

Practising 'Biodiversity':

The Articulation of International, National and Local Science/Policy in Guinea

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1 Introduction*

'Biodiversity' has become a central organising concept in international environmental debate. It also shouts loud within the cacophony of voices now speaking 'environment' in the Republic of Guinea, West Africa. Guinea was the second country in Africa to ratify the Convention on Biodiversity established at Rio in 1992, and the concept of biodiversity is now central to the strategising and daily work of the National Environment Directorate, the Forest and Wildlife Directorate, and the many donor-funded programmes which have now re-oriented their work towards biodiversity conservation objectives. But how do international and Guinean debates relate to each other? Are global ideas merely reproduced, or also reworked? How do those working in national organisations and their street and field level representatives understand and operationalise biodiversity conservation? How do Guineans relate to evolving international scientific and policy practice in its specific locales of application, and in the equally specific locales of national bureaucracies?

In addressing these questions, this article builds on our longstanding work on local knowledge and practices in landscape management in Guinea (Fairhead and Leach 1996). Yet our concern here is with the (internationalised) science/policy processes which shape the extent to which villager's perspectives gain (or fail to gain) influence and authority. We explore these processes through a 'science/policy as practice' approach, eschewing totalising narratives of 'Science' or 'Policy' to examine the array of specific practices, which can be taken to comprise them. Included in the idea of practice, as we use it here, are the ways in which ideas can become vested in (encoded in) landscape features (such as 'forest reserves') and networks of collaboration (such as those linking national park management and university zoology departments) as well as in methodological practices. While practices of science and policy are sometimes generated and proceed independently, with particular 'bits' of science taken up by particular bureaucrats at certain points in policy processes, there are also important ways in which science and policy are co-produced, becoming 'science/policy'. As we shall see, processes such as funding, the commissioning of studies and consultancies,

practices of ‘applied, policy-relevant research’, and the mutual framing of which issues and questions are relevant (and which are not) are all significant in this respect (see Shackley and Wynne 1995).

The social relations of science and policy are shaped through political history. In one-time colonies such as Guinea, this shaping has produced a high degree of disengagement of land users from the development of environmental science and policy to date. Modern concern for biodiversity and conservation echoes older colonial environmental concerns, although these focused more on deforestation and its supposed influence on climatic desiccation. As today, colonial administrations and their ‘street level bureaucrats’ (Lipsky 1979) had to balance international scientific practice and policy with the political, economic and ecological specificities of the territories they administered. The science and policy practices sedimented in earlier times have influenced those developed later, although sometimes in dialogical ways. In Guinea, this has happened through the various phases in a history of administrative succession from colony (1890s–1958), to independent African socialist state (1958–1984) to one-party military dictatorship (1984–93), and now a contemporary liberal democracy.

Take, for example, the attempt after Independence, of Guinea’s radical pan-Africanist socialist leaders to promote African herbal medicine. This was in part a political act which gained its meaning in dialogical opposition to the alien colonial health regime, which had earlier demeaned indigenous health practices. It also made sense in relation to the economic realities then faced by Guineans in the isolated and bankrupt economy. Yet, whilst the subject of the research was framed in opposition to colonial medical practice, the practice of research (what made it scientific) drew on colonially shaped scientific practice. Research sought to identify active plant chemicals, but not the social practices of medicine in which herbs were only a part. The policy thus trod a difficult line between Africanisation on the one hand (defined in opposition to colonial practice), and ‘demystification’ defined according to colonial traditions of scientific practice. In doing so, it helped shape new meanings (for those involved) about what it is to be African and Guinean; what is natural and what is

supernatural, what is cultural and what is ‘mystification’. Colonialism may be over, but its echoes still shape the present.

It is in this vein that we explore how, through specific practices, recent international imperatives around biodiversity and its conservation are articulating with existing practices of science/policy. These articulations generate both reproductions and re-workings of international ideas, manifested in several overlapping, yet distinct, sets of science/policy practices characterising biodiversity conservation in modern Guinea. These include:

- 1 first, the production of lists of plant and animal species which university scientists and projects carry out with donor support. As we shall see, such research is intimately related to the creation, justification and funding of national parks and forest reserves;
- 1 second, the exploration of ecosystem dynamics through ‘cutting edge’ sampling and computer modelling techniques, which is equally linked to funding justification;
- 1 third, the harnessing of traditional plant medicines by environmental NGOs and networks of healers to promote conservation; and issues also linked with discussion and action concerning biopiracy, multi-national corporations and ‘indigenous property rights’;
- 1 fourth, promoting the use of ‘semi-wild’¹ plants such as oil palms, which link conservation with inhabitants’ economic interests.

Each of these sets of practices involves different social relations and funding of science; different international networks, and different political discourses. In this respect, while each set of practices relates to biological conservation, each also carries wider importance in shaping national and local social categories and identities.

2 Biodiversity and administration

The National Environment Directorate has been responsible for the negotiations and the subsequent implementation of the Convention on

Biodiversity, and the production of a national biodiversity strategy and action plan. Whereas the Environment Directorate cannot implement, the Forestry Directorate can, with its large staff managing state forests and forest law throughout its prefectural and sub-prefectural administrations. The Forest Directorate is, however, heavily dependent on supplementary funding and infrastructure from donor-funded projects, and this – along with the green conditionalities imposed on Guinea by international financial institutions – means that large parts of its activity are now inflected by donors' concerns, where biodiversity looms large.

That those working in forestry, conservation, agricultural and environmental jobs have been turning their attention to biodiversity issues is certainly linked to funding. But it is also stimulated by a developing interest in the subject. Through the national and international networks, a mutually interested epistemic community has developed which gives new meaning and application to the skills of many involved. For national university academics, biodiversity provides an opportunity for 'research', and for those in foreign universities, it provides funding and interest in 'cutting edge' research.

That the major EU-funded Niger River Protection Programme, initially conceived for watershed protection, has recently employed as its key expatriate, a specialist ecologist skilled in ecosystem research (not hydrology), and that the refinancing of the programme that he is responsible for flags biodiversity as a major theme, clearly illustrates the shift in donor interest towards ecosystems and biodiversity.

National academics in universities and government research institutes have been incorporated into several of these developments. Many work simultaneously for non-governmental organisations (NGOs) which deal with environmental issues. International donors now often seek to work through NGOs rather than the state, and this enables talented government staff to work in the lucrative and better financed world in a freelance capacity. These rather entrepreneurial NGOs have been quick in 'mobilising' biodiversity and the funds it attracts. One, for example, is developing a

biodiversity project with university staff to re-invigorate a national game reserve, receiving financing from the German national fund dedicated to international biodiversity conservation, helping spend the money which Germany is obliged to spend following its ratification of the Convention on Biodiversity. The same NGO is developing a medicinal plant initiative. However briefly, let us look at the spectrum of practices in which these organisations and projects engage.

3 Science/policy practices around biodiversity in Guinea

3.1 Listing diversity

Focused attention on biodiversity has heralded a resurgence of interest in the identification and listing of plant and animal species. Long before colonisation, European visitors to West Africa had begun collecting and naming local flora. Early in the colonial period, botanical gardens and research centres collected, identified and classified plants, and established and managed plant herbaria. Certain Guineans became indispensable to this process through their knowledge of the flora and their capacity to identify and distinguish plants. The Guineans involved became renowned for their botanical knowledge, and informally, this contributed to their reputation as herbalists. At Independence, it was these few Guineans and their apprentices who took over the herbaria. Their skills were valued when the new state became interested in medicinal plants, and several were sent for botanical training in East Germany.

State funding interest in indigenous medical plants eventually waned following the death of President Sekou Toure in 1984, so the botanists had to continue with minimal resources and lack of recognition. They were kept busy 'tree spotting' (largely for forest inventories and forest exploitation), rather than for their herbaria and knowledge of diversity. In the last five years however, there has been a rapid increase in the demands on these charismatic botanist-healers as more attention is being paid to making species lists, identifying endemic species and those 'in peril', and adding up the numbers of each. These lists are central to many university and ministry biodiversity studies.

Species lists appear in justifications to prioritise particular locations for conservation (e.g. PROGERFOR 1995), yet their role in this is far from straightforward. First, species lists have generally been made in 'protected areas' such as forest reserves. Forest reserves have a long history in Guinea, being proposed in the 1900s and established from the 1930s onwards, largely for their supposed influence on regional climate. Species lists were drawn up in early ecological studies within three logics; (a) the 'practices' of the taxonomist-collector (locating new plants, interacting with metropolitan plant collections to establish the classification, coupled to the cult of naming in recognition of the finder); (b) the practices then used to define ecosystems (via plant communities – phytosociology), and (c) the practices of inventory for determining the 'economic value' of a forest. Significantly, there was little attention paid to diversity *per se*.

Thus, reserves and parks with their own logics of foundation have proved to be the site of taxonomic practice, and lists produced for one set of reasons are now important to supporting the continued existence of such reserves for another, in an era of biodiversity conservation. The practice of compiling lists from secondary sources only reinforces this focus on existing protected areas.

Virtually no comparable lists have been established for inhabited landscapes. The lists give the semblance of logical prioritisation to long-established parks and reserves, and by deduction, to the idea of biodiversity wealth and conservation in reserves, and biodiversity destruction in inhabited areas. In short, the presence of these reserves established for different reasons, has facilitated the development of science/policy around biodiversity in protected areas.

This has very real effects for the way conservation management is evolving in the region. In the Ziama forest reserve, for example, this logical association of biodiversity conservation with reservation has been reproduced both in the structure of its refinancing, and in everyday management practices. The forest reserve received support from one funder, and the inhabited buffer zone outside, from another. The reserve project is responsible for ensuring 'biodiversity and habitat conservation',

and the latter, for 'local participation and livelihood sustainability' (Schmidt Corsitto 1998; Kientz 1996). In this institutionally-divided setting, biodiversity and participation have come to be seen as trade-offs. As one expatriate project staff member put it: 'In village forests, biodiversity has no role. It does not interest villagers. In the forest reserve, the biodiversity aim must necessarily reduce the extent of participation; the more one has biodiversity conservation as a goal, the less one has participation.'² The reserve boundary came to be seen within the project as a dividing line between zones where important plants and animals might thrive, and those where farmers might be encouraged to intensify their agriculture and so reduce pressure on the reserve. As a Guinean critic observed, this structure precludes attention to the ways farmers have long used products from the forest reserve and integrated a huge diversity of 'wild' plants within their own landscapes.³ Yet his critique is not practised.

A second weakness to the seeming scientific rationality of prioritisation became apparent in the 1999 regional meeting held in Ghana by the Washington-based NGO Conservation International. More than 300 international and national scientists and policy-makers focused on prioritising biodiversity conservation in West Africa. Ideally, species numbers modified in relation to endemism and 'endangerment' were to be the key criteria in priority-setting. Yet in discussion, participants were understandably keen to favour their particular projects and protected areas and indeed countries, and when national or local importance appeared to be reduced due to a relatively poor position in relation to list-based endangerment, assorted arguments showing the real weaknesses of listing were marshalled in defence. The correct research had not been done... A key report had not been consulted... Important subspecies issues were overlooked... A focus on butterflies, orchids, or birds, rather than trees would show a different set of priorities..., etc.

Despite the practices of list-making, those managing protected areas actually consider the lists to be of little use. This is exemplified in the newly-established Parc National de Haut Niger (PNHN) in Upper Guinea, funded by the European Union. University researchers have been

contracted to conduct a series of animal and plant species inventories. The researchers involved find this rather tedious and uninteresting from a scientific point of view. They would prefer to be researching ecosystem dynamics, which they see as more important for advancing scientific knowledge of the region; 'there is not much treatment of systemic aspects of vegetation; this is a major lacuna'.⁴ Yet given the social and funding relations of science in a Guinea where universities are chronically under-funded and foreign aid projects provide almost the sole context in which field research costs can be met, and reports published, researchers have little choice but to work on the project's terms.

Paradoxically, however, those managing the park also see these qualitative inventories as of virtually no use in day-to-day management. As the Park's director put it: 'lists of species are fine for global biodiversity, but not for managers. We need to go deeper, to have quantitative information and information on ecosystem dynamics'.⁵ From his perspective, for example, rather different sets of data on species numbers and hunting kills are needed to inform wildlife management.

3.2 Ecosystems and diversity

A second conception of biodiversity elaborated through contemporary scientific practices highlights how diversity is embedded in ecosystemic relationships. From the first years of the twentieth century, colonial botanists categorised particular plant communities in relation to the broad climatic zones. Ecosystems were seen as stable formations, characterised by particular dominant trees – a 'climax vegetation' in relation to prevailing climate and soil conditions, unless 'disturbed' and 'impoverished' by human impact. This equilibrium analytical frame persists today in the national biodiversity assessments made by national university staff under commission from the Environment Directorate. Natural and social scientists have assembled data from secondary sources in such a way as to present general arguments about 'loss of habitat integrity' under pressures from farming, burning, over-fishing, over-hunting, population increase and so on. The work supports the reserve strategy for biodiversity conservation.⁶

Simultaneously, however, another research programme is being conducted as part of the Niger River Protection Programme, by expatriate researchers. This is using a highly detailed quadrat survey method and computer modelling technique to generate patterns of species association in relation to soil, climate land use, and the culture of it. The expatriate project leader, and force behind this research, sees the method as an ultimate tool in objective ecosystem analysis.⁷

The fresh approach provides a radical departure from the listing and climax ecosystem classification. First, it examines species diversity in inhabited landscapes, treating these not just as impoverished ecosystems which would be better represented in reserves. Second, it focuses on the forest-savanna transition zone as a species-rich tension zone (a site of speciation), rather than a species-poor zone (a site of degradation).

There are clear ways in which this research is shaped in its co-production with policy. Not only is it being conducted by an environmental programme, but it is already project policy to work to promote biodiversity in lived-in landscapes. And for regional political reasons, the project must now work in the forest-savanna transition zone. Both these dimensions are crucial to the refinancing of the programme, which has been uncertain. The expatriate hired had the skills and impetus to conduct this research.

These scientific practices are significant for the way they speak to an international scientific community, enrolling certain Guinean and expatriate researchers working in Guinea into a global actor-network developing high-tech ecosystemic research.⁸ To date, Guinean university biologists who conduct national biodiversity research have been 'confined' to carrying out taxonomic studies for donor projects. Most do not even know of the existence of this research.

It is perhaps ironic that most Guinean natural and social scientists, academics and project staff remain locked into colonial scientific paradigms, the view of nature they embody, and the reservation policy it has endorsed. The new, expatriate driven, science presents a radical departure from this, in dialogical relation to the old not just in method, but in its

policy practice. In countering deductive methods about climax vegetation with generative ones, it simultaneously counters exclusionary conservation in reserves with an apparently inclusive policy of 'participation'. Yet as in the case of the dialogical reversal in medical research and practice under Sekou Toure that we have described, this apparent reversal depends ever more on the 'practice of science', and its capacity to differentiate the 'good' aspects of African practice (in this case land management for biodiversity) from the problematic. Indigenous framing of biological issues, and the debates they have do not enter the picture. The adjudication of good and bad practices concerning African social life are again scientised, and in social relations of science as, or even more alien than in colonial times.

3.3 Medicinal plants and diversity

A third set of practices considered within the rubric of biodiversity concerns medicinal plants. Numerous donor-funded projects now compile knowledge of plant medicines, encouraging environmental and health NGOs and 'traditional healers' to pool information and discuss strategies for biodiversity conservation. This suits a generation of development donors concerned to link biodiversity conservation with 'participation' and to carry out development by working through 'traditional' forms of organisation and authority. This dimension of biodiversity generates interest among many Guineans. The taxonomist-herbalists discussed earlier now find themselves in great demand as brokers between healers, professional botanists, donors and government staff. They are popular not least because they can speak – and help integrate – the various languages. Numerous younger university-educated people have aspirations to 'join the circuit'. One in Kissidougou prefecture spends his spare time collecting and collating village information about plant medicines, and plans to produce a book which he hopes will attract the attention of ministerial and donor personnel.⁹ Many Guineans who share this perspective are already in positions of authority in the national bureaucracy, and they have not found it hard to enrol others to their perspective.

Biodiversity interest has thus given renewed impetus to practices that promote 'local' plant

medicines. As mentioned earlier, during the First Republic under Sekou Toure scientific and policy practices around plant medicines were strongly promoted. Between 1972 and 1978, all pharmacy students had to conduct a study of the medical uses of a particular plant, comprising a botanical examination, a determination of chemical constituents, and local knowledge of its pharmaceutical and therapeutic importance. East Germany provided funding and materials. This was part of a broader set of practices associated with the political philosophy of this phase in the First Republic, heavily influenced by the writings of the then President Sekou Toure and his ideologues. The key motives, as clarified in the students' introductions to their dissertations, include first, national self sufficiency, which is easily understood given Guinea's self imposed economic and political isolation during this period; second, a valuing of national patrimony, and third, a revaluation of elements of African popular culture – albeit in the terms of modern science. For example:

Our popular medicine is a rich mine marked with the impressive character of our historical legacy. The revalorization of this popular medicine through a painstaking exploration of our flora, and its restitution to all the people of Guinea remains a pressing and exultant duty of every militant of our country (Barry 1974).

The pharmaceutical research practices of the era were thus shaped by, and contributed to, discourses which simultaneously promoted modernist science and 'authentic' African culture. The practice of cataloguing medicinal plant knowledge and repackaging it in the terms of (medical/pharmacological) science, and valorising vegetation is very similar to international biodiversity concern today. In both cases, medicinal plant knowledge is extracted from the social relations of its day-to-day practice in village settings (see Agrawal 1995). But whereas under Sekou Toure this interest derived from a focus on human health, the interest of international discourse focuses on vegetation health, and whereas it was earlier locked into a nationalist discourse, it is now locked into an internationalist one.

Guinean historical experience continues to shape its engagement with international discourse. In

particular, Guineans are particularly sensitive to biopiracy (the exploitation of local biodiversity resources by other nations or corporations). This has been important to most 'southern' perspectives on international conservation, but it carries added weight in Guinea for at least three reasons. First, because there is a long history of the exploitation of local plant resources by European and Soviet powers. Second, the plundering of Guinea's other mineral and timber resources by foreign companies is today of great significance, and there have been numerous popular insurgencies against them. 'David and Goliath' stories of these struggles are on the lips of rural and urban publics alike. Third, biopiracy presupposes 'bio-wealth', affirming the idea that Guinea is tremendously rich in biodiversity resources, giving weight to the economic importance of conservation (past and future). Thus the concern is less with 'international wealth' and 'plants for plants' sake' than with national wealth, and the economic benefits of conservation.

When actively contributing to international debates concerning this issue, Guinean national spokespeople also bring a second distinctive perspective. Generally in international discourse, concern with biopiracy is juxtaposed with 'indigenous intellectual property rights'. But Guinean spokespeople reject the 'indigenous' polarity of this debate, continuing to see the practice of valorisation of biota as a 'nationalist' enterprise, and understanding 'indigenisation' of rights as a threat to state authority and stability.¹⁰ It promotes ethnogenesis; the antithesis of African nationalist discourse which those working in ministries had learnt at school. With the civil wars in Sierra Leone and Liberia on the border, this is also a very modern concern.

Once again, the particular way biodiversity is being mobilised in the country has been shaped by national history; by a sedimentation of practices from colonial times, transformed dialogically at independence, and transformed again in contemporary debate.

3.4 Economic plants and diversity

Extending out of interest in medicinal plants, the practice of biodiversity in Guinea also draws on a fourth set of existing practices around

economically-useful 'wild' plants. Projects are keen to show villagers how valuable are products such as tree nut oils, palm oil, honey, dental sticks. In project rhetoric, such an approach is linked to 'participation', especially among certain groups such as women's groups. It also conveniently links economic incentives to biodiversity protection. As one project worker noted:

Biodiversity is one of our strategies for the protection of natural resources which enables us to fuse economy and protection. We were oriented only towards protection, and it didn't work very well. Now with an economic emphasis, peasants are more interested. For instance, honey is a product of biodiversity, so is palm oil and palm nut oil.¹¹

Many projects have done surveys of potentially economic products. Yet all of those they identify are already widely used and frequently cultivated. Villagers actively preserve wildlings, and sometimes transplant them for accessibility and convenience. In this respect, the plants could be considered more 'agricultural' than truly 'wild'; a point overlooked by those discussions, which make a general equation between biodiversity and 'wild plants' and associate the latter with undisturbed 'nature'.

Projects have long been teaching villagers the value of their own environment. In doing so they simultaneously construct an 'ignorant peasant' who does not know the value of the resources around them, and an 'intelligent project' which does. When explicitly challenged with the idea that villagers might already use and value palm oil, honey and so on, personnel promoting this perspective tend to respond with the notion that this is specialised, not generalised knowledge, thereby allocating development projects a role in 'diffusion of information'. They also suggest that villagers may use these products, but are ignorant of their market value, thereby allocating projects a role in promoting commercialisation.

It is not difficult to trace these practices back to the colonial botanical gardens and their role in the commodification of wild plants. Botanists in the first decades of the twentieth century also sought out useful 'indigenous species', e.g. of rubber,

coffee, and sought to propagate and improve these products with a view to commercialisation. Resources were to be extracted from the local ecology and economy to serve the needs of a colonial administration, rather than locally-oriented to build synergies between livelihoods and conservation, as today's projects would emphasise.

However, the plants concerned were generally recognised to be 'semi-domesticated' by local populations, and indeed an aim of colonial policy was to domesticate and improve these plants further in order to enhance their economic value. Modern biodiversity concern, in contrast, seems to dictate a definition of these as 'wild' plants, not least because this confirms the relevance of developing them in a biodiversity project. Other possible interpretations of biodiversity, which would guide practices around these plants differently, e.g. emphasising agro-biodiversity and the ways local plant-use practices conserve and enhance genetic diversity among domesticated species, are hardly evident in Guinea. The difference is telling. Those practising this aspect of biodiversity policy in Guinea consider biodiversity to be something of nature, something wild: the antithesis of farming and land use.

4 Conclusion

Biodiversity, as an explicit organising concept for conservation, is new to policy in Guinea. Here we have tried to explore the way that Guineans and expatriates working in the country have interpreted and operationalised it. The different sets of biodiversity practices that we have explored are not associated exclusively with particular people. Rather, people and institutions, and the alliances they form, are sometimes engaging simultaneously with practices that we have considered separately.

To understand the emergence of these practices in Guinea today, it has been necessary not just to consider how international ideas and imperatives articulate with national and local science/policy traditions, but to do so in relation to the specific history of the country, and to contemporary social and political circumstances. Taking a practice perspective to do this allows attention both to the

sedimentation of history into 'structure', and the capacity for people to be creative agents. Those mobilising biodiversity concepts are grappling with their relevance to their work and its applicability to policy, latching on to existing sets of practices. The impetus from biodiversity has not left scientific and policy practice unscathed, as enduring phenomena. Rather these have been subtly changed in form and in meaning for those conducting them. Yet this has occurred in a dialogical relationship with practice-as-was.

This case also illustrates how science/policy processes produce and reproduce social and natural categories. For all their variation, the perspectives we have discussed here all in their different ways present biodiversity as a 'nature' which people might act on or exploit – whether in the form of commodities, of spaces (parks, reserves), or of desocialised medicinal plants – but from which their lives are ontologically distinct. In affirming such categories, these perspectives exclude both key alternative local framings, and a range of other ecological, historical and social analyses, which would point to a dynamic landscape perspective on forests; seeing vegetation patterns throughout the region as shaped through the interaction of social and ecological processes over time. Paradoxically, it seems that even foci with the potential for building such a landscape perspective, such as oil palms, long managed, used and spread by people, become detached from the social processes of their establishment in their reconfiguration into the 'wild plants' of international biodiversity debates.

Despite avowed attempts to 'include people' in biodiversity conservation, to move from colonial exclusionary approaches to modern 'conservation with development' and 'participation', the framing and institutional/funding imperatives linked to international biodiversity debates have pushed those working within their ambit further towards practices which reproduce western, colonial distinctions between nature and culture. Where perspectives of villagers have been incorporated, this has been only partially, with 'good' and 'bad' practices in African social life being adjudicated by scientific enquiry based on alien values.

Notes

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1. We use this phrase to refer to the fact that these plants sometimes grow wild, but are also actively distributed and cultivated by villagers. As will become apparent later in the article, different policy-makers, scientists and villagers variously emphasise the 'wild' or 'cultivated' dimension in defining and interpreting such plants.
2. Interview, expatriate project staff member, Nzerekore, 15 February 1999.
3. Interview, Director, Institut de Recherche Agronomique, Seredou, 18 February 1999.
4. Interview, Head of Département Eaux et Forêts, Institute of Faranah, 23 February 1999.
5. Interview, Park Director, Sidakoro, 26 February 1999.

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6. The broad topics and orientation for these thematic papers derives in part from the requirements of the Biodiversity Convention, 'adapted to suit Guinean conditions' by members of a cross-ministerial biodiversity co-ordinating committee, UNBIO (Interview, Head of Biodiversity Section, National Environment Directorate, Conakry, March 1999). Such adaptation nevertheless neatly slotted into a long analytical tradition of both botanical and social science work in Guinea framed by such assumptions from colonial times onwards (e.g. Adam 1948; Paulme 1954).
7. Interview, European consultant, EU Niger River Protection Programme, Conakry, 15 March 1999.
8. These methods construct what is inevitably indeterminate as uncertainty, knowable through its sampling and advanced computation. Indeterminacy is inevitable, given the chaos of path dependency, multiple variables, some unknown all changing over unknown timescales in interaction with unknown effects of landuse over an unknown history.
9. Interview, NGO leader, Kissidougou, 2 February 1999.
10. Interview, Head of Biodiversity Section, National Environment Directorate, Conakry, March 1999.
11. Interview, second NGO leader, Kissidougou, 1 February 1999.

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