



Trees on the march: the dispersal of economic trees in the prehistory of West- Central Africa

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Quand dies ne sont pas méconnues, les fonctions de l'arbre dans les civilisations africaines sont généralement sous-estimées.

Pélissier, Paul (1980a)

1. Introduction

One of the unconscious biases that commonly creeps into accounts of the development and spread of food production is the emphasis on cereals, pulses and tubers. Since these are the basis of agriculture in the developed world, students of prehistory constructing narratives tend to focus on these classes of cultigen and to ignore both trees and herbs. Rich ethnobotanical accounts of cultivated and protected trees remain few and far between, reducing the potential to reconstruct their history. Evidence for arboriculture in Oceania has considerable time-depth (e.g. Kirch 1989) and recent publications on biogeography and vernacular names have made possible historical sketches for many tree species (Walter & Sam 1999). However, the situation in Africa lags far behind that in the Pacific although there is every reason to believe that trees are of similar importance. One of the reasons for the success of biogeographical studies of fruit tree distribution in the Pacific is the existence of islands with relatively discrete flora. Many trees do not have seeds that can be distributed across the ocean spontaneously. Once it is established where a tree evolved, then it can often be determined whether its present distribution is due to human influence.

The situation is much more problematic with a large continent without significant geographical discontinuities. If a tree is found from Senegal to Angola, this may be its natural distribution or it may be that expanding Niger-Congo speakers carried it from West Africa down through the Zairean rainforest.

A pattern of conceptualisation of the environment that is highly familiar from ethnography and has a tendency to leak across to historical linguistics and archaeology is a distinction between culture and nature. The 'natural' vegetation of forest or savanna is domesticated when agriculture or intensification impinges on it through human activity. A historical linguistics that aims to reconstruct prehistory will also make this implicit assumption. Social institutions and technology are mutable, and the pattern of innovation and loanword reflects change and development. Natural and environmental items, whether biological or other, can be used to reconstruct homelands, based on at least some assumptions about environmental stability in a given area.

As with all neat dichotomies, reality is more complex. Just as the distinctions between agriculture and non-agriculture seems to be dissolving, it is equally clear that the woodland landscapes of the world have been influenced by human activity for a very long period and that as we approach the present these influences accelerate. Some of this can be reconstructed from ethnobotany and anthropology, but these provide only a limited time perspective.

Archaeobotany is one method of providing time-depth and in combination with biogeography and historical linguistics can provide a richer narrative of anthropic influences on the environment. It should be emphasised that this is a developing discipline; flotation and the evolution of reference collections for West Africa have only begun to develop in the 1990s.

African prehistory remains dominated by settlement archaeology and issues such as urbanism and the origins of metal working. This paper¹ combines the rather limited archaeobotany of West-Central Africa that relates to economic trees with cultural and ethnographic models in a historical schema illustrating the impact of human activity on woodland composition from the Late Stone Age to the postcolonial era.

2. A general scheme for tree salience in African history

The movement and manipulation of trees in African history can be divided into general categories that broadly correspond to historical epochs but also to the production system of particular groups. Until very

¹ I would like to thank Bruce Cornell and Katharina Neumann for comments on the issues raised in this paper. I have incorporated some of the unpublished findings of Stephanie Kahlhaber following her presentation at the SAFA Conference.

recently, arboriculture, the intentional planting of trees, an ancient characteristic of many agricultural systems in the Old World, was unknown in Africa. The spread of trees was essentially either through the opportunistic transport of seeds and the selective protection of individual species. Table 1 presents a highly schematic view of the correlations between production system and the spread of tree species. The sections that follow give examples of individual trees and the ethnography underlying their salience.

Table 1. Patterns of tree manipulation in African history

System	Characteristic	Example species	
		English	Latin
Forager	Transporting of economic fruits	Bush-candle	<i>Canarium schweinfurthii</i>
Pastoralist	Excretion of seeds		
	Transporting of economic fruits	Baobab	<i>Adansonia digitata</i>
Settled agriculture	Excretion of seeds		
	Bush-burning with protection of economic trees	Shea	<i>Vitellaria paradoxa</i>
	Selective economic extraction	False locust	<i>Prosopis africana</i>
	Ritual prohibitions on cutting	West African ebony	<i>Diopsyros mespiliformis</i>
Long-distance trade	Use and movement of economic fruits	Locust	<i>Parkia biglobosa</i>
	Sale of tree products	Pawpaw	<i>Carica papaya</i>
Colonial era	Intentional diffusion of fruit trees	Citrus	<i>Citrus spp.</i>
	Selective economic extraction	Tropical hardwoods	
Post-colonial	Agroforestry, plantation economies	Teak	<i>Tectona grandis</i>

Apart from the broad sweep of history, tree salience undergoes considerable local micro-variation, related to the interplay of economics and cultural patterns. Thus the shea tree, once predominant as the oil-crop of the savanna, has retreated significantly in many regions where the cultivation of groundnut has spread. Once people are no longer willing to process the shea-nut, the reasons for protecting the tree itself disappear and its virtue as a wood for carving mortars becomes more apparent.

3. Foraging and tree species diffusion

Prior to the development of agriculture, foragers intensively exploited a wide variety of fruit trees including species that are only considered of limited value today. It is generally assumed that LSA foragers were highly mobile and would therefore have actively spread the endocarps of economic fruits. However, this is hard to prove without clearer distributional data and some hypotheses as to the 'natural' environment of particular species. Nonetheless, finds of endocarps, as distinct from the identification of the presence of a tree from anthracological data, do suggest human intervention.

The most widespread species to appear in archaeological sites are;

<i>Elaeis guineensis</i>	oil-palm
<i>Canarium schweinfurthii</i>	bush-candle
<i>Celtis integrifolia</i>	nettle tree

The oil-palm, *Elaeis guineensis*, remains today the most significant oil-crop indigenous to Africa, even if Malaysia has taken over in world production statistics in recent years². Archaeobotanical finds of palm-nut husks occur all the way from Liberia to Zaire (see review in Stahl 1993) and also in the Sudan. Oil-palms were not cultivated until recently, but protected and allowed to spread by preferential extraction of nearby trees. Indeed in many places the West African humid forest now consists of degraded oil-palm forest with only a few scattered other species. Palynological data on *Elaeis* pollen has been presented for Lake Bosumtwi in Ghana (Talbot *et al.* 1984:185) suggesting an expansion of oil-palm 3500-3000 BP and in the

² Even, regrettably, exporting back to Nigeria palm-oil derived from parent material originally brought to Malaysia from Nigeria.

Niger Delta ca. 2800 BP (Şowunmi 1985). Modern opinion would be less willing to ascribe such changes to the 'beginnings of agriculture' or even to intensification. Nonetheless, these findings certainly point to a more intensive local use of the oil-palm.

Oil-palm is one of the few species, where there is sufficient linguistic data to propose a link between the distribution of widespread roots and the development of the culture of palm-oil. Williamson (1993:143). Both the tree itself and the oil seem to be reconstructible to a considerable time-depth in Niger-Congo languages arguing for its salience in an early period in the dispersal of the phylum. Connell (1998) combines further work on terms for oil-palm with the terminology of processing and is similarly able to suggest the antiquity of the tree name in Niger-Congo as well as the more limited reconstructibility of local terms for processing equipment. Williamson (1993:144) also notes the importance of the wine-palm, *Raphia hookeri*, although the linguistic data is confined to the area of modern-day Nigeria, suggesting a lesser antiquity than the oil-palm.

The bush-candle, *Canarium schweinfurthii*, is sometimes known as the 'African olive' for its black, oily fruits. The hard pericarps give it a high archaeological visibility and these have been recovered from a number of forest sites in West-Central Africa (e.g. Burkill 1985:301-303; Stahl, 1985, 1993; Eggert, 1993:324; Olisly 1996). The most ancient record of *Canarium* appears to be at Bosumpra cave in Central Ghana, where a date of 5303±100 bp has been recorded (Smith 1975). It is quite striking, however that *Canarium* is not even mentioned among the oleaginous species collected by contemporary hunter-gatherers in the forest (Bahuchet 1985:199).

The nettle tree, *Celtis integrifolia*, is striking as it turns up in a number of excavations from Dhar Tichitt (Munson 1976) to Kintampo (Stahl 1993:263), Gajiganna (Ballouche & Neumann 1995) and Saouga (Neumann *et al.* 1998) almost always in an uncharred form. The main use of *Celtis* today is for the leaves which are used as potherbs although the fruits are edible (Dalziel 1937:271). This suggest that it must both have been more widespread in the past and its fruits more highly prized.

It is perhaps remarkable that some of the best-known economic trees today, such as the shea and locust, which should have highly visible macro-remains, have a very low incidence in the archaeobotanical record. Neumann *et al.* (1998:60) report a testa from the medieval village of Saouga and note that shea-butter production was recorded by Ibn Baṭṭūṭa in the 14th century. Despite their present-day economic importance, it may be that techniques of processing their fruits only spread during the last millennium. The shea, for example, demands considerable investment in ovens and thus in firewood collection etc (see e.g. Hill 1930). This is probably only worthwhile when a market opens up and processing can be conducted during the dry season.

4. Pastoralists in the landscape

The impact of pastoralism on landscapes in Africa can be broadly assigned to three categories; burning bush to create open space and subsequently new grass shoots, the use of trees and shrubs as browse and the transport of fruit species as food and their subsequent establishment along migration routes. Bush-burning is carried out by foragers and settled agriculturists and its impact is dealt with below. The use of woody species as browse is more problematic, since it is connected with a whole series of broader debates on the impact of livestock on the landscape. Typically, large species, such as camels or cattle, either reach browse or have it cut for them. This does not usually destroy the tree and may even stimulate its growth. However, goats may well uproot shrubs and seedling trees and preferentially eliminate certain species from a region. Indeed there is some evidence that in a region such as the Horn of Africa, vegetation goes in long-term cycles, alternating between grass and woody species. As grazers such as sheep and cattle gradually eliminate all palatable grass species, woody species invade. The herders of grazers move out and herders of browsing species, such as camels and goats move in. They in turn gradually destroy the woody species and the grass returns for a period. Such alternations may have been in progress for considerable periods of time.

Pastoralists also carry easily stored fruits for consumption on migration. One of the most typical of these is the baobab, whose hard shell protects the flesh from heat. Apart from eating the flesh and roasting the seeds, extracts of the flesh are used by women to thicken milk in the dry season when yields are low. Across

West Africa, discarded baobab fruits can be seen along the line of Fulbe migration routes even today, and the presence of baobabs marks the lines of such routes, even after they have fallen out of use.

5. Trees and settled agriculture

Settled agriculture, being the most widespread, complex and well-established production system in Africa today, also has the most diversified systems of manipulation of trees. It is also the system where beliefs about trees are most explicit and can be most easily related to the distribution of individual trees. The following sections exemplify these processes at work.

5.1 Bush-burning and the protection of economic or ritual trees

The prevalence and intensity of bush-fires in the savanna has been remarked and condemned since the earliest forestry reports. The significance of bush-fires in tropical Africa has been discussed in West (1965) and for Ghana in Korem (1985). It is generally thought that bush-fires form part of the natural ecology of the West African savanna and indeed some plants are unable to germinate without the stimulus of fire. However, recent research, by carbon-dating sediments, has shown that the incidence of bush-fires has sharply increased towards the present, suggesting that the majority are anthropogenic³. Although occasionally lightning or spontaneous combustion can lead to burning, the great majority of fires are set by humans. A variety of reasons are cited;

- a) Hunters burning grass to drive small animals into the open
- b) Herders setting fires to encourage a new flush of grass for their stock
- c) Farmers engaging in pre-emptive burning to protect fields, groves etc.
- d) Farmers creating ash to fertilise low-yielding soils

In addition, there may well be more subtle, less well-explored agronomic strategies. It is generally believed that the yield of shea trees is greater if the grass around them is burnt early in the year. This might be to reduce competition for nutrients, but may also directly stimulate fruiting.

Burning exchanges a short-term gain for longer-term deleterious effects. There may, however, be more deep-rooted cultural causes of burning. Kirby (1999) has argued that wildlands are a threatening category in many cultures in northern Ghana and that trees are representative of that wildness. Burning is therefore an attempt to 'domesticate' the wild by levelling it. Similar motives explain the failure of numerous tree-planting schemes sabotaged by uncontrolled livestock and even human attacks. Such a deep cultural imprinting would help explain why attempts both to forbid setting bush-fires and to educate populations seem to have a very limited impact.

Bush-fires depend on a rather specific human population density. In very high-density regions, such as NE Ghana, field density is so extreme that areas of grass large enough to create a high-temperature blaze and threaten trees are very rare. Bush-fires flourish best in zones of medium-density settlement where the thinning of the trees creates ideal conditions for the growth of intermediary grass.

5.2 Ritual prohibitions on cutting and planting

Throughout much of Africa a strong distinction is made between indigenous and exotic trees. Indigenous trees belong to the 'bush', at once a threatening and significant place and as a consequence indigenous species should not be planted as this would be to mix two categories that should be kept distinct. It is said misfortune will fall upon anyone responsible for planting species of trees that already grow in the bush.

This belief was originally responsible for strong resistance to planting any type of tree, even mangoes and cashews. Throughout West-Central Africa, the colonial authorities were responsible for marking roads and

³ I am indebted to Professor Michael Bird of the School of Earth Sciences, ANU, Canberra for a copy of an unpublished report on this work.

gardens with exotics such as mangoes, neem, jacaranda, flame-trees and mahogany. Precisely because of their ambiguous status, these have gradually been accepted. However, indigenous species, such as *Parkia* and *Vitellaria* remain uncultivated.

There also tree species that are not cut for firewood, either in farmland or in the bush as they are believed to harbour spirits. These include;

West African ebony	<i>Diospyros mespiliformis</i>	Baobab	<i>Adansonia digitata</i>
Silk-cotton	<i>Ceiba pentandra</i>		<i>Sterculia setigera</i>
	<i>Gardenia terniflora</i>		

West African ebony, *Diospyros mespiliformis*, is particularly striking, since it is not otherwise a tree of major economic importance. The fruits are edible, but the leaves and wood are not considered of particular value. However, across a wide swathe of savanna West Africa, *Diospyros* is the focus of a complex of beliefs concerning sacred sites and the abode of woodland spirits. As a consequence it often occurs next to sacred sites and usually cannot be used for firewood. Even more strikingly, related species of *Diospyros*, in Zimbabwe appear to be the focus of similar beliefs.

Elsewhere, burning certain trees is said to induce madness or attract lightning to a compound. The pattern of these beliefs varies from group to group, drawing on a pool of common ideas. Seignobos (1997) gives an account of the various beliefs attached to trees in the Mandara mountains and in particular highlights the importance of *Vitex doniana*, now found throughout the region in association with the relict cultivation of finger-millet and strongly associated with funerals.

Apart from individual tree species, there are also sacred groves. These groves occur throughout much of Africa, both in the high forest zone and the savanna. Lebbie & Guries (1995) in a study of sacred groves in Sierra Leone argue that they act as significant reserves of biodiversity and as reservoirs for traditional medical remedies. Some are deserted overgrown settlements and have been conserved because they represent the original site whence a people migrated. This is confirmed by the groves found in tumuli in Northern Ghana where the surrounding slope is actually a litter of tiny potsherds. Large groves are less common in the savannah, where they can be several hectares or as small as a few trees.

The floristic composition of these groves has been the subject of some debate. It is tempting to see them as relics of the old forest that once covered much of the savannah. This view was espoused by French researchers writing about Burkina Faso and Guinea in the colonial era (Aubréville 1939; Adam 1948). If this were the case, the groves would then be very precious as embattled relics of a vanished ecosystem. However, changing views of woodland genesis have suggested to more recent researchers that the anthropogenic factor in forests has tended to be underestimated (see e.g. Fairhead and Leach 1995).

No detailed botanical research has been undertaken to settle this point but visual inspection of the groves suggests that they are a composite, including some now-rare tree species, but also common species of the savannah associated with human settlement. Nearly all groves in the low-density areas are surrounded by a firebreak, usually cut by the community at the end of the wet season to prevent bush fires sweeping across the grove. Fire is less of a hazard in the high-density agricultural areas as there is insufficient grass to burn effectively. However, there is normally a path leading from the periphery of the grove to the centre where the sacrificial site is located. It is unlikely that they are left over from the 'great forest' if any such entity ever existed. None appear to contain very old trees, in contrast to some of those within villages, suggesting that despite precautions, bush-fires do pass through them periodically. Occasionally groves are largely a stand of a single tree species.

5.3 Use and movement of economic fruits

Fruit is nowhere a prestigious food in African culture; since fruit trees were not traditionally cultivated, the fruits of indigenous trees are often small and sometimes toxic. Fruits were often considered food for children but only eaten by adults in times of shortage (see Savonnet 1980 for an interesting account of the exploitation of bush fruits by Lobi herdboys). Many trees were valued more for their wood, leaves and seeds than for the fruit; *Celtis* and *Adansonia* are good examples of this. The exceptions were trees and

vines with oily fruits or edible seeds, valued for their contribution to diet, which remain eagerly sought. Edible fruits are transported from remote locations to settlements and the stones or seeds scattered around, leading to increased densities of those species around villages. Trees and shrubs with useful leaves and sap are much less likely to appear in the archaeobotanical record simply because the fruits are not transported. Thus the palms other than the oil and fan-palms used for palm-wine or craftwork will leave little or no trace at settlement sites. Table 2 shows some of the key species for consumption and oil, concentrating on West-Central Africa;

Table 2. Examples of trees with economic fruits

Fruits directly consumed	Oleaginous fruits	Fruits with edible seeds
<i>Adansonia digitata</i>	<i>Canarium schweinfurthii</i>	<i>Amblygonocarpus andongensis</i>
<i>Annona senegalensis</i>	<i>Coula edulis</i>	<i>Ceiba pentandra</i>
<i>Blighia sapida</i>	<i>Dacryodes edulis</i>	<i>Omphalocarpum procerum</i>
<i>Borassus aethiopicum</i>	<i>Elaeis guineensis</i>	<i>Parkia biglobosa</i>
<i>Celtis integrifolia</i>	<i>Irvingia spp.</i>	<i>Treculia africana</i>
<i>Detarium microcarpum</i>	<i>Moringa oleifera</i>	<i>Xylopia aethiopica</i>
<i>iospyros mespiliformis</i>	<i>Pentadesma butyracea</i>	
<i>Hymenocardia acida</i>	<i>Vitellaria paradoxa</i>	
<i>Landolphia spp.</i>		
<i>Nauclea latifolia</i>		
<i>Parinari curatellifolia</i>		
<i>Piliostigma thonningii</i>		
<i>Raphia spp.</i>		
<i>Sclerocaiya birrea</i>		
<i>Sorindeia zenkeri</i>		
<i>Syzygium guineense</i>		
<i>Tamarindus indica</i>		
<i>Vitex doniana</i>		
<i>Ximenia americana</i>		
<i>Ziziphus spp.</i>		

Some species can be brought to the settlement for other reasons. The fruit-shells of the bush-orange, *Strychnos spinosa*, are used to make ocarinas and for other decorative purposes and the flesh can be eaten. The fruits usually have the pulp removed and the shell dried in the sun.

A more elaborate system of maximising access to economic fruits is described by Guillot (1980) among the Kukuya living in the savanna some 200 km. north of Brazzaville. The Kukuya develop circular groves of fruiting and other useful trees in a ring around their household, composed both of recent fruit trees such as citrus, avocados, guavas and bananas and more established species such as oil and raphia palms, cola and *Dacryodes edulis*. The resulting rings show up clearly in aerial photographs of the otherwise open grassland, regularly cleared by bush-fires. The Kukuya are still quite mobile and their households seem to move once a generation, leaving a pattern of deserted rings across the plain.

Given how many species of tree are recorded in the ethnographic literature, it is striking how few are in the archaeobotanical record. The most diverse site to date appears to be Saouga (Neumann *et al.* 1998) which is very late. Various explanations for this can be proposed. The low frequency of sampling in humid forest sites is in inverse proportion to the variety of tree species that might be expected at such sites. However, there may be a preservation problem; perhaps some seeds simply preserve better than others. One other possibility is that the lack of diversity in early sites is real, that in earlier periods fewer species were consumed, perhaps because population densities were low and foragers had more choice. Only more archaeobotany in more places will resolve this problem.

5.4 Fences and defences

A significant use of trees and woody plants that is often ignored is their incorporation in defensive structures. Until the early colonial period, chronic insecurity in many regions of African encouraged many small communities to construct elaborate defensive works using live plants. The most elaborate review of

these is Seignobos (1980) who focuses on the systems in Chad and Cameroun, based principally on the various Euphorbia species. These were also found on the Jos Plateau in Nigeria, where raiders from horse-mounted slaves were so frequent that the non-Islamised peoples created houses surround by rings of Euphorbia that could only be entered by crawling. The threat of raiding was so intense in some places that fields and woodland were created inside the rings of Euphorbia. Among the Dowayo in the Mandara mountains, for example, these parks included locust, tamarind, winter thorn and various *Ficus* species.

Although raiding is no longer a serious threat, the use of Euphorbia to enclose compounds and fields has continued. In regions of high population density such as the Jos Plateau, the fences have been adapted to control livestock. The traditional system in most parts of Africa was for livestock to be kept from the fields while crops were growing by being enclosed and fed on a cut-and-carry basis. Impenetrable fences around fields make it possible to release livestock throughout the year and control their entry to fields after harvest making it possible to benefit from their dung to improve fertility.

5.5 Selective economic extraction

The ownership and control of the bush has come to take on greater significance in recent times due to the increased economic importance of both fuelwood and charcoal. Charcoal was probably rarely made in the precolonial era due to the abundance of the wood resource. The most important use was probably for iron-smelting and blacksmithing and studies of intensive iron production have suggested that the result was occasionally local deforestation. Although charcoal has a very ancient linguistic history in Africa, it is likely that its use as a convenience fuel in Africa has largely been spread by Islam.

More recently, rather more extreme forms of extraction have been practised by smallholders. The introduction of the ox-plough and later the tractor made it impractical to have as many trees in a cultivated field as can exist when it is hand-hoed. As a consequence, farmers have been cutting first minor economic trees and subsequently clearing and stumping entire fields, including even valuable species. The consequence has been severe erosion in many areas, especially as the use of tractors in particular has proved completely unsustainable.

Another form of extraction occurs when pressure on arable land becomes extreme. In NE Ghana, for example, where unfarmed bush has all but disappeared, farmers have begun to take out economic trees because they cover farmland that could be planted to cereal staples (Blench 1999c). In such systems, firewood is no longer available and households are generally too poor to buy it from outside. As a consequence, they use the cereal stalks to cook instead of incorporating them back into the soil. With no trees, and no other strategies to prevent soil erosion, yields decline still further and households relapse into a cycle of nutritional decline and food-aid dependence.

6. Trees and long-distance trade

Long-distance trade does not exist in isolation; it acts as a transmission route for the ideologies of the traders. This is particularly true in those parts of Africa where trade was largely in the hands of Islamic merchants. Many economic trees and crops have been spread along these routes as the pattern of loanwords indicates. Dominant trade languages such as Hausa, Kanuri, Songhay and Dyula diffused new plants to remote areas as is testified by the lexical evidence (e.g. Blench 1998; Blench *et al.* 1997). This worked in several ways; either the plant could be directly transmitted through the sale of the fruit, or an idea about its use spread through the market. For example, the baobab is indigenous to Africa as the reconstructibility of a name for the tree itself in Niger-Congo languages testifies. However, the idea of collecting, drying and crushing the leaves as a soup ingredient is definitely attributable to the Hausa and thus their name, *kuuka*, is widely spread as a name for the leaves. In some cases the Hausa name has actually displaced the originally name for the tree itself in other languages. This has increased the salience of baobabs in many communities and led village communities to encourage protection of the tree.

Another key idea attributable to Islam was the concept of stuffed mattresses and pillows. Across the Sahel, cloth and leather were stuffed with the cotton-wool from the silk-cottons, *Ceiba pentandra* and *Bombax buonoponense*. These were strongly associated with power and authority, such that when the first European

travellers passed through West Africa, it was usually the chief they found reclining on cushions. The horsemen of the raiding states of West Africa were protected by quilted armour. As this practice developed, the value of the cotton increased and in some places, such as Northern Ghana, silk-cottons became a dominant feature of the landscape. This in turn made it necessary for the rulers to control access, so these trees were appointed their own chiefs to restrict the gathering of the seed capsules. In turn, when modern industrial stuffing came to replace the indigenous material, the silk-cotton fell into disuse and now in the season, the air is full of drifting cotton considered to be of no value.

The effectiveness of the transmission of new economic trees can be seen by the spread of New World trees into the interior of Africa. The most striking of these, the pawpaw, *Carica papaya*, is native to Central America and was carried by the Spanish to other regions of the New World, as well into Asia and Africa. The first record on the West African coast appears to be Bosnian in 1705, and other mentions follow shortly afterwards (Mauny, 1953:715). It is likely that the pawpaw was also introduced into Borno from North Africa in the nineteenth century as Barth records the Kanuri name *bambus Massarbe*, i.e. the melon of Egypt, and a now disused Hausa term *gonda Masr*, 'custard-apple of Egypt'. The analogy with the wild custard-apple, *Annona senegalensis*, is made in many languages, and the name for the custard-apple applied to the pawpaw. Thus in Hausa, pawpaw is *gwándá* and the custard-apple, *gwáddn daji*, the 'pawpaw of the bush'. A similar process in Fulfulde makes the pawpaw *dukku* and the custard apple *dukkuhi ladde*. Modern Kanuri has either *kawúsa* from the Arabic for pumpkin or *gonda* from Hausa *gwanda*. Curiously, Benton says 'Pawpaws have been introduced into some of the larger towns in British Borno, but do not flourish' (Schultze, 1913:77). Improved cultivation techniques have allowed the pawpaw to become widespread in southern Borno and is often known by a variant of the name *kabusa*, suggesting that it was borrowed from the Kanuri. Other evidence for the spread of the pawpaw from north to south is the Nupe name, *kónkeni*, meaning 'shea-nut [*Vitellaria paradoxa*] of the Hausa'. The lexical evidence provides a neat illustration of the rapid spread of the pawpaw both from the coast and across the desert in a short period after its transport from the New World.

7. Trees in the colonial era

Colonial era is here used as a shorthand for the period when European intrusion was transformed into political dominance and it was possible to both extract and plant by fiat rather than by negotiation with existing rulers. The colonial era was responsible for three significant changes in outlook in respect of trees; large-scale timber extraction, large-scale plantations for timber, firewood and fruit, widespread diffusion of cultivated fruit trees to smallholders.

7.1 Large-scale timber extraction

The rich tropical hardwoods of the high forest of West-Central Africa presented an unrivalled resource to the early traders on the coast. Large-scale extraction began in the early colonial period and has continued up to the present. Serious deforestation has occurred since about 1970, with much of the forest cover replaced by degraded secondary forest. There is a literature claiming that deforestation is not on the scale that has previously been claimed (e.g. Fairhead & Leach 1995).

7.2 Large-scale plantations for timber, firewood and fruit

Transport and storage conditions in precolonial Africa were such that plantations of even desirable tree species were not seen as either practical or desirable. Although emphasis on particular species produced near-plantation densities of palms such as the date, oil, coconut and fan palms these remained rooted in household economics rather than long-distance trade. However, as demographic pressure increased throughout the colonial era, the desire to plant fast-growing exotics and hardwoods such as teak as well as fruit trees gradually increased. In addition, almost unrestrained timber extraction had created gaps in the forest that could very well be filled by such plantations. Particular economic species such as rubber, cocoa and oil-palm were developed both as smallholder and plantation crops in the colonial era and have expanded massively in post-colonial times.

7.3 Cultivated fruit trees for smallholders

The extension of fruit trees was one of the briefs of forestry departments across West Africa and the key species were citrus, guava, mango, cashew, avocado, coconut and others (see Richard (1980) for a good account of this in northern Côte d'Ivoire). Although missionaries also played a part in this, the sale of seedlings became an essential activity of forestry workers. The marketing and trade in fruits gradually developed over the twentieth century and now is an essential source of income to smallholders throughout the continent.

8. Trees, post-colonial governments and NGOs

As has been indicated in the previous section, all too many postcolonial governments saw the forest as simply a resource to be exploited as rapidly as possible for immediate gain. Forests were often clear-felled and forest reserves created to conserve trees degazetted. Controls on smallholders burning off forest to create farms are no more effective in West Africa than in the Amazon and the demand for charcoal in the cities has also led to serious deforestation in some areas. Collapsing internal control has meant that many forest reserves created in the colonial era are now unpoliced and thus all but non-functional.

Demographic growth has created severe depletion of tree resources in many areas and one consequence has been the growth of NGOs and multi-lateral aid projects aiming to afforest eroded areas and to conserve areas rich in biodiversity. Reforestation or agroforestry projects aim to introduce fast-growing exotics such as eucalyptus, gmelina, teak and leguminous shrubs. Although these were often begun in the colonial era they have expanded dramatically in recent times. Teak plantations are now being created by multinationals such as tobacco companies, in support of a claim to be assisting reforestation, although there is no reason to believe these are not strictly commercial ventures.

Conservation projects may either attempt to conserve a region of biodiversity through policing, or involve a community in the management of their own woodland resources. The consequence of all these processes is an extreme fragmentation of the landscape. Much of the savanna in West Africa consists of highly anthropic vegetation with a limited range of tree species interspersed with occasional forest reserves and patches of woodland conserved as sacred groves. Even where a reserve is policed, much of its biodiversity cannot be maintained because it has become fragmented in an otherwise depleted landscape. Many mechanisms of seed dispersal depend on insect and bird species that are no longer present.

9. Links between cultural and linguistic salience

It seems a credible assumption that objects present in the natural environment of individual ethnolinguistic groups would have a name at the time of a proto-language and descendant forms of that name would recur in daughter languages. For example, if a particular animal is present in a zoogeographic region and this coincides with the home area of a group of related languages, there would appear to be no need to borrow or innovate the name of the animal. Reconstructions of the names of forest trees and fish have played a significant role in studies of the homeland and migrations of the Indo-Europeans.

In reality, however, matters are less simple. Only a few tree species can be reconstructed with any significant time-depth in the major language phyla of Africa. The evidence suggests that despite their presence in the natural environment, tree names are unstable and can be borrowed readily. This situation reflects cultural salience: in other words the environment is culturally constructed. People see in trees and landscapes what they need to see for immediate cultural purposes and name items accordingly. Social, economic and environmental change lead to changes in the salience of individual species and names can be created or borrowed according to circumstances.

10. Conclusion

At present, a powerful dissonance has opened up between the evidence of ethnobotany and the empirical data from archaeobotany. Much more distributional data and information about dispersal mechanisms will be required before any more definite statements can be advanced. In the meantime, ethnobotanical research can provide insights into anthropic influences on tree distribution and historical linguistics suggest links between the environment of language families and their likely expansion and migration processes. As ethnography suggests, a convincing historical scenario can only be constructed by a combination of disciplines. Species whose importance is underlined by both ethnobotany and historical linguistics, stubbornly refuse to appear in the archaeobotanical record. Archaeobotany is still in its earliest stages in Africa and tends to be driven by archaeology rather than initiating its own sampling procedures driven by specific questions about vegetation history. Nonetheless, the tools have now essentially all been developed; the task is to put them to use.

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