneous, no. 66. (London, 1910), citing the ‘notes’ section of *Nature*, 78 (1908), 608–12, which summarizes A. Walter, *Influence of Forests on Rainfall and the Probable Effect of Déboisement in Mauritius* (London, 1908).

demonstrated,⁶ had become central to inquiry into and orthodoxy about the impact of deforestation on climate in the nineteenth century. H. N. Thompson, the first trained forester in the Nigerian Forest Department, had earlier worked in India and Burma. Thompson was then employed to detail Ghana's forests in 1908, and once he had drawn up outlines for a forest service and legislation in Ghana (based on Nigerian and Indian legislation), he helped appoint the Indian-trained McLeod who had worked with Thompson in Nigeria to head it. As Ghana's forest department grew, the trained foresters it hired – Chipp, Gent, Moor – had all trained and served earlier in India or Burma. Indeed, Thompson specifically recommended recruitment from India. It was the second of Thompson's early subordinates in Nigeria (and his eventual successor), Unwin, also with experience in India, who was sent to detail Sierra Leone's forests in 1909 and to outline the problematics and plans for a forest department there.

This 'small world' of early British forestry and policy in West Africa is mirrored in French colonies. Between 1900 and 1913, Auguste Chevalier made extensive tours of Guinea, Côte d'Ivoire, Togo and Dahomey, and the consistency of his ideas about desiccation in his reports became the basis for common analysis in each of these countries, linked within the colony of French West Africa (Afrique Occidentale Française, AOF). Chevalier came to head both the *Laboratoire d'Agronomie Coloniale* from 1911, and the *Mission Permanente des Cultures et Jardins d'Essais Coloniaux* was soon established for him. He was not modest when he claimed that it was his students who authored the pioneering works on forest botany and ecology in West Africa: Fleury and Portères for Côte d'Ivoire, and Hédin for the Cameroun.⁷

There were links across the French and British forestry services from earliest times. Thus, for example, Chevalier visited Thompson in Nigeria in 1905 and they visited the botanical garden and Olokomeji forest reserve together.⁸ Thompson counted Chevalier as a friend.⁹ Moreover, some British foresters, including Lane-Poole, had been trained at the French Imperial School at Nancy. He had been commissioned in 1911 by the Sierra Leone Colony to prepare a report on the forests of Sierra Leone for the study conducted by Unwin two years previously.¹⁰ He went into greater detail concerning the desiccation effect of deforestation there.

Grove, who details the nineteenth-century links between French and British 'typologies of anti-desiccation forest policy', suggests that they were 'so closely interrelated that they can be said to have constituted a single ruling philosophy, rather than two separate traditions'.¹¹

These links between British and French colonies facilitated the early scientific depiction of West African vegetation. In various works between 1900 and 1933, the botanist Chevalier brought many of these together into a

⁶ Grove, *Ecology, Climate and Empire*, 5–36, 66–85.

⁷ A. Chevalier, 'Le territoire géobotanique de l'Afrique tropicale nord-occidentale et ses subdivisions', *Bulletin de la Société Botanique de France*, Séance du 13 Janvier 1933, 9.

⁸ Chevalier, *Les végétaux utiles*, 22.

⁹ Thompson, *Gold Coast: Report on Forests*, 69.

¹⁰ C. E. Lane Poole, *Sierra Leone: Report on the Forests of Sierra Leone* (Freetown, 1911).

¹¹ Grove, *Ecology, Climate and Empire*, 30.

general description of West Africa's vegetation zones.¹² These zones provided a basis for conceptualizing how people were, through farming and fire-setting, modifying the region's supposed 'natural' vegetation, converting dense humid forest to progressively drier forms. Devegetation was seen either to threaten climatic conditions or already to have altered them. For instance, early foresters and botanists considered the savanna areas on the northern margins of the forest zone to be bio-climatically capable of supporting forest, and thus assumed that forest had once existed, having since been savannised through inhabitants' farming and fire-setting practices, and that forest might have existed even further north in areas currently too dry for it, with forest and the climate to support it having disappeared together. This was the analysis of Unwin and Lane-Pool in Sierra Leone, Chevalier in Côte d'Ivoire, Thompson and Chipp in Ghana, and Chevalier in Dahomey, for instance.¹³ The work of Aubréville which correlated specific climates to specific forest types across Africa helped to formalize these speculations, purporting to give a precise delimitation of this ex-forest zone within the savannas.¹⁴ It is this zone which became popularly known in anglophone circles as 'derived savanna', later appearing as such in the descriptions of Keay, Clayton and Hopkins.¹⁵ Unwin's assertion that forest cover increases rainfall in a locality by 16–28 per cent 'according to the figures of Indian rainfall statistics' can be taken as representative of foresters' beliefs at this time.¹⁶

As Hall notes for Ghana, the belief of foresters in the ability of forest to ameliorate the climate amounted to religious dogma.¹⁷ Today, ecologists have become far more sceptical of the capacity of forest to improve rainfall, at least in West Africa. Although not the subject of this paper, these desiccationist ideas have long been called into question, throwing into even sharper relief the discursive nature of their truth.¹⁸

¹² A. Chevalier, 'Les zones et les provinces botaniques de l'Afrique Occidentale Française', *Comptes Rendus des Séances de l'Académie des Sciences*, 130 (1900), 1202–8; A. Chevalier, 'Essai d'une carte botanique forestière et pastorale de l'A.O.F.', *Comptes Rendus des Séances de l'Académie des Sciences*, 152 (1911), 1614–7; A. Chevalier, *Exploration botanique de l'A.O.F.* (Paris, 1920); A. Chevalier, 'Le territoire géobotanique'.

¹³ In addition to the reports already cited, see A. H. Unwin, *Report on the Forests and Forestry Problems in Sierra Leone* (London, 1909); A. Chevalier, *Rapport sur une mission scientifique dans l'ouest Africain (1908–1910)*, Missions scientifiques (Paris, 1912); T. Chipp, *The Forest Officer's Handbook of the Gold Coast, Ashanti and Northern Territories* (London, 1922); T. Chipp, 'The Gold Coast forest: a study in synecology', *Oxford Forestry Memoirs*, 7, 1927.

¹⁴ A. Aubréville, 'La forêt coloniale: Les forêts de l'Afrique occidentale française', *Annales d'Académie des Sciences Coloniales*, 9 (1938); A. Aubréville, *Climats, forêts et désertification de l'Afrique tropicale* (Paris, 1949).

¹⁵ R. W. J. Keay, *Vegetation Map of Africa South of the Tropic of Cancer* (London, 1959); R. W. J. Keay, 'Derived savanna – derived from what?', *Bulletin de l'Institut Français d'Afrique Noir*, Série A, 2 (1959), 427–38; W. D. Clayton, 'Derived savanna in Kabba Province, Nigeria', *Journal of Ecology*, 46 (1961), 595–604; B. Hopkins, *Forest and Savanna* (London, 1965/1974).

¹⁶ A. H. Unwin, *West African Forests and Forestry* (London, 1920).

¹⁷ J. B. Hall, 'Conservation of forest in Ghana', *Universitas*, 8 (1987), 37.

¹⁸ See P. W. Richards, *The Tropical Rainforest*. (2nd ed., Cambridge, 1996), 202–4.

DESICCATION AND SCIENCE-POLICY PROCESSES IN GUINEA

The scientists who imported and developed ideas about climate, soils and vegetation into the French colony of Guinea in the first decades of the twentieth century generally did so as consultants, frequently sent by the administration of AOF to visit and advise administrators alongside other missions, such as those establishing economically-focused botanical gardens. It was in such a capacity that the botanist Chevalier, for example, made systematic visits to district administrations between 1900 and 1912. His reports emphasized the importance of preserving remaining patches of forest, both because of their effects in conserving rainfall regimes and for their economic resources – especially wild rubber which was becoming a key colonial export product. His report on the vegetation of Kissidougou in the forest-savanna transition zone, for instance, considered it a model for the country:

The province of Kissi seems to us to fulfill currently what one must endeavour to obtain in all of Guinea. The managed forests there cover a rational area and alternate with de-wooded savannas and lands reserved for crops. Thanks to these forests the rainfalls are regularized, the agricultural lands are maintained and the indigenous inhabitants find... quantities of resources which do not exist in the bush in the strict sense of the word.¹⁹

Yet here, as elsewhere, forests were seen to be seriously threatened by shifting cultivation for upland rice and by the bush fires set by local populations for farming and other purposes.²⁰ Scientific consultants advised on measures to address these problems: restrictions on the setting of bush fires, and on ‘destructive’ shifting cultivation and the establishment of forest reserves.

But in these early periods, such scientific and environmental concerns were often at odds with those of a political administration just beginning to claim control within rural areas. *Cercle* administrators generally considered their staff and influence too weak for restrictions on fire-setting to be remotely feasible. Token measures to restrict shifting cultivation were sometimes taken – in Kissidougou, for example, by fining village chiefs²¹ – but were generally ineffective. Furthermore, having in many cases gone to great lengths to install compliant local chiefs and relying on them for the administration of taxes and the recruitment of *corvée* labour, administrators were generally unwilling to risk sacrificing their co-operation. In this context, both national and *cercle* administrators tended to consider reserve proposals as inadvisable. For example, the administrative response in 1905 to Chevalier’s proposed forest reserves in Fouta Djallon (the region which led the development of Guinea’s environmental policy) was very negative:

When it comes to obtaining the benevolent agreement of inhabitants to assist us in securing the reserve against depredations, one can hardly count on it. The chiefs

¹⁹ Archives Nationales de Sénégal, Dakar (ANS), 1G276: A. Chevalier, ‘Rapport sur les nouvelles recherches sur les plantes à caoutchouc de la Guinée française’, 1909.

²⁰ Archives Nationales de la République de Guinée, Conakry (ANC), 1R12: Nicolas, ‘Etat de cultures indigènes’, Aug. 1914.

²¹ ANC, 2D175, Administrateur du Cercle de Kissidougou, rapport agricole du 4^e trimestre, 1911.

will promise in good faith, perhaps; they will not be obeyed; bush fires will be lit as usual, cattle will continue to graze customary pasture and if the inhabitants emerge from their passivity their action will translate into regrettable excess as the police force is hardly organized and the chiefs cannot count on exemplary repression to obtain by terror an obedience refused on their prestige alone. I therefore predict insurmountable difficulties and insurmountable complications if one adopts the project of M. Chevalier.²²

Seemingly, scientific imperatives had to be tempered to respond to political circumstances. Colonial conservation which had initially come in with more globalized land use plans was forced to adapt to Guinea's local administrative agendas. Local administrators either had views at odds with those articulated by the likes of Chevalier or at least relegated the importance of such views in accordance with the impossibility of implementation.²³

These forestry policies, weakly implemented if at all, had little significant impact on local populations.²⁴ Local populations felt the impact of the colonial administration mainly in terms of the extraction of produce taxes and labour for portage and military purposes. Certainly, these are the issues emphasized in oral accounts from Kissidougou which refer to the first decades of the twentieth century. As the district chief of Lokongo, in Lele country, put it: 'once the wars finished and the white people came, it was the problem of taxes which made us suffer, and the calling of our young men from the rice fields for *corvée*'.²⁵ Reflections on forest-related activities by the colonial administration at this time – except for exhortations to plant rubber – are notable for their absence, at least from the accounts we heard.²⁶

Colonial agricultural administrators also considered certain conservation agendas to contradict those of their own nascent department. Their development agendas focused on rebuilding regional food production following the disruption of late nineteenth-century and colonization-related warfare. In rice areas, for example, they were concerned to avoid measures that might discourage rice production. For instance, Brossart, the first director of Kissidougou's agricultural research station, acknowledged the threat that upland cultivation posed to forest patches but argued that conservation should be approached not through reservation, but through supporting two existing alternatives to upland rice cultivation. First, the positive incentive of rising rubber prices, it was thought, would induce farmers to abandon upland rice in favour of growing more rubber; second, indigenous wetland rice cultivation was already practised effectively and could be actively encouraged.²⁷ Concern at the threat to its independence partly underlay the

²² ANC, 2G276, Letter from Cabinet Inspection de l'Agriculture to Monsieur le Gouverneur Général, Gorée, Dakar, 2 Dec. 1905.

²³ For Ghana, see Grove, *Ecology, Climate and Empire*, 147–78.

²⁴ See Fairhead and Leach, *Misreading the African Landscape*, 237–48.

²⁵ Interview, Yirassy Camara, 9 Sept. 1992, in Lokongo village, Kissidougou prefecture.

²⁶ Fieldwork was conducted on the history of land management in Kissidougou prefecture between 1992 and 1994, and again in 1996 and 1999. Interviews were conducted as part of anthropological fieldwork and more than 120 formalized interviews in 38 villages were recorded; see Fairhead and Leach, *Misreading the African Landscape*.

²⁷ ANC, 1R12, Brossart, Service de l'Agriculture de Kissidougou, rapport juillet, 10 Aug. 1910.

repeated arguments of the agricultural administration that forestry should remain under its administrative control and that forest agendas should therefore remain subordinate to those of agriculture.²⁸

Agricultural agendas gained further ascendancy within colonial development following the First World War when the national agriculture service began a series of attempts at large scale agricultural modernisation. These focused both on the settler plantation economy centred around Kindia and Boffa and in the forest region and savanna plains on large-scale plough-based schemes for wetland rice.²⁹ Amid these concerns, forest conservation agendas were again highly marginalized. The first full-time forestry personnel arrived in Guinea in 1926, but were initially posted to the railway service where forestry attention was concentrated on supplying timber for sleepers and charcoal for fuel and also on protecting vegetation from fire caused by sparks.³⁰

From the early 1930s, seeds were sown for significant changes in the relationship between desiccation science and colonial development. This potential change was linked to the establishment of Guinea's national *Service des Eaux et Forêts* in 1931, and – as was the case for similar nascent forestry services across West Africa at this time – the institutionalisation within it of prevailing scientific ideas about vegetation, climate and soils. As we shall discuss, a nexus of scientific thinking, practical policies and administrative imperatives emerged during this period, linked together essentially by desiccationist logic. Yet a number of factors were to limit its impact on the ground, both by comparison with some other West African countries and certainly by comparison with what was to transpire in Guinea after the Second World War. The implementation of anti-desiccation policy was to founder in the face of state and local opposition.

The heads of these new forestry services, if not actually scientists themselves, maintained much closer advisory links with scientists than had earlier administrators. Thus the head of Guinea's newly created service drew explicitly on Chevalier's ideas about the links between savannization, bush fire and soil erosion during his initial assessment tours.³¹ In the forest region, alarm about deforestation was now starting to be expressed in terms of the implications for the tree crops – coffee, cocoa, kola – grown in forest patches there. Fears were expressed that along with its forests, the region was losing its forest climate and thus its future potential to produce these forest crops, which in Guinea – rather later than in neighbouring Côte d'Ivoire and Ghana – were starting to contribute to a valuable export trade. The forestry service in its annual reports argued forcibly that forest reserves needed to be established, especially in a 'curtain' along the northern margins of the forest zone so as to inhibit the southwards spread of savannas.³² Thus were scientific logics concerning the southwards shifting of ever-drier vegetation zones inscribed into reserve plans.

²⁸ For example, ANS, 2G13(1), Guinée Service de l'Agriculture et des Forêts, Rapport Annuel, 1913.

²⁹ Kair, Mission de contrôle, Service de l'Agriculture, 1927, Archives Nationales d'Outre Mer (Aix-en-Provence), Series Direction Contrôle, 930-1.

³⁰ I. K. Diallo, *Historique et évolution de la foresterie guinéenne* (Conakry 1989).

³¹ ANS 2G32(70), Guinée Service Forestier, rapport annuel de fin d'année 1932, programme 1933.

³² *Ibid.*

A number of such curtain reserves were designated, including Ouladin and Selly-Koro in the Cercle of Kissidougou in 1932³³ and the larger Ziama reserve in the Cercle of Macenta ‘of which the climatic effects are indisputable’.³⁴ The botanist Adam, who was responsible for the reservation of Ziama, justified this on the basis of his analysis of progressive savannization of the area’s forests as Maninka farmers, assumed to use forest-destructive agricultural technologies, migrated southwards into the forest zone. He argued that ‘the advance of the savanna, which is an evident fact, could be prevented in this region’.³⁵ In establishing reserves, the Guinean administration drew on the principle in operation throughout French West Africa at the time that the state was entitled to claim into its domain lands anything that could be deemed ‘*vacant et sans maître*’. Local rights to fell trees, set fires and farm were removed. But these policies encountered considerable local resistance and non-compliance.³⁶ Around Selly-Koro, elders in the village of Bagbe recall with bitterness the reservation of land in their territory on hydrological grounds; land which, in their interpretation, was fallow land controlled by village families and was in any case far from fully forested:

The white people said not to cultivate on the mountain there; that was the limit of the forest. If the forest goes one will suffer, and the swamps will dry up – that is what those who reserved the forest said... But at the time that they named it a *forêt classée*, there wasn’t forest in this [lower] area; here it was cane grass [*Andropogon gayanus*].³⁷

In the case of Ziama, too, many families around the reserve claimed rights and political authority over land within it on the basis of their ancestors’ cultivation there during the nineteenth century when this was a heavily-populated forest-savanna mosaic.³⁸ These local interests in reserved land and resources, whether political or economic, gave rise to ‘encroachments’. The nascent forestry service found these very difficult to prevent, given its highly limited personnel. Forestry was not deemed a staffing or budgetary priority by the central colonial administration. In 1932, Guinea’s four forestry inspections had only four forest guards between them so policy implementation relied on the *gardes de cercle* who were already overburdened with other activities and agendas. In the case of Ziama, local conflict proved such that by 1942 the reserve boundaries had to be re-drawn to allocate more cultivable land in the vicinity of villages.³⁹

Further north, fire-induced vegetation change was now seen to be threatening not only local climate, hydrology and land productivity, but also the downstream flow of the major rivers such as the Niger which took their

³³ Archives, Direction Nationale des Forêts et de la Faune, République de Guinée (ADNFF), Arrêté No.1.387 A/E; Conakry, 28 July 1932.

³⁴ ANS 2G32(70), Guinée Service Forestier, rapport annuel de fin d’année 1932, programme 1933.

³⁵ ADNFF, rapport de M. Adam, 1942, sur le projet de reclassement du forêt du Ziama.

³⁶ ADNFF, Procès Verbal de la Commission de Classement de la Forêt de Selly-Koro, Inspection de Haute Guinée, Cercle de Kissidougou, 1950.

³⁷ Interview, Sayon Mansare, 24 June 1993, Bagbe village, Kissidougou prefecture.

³⁸ J. Fairhead and M. Leach, ‘Contested forests: modern conservation and historical land use in Guinea’s Ziama reserve’, *African Affairs*, 93 (1994), 481–512.

³⁹ ADNFF, rapport de M. Adam, 1942.

sources in Guinea's 'chateau d'eau', and upon which livelihoods depended. Hence in 1934, plans were outlined for a programme to protect and rehabilitate the flow of the Niger river by rewooding what were seen as its degraded and degrading upstream catchment areas.⁴⁰ However, this programme also foundered in the face of limited budget allocations and failed to receive funding at this stage.

The forestry service also had limited success in implementing bush fire policies and in its more general attempts to regulate farmers' land and tree management. In the absence of dedicated forestry staff, regulation of bush fire – which by 1935 was supposed to combine prevention of all 'wild' fires with the controlled and early application of fires deemed useful, such as in farming⁴¹ – relied on implementation through the canton chiefs, who were answerable and fineable for contraventions in their territory. But with only the *gardes de cercle* to rely on, the *cercle* administration was in no position to enforce these regulations nor the various other restrictions placed on forest felling at this time.

Compounding these problems of policy implementation in the face of local resistance were continuing tensions between forest conservation and other policy objectives. These tensions sometimes led local administrators to remain inactive in the face of contradictory instructions. When addressed head-on, it was usually agricultural concerns which predominated. Thus many *commandants de cercle*, in the face of pressures from agricultural development and tax collection needs, chose to interpret the 1935 bush fire decree as legitimizing all bush fire for pasture and field preparation – contrary to the interpretations of the forest service.⁴² The forest service also considered that land tenure laws worked against forest conservation, especially in enabling settlement and farming in the forest region by Maninka immigrants from areas further north. In line with the analyses of scientists such as Adam, foresters generally considered Maninka as 'savanna people' whose practices were considered to provoke savannization. But while the forest service pushed for greater direct state intervention in land tenure and use, such an overhaul proved impossible given competing pressures from the Agriculture Service and civil administration to maintain the status quo.⁴³

DESICCATION AND DOMINATION

In contrast with earlier decades, the late 1940s and 1950s witnessed a transformation in which environmental policy concerns, and concerns about desiccation within them, came to occupy a central prominence. In this transformation, the relationship between science and administration was crucial. Scientific analyses did not show any major discontinuity – quite the contrary, similar desiccationist arguments were reiterated and strengthened during the 1950s. But this happened in such a way as to allow science to come to constitute development in newly authoritative ways. And whereas earlier conservation had had to respond to local resistance, by the 1950s it could

⁴⁰ ANS 2G32 (70), Guinée Service Forestier, rapport Annuel de fin d'année, 1934.

⁴¹ 'Service de l'Agriculture, Rapport Annuel 1945', Institut de Recherche en Agronomie Tropicale, Paris (IRAT); Sudres, 'Quelques notes sur la region forestière de la Guinée française', IRAT, c. 1935.

⁴² *Ibid.*

⁴³ ANS 2G32(70), Guinée Service Forestier, rapport annuel de fin d'année, 1932.

afford to ‘forget’ these lessons or to ride more roughshod over those sensitivities, while it also found alliances with certain local agendas and elite perspectives.

This transformation in the status of conservation science in colonial development in the post-Second-World-War era was influenced by a number of linked phenomena. Here we outline several state–science relationships before going on to suggest how, in this context, interactions between aspects of state and local discourse also served to reinforce the place of desiccationism within development.

Of the intra-state phenomena, first was the legacy of the war itself. The war effort had created both imperatives and opportunities to make exacting demands on rural populations, both in labour and in requisitioned products. *Cercle* administrators, via canton chiefs, extracted wartime rice and palm oil quotas at artificially low prices, and elders remember this as a period of heavy taxation, poverty and hunger, leaving, it seems, a legacy of increased bureaucratic control. While felt throughout the colonial state, this greater ability to extend bureaucracy into rural areas also extended to the agricultural and forestry administrations.

Second and relatedly, the forestry service experienced a significant increase in personnel and administrative capacity. Regional forestry inspectorates were allocated greater resources and were able to employ several forest guards within each *cercle*. The *cercle* of Kissidougou, for example, had eight forest guards and one auxiliary by 1953.⁴⁴ For the first time, this allowed the sustained and systematic implementation of environmental policies and programmes which had long been on the agenda. Modes of implementation were, moreover, explicitly repressive. As in other French colonies, the forest service in Guinea was modeled along military lines, a fact not unconnected with the availability of many decommissioned soldiers following the Second World War. The national director of the forest service in 1951 urged forest guards to act as a ‘repressive police force’ and to use draconian military methods.⁴⁵

Third, and perhaps most significantly, there were new configurations in the production of scientific knowledge for policy. From a handful of scientific consultants and then the heads of struggling forestry administrations, the scientific enterprise had by the late 1940s enlarged considerably. It included forestry and agronomic research centres such as the *Centre de Recherche Agronomique* at Sereidou in the forest region. It included students of these centres and of foreign universities carrying out studies and writing theses under the direction of key scientific figures such as Chevalier, Aubreville, Adam and Schnell. These botanists were now in senior positions, both administratively and intellectually. They had produced major works, such as Aubreville’s *Climats, forêts et desertification de l’Afrique tropicale*, which became the authoritative texts in training foresters and botanists and in setting the parameters by which West African environmental change was to be understood more generally. Those informed by such works included the

⁴⁴ ANS 2G53(42), Service des Eaux et Forêts et Chasses, rapport annuel, 1953.

⁴⁵ R. Rouanet, ‘Rapport sur la Guinée Française’, Première Conférence Forestière Inter-africaine, Abidjan 4–12 Dec. 1951, deposited in the Direction Nationale des Forêts et de la Faune, Conakry, Guinea.

social scientists and anthropologists recruited through the colonial administration. While anthropologists such as Denise Paulme, researching among the Kissia in the 1940s, did not directly study deforestation, they framed their works on social change on the assumption that it had taken place, for instance portraying the Kissi settlement as immigration into a once virtually uninhabited, fully forested environment.⁴⁶ Colonial science was not, of course, homogeneous. Within the consolidated analyses of the 1940s and 1950s debates certainly existed, but these tended to fine-tune rather than to challenge dominant theories. The precise effects of bush fires, for instance, and the relative appropriateness of 'early burning' versus fire prohibition as a means to control them in different regions of the country were strongly debated without questioning the overarching view that fire was progressively damaging the region's vegetation.⁴⁷ More challenging views – such as those posed in the critical work of Jeffreys – were ignored or ridiculed, as illustrated in cutting remarks penned by French administrators in the margins of the forest service's copies of Jeffreys' paper.⁴⁸

Fourth, supporting the growing authority of scientific arguments within West African colonial administrations was their growing globalization. While global scientific networks had always influenced desiccation debates and while the latter were indeed global in origin and claimed universal relevance,⁴⁹ the late 1940s and early 1950s saw a number of important Africa-wide conferences and other fora in which ideas were synthesized and their importance for development reinforced in unprecedented ways. These included the first inter-African soils conference held in Goma, Zaire in 1948 and the first inter-African forestry conference held in Abidjan in 1951. Such fora urged not only an internationalism in tackling a common crisis but also a new sense of urgency and immediacy, and in some cases they secured development funds to assist. Desiccationist science was thus strengthened not only in its authority, but in its capacity to command administrators' urgent attention.

Fifth, then, other rural development agendas became linked with environmental ones in new and reinforcing ways. In particular, agricultural agendas, which during 1910–35 had been to some extent contradictory to environmental agendas and thus supportive of local resistance to conservation policy, became in large part integrated with or at least subordinated to environmental concerns. The new globalized urgency of desiccation discourse was a major factor in this. Thus the master plan for rural development in the *cercle* of Kissidougou in 1956 stated boldly that 'all must be subordinated to the conservation of soils and forests'.⁵⁰ Changes in agricultural priorities also played a part. By the late 1940s, under the influence of high world market prices, Guinea's forest region was experiencing a major boom in coffee production. The perceived need to maintain humid climates conducive to high coffee yields had impressed upon the agricultural adminis-

⁴⁶ D. Paulme, *Les gens du riz* (Paris, 1954).

⁴⁷ Service de l'Agriculture, rapport annuel, 1945, IRAT.

⁴⁸ M. W. Jeffreys, 'Feux de brousse', *Bulletin de l'Institut Français d'Afrique Noire*, 3 (1950), 682–710. The marginal notes are in the copy in the library of the Direction Nationale des Forêts et de la Faune, Conakry.

⁴⁹ Grove, *Green Imperialism*, especially 309–79.

⁵⁰ ANC 2D431(7), Plan de Cercle pour Kissidougou, 1956.

tration, too, the importance of forest conservation and its links with climate. As Cole, the director of agriculture for the forest region, argued in 1951, 'the dominant agricultural character of the region is forest, and it is important, above all, to protect this natural wealth by growing only profitable tree crops and using them to replace lost forest, thus avoiding a change in microclimate'.⁵¹ Tree crops, the administration's current focus, were seen as compatible with the struggle against desiccation in a way that rice cultivation prioritized earlier was not. Thus contradictions between different departments of the state administration, which had earlier been so significant, were more or less ironed out.

By the late 1940s, scientific ideas about deforestation and climatic change thus gained a new authority and pervasiveness as strengthened forestry services implemented the programmes that science had recommended. In effect, implemented policies embedded scientific ideas concerning desiccation in both law and landscape, contributing to their further reinforcement.⁵² Furthermore, while building on policy ideas that dated from early in the century, they were now put in place with a new scale, scope and lack of compromise. Ironically, desiccationism became a major pre-occupation during what is believed to have been the wettest decade of the twentieth century in this part of West Africa (a belief confirmed by the 1950s rainfall statistics for Kissidougou). This underscores the extent to which policy ideas were responding to institutional circumstances rather more than to physical realities.

The late 1940s and early 1950s saw a major wave of forest reservation in the northern part of the forest region, including many small forest patches too controversial for earlier reservation. Furthermore, several reserves that had been created in the early 1930s were 're-reserved' by the newly forceful regime, with the acknowledgement that earlier forest protection had been ineffective. This was the case for the forest of Selly Koro in Kissidougou prefecture in 1950, for example, where what the administration saw as encroachment, and villagers saw as re-establishing customary land claims, had been extensive. As a forest service commission explained:

The motivations for the Administration's intervention are the same as in 1932. But today it is even more urgent to halt the indiscriminate clearing which has seriously damaged the forest massif since this time, as a result of insufficient surveillance.⁵³

Local inhabitants were 'reminded' of laws inhibiting their clearance of land within the reserve.

The reservation and the reinforced protection of these reserves wrote desiccationist ideas into the landscape. As earlier, many reserves were positioned as curtains to defend the forests against supposed southwards

⁵¹ Archives, Préfecture de Kissidougou, République de Guinée (APK): H. Cole, 'Compte rendu sur le programme du service de l'agriculture en région forestière, la réalisation de ce programme', Circonscription Agricole de la Région Forestière, 2 Oct. 1951.

⁵² J. Fairhead and M. Leach, 'Deforestation in question: dialogue and dissonance in ecological, social and historical knowledge of West Africa – cases from Liberia and Sierra Leone', *Paideuma*, 43 (1997), 193–225.

⁵³ ADNFF, 'Procès Verbal de la Commission de Classement de la Forêt de Selly-Koro, Inspection de Haute Guinée, Cercle de Kissidougou, 1950.

savannization; many were also created or planned around the headwaters of rivers to protect hydrological relations deemed important for maintaining 'normal' river flow. The relationship between forest and climate was inscribed at a more general level in the area of forest that planners aimed to reserve. Throughout West Africa, it became 'a rule of thumb' that in all parts of the forest zone 20 per cent of the area needed to be under forest (and reserved to ensure this) to maintain climatic conditions.⁵⁴ All these arguments, as well as the specific recommendations of the Goma soils conference, underlay the funding in 1950 of the plan first discussed in 1934 to regularize the major West African rivers flowing north from Guinea. In 1950, a very grandiose scheme indeed was proposed. It was envisaged that 15 per cent of the entire upper Niger watershed be placed in large reserves, as well as 30 per cent of the more densely wooded areas to the south. Pilot schemes were launched on the Milo watersheds of the Niger in the Cercle of Macenta, as well as on the Bafing watersheds in the Fouta Djallon. The work was to be done by force until the inhabitants realised the benefits to be gained.⁵⁵ Along with these major schemes, forest guards acted throughout Guinea's rural areas to protect the regime's reserves and implement its rules and sanctions concerning bush fire prohibition and externally-directed 'early burning', and the protection of key tree species from felling and shifting cultivation.

It can be argued that the sum of these transformations was a qualitative change in the relationship between science, policy and practice linked to desiccation. When linked to institutional and bureaucratic forms, the effects of desiccationist thought were now felt deeply in Guinea's rural areas. Attributing these effects to desiccationism rather than to the political economy of control over timber resources is reasonable given that the timber industry was hardly developed and in its existing form experienced few problems of supply. For most rural inhabitants, forestry policies rode roughshod over prior rights and livelihood concerns by imposing prohibitions and fines on local practices involving the management of fire, fallows and land productivity and on the use of plant and animal resources. The forest service came to represent the arm of state bureaucracy with most direct negative influence within remote rural villages.

Oral testimonies from the northern part of Kissidougou – an area where there were not even any major forest reserves – testify to the problematic material effects of desiccation discourse and to the ways villagers responded to them. As an elderly man in the village of Mara recalled, forest guards would pass from village to village during the dry season to fine villagers for setting fires and felling trees. Where no fires were evident, he claimed, guards would set them themselves and then blame villagers. Village chiefs would be approached to pay a lump sum even when fire had clearly originated outside their particular territory and no individual culprit could be found. To deter forest guards from visiting fields, villagers felt obliged to offer generous

⁵⁴ Unwin, *West African Forests and Forestry*, 491–5.

⁵⁵ P. Bonnet and P. Vidal, 'Les premiers travaux du secteur pilote de conservation et d'utilisation des sols du Milo, Guinée Forestière', *Troisième Conférence Inter-africaine des Sols*, 1959, II, (Dalaba: Commission de Coopération Technique en Afrique au Sud du Sahara); P. Vidal, 'Etude agro-écologique des sols de culture du Secteur Pilote du Milo', Seredou, Guinée: Centre de Recherche Agricole de Seredou, 1954.

hospitality and largesse. Whether the payments were official or informal, then, the period is remembered as one of high 'taxes' to the state and of impoverishment. Both in Mara and a little further south in Sandaya and Yomadou,⁵⁶ elders emphasize related difficulties in land management. The carefully placed and timed fire-setting so important to protecting settlements, encouraging woody growth in savannas and ensuring productive farming and hunting could be carried out only in 'secret'. And secrecy and worry, in turn, made it difficult to mobilize the whole village in public action to extinguish those fires which did escape control. Hence in the 1950s, many recall, 'running fire' became a problem for villagers in the forest-savanna mosaic in a hitherto unprecedented way. Equally, the forest department's claims to ownership of a list of 'protected' tree species and prohibition on felling them were implemented in such a way that farmers lost control over the management of their woody fallows. Whether in streamside gallery forests or on certain enriched upland soils, these woody patches in the savanna had been under the tenurial control of landholding families who relied on their rotational farming for rice and intercrops as part of long-term livelihood strategies. Yet in the 1950s gallery forest farming came to require either a permit or extreme secrecy.⁵⁷

While contravening many tenets of local tenure arrangements, ecological knowledge and practice as well as morality, state desiccation discourses accorded in a more complementary way with certain other aspects of local discourse in the late colonial context. One set of supportive links arose around discussions of ethnic identity and migration. As we have seen, scientists since the early colonial period had tended to stereotype the Maninka-speaking inhabitants of Guinea's northern regions as 'savanna people' with more forest destructive farming practices and greater proclivities to fire setting than 'forest people' such as the Kissia, Guerze and Toma. Maninka migration into the forest zone – an ancient tendency in the Guinean region – was conceptually associated with southwards deforestation, savannization and drying-out, as savanna people supposedly transformed the landscapes they found in accordance with those they had left. Very strong scientific statements were made to this effect in the late 1940s.⁵⁸ Such stereotypes bore little relevance to local social and ecological experience. For instance, complex family genealogies and migration histories belie any such clarity in 'Maninka' or 'Kissi' origins and identities, since many individuals are of mixed descent. And within Kissidougou, there are broad similarities in land use practice across the various language groups, with differences responding far more to *in situ* ecological and economic specificities than to any 'ethnic' distinction.⁵⁹ Nevertheless, the notion of Maninka-induced desiccation could provide a discursive vehicle for raising the real concerns people felt, at times, about cultural and economic domination by powerful immigrant strangers, fears heightened in the more dynamic trading context of the late colonial period. These concerns were

⁵⁶ Group discussion with unnamed elders, 21 May 1992, Yomadou village, Kissidougou prefecture, recorded on cassette (Ku6).

⁵⁷ Fairhead and Leach, *Misreading the African Landscape*.

⁵⁸ See, for example, J. G. Adam, 'Les reliques boisées et les essences des savanes dans la zone préforestière en Guinée française', *Bulletin de la Société Botanique Française*, 98 (1948), 22–6. ⁵⁹ Fairhead and Leach, *Misreading the African Landscape*, 176–209.

evident, for example, in the discussions anthropologist Denise Paulme had with her informants in the late 1940s. Through these, 'the Kissia' presented themselves as having a cohesive identity linked both to wet rice cultivation and to their 'sacred forest' institutions and initiation societies which held their activities within the concealment of peri-village forest islands.⁶⁰ They are also echoed in contemporary statements by Kissi-speaking villagers. As one man described, 'We do not have strangers here; the Maninka came but the youth banished them because they were enriching themselves on one hand and distracting the young girls on the other'.⁶¹ In such circumstances, attributions of environment-related behaviour can be a powerful way of emphasizing difference. Interpreted within local conceptual frameworks, statements such as 'everywhere Maninka settle is dry and open'⁶² are idioms signifying the possibility of general loss of human and plant fertility and well-being.

A second set of supportive links concerns the ways that the notion of desiccation could be incorporated within local commentary on socio-economic change and modernity. Breaking key aspects of the moral and political order, especially those surrounding reproductive practices, could, in certain logics, result in drought and infertility. Events which can precipitate climatic disruption include sorcery, breaking of prohibitions concerning the timing and location of reproductive behaviour, felling of particular trees or woodland patches that are the 'homes' of land spirits, and contravention of particular ancestrally-defined rules linked to the maintenance of village moral order.⁶³ Desiccation can thus be a moral issue, and stability in rainfall guaranteed by the powers that be and by sticking to codes of moral conduct. The bringing of humidity to a previously parched, barren land is a central theme in origin stories among peoples across the northern forest and savanna zones, whether the humidifying agent is a termite, the breath of God or a python-spirit, all agents with which people must make and uphold social pacts. In part it is the breaking of these pacts that brings infertility and desiccation.

So whilst there are other frames in which inhabitants of the region consider their impact on humidity and vegetation, including the more pragmatic considerations of the impact of cultivation on soil humidity, water infiltration and vegetation, the externally derived scientific concerns with deforestation-led desiccation could feed into existing moralising discourses and the forms of authority they upheld. Guardians of the moral order, whether chiefs and elders or members of the new formally-educated cadre such as teachers thus found the linkages that the administration made between tree-felling, fire-setting and desiccation credible and useful in contexts of challenges to their moral vision and authority, such as in

⁶⁰ Paulme, *Les gens du riz*, 14–15.

⁶¹ Interview, Yadou Tenkiano, 22 Aug. 1992, Maikoro village, Kissidougou prefecture.

⁶² Interview, Yooya Tolno, 13 Jan. 1993, Fondambadou village, Kissidougou prefecture.

⁶³ For Côte d'Ivoire, see A. Gottlieb, *Under the Kapok Tree: Identity and Difference in Beng Thought* (Bloomington, 1992); for Guinea, Paulme, *Les gens du riz*; Fairhead and Leach, *Misreading the African landscape*; and more generally, A. Jacobson-Widding and W. van Beek (eds.), *The Creative Communion: African Folk Models of Fertility and the Regeneration of Life* (Uppsala, 1990).

lamenting the wayward tendencies of the young. For example, an elderly Kuranko man talked of worsening fire, the drying of water sources and declining land productivity around his village of Yomadou, in north-west Kissidougou, as part of a discourse on the loss of control of elders over youth since his childhood. 'Then, it was the elders who decided how to manage fire – they commanded 'like this, like that' ... today one tells the youth but they do not listen'.⁶⁴

When people did have cause to latch on to desiccationist reasoning (although they might consider the causes and consequences very differently), several aspects of 'experiential evidence' could confirm its relevance in their everyday lives. For instance, the drying-up of particular water sources is one of the most consensual opinions in oral accounts, although unlike most scientists, local people have not linked this fact to generalized deforestation. Thus it appears that in addition to strengthening through transformations within the colonial state and its international relations, desiccation discourse was also influenced by certain state-local and intra-village interactions and experiences. Owing to the way the desiccation logic of colonial conservation could intersect with existing moral discourses and emerging ethnic discourses (as well as with indigenous economic and political interest groups, as Grove highlights in Ghana⁶⁵), it might be overstating the case that colonial forest reservation was a militarized instrument of colonial oppression. To suggest the inverse (as Grove does for Ghana earlier in the century), that 'the general pattern of land use change and forest survival was dictated far less by the colonial state than by indigenous political interest groups in close alliance with the interests of metropolitan capital',⁶⁶ would nevertheless understate the power of the colonial state in Guinea at this time.

INDEPENDENCE: A BRIEF OPPORTUNITY FOR DISSENT

By the 1950s, the colonial state was exhibiting two incongruous tendencies. One tendency, as we have been arguing, was towards a scientific authoritarianism, extending bureaucratic control and infringing local rights in often overtly repressive ways. Yet by this time, the politics of independence had begun and a second tendency was towards a regime increasingly responsive to internal dissent and to the claims of its constituencies. Desiccation science in its institutionally-embodied form, and drawing on its international connections, was increasingly divorced from the *realpolitik* of state control.

In this context, the domination associated with desiccationism ended up provoking serious dissent. The two incongruous tendencies conflicted with one another, and the colonial science-development apparatus became an explicit target of liberationist struggles. However, it can be argued that this was an exceptional moment in Guinea's environmental politics, providing an opportunity for dissent swiftly superseded by the re-engagement of a 'desiccationist machine' immediately following independence.⁶⁷

⁶⁴ Group discussion with elderly men, Yomadou, 21 May 1992 (Ku6).

⁶⁵ Grove, *Ecology, Climate and Empire*, 148.

⁶⁶ *Ibid.*

⁶⁷ 'Machine' here is used in the sense of Ferguson's discussion of development in Lesotho as an 'anti-politics machine', J. Ferguson, *The Anti-Politics Machine* (Cambridge, 1990).

In the immediate pre-Independence period, the repressive tactics of the science-empowered 'forest police' reached such proportions that they became a target of political movements in Guinea.⁶⁸ The extent to which direct protest from rural inhabitants contributed to this is not entirely clear; villagers had certainly resisted the activities of forest guards, although resistance had tended to be of a hidden kind – such as covert lighting of fires – rather than taking the form of open protest movements. Nevertheless, politicians in the run-up to elections found that they could easily rally rural support through slogans such as 'we promise to give you back your lands and forests'.⁶⁹ This, in turn, led to a disintegration of the dominance and supportive alliances that the environmental services had enjoyed within the state. Once again, the forest service could no longer count on the support of other sectoral administrators. It was forced to reform and faced cuts in funds. And in an attempt to reduce its unpopularity, it was forced to de-reserve a number of the forests which it had earlier classified into state control, in many cases less than a decade previously. In 1957, for instance, part of the forest reserve of Selly-Koro was de-reserved, with the Kissidougou forest inspection describing this as 'returning customary agricultural lands to the control of peasant populations'⁷⁰ for 'humanitarian reasons' given the suffering of certain villages in the face of a lack of cultivable land.⁷¹ In a brief period, then, desiccationist science development had come full circle, emerging from political marginality to a politics-suppressing dominance, only to be marginalized again within the charged political context pre-Independence.

Almost immediately after Guinea's independence in 1958, however, these anti-desiccationist politics rapidly declined, and the science-development agenda, which had dominated in the early 1950s, resumed prominence. Indeed, it did so with even greater force. As we have documented elsewhere,⁷² the same scientific concerns and the same policy emphases, reinforced by remarkable continuities in administrative personnel, continued to dominate in the post-Independence era. During the First Republic under Sékou Touré, they were strongly reinforced by the modernizing, 'de-mystifying' scientific stance, which the state socialist regime adopted. Along with the massive increase in forest department staff, legal penalties were strengthened, leading in 1974 even to legislation enabling fire-setting to be punishable by death. And more recently, they have been reinforced by the priorities and discourse of international donor agencies within today's globalized environmental policy arena. The programme to regularize the Niger and other rivers was finally launched on a large scale in 1991, with major European and American funding. The extent to which the avowedly new 'decentralized', 'participatory' approaches of today's programmes are genuinely different in

⁶⁸ See C. Rivière, 'Les partis politiques guinéens avant l'indépendance', *Revue Française d'Etudes Politiques Africaines*, 107 (1974), 61–82.

⁶⁹ Diallo, *Historique*, 38–41, 45, 62–3.

⁷⁰ ADNFF, Service Eaux et Forêts, Inspection du Kissi – Action Rurale. Devis, Secteur d'Assistance Rurale de Selly-Koro.

⁷¹ P. Bonnet and P. Vidal, 'Problèmes posés par la mise en culture des terrains de la remise de Selly Koro', in ADNFF, *Compte-rendu de la tournée effectuée du 4 au 7 juin [1957] dans le Cercle de Kissidougou*, Division des Recherches Agronomiques, Centre de Seredou.

⁷² Fairhead and Leach, *Misreading the African Landscape*, 252–4.

effect or local perception from the earlier forest police is a question for another day. Suffice to say, the configuration of science, policy and administration has changed rather little and in this context there has been more continuity than rupture.

CONCLUSIONS

Debates concerning the relationship between science and policy – and representation and administration – have drawn on a range of theoretical traditions dealing with knowledge and power. Recently, several authors, most notably Ferguson and Escobar, have drawn on interpretations of Foucault's discourse theory to examine the operation of conservation policy in colonial and development contexts.⁷³ Several of their readers have been concerned that these works present the scientific basis of development problematics and the institutions that generate them as overly integrated and as operating as a monolith to reproduce the positions of power in which they are historically located. This is of concern to authors such as Grillo and Sivaramakrishnan and Agrawal⁷⁴ for several reasons. First, they argue, bureaucracies are far from monolithic; in Guinea, for example, the interests of cultivators, plantations, forest conservation, and timber production have been articulated by different personnel and offices, and have frequently come into conflict in colonial and modern times. Second, subsuming bureaucratic practice into discourse absolves the actors involved of consciousness, intentionality and responsibility in their deployment of science, which at the very least obscures the everyday dilemmas and anxieties faced by colonial administrators and the ways they responded to them. This in turn leads to a third limitation: the reduction of interactions between administrations and local populations to a confrontation of discourses, casting their interaction as one of assimilation or resistance. Yet this approach overlooks how desiccationism, for example, may have allied with particular interests within local politics. And to speak merely of resistance overlooks the ways that unfolding political events in the relationships between local resource users and administrations may lead to transformations in discursive structures. Each of these three critiques is germane to recent studies of the colonial encounter more generally, as exemplified for example in Berman's (and Berman and Lonsdale's) analysis of the colonial state in Kenya. As well as revealing the might of the colonial state, these works also highlight its inherent weaknesses, and the incoherent and *ad hoc* nature of colonial state activities as political and economic policy was played out in relation to local and metropolitan interests.⁷⁵ Yet this analytical tradition has been less attentive to relations of

⁷³ Ferguson, *The Anti-Politics Machine*; A. Escobar, *Encountering Development: the Making and Unmaking of the Third World* (Princeton, 1994).

⁷⁴ See R. D. Grillo, 'Discourses of development: the view from anthropology', in R. D. Grillo and R. L. Stirrat (eds.), *Discourses of Development: Anthropological Perspectives* (Oxford, 1997), 1–34; K. Sivaramakrishnan and A. Agrawal, 'Articulating regions: globalization, modernity and locality in stories of development', *Ford Foundation Crossing Borders Initiative, Environment and Development Working Paper, no. 1*, Yale University Center for International and Area Studies, 1998.

⁷⁵ B. Berman, *Control and Crisis in Colonial Kenya: the Dialectic of Domination* (London, 1990); B. Berman and J. Lonsdale, *Unhappy Valley: Conflict in Kenya and Africa, I: State and Class (Eastern Africa)* (Athens, OH, 1992).

power embodied in discourse, and to ways scientific discourses associated with state policy – or co-produced with it, as Jasanoff and Wynne highlight⁷⁶ – play out in relation to local and international discourse.

Whilst the potential shortcomings of discourse theory outlined above could be used to reject it, the extent to which these critiques are pertinent could probably be treated more as an historical question than an *a priori* theoretical consideration. In the case of Guinea, we have argued that desiccationism was a colonial anxiety from the earliest. Yet the configurations in which scientists, administrations and populations interacted during the first few decades of the twentieth century limited the implementation of anti-desiccationist policies and frequently forced the adaptation and reworking of those that were implemented. This was mainly because the advice of scientists, generally working as consultants, was easily rejected in the face of more pressing administrative or economic concerns. Implementation of any policy was through the more general administration and thus subject to its agendas, and in this context, local resistance had to be taken seriously.

While this situation began to change in the 1930s with the establishment of forestry services, it is useful to consider it becoming qualitatively different in the post-war period. Science-driven policy gained a strength of its own, supported by regional and global agendas and by a strong administration forged in its image, enabling it to ride roughshod over local political concerns. In this context, in as much as lessons about sensitivity to the politics of resistance – both local and from other branches of the state – had had to be learned during the period 1900–30, they were able to be ‘forgotten’. The environmental services came to operate as an intrusive and taxing surveillance operation in rural areas, using scientific and technical arguments to extend bureaucratic control into rural areas. Seen from this perspective, independence was not a major rupture with a colonial past, but a brief hiatus in which scientific priorities and concerns could be challenged, if very temporarily. Again, this would echo Berman’s analysis in emphasizing the continuity in relations between political economy and state bureaucracy as colonies became independent, although it displaces the focus from political economy to power-knowledge and the autonomy or otherwise of the state in relation to science. The history that emerges from the Guinea case is not of colonial desiccationist science operating as a monolithic discourse from the start, but of scientific and administrative networks that were somewhat divided during the first few decades of the twentieth century, coming together through a series of events to form a powerful discursive coalition.

Lastly, as we have argued, scientific and local discourses have not been solely in opposition to one another in Guinea, which is the impression sometimes given in analyses that treat discourses in more monolithic terms. Indeed a significant influence on the continuity of desiccationism has been the interlocking of scientific ideas with certain aspects of local thought and political positions during ongoing struggles around identity and change.

⁷⁶ See S. Jasanoff and B. Wynne, ‘Science and decision-making’, in S. Rayner and E. Malone (eds.), *Human Choice and Climate Change, I: The Societal Framework* (Columbus, OH, 1995), 15–16.

SUMMARY

This paper examines science–policy interactions associated with desiccationism, a gloss for the drying effects of vegetation loss on climate and soils, in Guinea, West Africa. Drawing mainly on case material from the forest region of Guinea between 1900 and the post-Independence period after 1958, it traces the uneven rise to dominance of desiccationism in policy and its effects. Desiccationism, we argue, was a colonial anxiety from the earliest, but until the 1930s scientists, administrators, and populations interacted in configurations that limited the implementation of anti-desiccation policies and forced their adaptation to local resistance. By the 1950s, however, political and administrative changes, coupled with shifting regional and global agendas, enabled a transformation in the relationship between scientific analysis and bureaucracy. Agricultural and forest policy now aligned closely with desiccationism, extending bureaucratic control and exerting profound – and damaging – effects on rural livelihoods. In the political climate leading up to independence, this colonial science-development apparatus became a target of liberationist struggles, provoking greater heed to local resistance. But this proved to be only a short interlude, and post-Independence policies showed remarkable continuity with those in place earlier. Reflecting on recent theoretical debates, we emphasize that comprehending these shifts requires attention to power–knowledge and state–science relations as well as political economy and to the actual practices, actions and relationships of administrators and populations.