Reading Forest History Backwards: The Interaction of Policy and Local Land Use in Guinea's Forest-Savanna Mosaic, 1893-1993.

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SUMMARY

Sophisticated local agricultural and forest management techniques have underlain the creation and maintenance of the main landscape features in Kissidougou Prefecture of Guinea's forest-savanna transition zone. Social anthropological, oral historical, archival and aerial photographic evidence shows how over long periods, peri-village forest islands have been created from savannas, productive rice swamps from inland valleys, and productive upland soil and vegetation conditions from unimproved herbaceous savanna. From 1893, colonial policy was based on reading the region's environmental history backwards, assuming forest islands to be relics of a once-extensive dense humid forest cover which local agriculture and fire-setting had destroyed. Archival evidence shows how the deductions of botanists, agronomists and foresters, coupled with the assumptions of administrators and other visitors, mutually reinforced each other to create and sustain a vision of degradation so pervasive that it still underlies modern environmental policy. The paper examines how colonial and post-colonial policies conceived within this vision have interacted with local land use. Given varying administrative capabilities, it considers the extent to which changes in local practices have been conditioned by policy as opposed to other social, economic, political or ecological changes, and the extent to which environmental changes have fortuitously coincided with policy objectives.

INTRODUCTION[1]

Modern Kissidougou Prefecture in the 'forest region' of Guinea (figure 1) is typically described as part of West Africa's forest-savanna mosaic, lying between the Guinea savanna zone to the north and the tropical humid forest zone

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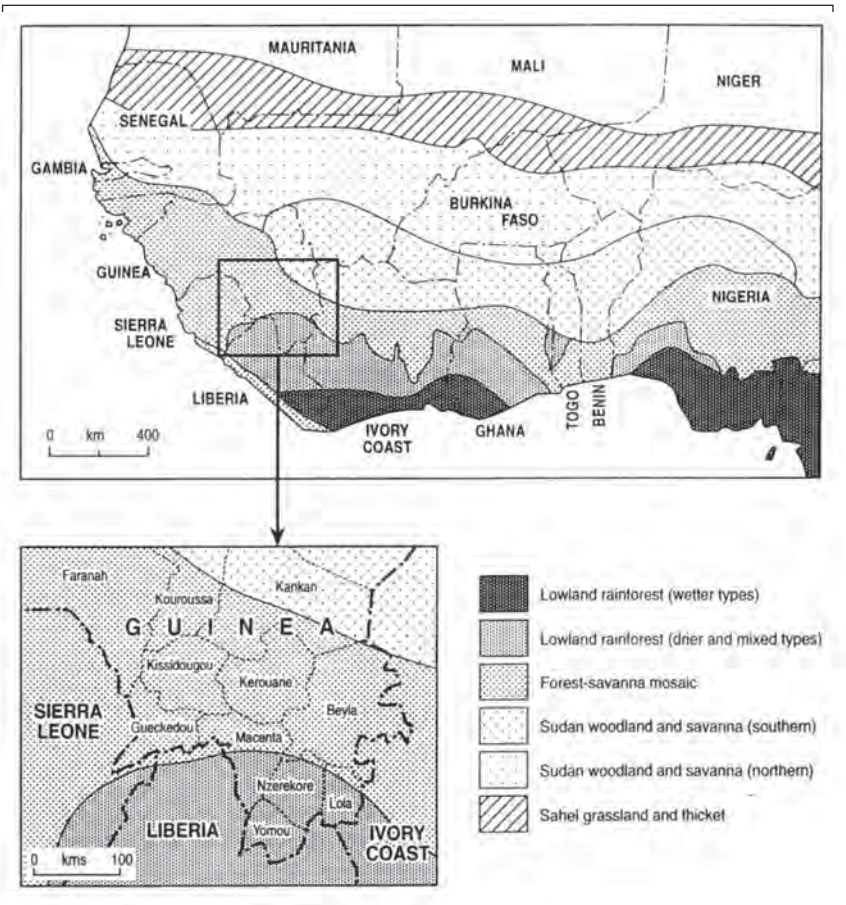

FIGURE 1
Kissidougou Prefecture in the forest-savanna mosaic zone of West Africa
(based on the UNESCO/AEFTAT/UNSO vegetation map of Africa)

to the south.[2] Many observers – especially, as we shall see, those who have influenced Guinea's environmental policy – consider this spatial 'pre-forest' zone to be unquestionably a temporal ex-forest zone; one in which forest has been savannised through the combined action of cultivation and bush fire.[3] The islands of forest which now surround most of Kissidougou's 800 or so villages, as well as the network of gallery forests which dissect an otherwise herbaceous or woody savanna, are considered to be relics of a formerly extensive dense humid forest cover.[4]

Nevertheless, recent studies in other parts of West Africa's forest-savanna transition zone have questioned this hypothesis. Some have shown vegetation patterns to be relatively stable, reflecting edaphic differentiation.[5] Others, notably in neighbouring Côte d'Ivoire, have shown how, even in the presence of bush fire, the forest limit is currently advancing into savanna areas.[6] They draw on increasing evidence of a climatic rehumidification of the Upper Guinea Coast region since the mid-nineteenth century, following a 200 year dry phase.[7]

Whichever side they take in the debate, such studies have ignored how local inhabitants consider their resource management practices to affect the vegetation patterns of the zone. An exceptional study in Côte d'Ivoire shows, somewhat surprisingly, that cultivation is locally considered to, and does, enhance forest regeneration over savanna; thus:

> A growth in population ... leading to an increase in the areas cultivated in forest, boundary land and savanna, strongly accelerates the phenomenon of reforestation by secondary bush in this region already in climatic disequilibrium.[8] (translated from French).[9]

It is local resource management strategies, and local assessments of their environmental effects, that form the starting point for this paper. Part I outlines key elements of the current technical repertoire used by Kissidougou's Kissi and Kuranko villagers as they live and work with ecological processes, using villagers' own ecological concepts. Part II examines how a particular and contrasting interpretation of forest-savanna transition ecology and history evolved within Guinea's agricultural and forestry administrations during the colonial period. It examines the interaction between policies based on this historical vision and changing local land use practices. Part III assesses both the colonial legacy in post-colonial policy, and the environmental legacy of local land use changes.

In examining policy-land use interactions, the paper considers how far policy objectives, however clearly-stated, could translate into implemented action given varying administrative capabilities and local forms of resistance. It examines the extent to which shifts in local practices have resulted from other unrelated (or indirectly related) social, economic, political or ecological changes. And it considers the extent to which land use changes can fortuitously coincide with policy objectives even if they are not attributable to policy.

Policy-makers throughout the colonial and post-colonial periods considered Kissidougou to be rapidly losing its 'original' forest cover. This historical vision contrasts with the accounts of the rural population, as elicited by social anthropological fieldwork and the collection of oral histories.[10] In general, local accounts emphasise a dynamic stability in the creation, growth and loss of forest islands; increases in woody cover on savanna land, and the cession of certain savanna areas to bush fallow rich in forest tree species. Oral accounts of historical ecology are fraught with problems,[11] but in this case the combination

of several data sets suggests their accuracy. Firstly, the processes which they refer to can be observed in the present. Secondly, separately-collected histories of everyday vegetation use, indicating past vegetation cover, add up to a common picture. Thirdly, oral accounts are confirmed by comparing past documentary vegetation descriptions with present day vegetation maps and observations.[12] Fourthly, wooding of savannas and increases in forest cover are evident when 1952 and modern aerial photographs are compared – covering the 40 year period which today's policy-makers consider to have been the most degrading. Finally, given the region's long-term climatic humidification, it is clearly wrong to speak of an 'original' stable vegetation form. Oral accounts suggest that drier, rather than wetter vegetation forms were present in ancestral memory, as climate historians would confirm. This analysis has now, in 1993, been accepted by astonished environment and development agencies operating in Kissidougou. The Kissidougou case shows how stark can be the contrast between policy interpretation of environmental change and locally-lived reality.[13]

I. LIVING WITH AND IMPROVING THE FOREST-SAVANNA MOSAIC

For Kissi and Kuranko villagers, the development of a belt of woodland around a settlement is a logical corollary of habitation: both important for, and encouraged more or less deliberately in, the course of everyday life.[14]

Thatch-roofed villages are always at risk from the fires which sweep the savannas each dry season, throwing ahead burning material such as nests and epiphytes which can carry flame over long distances. New settlements are often preferentially sited where gallery forests or swamps give partial protection from dry season fires. A fire-break which completes the protection is created largely through everyday activities which reduce flammable grasses around the village. Grass suitable for thatch roofing is collected on village borders, as is the sturdy grass *Andropogon gayanus* used to build compound and kitchen garden fences. The assorted paths out of the village are regularly cleared, and villagers slash the grass beside them when they pass through. When such everyday activities are insufficient, villagers cut a fire-break or make a controlled early burn around the village.

Thus protected, village-edge areas develop dense woody vegetation over the years. Initial fire-resistant tree species (e.g. *Pterocarpus erinaceus, Terminalia avicennioides*) gradually cede to those fire-intolerant species characteristic of gallery and dense humid forest (e.g. *Khaya grandifolia, Afzelia africana*), and colonising species (e.g. *Harungana madagascariensis, Ceiba pentandra*) give way to those typical of later forest successional stages. The developing forest is fertilised by human excreta, because of the proximate privacy it offers, and tree succession is facilitated by animal seed distribution (e.g. monkeys, cattle, birds and bats) and human activity.

The early stages of this succession are accelerated when, as is often the case, a new permanent settlement develops from one of the old wet season farming camps of a parent village. When the surrounding abandoned fields are protected from fire, farmers consider that woody vegetation will develop especially quickly as the soils have been 'opened up' and 'matured' by their cultivation. The mounding techniques used to sustain long cropping sequences, and the incorporation of organic matter into the soil from weed, crop and settlement residues, improves soil structure and water infiltration and storage, and so creates the conditions in which trees easily become established from seed. Villagers explain that dense vegetation does not establish easily on 'new', uncultivated land.

During the cultivation season cattle are frequently tethered close to the village and this also enlarges village woodland belts. The cattle must be tied on open grassland where their tether ropes cannot catch on trees. Here, their grazing reduces burnable grasses, and their selectivity and manuring permit the rapid establishment of certain tree and shrub species. As woody vegetation subsequently develops the cattle are, in subsequent years, tied beyond the growing woody zone, initiating an ever-increasing process of forest island expansion. For these reasons, villagers find more generally that the presence of large numbers of cattle on savanna land tends to increase woody vegetation cover.[15]

Economically useful trees such as kola, fruit trees and bananas which, for reasons of microclimate or fire, cannot grow in savanna, are planted in these forest islands where they can be easily protected from raiding birds and monkeys. Developing forest islands also become a convenient source of gathered products from forest species, including cords, basketry materials, building poles, seeds, nuts, medicines and dead wood for fuel. Those who plant, transplant or protect particular useful plants and thus enrich the forest island acquire enduring tenurial control over these, but not over the forest land itself which remains under village-level control.

When necessary, villagers have deliberately accelerated processes of forest island formation and expansion, notably to create fortresses and coffee plantation sites. The wars of the nineteenth century and before made it essential that villages were fortified. If it was impossible to move into an existing forest island, owing its presence to previous inhabitants or possibly edaphic factors, a new village would be established in savanna or beside a gallery forest, and its open edges planted with one or more rings of forest-initiating trees. These were normally fast-growing, relatively fire-resistant silk cotton trees (*Ceiba pentandra*), fertilised and pruned to ensure rapid growth and branch development. The trees were often interplanted with thorny bushes and, in combination with mud walls and ditches, thus provided a fortress penetrable only through a secured doorway. The shade and fire protection afforded by these initial fortifications enabled the rapid establishment of other forest trees. In some cases, strongholds were established around the entrance to the caverns and tunnels common in this area, adding to the security of village defences.

Since it is normally everyday life activities which promote forest island growth around an inhabited village, village abandonment can precipitate forest island loss. Villages can be abandoned for various reasons, including settlement consolidation, shortage of space or water, and social or medical problems. While uninhabited forest islands may be maintained for their economic trees, their management and protection becomes difficult at a distance from the new settlement site. As a new settlement develops its own forest, therefore, interest in the trees of the old forest can decline. Fire encroachment may gradually diminish the island's size and eventually it may be converted partially or wholesale to agricultural use to take advantage of the highly fertile soils beneath it.

Gallery forests are sometimes extended to make village forest islands; others are planted with economic trees, or preserved for valued wild plant products, especially when near frequently-visited farming sites. But otherwise, suitable gallery forests are managed for swidden agriculture, as one of a number of different forms of farming within local agricultural repertoires. A mature gallery forest, once under-brushed, felled, burned and cleared, provides a relatively fertile, weed-free site for sowing rice and a variety of intercrops. Parts of the site may be cultivated for a second year with lightly-mounded peanuts, but it is then left fallow until the forest regenerates and 'matures' once more. While farmers suggest that forest regeneration from seed, coppice and cut roots can be delayed by a second year crop, and while flammable grasses invade during the first two or three years, their experience is that the humid soil conditions ensure eventual forest re-establishment: a process sometimes accelerated by conserving adjacent patches of uncleared forest as sources of seed and shade. The gallery forest fallow is mature when, in local perspective, it will suppress weeds and provide sufficient fertility during the following rice cultivation but will not be too laborious to fell with hand tools: normally a period of eight to twelve years.

Where the upland slopes and plateaux between these gallery forests themselves become covered in forest successional vegetation, villagers farm them in a similar way, and are similarly concerned to clear the vegetation regularly to prevent the development of difficult-to-fell high forest trees. Where uplands are savanna, farming possibilities are more varied but tend to fall into either short or long-term farming sequences involving rice, fonio, manioc, peanuts, and other root crops. In short-term sequences, once the few trees are felled and the savanna grass is burned and uprooted, the site is cropped for two or three years with rice or manioc as a fallow-breaking crop, and then left fallow for five or more. In long-term sequences, gardening techniques and sometimes single-year fallows and cattle-tethering are used to maintain soil fertility over a period of up to ten years. Such extended cropping is common near existing or ancient wet season farming camps, on abandoned village sites, and in locations convenient to the village.

Villagers consider certain sorts of upland cropping to enhance the density of tree cover in savanna. A single year of manioc, for example, allows existing trees to re-grow from coppice and certain species (e.g. *Pterocarpus erinaceus*, *Terminalia avicennioides*) to multiply by growing new shoots from roots cut by the hoe during mounding. When the cropping period is long, existing trees are killed, but soil conditions are so improved that new trees rapidly establish on the site, and gain some protection from fire from the soil's improved water-holding capacity and its less flammable, heavily-grazed post-cultivation grasses.

Certain valleys have swamps at their base which are farmed with rice. Swamps can form the bottom-most part of a gallery forest or catenary upland farm, in which case swamp forest fallow vegetation dominated by *Mitragyna stipulosa* regenerates during the relatively long fallow periods. Other swamps are farmed more frequently, alternately cultivating and fallowing for a few years. Others still can be farmed annually, when fertilised through flood capture. The more intensively swamps are used, the more important becomes water management, whether for weed control or fertility. Farmers control water using banks and dams to regulate stream and flood flow, to encourage flood silt deposition, and to distribute water more evenly within the swamp. By using ditches to direct central stream flow to the edge of the swamp, farmers irrigate the previously drier margins, thus converting them to swampland and suppressing weeds in the rice crop. Using such banks and ditches, Kissidougou's farmers have, over decades and even centuries, widened once-narrow swamps, and converted certain gallery forests containing small swamps to larger, intensively-managed swampland areas. Villagers farming the plains of larger rivers have used similar flood regulation techniques to encourage silt deposition by river flood water, rendering plains flatter and more fertile.

The managed forest-savanna landscape provides a diversity of gathered as well as agricultural products. While the village forest island provides certain useful plant products, others are obtained from savanna (e.g. thatch, sauce leaves, toothbrush sticks, edible tree seeds such as of *Parkia biglobosa*), gallery forest fallows (e.g. building poles), and swamp vegetation (e.g. basketry materials). Villagers make use of the product availability afforded by agricultural management, collecting firewood, for example, from the dead branches left by upland field clearance. Certain trees which provide valuable wild products are carefully preserved during field clearance, and their distribution enhanced. The oil palm (*Elaeis guineensis*) is a prime example; once oil palms are present in an area, villagers multiply them both by deliberate sowing in forest islands and on soon-to-be-fallowed farmland, and by preserving animals (e.g. palm rats) known to distribute their seeds.

Fire has long been integral to the maintenance and management of Kissidougou's savannas. In sparsely populated, drier northern regions, villagers cannot, and do not seek to, prevent running fire; rather, they seek to turn it to their

advantage in activities sequenced through the seasonal cycle. Here, early in the dry season, when dew and green vegetation enable fire to be controlled, village authorities organise the protection of the village, forest island and certain sacred forest sites using fire-breaks, early-burning or both. Farmers also take steps to protect their own crops, gallery forests and, where deemed appropriate, fallow vegetation, carefully controlling any early-burning used to avoid liability for property damage. Hunters set early fires in personal hunting grounds of limited extent both to attract game to the young grass shoots which soon appear and to improve visibility. Later in the dry season fires are set for field preparation, and because fire spread outside field boundaries cannot be prevented, the village co-ordinates field burning to reduce the risk of those not yet ready being accidentally burnt by running fires. Thus by the hottest time of the dry season, when violent and more destructive fires sweep in from other territories, upland fields and much of the surrounding savanna uplands have already been burnt. At this time hunters profit from the animals driven by fire into unburned areas. Village groups which hunt cane rats (*Thyronomis swinderianus*) as a crop protection measure in unburned swamps, as well as collectors of wild honey, set additional small fires in the course of their work. It is only when late fires threaten houses or property that villagers mass-mobilise to extinguish them, and when untimely fires damage property, customary laws punish and exact compensation from the setter.

In the more humid, densely populated southern regions, control of running fire is more feasible, and sometimes enforced. Villagers cut fire-breaks around field boundaries, assisted by the low boundary-to-area ratio of the blocks of contiguous village fields typical of their agricultural organisation. When combined with hunting technologies oriented more towards trapping than fire use, this has periodically allowed the protection of fallows and village territory as well as houses and plantations.

Throughout the Prefecture, villagers consider fire as an integral part of the processes which shape their landscape, taking account of numerous ways in which vegetation, soil and water conditions influence the passage of fire across it. In this context, they appreciate the ways the soil and vegetation legacies of their farming and livestock management activities influence fire patterns. Village cattle, for instance, although tethered during the farming season, roam freely in the dry season. Where they graze, often on post-cultivation savanna sites where farming has encouraged palatable grasses, they reduce the quantity of grass and hence the intensity of fire.

From a village perspective, then, landscape use and management tend to be synonymous with landscape improvement according to local productivity criteria. Forest islands are the products of everyday life and management, not relics of destruction; upland cultivation and cattle grazing ultimately enhance fallow quality rather than degrading it, and swamp use is swamp improvement. These are central principles of locally-lived environmental history, but ones which have operated in different ways and to varying degrees during the past century.

II. COLONIAL POLICY AND LOCAL LAND USE CHANGE

Colonial policy-makers did not seek to elucidate such local resource management techniques and relationships. Instead, they interpreted the environmental impact of local land use practices as the destruction of an imaginary 'natural' earlier landscape. Supported principally by deductions from botanical, not historical evidence, this colonial vision emerged within the developing agricultural and forestry administrations, and the responses of these to emergent internal and external agendas. Examining the evolution of vision, policy, and local practices during different phases of the colonial period will enable us not only to understand the vision's legacy in post-colonial policy, but also why this legacy is so problematic.

1. *Local trends prior to colonisation in 1893*

The centuries preceding colonisation were characterised by periodic warfare between warlords and their followers, competing variously over territory, trade routes, booty and captives. These wars left the north of the territory which would become the colonial Cercle and post-colonial Prefecture of Kissidougou inhabited by numerous Kuranko principalities, the centre and south by Kissi-speakers, many of whom were descended from Mande immigrants, organised in multi-village confederacies of varying size, and the south-west by the Lele.[16] The density of population, and hence of villages and their forest islands, was higher in Kissi than in Kuranko country; a population differentiation accentuated by the devastation and depopulation of certain Kuranko areas during the Samory wars (1882-93). Many Kuranko and Malinke people had sought refuge in Kissi country which generally successfully resisted Samorian invasion.

The first Frenchman in Kissi country, Combes, described the tall and burning grassy savannas through which his military column passed as:

> dotted with clumps of forest of great vegetational strength, rendered impenetrable by a tight confusion of trees and interlaced creepers … it is at the centre of these clumps, in the middle of large clearings … that one finds the villages.[17]

The upland landscape throughout the region was, at this time, a largely herbaceous savanna, with the exception of certain densely populated eastern Kissi districts. The need for fortification had encouraged the formation of forest island fortresses around villages. Where politically-allied villages lay close together, forest development between village fortresses was encouraged, uniting several into the 'single forest' that is such a strong metaphor of political solidarity for the Kissi.

In both Kuranko and Kissi areas, upland rice farming was carried out by large extended family groups incorporating the captives and strangers under the authority of the compound head, and it was common for families to pass the wet season in farm camps. Most rice farms were made in savanna, although gallery

forests were periodically cultivated, sometimes as part of a catenary upland system, and in the most densely populated Kissi areas parts of the uplands were farmed on a forest fallow, rather than savanna, system. Intensive swamp cultivation was rare, except in certain southern Kissi and Lele localities where irrigation and transplanting were established local techniques. Elsewhere, while large swamps and river plains were flood-capture farmed, they were not irrigated. Smaller swamps were normally used only on a long swamp-forest-fallow basis as part of gallery forest farming.

Compound heads bore major responsibility for members' food provisioning and other economic affairs such as marriage payments. Nevertheless, at least in Kuranko areas, married men and some senior women organised small personal rice farms for additional food security. The cultivation of other upland crops varied considerably across the region. Cotton was universally grown either as a rice intercrop or in separately-cleared savanna fields. Especially in the north, manioc, fonio and the early variety of 'small peanut' were cultivated, mainly for food, by the compound and certain individuals. In southern Kissi areas, manioc, fonio, maize and sweet potatoes were all more minor hunger season food crops. Although these crops were sometimes grown in intensive gardening sequences around farming camps, they were more often second-year crops following upland rice, before leaving the area fallow.

At this time cattle numbers in the north of the Cercle were small, having been reduced during the Samory wars. They were relatively high in the Kissi regions to the south, however, having been latterly accumulated from Dioula traders with Mali and the Fouta Djallon in exchange for Kuranko refugee captives. Oil palms, relatively abundant in the south and east, were rare or absent in the drier Kuranko areas of the north and north-west. Here, people made more use of other cooking and body oils,[18] and obtained palm oil by bartering honey with palm-rich areas to the south.

2. *1893 - 1906: The French occupation and taxation*

The first military occupiers were impressed by the forest islands they found in Kissidougou and by its verdant savannas; a perception undoubtedly coloured by their arrival from the sudanian savannas to the north.[19] As Captain Valentin emphasised in 1893, the region offered extraordinary natural fertility and economic potential. Significantly, though, he considered the forests which he saw to be the relics of an immense forest which covered the landscape 'entirely at an epoch relatively little distant from our own'.[20]

Following occupation, the French divided the region into administrative cantons or provinces, each with a chief, according to their interpretation of local political units and authority. The legal basis of occupation maintained customary rights, including tenure over land and trees.[21] The nascent administration exacted taxes to secure and finance military, and subsequently civilian, admin-

istrative control. For this, it taxed in kind kola, palm oil and rubber: products with long-established trade in the region which were thus easy to sell to local merchants. A rice tax was imposed, but it was not increased as there was no ready market for a surplus. The main concern was thus not with agricultural, but with gathered forest products. The military administrator of 1896 suggested that support be given to improving the management of only these commodities, so as to harness and improve the productivity of the region's perceived 'natural' richness.[22]

The administration also initiated the requisition of cattle, wood, thatch and rattans for building, and of the corvée labour which would continue at least until the Second World War, whether for porterage, construction or road-building. This withdrawal of labour would later be accentuated by army recruitment and by migration to work on the European-owned banana plantations near Conakry, enforced, if not by compulsion, then economically by the need to earn money for taxes. Elders recall large-scale, compound-based farming organisation as an essential strategy for coping with unpredictable labour losses caused by the colonial administration, since this could accommodate the periodic departure of some men. Large-scale farming organisation was also reinforced by the system of tax and corvée extraction, which gave compound heads, through the intermediaries of village and canton chiefs, responsibility for its provision. The exaction system therefore reinforced, rather than undermined, the relationships of economic authority and dependence between compound heads and their members.

3. *1901 - 1914: Rubber and early environmental policy*

By the first decade of the twentieth century, Guinea's colonial economy had become reliant on rubber exports, in an era of high world market prices. The need to sustain and increase rubber production provoked the first intensive study, debate and policy formulation concerning Guinea's environment.

Wild rubber species in which the colonial administration were interested existed in village forest islands and gallery forests, but had been systematically exploited by villagers only in certain localities to serve a small trade with Malinke merchants. The colonial administration promoted rubber extraction and commerce, founding, for example, an agricultural research station in Kissidougou in 1909 largely devoted to promoting rubber exploitation. At the national level, there was increasing concern about the sustainability or otherwise of local rubber extraction techniques.[23] The botanist Chevalier, who undertook various advisory missions for the AOF, argued that with the exception of the dense forests of Macenta and further south, local extraction was skilful, and the threat to rubber production was the destruction by fire and farming of the forest patches in which it could be found or planted.[24] In this context arose the first accusations of the destructive nature of local land use practices, and the administration's unease about the extent of bush fire (which had already prompted a number of

ineffectual national directives via Cercle administrators to village chiefs to monitor and improve the situation[25]) developed into a central problem for the national economy.

While it was admitted that fire was a necessary part of local agriculture, its incidence was considered to be steadily increasing amidst the country's growing economic activity and ease of movement – as well as through the use of fire by European hunters.[26] The national policy which was outlined relied not on reducing fire itself – which the small administration recognised its limited capacity to do – but on the creation of extractive reserves in which to protect wild and planted rubber. In Kissidougou, however, no such reserves were established. Indeed, Chevalier identified the Cercle's existing vegetation regime as 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 regularised, 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.[27]

The growing value of rubber was considered to encourage the protection and even enlargement of the existing forest patches which would otherwise be threatened by upland rice cultivation.[28] Thus, while at least in 1910, token measures were taken to repress forest clearance for agriculture by fining village chiefs,[29] the agricultural service recognised that it would be the economic gains from increasing rubber values and kola, coffee and palm planting which would induce forest protection by local people.

Brossart, the director of Kissidougou's agricultural research station, made extensive tours to assess forest areas and quality in terms of their value for rubber. His close observations of local farming practices reinforced the policy to focus on improving gathered products, rather than local farming which as he saw it was already highly sophisticated.[30]

As Chevalier's remarks indicate, the perceived need for forest protection by then also encompassed climatic and soil considerations, issues already prevalent at the national level.[31] The erroneous assumption about the relationship between deforestation and climatic change which had been elaborated has, ever since, been a central pillar of Guinea's and Kissidougou's environmental policy. Other observers were, however, notably more pessimistic than Chevalier and Brossart about the sustainability of Kissidougou's vegetation management. During the drought of 1914, Brossart's successor Nicolas (after only 6 months in Kissidougou) wrote:

> Never, I believe, has a year so dry occurred in Kissidougou. I am left to say that from year to year, rain becomes more and more rare. And this I do not find extraordinary – even the contrary would astonish me – given the considerable and even total

> deforestation in certain parts of this region. From Kissidougou to Gueckedou, all has been cut … the effects of this de-wooding are disastrous; one will soon see nothing more than entirely naked blocks of granite. A region so fertile become a complete desert. Now there rests no more than a little belt of trees around each village and that is all.[32]

Chevalier's early positive depiction of Kissidougou's environment proves to be an exception. All subsequent observers are convinced that there is an ongoing process of degradation from a previously forested state. They interpret local forest-savanna use not as a sustainable management system in which some forest areas are preserved and other lands rotationally fallowed, but as a degrading system progressively drawing down ever more of the forest resource.

The establishment of this vision was probably reinforced by colonial observations of villagers cutting high forest for three reasons during the first few colonial decades. Firstly, villagers may have been re-claiming areas which had once been rotationally-managed farmbush, but which had 'escaped' into relatively high forest during war-related depopulation. Secondly, especially in depopulated Kuranko areas, they may have been converting certain old, now uninhabited forest islands to make use of their highly-valued agricultural soils. Thirdly, in increasingly secure conditions, villages which had 'shared a single forest' might well have found it more useful to convert some of the inter-village forest area into farmable fallow bush, than to retain it as a redundant defence system. It should be noted that in terms of Kissidougou's land surface these areas were small, if not minimal.

In 1913 the rubber price collapsed, engendering an economic crisis in Guinea. While Kissidougou's agricultural research station, already criticised for its lack of impact, was closed, at the national level greater attention now began to be given to the agricultural development on which the country's future was seen to depend. But the concern with upland soil and vegetation degradation persisted. Thus the combined national agriculture and forestry policy just before the First World War had the general aim of reducing the perceived destructive effects of upland shifting cultivation, through several specific policies: the control of bush fire, the replacement of shifting cultivation by intensive peanut-based upland farming, and the intensification of swamp cultivation through water management and transplanting techniques. If these policies were applied, it was said, the natural regeneration capacity of the region's vegetation meant that it would not take long to regain its 'original' form.[33]

4. *1914 - 1930: Agricultural modernisation*

The overt environmental concerns underlying agricultural policy just before the First World War were rapidly overridden, however. The period between 1914 and 1930 was dominated by a concern for improved production, exports and labour productivity through agricultural modernisation. In this the national

agriculture service, now divided from the poorly resourced and ineffectual forestry service, concentrated on two issues: developing the settler plantation economy around Kindia and Boffa, and the promotion of what is best described as a 'plough complex'. It was anticipated that introducing animal traction would increase labour productivity in food production five-fold, thus releasing labour for infrastructural and export-oriented activities.[34] Permanent cultivation on land improved through de-rocking, de-stumping and manuring was envisaged, along with improved cattle rearing, grazing and stall-feeding strategies. Individual land tenure was deemed necessary for local people to make these investments, because within this complex, it was thought that 'the plough attaches a person to the land'.[35]

In Kissidougou, where there were by then no agricultural service personnel, agricultural development responsibilities reverted to the Cercle administration. While urging more rice production, the administration could offer no technical assistance, and it suffered infrastructural isolation which limited the profitability of agricultural development.[36] By 1927 some ploughs had been purchased by several Kissidougou farmers but none were operational for want of trained animals and extension staff.

Initially the Cercle administration had preferred to concentrate its limited and intermittent means on promoting tree crops – kola and, increasingly, coffee. In this it intensifed kola planting actions begun by the agricultural station, but found it necessary to alter the approach for social and tenurial reasons. Brossart had faced resistance to the policy of actively establishing plantations in village forest islands; accustomed to owning individually the trees which they planted, villagers were reluctant to establish and maintain imposed 'village' plantations, considering their establishment as pure corvée. Thus from 1914, when all villages were obliged to create a nursery and prepare land for kola planting, the policy was to divide plantation ownership and management among compound heads.[37] Between 1914 and 1916, 152,000 kola seedlings were planted, and in 1917 coffee was added to the village nurseries. But thereafter planting was neither continued nor monitored. By 1930 it was noted that plantations had been established and semi-maintained only by canton chiefs. It took a new push from 1925, when compound plantations were forced under pain of penalty,[38] for these to be established in most villages; today's elders remember the following decade as a period when work on the compound head's coffee became part of compound farm labour obligations.

Throughout the colonial involvement with kola and coffee production, indigenous plantation management was repeatedly criticised. Kola, and subsequently the coffee with which it was interplanted, was seen as unproductive because villagers neglected adequate under-brushing, spacing, shading, pruning and epiphyte removal. Attempts to persuade them to adopt 'efficient' European methods met resistance and always proved unsuccessful. This resistance is readily comprehensible from a local perspective. Firstly, locally-managed

plantations were multi-purpose, integrated with other forest island use priorities including the collection of wild products. Secondly, local strategies enabled plantations to be minimally-maintained on a low labour input basis until such time as contingencies, high prices or labour availability encouraged their renovation. Thirdly, the gains from intensive tree crop management were not reliable given that yields varied considerably from year to year, irrespective of management, for reasons which neither villagers nor European experts fully understand. And fourthly, villagers were unwilling to surrender kola, a tree central to local socio-cultural and political life, to the strictures of an alien management regime.

Kissidougou's infrastructural isolation rendered it unsuitable for the development of settler plantations during this agricultural modernisation phase. The idea of introducing large-scale settler coffee plantations into 'the forests of Kissidougou' was raised by the AOF Governor in 1920. The reply of Kissidougou's Commandant was bluntly negative, partly because of the prohibitive porterage costs to the railhead at Kankan but principally because Kissidougou had no available forests.

> One has given the pompous name of forest in this country to simple clumps of trees, 2 - 3 kilometres from each other and of an average area of 2 - 3 dozen hectares … savannas almost without trees join these various woody clusters.[39]

The Cercle did however contribute to the settler economy by supplying a large proportion of its labour, as the Cercle administrator complained:

> I have never ceased to struggle officially against the habit adopted in Guinea of emptying the forest region of its best elements to furnish European plantations with labour which it would be equitable to take from the whole colony … there were 105,000 inhabitants in the Cercle in 1930, there are not more than 93,000 now … the percentage of taxable adult men is only 21%.[40]

In the 1920s and 30s such labour losses continually reinforced the large-scale compound-based organisation of farming.

The forest administration was even weaker than the agricultural. The first full-time forestry personnel arrived in Guinea in 1926 but were initially posted to the railway service,[41] and forestry attention was concentrated here and in the more accessible coastal and Fouta Djallon regions. Forestry policy during the 1920s was restricted to attempts to control forest clearance, fire and timber exploitation through regulations, taxes and fines. But the regulations did not restrict shifting cultivation, instituting control only at a level of 200ha or more. Forestry regulations were supposed to be applied directly by the Cercle administration, through canton chiefs, backed up by the Gardes de Cercle,[42] but there seems to be neither record nor memory of the rhetoric undoubtedly issued to canton chiefs having any impact on local practices at this time.

5. *1930 - 1939: Forestry and agricultural policies solidify*

In the 1930s environmental concern returned to the fore, and the major interpretations of environmental change were laid down and institutionalised in forestry and agricultural policy, much of which persists to the present day. Nevertheless both agriculture and forestry services still had very limited personnel and budgets, rendering policy implementation in Kissidougou ineffective.

Economic interest in forestry issues led to a review of forestry potential in Guinea in 1930. Concern over processes of environmental degradation in Guinea was re-emerging, stimulated partly by the work of Chevalier,[43] but forestry policy seemingly required additional economic justification before it could respond to it. Timber production to supply growing towns, reduce imports and expand exports was emphasised, and plans for sustainable logging were integrated with a forest reserve policy otherwise aimed at environmental protection. Two sorts of reserve were envisaged: absolute reserves, in which there were no local use rights, and protected reserves, in which local use rights were maintained except for tree felling. A ban was proposed on the felling of gallery and closed canopy forests.[44] Following this review, the national Service des Eaux et Forêts was established in 1931, but with personnel so limited that forestry policy could hardly be implemented. The Cercle of Kissidougou was no exception. Divided between two of the four forestry inspections established in 1932, the Cercle had only one Guinean forest guard, recruited, as were the other 18 in the country, from among ex-soldiers, and forming part of the Gardes de Cercle. By 1940 this situation had not changed.

Nevertheless, a forestry Contrôleur and the national Chef de Service visited the Cercle of Kissidougou in 1931. Observing its landscape, they reproduced the catastrophic vision that Nicolas had portrayed in 1914:

> The Kissi forest, very feeble, is composed of islands of high forest scattered in a savanna almost totally impoverished of trees or bushes … everywhere, the cultivation of dryland rice with intensity ruins the forest and causes it to disappear. In Kissi country, one has arrived at such an advanced stage that the level of afforestation certainly does not exceed 1/10.[45]

The process of deforestation and savannisation was seen to be progressing steadily southwards; and immediate attention was deemed necessary to halt this perceived movement of the 'dense forest' boundary and prevent the Toma country further south-east becoming like Kissi country. The economic justifications for this forest conservation were less the timber production concerns dominating the country's more accessible regions, and more the preservation of a vegetation type which accommodated the area's export crops; i.e. kola, coffee and oil palms. The forestry strategy was to create a curtain of reserves in the north of the forest zone, and it was thus that Kissidougou's first two forest reserves were established in 1932, at Ouladin and Selly-koro in Lele country. Although

some local use rights were retained in these protected reserves, this was the first instance of real removal from local control of a forest area which local people had partly if not wholly created; it is remembered with resentment.

The recession of the forest belt was seen to be accelerated by the migration from the north of Kuranko and Malinke who were seen as 'savanna people' with a particular proclivity for fire setting and forest clearance, whether in their agriculture, hunting or warfare techniques. Contemporary visions contrasted them with the 'autochthonous' Kissi and Toma whose 'fetichism' led them to preserve, at least, the 'sacred' relic forest islands around their villages.[46] Indeed, the idea that 'sacred forests' could act as 'nature reserves' amidst secular deforestation processes was prevalent at the time.[47]

In the context of this perceived migration problem, a debate ensued concerning local forest use rights. In Guinea, it was argued, even immigrant, non landholding strangers were unconstrained from abusing forest resources as they liked, whereas in France, even the rights of owners in forest matters were severely restricted by state legislation. This tenurial 'anomaly' was considered a major cause of deforestation processes in Guinea's forest region, especially in Kissidougou where fire was seen to be progressively invading forest islands: 'if this question of use rights is not rapidly resolved, and in our favour, the forest will disappear totally in the Cercles of Kissidougou and Gueckédou'.[48] But a complete overhaul of tenure law in favour of forestry was seemingly impossible given the competing pressures from the Agriculture Service and civil administration to maintain the status quo. The 1930s therefore saw further piecemeal attempts to curb customary land and tree use rights: in the late 1930s, the ban on high forest clearance was extended to areas less than 200 hectares, for example, while the decree of 4 July 1935 at AOF level extended the system of taxes on tree felling.

Bush fire was a particular focus of forestry discussions. Dry seasons and the harmattan were seen to be increasing as a result of fire-induced vegetation change.[49] This was seen to have regional, as well as local consequences, and indeed a programme was outlined in 1934 to protect and regularise the flow of the Niger river by re-wooding what were seen as its degraded and degrading principal upstream catchment areas. This programme would eventually be initiated in 1950 and again re-launched in 1989, periods when financial and administrative means became available. Whereas earlier fire policy had rested on a distinction between agricultural and forest/fire-reserved areas, the AOF decree of 1935 instituted a new distinction between 'wild' and 'useful' fire over the entire territory, the former to be entirely forbidden, and the latter to be applied using specified controlled methods including early-burning. This policy had little impact on local practices. As earlier, it was implemented through canton chiefs who were answerable and finable for contraventions in their territory, but administrative incapacity made it unenforceable. Furthermore, many Commandants de Cercle interpreted the 1935 decree as implicitly authorising bush fire for

pasture and field preparation.[50] Oral histories suggest that external intervention in fire management remained insignificant during this period.

Agricultural objectives in the forest region during the 1930s, while primarily production-oriented, were also justified in environmental terms. Fundamentally, the intensification of swamp rice farming would, it was argued, reduce the extent of destructive upland agriculture, as well as increase rice output by taking advantage of swamp fertility and production possibilities. This policy was deemed all the more important as with infrastructural improvements from 1925 onwards, notably road connections to the railhead at Kankan, Kissidougou and the forest region came to be considered as a major rice supplier to other regions of Guinea.

But while this policy to move agriculture to swamps made sense to policy-makers who were reading Kissidougou's forest history backwards, it actually contained a basic contradiction. The idea was that deforested upland savannas would 'regenerate' if used less; that the 'deforestation problem', assumed to lie on the uplands, would be resolved by a shift to low-lying wetlands. Yet excepting the forest islands maintained or created around villages, virtually all of Kissidougou's existing forest area actually lay in such wetlands, in the form of uncut and long-fallowed gallery and swamp forest. That conversion of such wetlands to continuously-cultivated swamps would destroy such forest was either unacknowledged or considered a valid trade-off; allowing, for example, the instructions given to Kissidougou's monitors in the 1950s for their regular tours of villages to contain flatly contradictory signals. One point told monitors 'to advise farmers not to neglect any depression, any valley for the establishment of rice fields', and the next, 'to forbid, in the strictest fashion, all felling of forest'.[51]

In the 1930s, however, implementation of swamp promotion policy was limited only to distribution of improved swamp seed varieties. While the agricultural research station was re-established in Kissidougou in 1930, it was moved to the headquarters of the Circonscription Agricole du Region Forestière at Macenta in 1933, so Kissidougou was again left almost entirely reliant on the Cercle administration and the newly established self-financing development associations: the Societés Indigènes de Prévoyance (SIP).[52] In Kissidougou, SIP assumed responsibility for distributing agricultural equipment and planting materials[53] and throughout the 1930s employed one or two agricultural monitors and up to 30 workers who devoted their attention to the three Cercle nurseries, and to surveying plant distribution from them to villagers. Coffee, rather than kola, was by now the main tree crop promoted, considered, as ever, synergistic with forest protection and extension. SIP was able to offer no technical assistance to rice production and had no success in promoting ox ploughs; none were operational in the Cercle by 1940.

But despite the limited policy impact on rice farming, this period saw significant changes in local upland cropping practice. SIP enforced loans of

peanut seed and subsequent farmer-to-farmer extension seems to have assisted the spread of new appreciated varieties. These were incorporated into the existing cropping patterns of second-year cultivation on old rice fields, and intensive upland gardening. They also contributed to an increase in peanut cultivation by individual women, now not only for food but also to serve a growing number of local markets. The growing market development which assisted food crop sales also widened the availability of imported cloth and this brought about the rapid decline of local cotton production.

An unexpected increase in the price of palm kernels in 1936-37 re-invigorated discussions about the incorporation of oil palms into Cercle nurseries[54] and encouraging their development in the north of the Cercle where they were rare or absent. This idea had first been tried in 1912 but not followed through;[55] nor was it now. Nevertheless, palm densities in the north were already increasing as a result of local methods of spread in which villagers introduced palm seeds obtained further south into gallery forest fallows, forest islands, swamp margins and uplands. Villagers conceive of a northern movement of the palm frontier – i.e. of areas self-sufficient in or exporting palm oil. This northward movement dates from the nineteenth century or before and indeed continues to the present day,[56] and was undoubtedly stimulated by periods of high palm product prices and vigorous trade. [57]

Ironically, the existence of palms has repeatedly been taken to indicate previous forest cover, now destroyed.[58] Kissidougou's administrators remained convinced that palm densities were regressing further under the effects of fire and upland agriculture: indeed in 1953 they would attribute increases in peanut production to the need for a substitute oil as palms disappeared and as soils degraded, rendering them more apt for peanuts.[59] The administration then promoted oil palms as the basis for reforestation.[60] That palm density and distribution were already increasing due to positive management by local populations was never considered.

6. *1939 - 1945: The Second World War*

During wartime the imperative of food production took precedence over environmental policy objectives. The Eaux et Forêts service was cut back, and fire policy had no impact because of the indifference of the public authorities who had to put it into effect.[61]

The Cercle administrators passed on to canton chiefs responsibility for purchasing wartime rice and palm oil quotas at artificially low prices, and today's elders remember this as a period of taxation in kind of compound heads, and of poverty and hunger. Local responses included significant land use changes. The need to fulfil rice quotas forced farmers to increase rice production on both upland and swampland. Parts of certain village forest islands, swamps in particular, were converted to intensive farming use. Forced to give up large

parts of their rice stocks, farmers also turned more heavily to 'secondary' food crops such as fonio, peanuts, taro and manioc, the latter encouraged by their relatively high prices at this time and the national campaign to encourage tuber production.[62] When rice production returned to previous levels after the lifting of the quotas in 1950, higher production of these secondary crops continued. Women were unwilling to drop what had become their lucrative personal cash crops in favour of their husband's coffee plots.

Kissidougou's coffee yields plummeted from 956 tonnes to 40 tonnes between 1940 and 1941; a result of local disinterest in coffee production in view of its low price and the labour trade-off with intensive rice and secondary crop production, especially felt by women who processed coffee.[63] The need to reinstate production, as well as to meet war effort food quotas, stimulated a major attempt to upgrade the agricultural extension services which had operated so weakly during the previous decade. In 1942 the Cercle administrator made funds available to a newly-arrived French representative of the agriculture service. He imposed coffee quotas and, critical of local rice and coffee management and yields, called for an agricultural organisation capable of educating 60,000 indigenous farmers. To this end, he established a 'farm school' in 1943 to train extension workers and run model coffee plantations, and a network of canton farms to re-launch the plough through demonstration and instruction.[64] This round of the rice production mechanisation drive was seen as best focused on large swamps and river plains, where its limited success had been most pronounced. By 1944 there were 20 trained agricultural monitors paid by SIP, and more than 100 ploughs operating in the Cercle.

7. *1945 - 1956: Administrations gain strength*

After the immediate post-war period, concerted attempts at agricultural and forestry policy implementation were made, with growing personnel and financial resources.

Kissidougou's agriculture service suffered an initial setback when its French representative left in 1945, leaving only one moniteur-adjoint in Kissidougou and the staff of the by now debt-ridden SIP.[65] The farm school folded,[66] and all agricultural activity except SIP-funded coffee nurseries, seed loans and ox plough sales concentrated on the regional agricultural administrative centre of Macenta.[67] But by 1950 a French representative of the Service de l'Agriculture was once again stationed in Kissidougou; by 1952 he was working with three trained monitors, and by 1956 with two more trained Guinean staff and a European product controller. The forest service also expanded. During the war, 5 forest guards had been recruited in Kissidougou, although the forestry service remained biased both financially and in staff towards the Fouta Djallon where 60 of the country's 100 forest guards were based. But by 1953, there were 8 forest guards and one auxiliary operating in Kissidougou,[68] and in 1956 a forestry 'Inspectorate' was opened there.

Environmental concerns regained centrality in the policies of both the agricultural and forestry services, integrating them in a mutually reinforcing way. The increased areas of upland rice, manioc and peanut farming during the war were considered to have accentuated upland deforestation, leading, post-war, to a major rejuvenation of the policy to shift rice production to swamps and river plains.[69] For example Kissidougou's 1956 Cercle plan stated that 'all must be subordinated to the conservation of soils and forests'. The top priority for rural development was 'action in favour of wetland rice cultivation. The future will be preserved by the progressive reduction of upland rice.'[70] This time, two approaches to increasing the proportion of wetland rice in exports were taken: firstly the improvement of production in large swamps and river plains such as those bordering the Milo and Niandan rivers through radical water control structures and animal traction and mechanisation.[71] Secondly, farmers throughout the Cercle were encouraged to cultivate their own smaller swamps and plains more intensively.

Policy-makers in the early 1950s were encouraged to observe that 'over the last 20 years, swamp improvement has been proceeding in Kissidougou',[72] a process which, as oral histories show, greatly accelerated in the north of the Cercle during the 1950s. This change was partially attributed to presumed fertility declines in ill-maintained and eroded uplands.[73] But while it was in keeping with agricultural and environmental policy since the 1930s, and benefited from the availability of new wetland rice varieties introduced over this period, the shift and its timing are more attributable to a combination of social and economic changes. Compound members were acquiring greater financial autonomy; women through the cultivation and marketing of their own peanut and manioc crops, and men through new employment opportunities, as migrant labourers to work on the more extensive coffee plantations, upland farm clearance, and palm fruit cutting further south, and in the developing mines and industrial plantations. Dry season migration, importantly, was a way for men to accumulate their own marriage payments while avoiding the increasingly-resented labour obligations at home on the relatively small coffee plantations still controlled by compound heads. While compound rice production organisation persisted, swamps became more attractive than uplands because the male labour in clearance and cultivation did not begin until much later in the year – in July rather than April or earlier – making swamp farming compatible with the extended dry season migration of a large proportion of the compound's male labour force. In most cases, the water control techniques needed to improve swamps and sustain more intensive swamp farming were learned not from colonial extension services, but from the Kissi and especially Lele farmers in the south of the Cercle who had been practising them since pre-colonial times.

With this reduction in upland rice cultivation in the north, secondary cropping patterns also changed. Instead of growing a large proportion of their peanuts, fonio and manioc on second-year rice fields, farmers more frequently incorporated them into their intensive, long gardening-type cultivation se-

quences. Thus the intended effect of colonial policy – reducing the area of upland cultivation – was acheived, even at a time when upland secondary cropping was increasing because of its growing importance to women's independent food and financial security.

Such a shift to swamps did not occur in the more southerly, higher coffee producing Kissi areas. Here upland rice was the basis of subsistence, and it persisted. The coffee harvest and processing during the early part of the dry season coincided with the harvest of swamp rice, inhibiting a major expansion of swamp farming. Kissi farmers were also, and remain, unwilling to dispense with upland rice for dietary and cultural reasons.

Policy-makers were also encouraged by the gradual increase in cattle numbers observable in the 1950s. Cattle populations, high in the south though low in the north at the turn of the century, had fallen everywhere since the 1920s as villagers sold them to meet onerous tax burdens. Colonial observers had tended to attribute this failure to develop the region's perceived natural livestock potential to local lack of aptitude for cattle-raising. From the 1950s, as coffee, labour migration, food marketing and palms provided alternative sources of money for taxes, villagers, especially in the north, increasingly kept and expanded their small cattle herds. Their positive impact on the woody cover of savannas, and on forest island edge vegetation, would be felt over the following decades.

While soil degradation had been a secondary concern in the debate about the relationship between environment, fire and upland farming, it came to the fore in the late 1940s and 50s. Africa-wide discussions around the first inter-African soil conference in Goma in 1948 were echoed in Guinea.[74] All existing environmental policies came to be considered important for, and justified in terms of, soil conservation. During 1948-49 the shift from upland to swamp agriculture was seen as the principal soil conservation measure.[75] Then fire policy and forest reservation became lynchpins of soil policy. The impacts of upland farming and fire were imaged in terms of the loss of vegetation for the soil which it protected. In 1952 the director of the forest region's Circonscription Agricole described the relationship between deforestation, fire, soil erosion and laterisation, as he saw it, as the most pressing agricultural development problem: 'Guinée Forestière is characterised by an originally rich soil on the way to sterilisation following the irrational agricultural procedures of the autochthones.'[76]

While the extent of observed bush fire was little different from the beginning of the colonial period,[77] it was at the time considered to have increased. In Guinea, as in West Africa more generally,[78] the effects of bush fire were strongly debated, with polarised opinions about whether or not fire was useful and under what circumstances.[79] The fire policy of the 1935 AOF decree was ambiguous, as it had distinguished 'useful' and 'wild' fire without defining either. This debate was not resolved, although in 1945 a more clearly defined fire policy was imposed uniformly throughout the country. This involved a ban on running fire

at any time except December, precise controls on agricultural land clearance, and the immediate extinguishing of any observed running fire.[80] Some unease was expressed about the universal applicability of a policy, devised, it was admitted, mainly with reference to the Fouta Djallon. Early burning-based strategies might, it was felt, be more suitable for Kissidougou and Haute Guinée. Indeed early burning had, since 1935, formed part of national fire policy, and in 1942 instructions had been given to set early fires throughout the territory. But pending further study, the 1945 regulations were to apply everywhere.[81]

This fire policy was implemented with new administrative force. The implementation strategy involved not only rules and sanctions, the tools of earlier policy, but also direct demonstration and action by teams of guards co-ordinated between the forestry, agriculture and Cercle administrations.[82] Forest guards were urged to act as a repressive police force,[83] and to use draconian military methods which, by now deemed inappropriate in other areas of colonial policy, came easily to ex-military guards who until the establishment of a forestry school at Mamou in 1956 received no other form of training. Combined with the increase in forest guard numbers, fire policing in Kissidougou now increased sufficiently to have an impact on local fire management practices.

Nevertheless, fire prevention failed. In 1950, in the north of the Cercle, early burning was reinstated as part of fire policy, but it was removed from local control and hence oral accounts perceive forest guards as having imposed a ban on all fire-setting. Consequently they hardly distinguish this period from the first post-independence Republic when not even early burning was permitted. Villagers began to lose control over the ways they had sequenced fire and prevented damage to crops and property through its use in integration with their seasonal activities, and they lost the flexibility to alter fire use in relation to highly variable dry season lengths and intensity. Fear of fines led to a loss of public activity around fire setting and control, and excluding fire from valued property became more difficult. People were forced to develop coping strategies to set fires secretly, and to deal with forest guards by offering largesse to dissuade them from visiting fields. In this context, there is no evidence to suggest that there was any reduction in the extent of annual fires. But people do consider damage to their plantations to have increased.

In the south-east of the Cercle, the situation was somewhat different. In this higher rainfall and more populous area, early burning was not allowed, and policy focused on fire-breaks, banning all running fire. In certain areas this policy coincided with local fire management techniques already in place and in village opinion served to reinforce them.

Forest reservation was also pursued with vigour in the post-war period. Concern with the future of Kissidougou's forest islands, almost certainly linked to the wartime work of the botanist Adam,[84] led to the reservation of several islands near Kissidougou town immediately after the war.[85] In 1948, Adam emphasised the annual retreat of woody vegetation in the forest region.[86] He

attributed this – as 1930s observers had done – largely to the southwards movement of Malinke, with their frequent fire-setting and over-intensive agriculture. Having reduced the dry forest of the sudanian zone to more or less woody savanna, it was said, they are now reducing the forest region to a herbaceous savanna which only gradually becomes re-wooded with fire resistant savanna species. Meanwhile Kissidougou's forest islands, all in regression, were, as ever, said to be destined to disappear within a few decades.

The chief of the Service des Eaux et Forêts fully endorsed Adam's analysis, considering that dense forest must have covered Kissidougou 200 years previously, and used it to orientate the the general strategy for forest conservation adopted in Kissidougou.[87] But it was recognised that Kissidougou's 'relic' forest islands were now filled with coffee: in the context of the high coffee prices of the late 1940s and 1950s, the Cercle's production regained its pre-war levels by 1949 and by 1955 had further increased ten-fold to 10,000 tonnes per year. It was not possible, therefore, to turn many more forest islands into strict forest reserves. On the contrary, one element of the strategy outlined was to exploit the valuable timber from within these otherwise doomed forest islands. The commercial timber installation and sawmill established on the Niandan river in 1947 was seen as a model in this respect, intended – and succeeding – to lead the way for the establishment of many similar, privately owned commercial timber exploitation outfits througout Kissidougou to serve growing urban markets. By 1956, Kissidougou was recognised as Guinea's foremost timber producer.[88]

A second element of the forestry strategy was to encourage forest reconstitution in the savanna neighbouring forest islands, by some planting of quick-growing species, but principally by natural regeneration. The 1930s perception that ongoing deforestation in Kissidougou was a threat to coffee production had not disappeared. Indeed in 1955 (and despite much higher than average rainfall) alarm was expressed that the region was drying out and turning from a forest region to a sudanian zone no longer apt for coffee; urgent forest protection and reconstitution were needed to restore its forest character, notably through a programme of re-wooding to extend forest islands in association with coffee, kola and other tree crops.[89]

Thirdly, building on the recommendations of the Goma soil conference, the idea first proposed in 1934 to assist the regularisation of the major West African rivers flowing north from Guinea was now linked to soil conservation priorities, and funded in 1950.[90] The vast scheme differentiated between the entire upper Niger watershed where 15% of the area, including northern Kissidougou, was to be put into large reserves and where early fires would be used, and the more densely wooded areas, such as the southern half of Kissidougou, in which fire was to be eliminated and forest reserves established over 30% of the area. The programme was initially launched in two pilot sectors, one on the Bafing in the Fouta Djallon, and the other on the Milo, a tributary of the Niger, at Foronkonia in the Cercle of Macenta.[91] Not counting on local participation, the work was to be done by force until the inhabitants realised the benefits to be gained.

In the 1950s, the issue of permits for tree cutting became a major source of revenue for the forestry service. Permits were by now required not only for felling forest stands, but also for cutting individuals of a list of protected tree species. This deprived villagers of their previous tenurial control over trees, as individuals, family or village members. Notably, forestry service values emphasised the protection of species valuable, when mature, as commercial timber; not necessarily the species on which local use-values focused. Nevertheless, the list created problems for villagers who wished to fell small individuals of protected trees for use as poles, and in the farming of gallery and upland forest fallows. Villagers coped, as they coped with fire policy, by offering hospitality to encourage forest guards to ignore their actions.

In the immediate pre-independence period, the repressive tactics of the policy-empowered 'forest police' had reached such proportions that they became a target of political movements in Guinea. Rural political support could be readily gained through slogans such as 'we promise to give you back your lands and forests'.[92] This led to a position in which, as Rouanet, the last colonial Chef de Service put it, Guinea's Eaux et Forêts could no longer count on the direct support of the territory's upper echelons. The forestry service shrank, funds were reduced, and in an attempt to reduce its unpopularity there was a partial declassification of forest reserves, converting them into 'sylvo-agricultural reserves' with, in effect, no restrictions over their use. In Kissidougou, the forest islands which had been classified in 1945 were now declassified. It was, as Rouanet suggested, necessary to re-think the country's forest policy.[93] While it would take another thirty years for policy to be re-thought, the analysis of environmental change on which it is based has still not been questioned.

III. THE COLONIAL LEGACY IN POST-COLONIAL ENVIRONMENTAL POLICY

1. *1958 - 1984: The First Republic*

The vision of a degraded and degrading environment created during the early colonial period, and reproduced and elaborated during it, was carried over wholesale into the post-independence period. Despite the huge changes in Guinea's political, social and economic life which occurred during the First Republic under President Sékou Touré, environmental policy and the analysis informing it is best characterised in terms of continuity, and significant further reinforcement.

This continuity was partly institutional. The renowned French botanists who had created the degrading vision had, by the end of the colonial period, become the most senior figures in the French colonial environmental administration. Their legacy was the very organisation and operation of the Eaux et Forêts institution.

Soon after independence, the position of forest guard was abolished for political reasons, and only trained staff, not ex-soldiers, were eligible to become forest agents. Initially during the 1960s, therefore, the Eaux et Forêts service was not large. Nevertheless, the service gradually increased in size. Although the number of trained foresters remained small (about 200 in Guinea in 1984) the service was reinforced by recruitment from the vast pool of agronomists trained in the agronomy faculties found in each Prefecture. By 1984 there were 45 agronomists and foresters working in the Kissidougou section of Eaux et Forêts.

The lack of administrative priority for environmental issues immediately post-independence, and the capacity of staff to finance themselves through fines and permit-granting, assisted the maintenance of the status quo. In as much as environment was made the subject of policy, it was Rouanet, who had instigated the late colonial forest police force, who was called in to advise.[94] The new service combined the colonially-inherited environmental vision and policies with the slogans and state socialist momentum of the First Republic's regime. That there was a total ban on all bush fire from 1972, during which forest burning was criminalised and carried the death penalty,[95] graphically illustrates the administration's approach. Combined with state functionaries' declining remuneration, official benefits and bureaucratic management, these forestry laws created the conditions in which the large numbers of forest agents operated in villages in an extremely repressive, and often freelance, way.

In the north of the region, the threat of damage of late fires to villages and plantations, already felt at the end of the colonial period, increased proportionately. Villagers not only continued the coping strategies they had begun in the late colonial period, but increasingly felt highly constrained in their upland farming since in this relatively dry and sparsely populated area the labour costs of preventing the spread of fire outside field boundaries were prohibitive. Gallery forest farming required either a permit or extreme secrecy. This situation undoubtedly further encouraged rural outmigration, and the shift from upland to swamp rice which had been progressing through the colonial period and, as oral histories emphasise, intensified after it.

In the south-east, the effects of colonial policy were similarly reinforced, in certain areas adding to local abilities to create effective fire-breaks. In this region, therefore, the policy probably added to, but is not necessarily responsible for, the gradual cession of herbaceous savanna to bush fallow vegetation containing a high proportion of forest tree species which took place during this period. Villagers benefited from increased agricultural fertility and reduced fire risk to property, but lost pasture, land and cattle numbers declined proportionately. Their policy interaction problem of 'fire' developed into the problem of authorisation of tree cutting on their fallows.

In agriculture, state policy initially neglected the rural sector, taxing it to favour low urban food prices and industrialisation. Subsequent policy pursued two linked strategies: modernisation through mechanisation, intensifying strands

of colonial policy, and encouragement to collective forms of production, in line with state socialist goals. After independence, farmers were asked and then forced to join co-operatives in which some fields were to be farmed collectively.[96] In 1968, these co-operatives were abandoned in favour of inter-village Brigades, which from 1973 were mechanised with tractors or ploughs. These Brigades were in turn abandoned in favour of state farms (FAPA) in 1979.[97] But such collectivisation had no enduring influence on village work forms. Equally, mechanised production techniques were only used either by the externally-imposed collective organisations, or an emergent class of large farmer-traders, and even then, only on certain field types such as large river plains. Thus apart from required periodic contributions to collective fields, most villagers carried on with their accustomed agricultural organisation and techniques.

The period is, however, remembered for its very low producer prices, high levels of rural taxation, and – in consequence – emigration, especially of young men. Once again it was these factors, more than explicit agricultural policy, which had an enduring impact on local farming. Under the effect of extremely low official prices, villagers either abandoned coffee production or reduced it to minimum maintenance levels, except in those border areas where the parallel market kept producer prices high. Food crops replaced coffee as the principal cash crops. In southern areas, and where swamps were available, the decline of coffee production freed up labour for swamp rice production and both men and women turned to individual swamp rice cultivation as their principal cash crop. Thus occurred the major increase in intensive swamp rice production which had begun earlier in the lower coffee-producing areas of the north. Notably this individual, cash-oriented swamp rice production increased as an addition to, rather than a replacement of, household upland rice production, so there was no absolute change in upland use.

In the north, the importance of rice as a cash crop, emigration leaving smaller farm-households, and the increasing problems with upland field burning hastened the ongoing shift of household rice production from uplands to swamps. Where swamps were scarce, or where family rice was itself swamp based as, by now, in much of the north, women increased further their production of peanuts and manioc as their principal source of personal money and food security. Heavy taxes were levied in cash or kind on a per capita basis and women had either to 'help' their husbands or pay their own, especially if their husbands had emigrated. Given that fewer uplands were cleared for rice, secondary crop farming was concentrated even more within intensive gardening sequences and on the land previously improved by such sequences, and short sequences involving manioc alone. Thus such upland farming as there was tended to be improving of woody vegetation cover.

The First Republic encouraged villages to amalgamate and move to new sites which could be accessed by the developing feeder road network. Even villages already near such roads were encouraged to move out of the 'mystified obscu-

rity' of their forest islands into 'the open'; into the 'clarity' and 'modernity' which Sékou Touré's cultural policy upheld. Although this was frequently successfully resisted, many forest islands were nevertheless abandoned and a few, no longer valuable even for their coffee, were neglected and eventually converted to fertile cultivation sites. Around new village sites, however, new forest islands inevitably began to develop.

Colonial environmental ideas and the modernisation-with-mechanisation approach to agricultural development gained significantly in strength during the First Republic. They were reinforced not only in policy-making institutions, but also in education. Through the extensive propaganda of Sékou Touré's regime and the teaching in its schools, universities and 'Centres d'Education Révolutionnaire' these ideas became embedded state functionaries' thinking and urban popular consciousness, where they have remained. Notably, the emphasis on the need radically to transform local environmental and agricultural knowledge and practices rests in stark contrast with the emphatic (if selective) re-valorisation of indigenous medical practices. Indeed there was a strong official interest in ethnobotany during the period, but this focused exclusively on plants used in medicine and veterinary medicine.[98]

2. *The Second Republic: 1984 - present*

Environmental policy in Guinea's Second Republic, now influenced more than ever by the agendas of foreign aid donors, is still working with the idea of the ongoing degradation of a once-extensive forest cover in the Kissidougou region. And today, the problems in this position as viewed from a local perspective are greater than ever; not least because of the unprecedented investment and personnel pursuing environmental goals.

Considering forest protection and fire control policy during the First Republic to have been ineffective, the forestry administration reinstated the colonial 'forest police': the forest guards. In Kissidougou, 30 ex-soldiers joined the forestry service in 1984, bringing the total number of forest agents to 75; about five times the number present at the end of the colonial era. In Guinea more generally, between 1958 and 1986 the number of forestry personnel increased from 138 to 3,194.[99] The number of trained staff was reduced again (by 13 in Kissidougou) in 1987, but the uncontrolled repression by forest guards continued until 1993, when the position was once more abolished. To the forestry service have been added foreign-funded, semi-autonomous environmental protection projects with agendas driven partly by global and regional environmental concerns.

Currently, the image of a continuously degrading forest is maintained by updating the period when the dense forest was presumed to be intact. For example, Green, a rural development consultant concerning bush fire in 1991 postulates that there was no fire-maintained savanna only 40 years ago;[100]

equally a 1986 report for the Projet Agricole de Gueckedou suggests that the dense forest limit reached 30 kilometres north of Kissidougou town in 1945.[101] Adam, writing then, had found the extent of Kissidougou's forests and savannas to be the same as they are today: confirmed by air photograph comparison. Both he, and a team of modern European and Guinean consultants who cite him, push back the date of dense forest cover further to 1893:

> the whole region was covered with forests about 99 years from 1992, which goes back to 1893 and corresponds with the Samorian period.[102]

Yet the archives dating from this time, as we have seen, described a landscape just as it is found today. That observers at all dates have been tempted to imagine the recent existence of a now-degraded dense forest cover further forces one to question Valentin's 1893 interpretation (verifiable only through oral, not archival data) of the Kissi region as 'relatively recently' covered in dense forest.

It is not just the past existence of a contiguous forest that is mythologised, but also the on-going diminution of relic forest islands, which, at every date since 1914 have been seen to be on the verge of disappearance. As Guinea's 1988 forestry policy puts it:

> The opinion, quasi-general, is that the part north of Macenta, Gueckedou, Kissidougou will soon be no more than a vast poor savanna, the islands and gallery forests still present at risk of being rapidly destroyed.[103]

As research from a local perspective reinforced by time data series such as air photographic comparison shows, during the period when policy-makers have considered forest and savanna tree cover to be most in decline, it has actually been increasing. 'Relic' forest islands have in fact been created, and their continual creation has remained in relative balance with their destruction. In the centre and north once-herbaceous savannas have become more woody, while in certain southern localities, they have ceded to 'secondary forest'. Quite simply, policy-makers have been reading history backwards.

These unseen increases in vegetation cover are clearly in keeping with policy objectives. Their causes are multiple and complex, involving locally-specific shifts in resource management patterns in the long-term contexts of climatic rehumidification and population increase. In the north, as we have seen, local land use shifts have included increases in vegetation-enhancing cattle populations, and a switch in upland use from rice to soil- and vegetation- enhancing forms of secondary crop cultivation. In the south, vegetation change has also been influenced by reductions in the spread of fire, attributable to greater population and policy-reinforced fire control organisation, in the context of climatically-influenced colonisation by forest species from areas further south.

Given the complexity of influences on these changes, it is hard to attribute a clear causal role to policy; especially policy whose implementation has been patchy and at times weak and ineffective. Where environmental policy did have

an impact on land use changes, it was not because people adopted colonial suggestions wholesale, but because they used possibilities made available by policy as inputs into their own resource management strategies; for example in the case of swamp rice and peanut varieties, and greater sanctions on failures of local fire control in the south. But arguably, resource management patterns have responded less to environmental and agricultural policy than to changing social, economic and demographic pressures and possibilities. These have of course themselves been influenced by policies, for example concerning taxes, prices, road-building and employment, but policies whose environmental effects are unforeseen, and indeed unacknowledged, consequences. Outside policy influence, changes in vegetation cover have nevertheless often coincided with policy objectives. Evidently, local interests in managing the environment for agro-ecological productivity and local needs sometimes produce the results which policy, driven by other internal and external agendas, aims for. But this coincidence operates only to the extent that local and policy-makers' agendas match.

The colonial legacy is clearly visible in the environmental projects in place in Kissidougou today. For example in 1989, the programme to improve and regularise the flow of the major Sudano-Sahelian rivers through restoring the vegetation cover of their upstream watersheds in Guinea, first outlined in 1934 and implemented in the 1950s, was launched once again on an enormous scale with two sub-projects in the Prefecture of Kissidougou. Such project continuity is unsurprising given that the major causes of deforestation postulated today, and the major solutions, encapsulate those which evolved during the colonial period. Modern national policy and project documents still emphasise the irrationality of upland shifting cultivation, the problem of uncontrolled bush fire, the negative effects of increased cattle numbers, the vandalism and ignorance of the population, and anthropogenically-induced negative climatic change.[104] The only major difference is that commercial timber cutting is now viewed as a serious threat to Kissidougou's forest islands and gallery forests. The extent of urban-based, mechanised artisanal logging has massively increased since the late 1980s and is indeed leading to a thinning-out of large forest trees in many accessible forest islands; the aspect of forest vegetation through which environmentalists, if not villagers, judge forest island quality.

The increasing number of modern (and confused) social science studies still attribute the retreat of the forest frontier to southwards Malinke migration. They have, however, elaborated other socially-grounded arguments to account for the degradation they believe to have taken place this century. A Rousseauesque picture of people (in some respects including Malinke) in harmony with their environment is projected onto the pre-colonial period; a harmony maintained by efficacious traditional authority[105] or, in more sophisticated terms, by the integration of fire control within intra- and inter-village social, cultural and political relationships.[106] It is argued that these harmonious society-environment relationships have been broken down by colonial and post-colonial policy and

socio-economic change, as well as the weakening of traditional authority, poverty which induces short-term resource management perspectives, new urban economic and cultural aspirations, population pressure, and alienation of local resource control to state structures, leading to tenurial insecurity and disincentives for long-term management.[107]

It seems to be such social theories, as well as recognition of the ineffectiveness of earlier policy, which underlie the new orientation towards local 'participation' evident in late 1980s and 1990s environmental policy. Guinea's 1988 forestry action plan, for example, emphasises local community involvement in the implementation of forest and fire policy, while Guinea's National Environmental Action Plan and the latest round of the river watershed protection projects adopt the framework of 'gestion des terroirs villageoises'.[108] In these, it is assumed that re-establishing 'community' rights and authority over resources will assist in reversing environmental degradation, and some consideration is being given to the reform of the forest service's relationship with villagers necessary to foster such an approach. Notably, these calls for a more participatory approach are not driven by any new recognition of indigenous technical skills; nor, it seems, does local participation extend into the analyses of environmental change and setting of environmental values which guide policy and project objectives. And it seems questionable that 'participatory resource management' (however conceived) can genuinely be promoted by agencies funded and operating on the basis of mistaken analyses of environmental history which misrepresent local resource management priorities and capabilities.

The social theories underlying modern 'participatory' approaches not only assume that pre-colonial local resource management systems were once effective 'in their own terms', but also – by leaving begging the question of what those terms might be – assume old local priorities to be identical to those of modern environmental projects: extensive high forest cover, and as little fire as possible. They assume that local land use is inevitably degrading, that more people means more degradation, and that resource use can be rendered sustainable only by improving forms of 'regulation', 'authority' and 'organisation'.

The analysis in this paper suggests, however, that Kissidougou villagers' agro-ecological priorities have never been those of foresters or environmentalists; rather, they lie in encouraging and maintaining balances between a diversity of vegetation types. Furthermore effective long-term resource management depends less on community-level authorities than on the cumulative effect of multiple, seasonally- and socially-sequenced actions by individuals and small groups, often over long periods, and on the ways that the maintenance of productivity is built into production patterns. When local resource management is viewed from a local perspective, the history of its interaction with colonial and post-colonial policy and socio-economic change looks different. Local resource management has responded flexibly; it has not suffered major technical or social breakdown.

NOTES

Archives consulted:

ANGC = Archives Nationales de la République de Guinée, Conakry
ANS = Archives Nationales de Senegal, Archives du Gouvernement Général de l'AOF
APK = Archives de la Préfecture de Kissidougou
ANF = Archives Nationales de la République Française, Centre des Archives d'Outre-Mer, Aix-en-Provence
ACRAS = Archives du Centre de Recherche Agronomique de Seredou, Guinée
IRAT = Archives de l'Institut de Recherche de l'Agriculture Tropicale, Nogent-sur-Marne, France.

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[2] Present day rainfall is between 1,500mm and 2,100mm per annum, over a rainy season of 7-8 months, with quantity and duration highly variable from year to year. It is this seasonality and variability, as much as total rainfall, which influences vegetation patterns.

[3] For example: Aubreville, A. 1949, *Climats, forêts et désertification de l'Afrique tropicale*, Paris; Adam, J. G. 1968, Flore et végétation de la lisière de la forêt dense en Guinée, *Bulletin IFAN* Series A, 30, 3, 920-952; Keay, R.W.J. 1959, 'Derived savanna – derived from what?' *Bulletin IFAN* Series A 21, 28-29; Gayibor, N.L. 1986, 'Ecologie et histoire: les origines de la savane du Bénin', *Cahiers d'Etudes Africaines*, 101-102, XXVI-1-2, 13-14, and Jean, B. 1989, La Gestion des Ressources Naturelles, ms, Ministère de l'Agriculture et des Ressources Animales, Conakry.

[4] Adam, J. G. 1948, Les reliques boisées et les essences des savanes dans la zone préforestière en Guinée francaise, *Bull. Soc. Bot. Fr.* 98, 22-26.

[5] For example: Moss, R.P. & W.B. Morgan 1970, 'Soils, plants and farmers in West Africa', in Garlick, J.P. (ed) *Human ecology in the tropics*, Pergamon Press, London, 1-31; Avenard, J-M, J. Bonvallot, M. Latham, M. Renard-Dugerdil & J. Richard 1974, *Aspects du contact forêt-savane dans le centre et l'ouêst de la Côte d'Ivoire: étude descriptive*, ORSTOM, Abidjan; Blanc-Pamard, C. & P. Peltre 1987, 'Remarques à propos de "Ecologies et histoire: les origines de la savane du Bénin"', *Cahiers d'Etudes Africaines*, 107-108, XXVII-3-4, 419-423.

[6] For example: Adjanohoun, E. 1964, 'Végétation des savanes et des rochers découverts en Côte d'Ivoire centrale', *Mémoire ORSTOM* no.7, Paris; Miège, J. 1966, 'Observations sur les fluctuations des limites savanes-forêts en basse Côte d'Ivoire', *Annales de la Faculté des Sciences*, 19, 149-166, Dakar, and Guillaumet, J.-L 1967 'Notice explicative de la carte de la végétation au 1/500 000 de la Côte d'Ivoire', Centre ORSTOM d'Adiopodoumé.

[7] For example: Nicholson, S.E. 'The methodology of historical climate reconstruction and its application to Africa', *Journal of African History*, 1979, 20, 1, 31-49, and Brooks,

G.E., 1986, 'A provisional historical schema for Western Africa based on seven climatic periods', *Cahiers d'Etudes Africaines*, 101-102, XXVI-1-2, 43-62.

[8] Spichiger, R. & C. Blanc-Pamard, 1973, 'Recherches sur le contact forêt-savane en Côte d'Ivoire: Etude du recru forestier sur des parcelles cultivées en lisière d'un ilôt forestier dans le sud du pays baoulé', *Candollea* 28, 21-37.

[9] All the quotations given henceforth in this paper have been translated by the authors from their original French.

[10] Oral historical accounts were collected from elderly men and women in different localities of Kissidougou Prefecture during 18 months of social anthropological field-work. More than 200 hours of oral accounts concerning local resource management practices have been cassette recorded, transcribed and translated. For details of this historical analysis see Leach, M. and J. Fairhead, 1994, The forest islands of Kissidougou: social dynamics of environmental change in West Africa's forest-savanna mosaic. Report to ESCOB, Overseas Development Administration.

[11] This is not least due to the manipulation of ecological categories in political discourse; see, for example, Dupré, G., 1991, Les arbres, le fourré et le jardin: les plantes dans la société de Aribinda, Burkina Faso, in G. Dupré (ed) *Savoirs paysans et dévéloppement*, Karthala-ORSTOM, Paris, 181-194.

[12] Fairhead, J., and M. Leach with D. Millimouno and M. Kamano, 1992, Forests of the past? archival, oral historical and demographic evidence for Kissidougou Prefecture's vegetation history, *COLA Working Paper* 1, Kissidougou.

[13] Recent studies have shown such contrasts elsewhere in Africa; for example M. Tiffen et al 1993, *More people, less erosion: environmental recovery in Kenya*, Wiley.

[14] For details of these processes see Leach, M. & J. Fairhead 1993, Whose social forestry and why? people, trees and managed continuity in Guinea's forest-savanna mosaic, *Zeitschrift fur Wirtschaftsgeographie*, 37:2, 86-101, and Fairhead, J. & M. Leach with D. Millimouno & M. Kamano 1992, 'Managed productivity: the technical knowledge used in local natural resource management in Kissidougou Prefecture, *COLA Working Paper 3*, Kissidougou, and Leach, M. and J. Fairhead, 1994, op. cit.

[15] This local supposition is supported by pastoral studies in humid savanna zones; for example Boutrais, J. 1992, L'elevage en Afrique tropicale: une activité dégradante? *Afrique Contemporaine*, 161, 109-125.

[16] Kuranko is normally classified as part of the central core of the Mande language family, Kissi as a Mel language, and Lele as part of the Vai-Kono sub-branch of the Mande family.

[17] Combes, Rapport sur les opérations de la première colonne détachée dans le Kissi, Campagne 1892-1893, ANS 1D132.

[18] For example from small peanuts, and the forest trees *Carapa procera* and *Pentadesma butifera*.

[19] This is evident in the descriptions, for instance, of Pinchon, Notice sur le Cercle de Kissi, 1899, ANS IG188, and Valentin, Rapport sur la Résidence du Kissi, 1893, ANS 1G188.

[20] Valentin, Rapport sur la Résidence du Kissi, 1893, ANS 1G188.

[21] A. Arcin, 1908, La propriété indigène et les concessions en Guinée Française, *Actes de l'Institut Colonial de Bordeaux*, Congrès Colonial de Bordeaux, 312-331.

[22] Rapport d'ensemble sur les produits du pays, 1896, ANGC 2D173.

[23] Rapport d'ensemble sur la situation agricole, 1904, ANS 2G4(2).

[24] A. Chevalier, Rapport sur les nouvelles recherches sur les plantes à caoutchouc de la Guinée française, 1909, ANS 1G276.

[25] Letter from Lieutenant Gouverneur to le Gouverneur Général de l'AOF, 15 avril 1909, ANS 1G276.
[26] Chevalier, op. cit.
[27] Chevalier, ibid.
[28] Brossart, Service de l'Agriculture de Kissidougou, Rapport juillet, 10 aout 1910, ANGC 1R12.
[29] ibid., and Administrateur du Cercle de Kissidougou, Rapport agricole du 4e trimestre 1911, ANGC 2D175.
[30] Brossart, Service de l'Agriculture de Kissidougou, Rapport février, 12 mars 1910, ANGC 1R12.
[31] Guinée Service de l'Agriculture et des Forêts, Rapport Annuel, 1913, ANS 2G13(1).
[32] Nicolas, Etat de cultures indigènes, août 1914, ANC 1R12.
[33] Guinée Service de l'Agriculture et des Forêts, Rapport Annuel, 1913, ANS 2G13(1).
[34] Agriculture par les indigènes, c.1915, ANGC 1R12.
[35] Kair, Mission de contrôle, Service de l'Agriculture, 1927, ANF Direction Controle 930-131.
[36] Cercle de Kissidougou, Rapport agricole, 2e semestre 1917, ANGC 2D175.
[37] ibid.
[38] Sudres, R. Considérations sur la culture du cafeier faite par les indigènes, Guinée française Rapport 1930, IRAT.
[39] Chaffaud, lettre du Commandant du Cercle au gouverneur au sujet de plantations de caféiers, 1920, ANGC 2D175.
[40] Rapport sur la main d'oeuvre, Cercle de Kissidougou, 2e semestre, 1939, ANS 2G(39/32).
[41] Diallo, I.K. 1989. Historique et evolution de la foresterie Guinéen, FAO, Conakry.
[42] The Gardes de Cercle comprised the police force at the disposition of the Commandant de Cercle, and numbered 24 in Kissidougou in 1921. Kair, Mission 1920-21, Rapport concernant la vérification de M. Sauvain, administrateur du Cercle de Kissidougou, ANF Direction Controle 925-926.
[43] Chevalier, A. 1928. Sur la dégradation des sols tropicaux causée par les feux de brousse et sur les formations végétales régressives qui en sont la conséquence *C. R. Acad. Sci.* CLXXXVIII, 1928, 84-86.
[44] G. Cochet, Rapport sur les forêts de la Guinée, 1930, ANS 2G30(45)
[45] Guinée Service Forestier, Rapport annuel de fin d'année 1932, ANS 2G32(70).
[46] For example by A. Sudres, Quelques notes sur la région forestière de la Guinée française, c. 1935, IRAT. This stereotyping is especially ironic given the Malinke origins of many of Kissidougou's Kissi-speaking families.
[47] Chevalier, A. 1933, Les bois sacrés des Noirs de l'Afrique tropicale comme sanctuaires de la nature. *C. R. Soc. Biogéogr.*, p. 37. Aubreville, A. 1939, Forêts reliques en A.O.F. Paris. *Rev.Bot.Appl. et Agron.* Trop., 1939, 215.
[48] Guinée Service Forestier, Rapport annuel de fin d'année 1932, ANS 2G32(70).
[49] Sudres, Quelques notes sur la région forestière de la Guinée française, c. 1935, IRAT.
[50] Service de l'Agriculture, Rapport Annuel 1945, IRAT.
[51] Secteur Agricole de Kissidougou, Note de Service, in Rapport Mensuel, janvier 1956, APK.
[52] A European agronomist appears to have been working in Kissidougou in 1936, but was repatriated and not replaced. Huet, Rapport concernant la verification de M. Vigier,

Président du Conseil d'administration de la Société de Prévoyance de Kissidougou, 1 avril 1937, ANF Contrôle Affaires Economiques 103(5) A.

[53] This distribution took place under various financial arrangements. SIP raised funds through the contributions of local membership, compulsory for all head-taxable inhabitants.

[54] Huet, op. cit.

[55] Cercle de Kissidougou, Rapport Agricole du 4e trimestre 1911, ANGC 2D175

[56] The precise movement of palms can be traced from oral histories concerning changes in palm oil trading and extraction patterns, as well as archival vegetation descriptions and maps; for example Valentin, Rapport sur la Résidence du Kissi, 1893, ANS 1G188.

[57] That palm-rich villages in 1937 had no need to sell rice to pay taxes – which led to urban rice shortages and strikes in Conakry – indicates the potential value of palms to rural household economies.

[58] For example, in Kissidougou by Green, W. 1991, Lutte contre les feux de brousse, Rapport pour projet DERIK, Dévéloppement Rural Intégré de Kissidougou.

[59] Circonscription Agricole Région Forestière, Rapport Annuel 1953, ACRAS.

[60] Cole, H., Compte-rendu sur le programme du Service de l'Agriculture en région forestière, 2 octobre 1951, APK.

[61] Rouanet, R. 1951. Rapport sur la Guinée française. Première Conférence Forestière Interafricaine, Abidjan 4-12 décembre 1951.

[62] Guinée Service de l'Agriculture, Rapport d'ensemble pour l'année 1941, 1 Aout 1942, IRAT.

[63] Service de l'Agriculture, Rapport Agricole 1948, IRAT.

[64] Martine, Service de l'Agriculture, Cercle de Kissidougou, Rapport Annuel 1943, APK.

[65] Service de l'Agriculture, Rapport Annuel 1946, IRAT.

[66] ibid.

[67] ibid.

[68] Service des Eaux et Forêts et Chasses, Rapport Annuel 1953, ANS 2G53(42).

[69] for example in Service de l'Agriculture Rapport Annuel 1948, IRAT.

[70] Plan de Cercle pour Kissidougou 1956, ANGC 2D431(7).

[71] Such actions were assisted by new sources of administrative finance available in the 1950s, notably from the 'rural action' budgets FERDES and FIDES.

[72] Cole, H. 1952, La vulgarisation agricole en Guinée Forestière, IRAT.

[73] Circonscription Agricole Région Forestière, Rapport Annuel 1953, ACRAS.

[74] For example: Aubréville, A. 1947, Erosion et bovalisation en Afrique Noire française. *L'Agronomie Tropicale*, 1947, 2, 24-35, and Rouanet, R. 1951, Le problème de la conservation des sols en Guinée, Conakry, Service des Eaux et Forêts. From 1949, each annual report of the Service de l'Agriculture had a section devoted to soil conservation.

[75] Service de l'Agriculture, Rapport Agricole Année 1949, IRAT.

[76] Cole, H. 1952, op. cit.

[77] Rapport sur les forêts de Kissi et Beyla, 1909, ANS.

[78] Jeffreys, M.D.W. 1945, This burning question, *Farm and Forest* vol VI no.3, replies in vol. VII no.2, 1946, vol VIII no.1 & 2 1947, vol IX, no.1 1948, and French version 'Feux de brousse', 1948.

[79] Service de l'Agriculture, Rapport Annuel 1945, IRAT.

[80] Rouanet, R. 1951, Rapport sur la Guinée française, Première Conférence Forestière Interafricaine, Abidjan 4-12 décembre 1951.

[81] ibid.
[82] Service de l'Agriculture, Rapport Annuel 1945, IRAT.
[83] Rouanet, R. 1951, op. cit.
[84] Adam, J. G. 1948, Les reliques boisées et les essences des savanes dans la zone préforestière en Guinée francaise, *Bull. Soc. Bot. Fr.* 1948, 98, p.22-26.
[85] These forest islands were Keredou, 90 Ha; Sangalabadou, 100 Ha; Gbangbadou, Kissi Dialakoro and Gbassanko, 1750 Ha; Bambaya, 550 Ha; Fero, 235 Ha, and Bouye, 470 Ha. Lettre ouvert du Commandant de Cercle, 26 août 1945, APK.
[86] Adam, J. G. 1948, op. cit.
[87] Rouanet, R. 1951, Rapport sur la Guinée française. Première Conférence Forestière Interafricaine, Abidjan 4-12 décembre 1951.
[88] Comité Consultatif Local de la Production Agricole de Guinée, Memoire du Service des Eaux et Forêts, 1956, IRAT.
[89] Circonscription Agricole de la Région Forestière, Projet Programme Café, 1955, Secteur Agricole de Kissidougou, 6 octobre 1954, APK.
[90] Diallo, I.K. 1989, Historique et evolution de la foresterie Guinéen, FAO: Conakry.
[91] Bonnet, P. & P. Vidal, 1959, Les premiers travaux du secteur pilote de conservation et d'utilisation des sols du Milo, Guinée Forestière, Troisieme Conference Interafricaine des Sols, Vol II, CCTA: Dalaba, and Vidal, P. 1954, Etude agro-écologique des sols de culture du Secteur Pilote du Milo, Seredou, 24pp ms.
[92] Diallo, I.K. 1989, op. cit.
[93] ibid.
[94] Rouanet, R. 1961, Experiences et travaux de reboisement forestier et de restauration des sols: conservation des sols et reforestation, République de Guinée, Direction des Eaux et Forêts.
[95] Jean, B. 1990, Etude relative aux feux de brousse, ms, Conakry.
[96] Leunda, X. 1973-74, Nouvelles institutions rurales en Guinée, *Civilisations*, Part 1 23-24 (1-2) pp. 76-97; part 2 23-24 (3-4) pp. 161-194.
[97] ibid; also World Bank 1983, Guinée: Etude du Secteur Agricole, 31 août 1983.
[98] Illustrated, for example, by the requirement that medical students should make a study of an indigenous plant medicine (large numbers of which now rest in the archives of the botanical research station at Seredou) and university theses from the faculty of agronomy such as: M.Y. Ouendeno 1979, Recensement des méthodes populaires de lutte contre les maladies bovines en Guinée forestière, University of Kankan, Memoire de diplome de fin d'études superieures.
[99] République de Guinée 1988, Politique forestière et plan d'action, TFAP 1988.
[100] Green, W. 1991, Lutte contre les feux de brousse. Report for Project DERIK, Kissidougou.
[101] Ponsart-Dureau, M-C. 1986, Le pays Kissi de Guinée forestière: contribution a la connaissance du milieu; problematique de developpement, Memoire, Ecole Supérieure d'Agronomie Tropicale: Montpellier.
[102] Zerouki, B. 1993, Etude relative au feu auprès des populations des bassins versants types du Haut Niger, Programme d'Amenagement des Bassins Versants Types du Haut Niger, Conakry.
[103] République de Guinée 1988, Politique forestière et plan d'action, TFAP 1988.
[104] For a few among many examples, see Grégoire, J.M., S. Flasse et J.P. Malingreau, 1988, Evaluation de l'action des feux de brousse, de novembre 1987 à février 1988, dans la région frontalière Guinée-Sierra Leone, Projet Régional FED-CILSS-CCR 'Surveil-

lance des Ressources Naturelles Renouvables au Sahel-Volet Guinée', ISPRA: EEC; Zerouki, B. 1993, op. cit.; République de Guinée 1988, op. cit., and Green, W. 1991, op. cit.

[105] For example Green, W. 1991, op. cit., and Stiegelitz, F.V. 1990, Exploitation forestière rurale et réhabilitation des forêts: Premiers résultats d'un projet de recherche interdisciplinaire en Haute-Guinée, Berlin.

[106] Zerouki, B. 1993, op. cit.

[107] These causes are variously elaborated in, for example, Cortin, A. 1992, Contribution du régime foncier dans la demarche de gestion des terroirs villageois, Operation Pilote de Plan Foncier Rural, MARA/DNA, République de Guinée, and Zerouki, B. 1993, op. cit.

[108] Elaboration du Plan National d'Action Pour L'Environnement (PNAE), Ministre du Plan et de la Coopération Internationale, Conakry, 1993.