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Revealing Gendered Landscapes: Indigenous Female Knowledge and Agroforestry of African Shea

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Résumé

L'arbre à beurre (Vitellaria paradoxa) est une espèce qui pousse dans la région Soudano-Sahélienne de l'Afrique et joue un rôle crucial dans les écosystèmes et la vie des peuples de la savane. Les noix de karité représentent une des rares denrées régionales, dont l'extraction, la transformation en huile et la commercialisation sont soumises au contrôle exclusif des femmes. Cet article place l'écologie historique et politique du karité dans le contexte de la globalisation du produit; il met en lumière trois périodes distinctes: précoloniale, coloniale et contemporaine. S'appuyant sur des travaux de terrain, ainsi que sur des sources historiques, écologiques et biogéographiques, les auteurs explorent les systèmes indigènes complexes de connaissance, organisés selon les sexes qui gèrent la sélection, la conservation des arbres à beurre et la transformation en huile des noix de karité. L'emphase est mise sur le rôle des femmes dans l'agrosylviculture du karité, et sur le sens de cette connaissance distribuée selon les sexes comme fondement de l'économie du karité et de la préservation de l'espèce.

Introduction

Recent scholarship is engaging anew the role of Africans in shaping vegetation history (Fairhead and Leach 1996, 2003; Leach and Mearns 1996). The findings present a challenge to longstanding views that describe traditional savanna agricultural practices as

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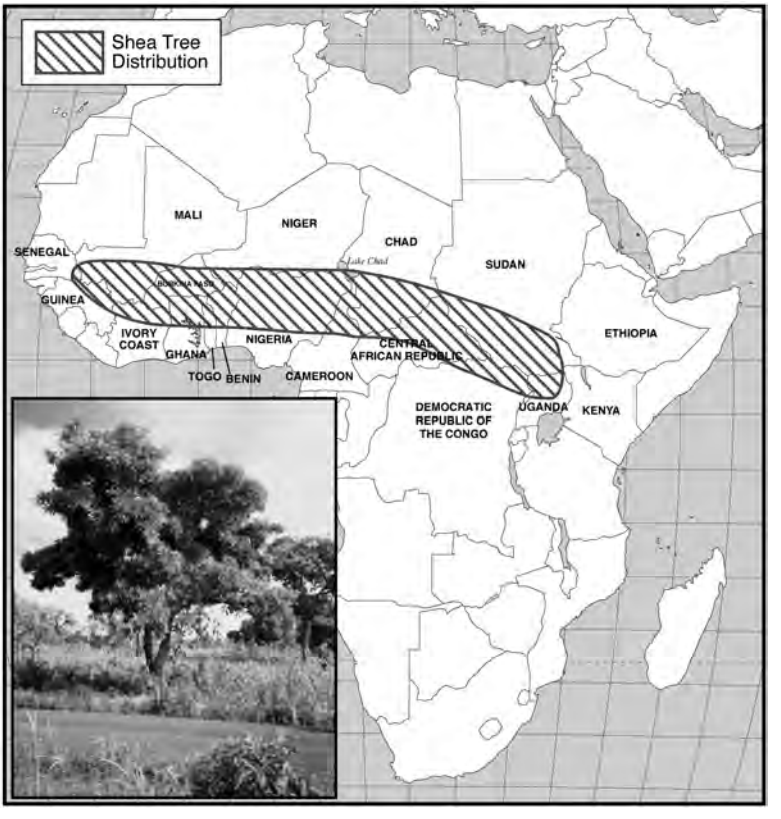
detrimental and Africans as destructive of forest resources (Duvall 2003). In Guinea, farmers shape the environment to expand regional forest cover rather than to deplete it (Fairhead and Leach 1996, 2003). Research in Burkina Faso and Mali elucidates farmer expertise in selecting and protecting trees with desirable characteristics in cultivated fields as well as the management of wild specimens as genetic reservoirs (Maranz and Wiesman 2003). Increasingly recognized as repositories of indigenous knowledge, these agroforestry systems point the way toward sustainable institutional approaches to natural resource management.

It is now appreciated that within a rural population, silvicultural knowledge varies with ethnicity, socio-economic standing, age, and gender (Rocheleau 1987; Schroeder and Suryanata 2004). In rural West Africa, gender roles are highly differentiated, and gender represents a key factor mediating access to natural resources (Carney 1994; Fortmann 1996; Rocheleau, Thomas-Slayter and Wangari 1996). Owing to their different access to, and use of, local vegetation, women and men develop knowledge about distinct resources as well as dissimilar knowledge of the same resource. Their respective expertise informs local biodiversity management and livelihood strategies (Norem, Yoder and Martin 1989). Yet, the significance of this gender-specific environmental knowledge and its role in guiding landscape evolution remain understudied. Aiming in part to address this issue, this paper examines the indigenous knowledge surrounding shea agroforestry in West Africa. Emphasis is placed on the female expertise that guides the transformation of shea nuts into oil and the significance of the knowledge held by women for the tree's management and selection.

Africa's shea tree (*Vitellaria paradoxa* C.F. Gaertn.) grows in nineteen countries across five thousand kilometers of Africa's Sudano-Sahelian savanna, which receives between six hundred and fourteen hundred millimeters of precipitation per annum (Boffa 1999; Hyman 1991, 1248) (Map 1).[1] The species is central to the subsistence of agricultural peoples throughout the region. When processed into vegetal butter, shea nuts provide African societies a cooking oil, moisturizer, medicinal, and illuminant (Dalziel 1937; Boffa *et al.* 1996). Significantly, shea butter (French: *karité*) is one of the few regional commodities whose extraction, processing, and commercialization are exclusively under the control of women.[2]



Map 1: Shea Tree Distribution across the Sudano-Sahelian Savanna

An estimated two million female shea butter makers (Hyman 1991, 1247) possess a rich expertise regarding the selection, collection, and transformation of shea, which is used to encourage the preservation of specific trees in the landscape.

A review of more than a thousand years of shea history — based upon pre-colonial, colonial, and contemporary sources — reveals that the role of African farmers in managing shea parklands, and of women in processing the nuts, is longstanding. Yet, this knowledge has only been partially engaged in the shea export strategies developed over the past century. Despite considerable interest in the product, colonial officials did not consider the human agency involved in *V. paradoxa* selection. Instead, local management practices were viewed as destructive of specimens that would otherwise contribute to export production. More strikingly, given

the historical centrality of rural women in shea nut collection and transformation, women continue to be left out of the picture in studies of shea agroforestry. This remains problematic as it is upon this incomplete understanding of shea agroforestry systems that aid projects, pursuing the dual goals of economic development and environmental conservation, are based.

The emphasis of this study is on Burkina Faso, West Africa's largest shea exporter and one of the world's poorest nations, where fieldwork was conducted in 2001. Additional research was carried out in 2004 in Gambia, where the species has recently been established due to deliberate dissemination of seedlings. Both studies reveal the ways that differentiated knowledge is critical to understanding the presence and dissemination of the species, as well as the processing of shea nuts into butter. Divided into three sections, the discussion begins with an historical overview that traces the processing, management, and significance of *V. paradoxa* in West Africa since the fourteenth century. Early commentaries unveil a millennium of shea exploitation and commerce and an equally longstanding interest in the product by foreigners. Colonial archives provide additional information on early twentieth-century policies that aimed to reconfigure the human and physical shea landscape in order to promote shea nut exports. The second section details the gendered management of shea parklands, which involves the selection and conservation of trees with desired characteristics, the socio-cultural conventions that mediate access to and conservation of *V. paradoxa*, as well as the female knowledge entailed in nut processing. The third and final section engages shea's current incorporation into the global economy, especially the role of development assistance in promoting shea butter exports. We contend that these century-long efforts to encourage global shea commercialization are placing acute demands on environmental resources and female labor. Following previous research on women in agroforestry (Rocheleau 1987; Rocheleau, Thomas-Slayter and Wangari 1996; Schroeder 1999), this examination of shea confirms that gender is an important consideration in understanding African land use systems.

Shea through Historical Sources

The shea tree yields many indispensable products, including highly nutritive fruits, hardwood for making mortars, medicines,

and fuelwood (Dalziel 1937; Burkill 1997, 4: 258). But the species' most prized derivatives are its nuts. When processed into vegetal oil, shea nuts provide the principal source of fat in the regional diet. Among myriad other uses, shea oil is also valued in the local pharmacopoeia as an ointment for healing wounds and burns, to alleviate wrinkles, and for ceremonial purposes (Compaoré 2000). Due to its local significance, *V. paradoxa* has drawn the attention of major visitors to the West African Sahel since the arrival of Muslim scholars in the Middle Ages.

Pre-colonial Sources

The earliest recorded references to shea date from the thirteenth century, when shea butter was traded as far south as the Volta River in Ghana for products from the coast (salt and fish) and forest (kola nut) (Ehret 2002, 321-22). The steady Islamicization of the Mali Empire brought Muslim travelers to the region along trade routes that crossed the Sahara. The mention of shea by Al-'Umarî (c. 1337-38) drew upon second-hand accounts and corresponds with that of Ibn Battûta, who visited the Mali Empire between 1352-53 and left an especially detailed description of *"ghartî"* (or *karité*):

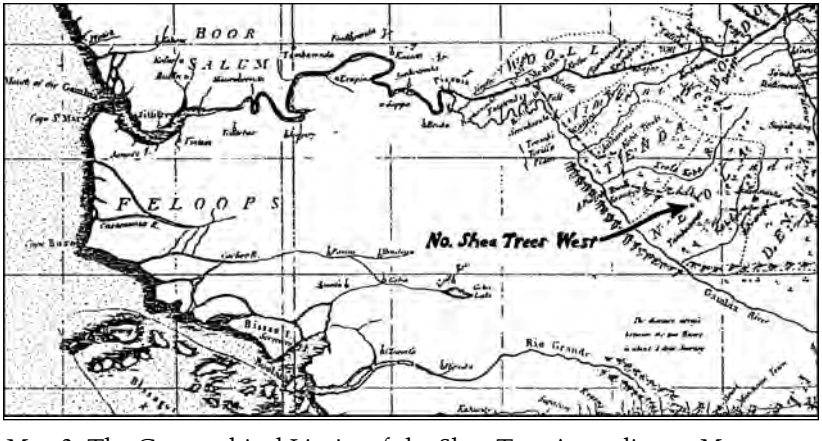
> Ghartî is a fruit like a pear, very sweet, which is harmful to white men [Arabs] if they eat it. Its kernel is crushed and an oil then is extracted from it, for which they have many uses. For instance, they cook with it, and light their lanterns with it, and fry these fritters with it, and anoint themselves with it, and mix it with earth which they have and coat the roofs of their houses with it, as one does with lime. It is abundant and easily available with them and transported from place to place in big gourds... (Levtzion and Hopkins 1981, 287).

In the centuries preceding the Atlantic slave trade, Mossi, Juula, and Hausa caravans carried shea butter over long-distance trade routes (Lewicki 1974, 106; Park 2000 [1799]). When fifteenth-century Genoese traveler Antonius Malfante wrote about the international trade of a Sudanese vegetable oil between Morocco and western India, he was likely referring to shea butter (Lewicki 1974). Drawing upon first-hand accounts from slave traders operating along coastal Gambia and Guinea-Bissau, Valentim Fernandes (c.1506-10) described shea as a white oil Mandingoes used to anoint themselves (Terpend 1982). Fernandes' remarks reveal an

orientation of the shea trade from the interior to the Atlantic coast, where the tree did not exist. Shea provided the primary vegetable fat over a vast region of semi-arid Africa, in which the African oil palm *Elaeis guineensis,* used for similar purposes in wetter environments, did not grow (Lewicki 1974). Labat noted the use of shea oil in what is now Senegal in 1728 (Dalziel 1937). The demand for shea butter continued with the deepening of the Atlantic slave trade, as it provided an emollient to moisten the skin of Africans awaiting sale to Europeans (Cowley 1928).

The arrival of European explorers to West Africa's interior from the end of the eighteenth century brought new attention to shea. Mungo Park's search for the source of the Niger River took him along ancient overland trade routes from the Gambia River into Guinea and Mali. The Scottish explorer noted the importance of shea butter to Mande-speaking populations (Bambara, Mandingo) and the product's multiple uses in his book, *Travels in the Interior Districts of Africa,* published in 1799. He mentioned the transport of the oil (shea-toulou) by slave traders from the interior to coastal areas and described the shea-dominated parklands (cultivated areas with sheanut trees) along the Niger River between Ségou and Bambaraland in Mali. When forests were cleared for cultivation, he observed that sheanut trees were spared (Park 2000, 84-85, 201).

Because of its cultural importance over the region he traveled, Park made the first attempt to determine the shea tree's geographical limits. He demarcated the western boundary of its distribution,



Map 2: The Geographical Limits of the Shea Tree According to Mungo Park, c. 1800

northeast of Gambia in Senegal, on a map of his journey (Map 2). Wishing to bring a specimen back to Kew Gardens in England, the explorer carried nut and leaf samples from the interior in his hat. These withered specimens were replaced with a fresher sample from the area he indicated with an arrow on the map. It remains the oldest known herbarium specimen of *V. paradoxa* (Park 2000 [1799], 11; Hall *et al.* 1996). Mungo Park's late eighteenth-century journey along the Gambia River into Guinea and Mali, and his observations of shea, inspired the species' initial Latin name, *Butyrospermum paradoxum* spp. *parkii.*

The expedition of René Caillié in the region from 1824-28 provides historical detail on the value of shea among the Mandingo. Caillié noted the occurrence of shea trees in cultivated fields near villages and observed the oil extraction from its nuts. After consuming the mealy, yet pleasant-tasting fruit pulp, he described how the kernels were sun-dried, pounded in a mortar, and placed in a large calabash where warm water was added. Two hundred years later, the steps in traditional nut processing remain very much the same. The batter is kneaded by hand, water is gradually added, and the fat that rises to the surface as foam is removed and boiled. The clarified mixture is placed in a calabash and left to cool. The finished product is wrapped in plant leaves, where it can be preserved for as long as two years (Caillié 1992 [1830], I: 357).

As a result of the attention overland travelers gave to shea in West Africa, by the early nineteenth-century it was well known in European scientific circles. Without ever having traveled in Africa, Alexander von Humboldt would write: "it is said with reason that in Africa, rice, gum arabic *(Faidherbia albida),* and shea butter help men to cross the deserts" (1985 [1818-29], II: 172).

By the end of the nineteenth-century, French explorers had provided the details on shea that would later prove critical for shaping its role in international commerce. Louis Hecquard (1855, 373-74) commented favorably on the taste of the shea fruit and the ability of the oil to last years without turning rancid. Paul Soleillet drew attention to the fact that shea butter retained a solid state even when temperatures reached 45 degrees Celsius. He made candles from it and noted that the French were using shea oil to grease cannons (Soleillet 1887, 273-74). Joseph-Simon Gallieni's (1885, 440) exploratory mission to the upper Niger River in 1879-81

contributed the observation that women and children collected shea fruits, which were fermented prior to oil extraction from the nuts. But Paul Soleillet (1887) was the first outsider to make explicit the crucial detail that was missing from all previous Muslim and European descriptions of *karité:* shea butter was prepared exclusively by African women.

Colonial Sources

The most productive shea areas of West Africa encompassed French and British colonial states. Due to its myriad uses, *V. paradoxa* figured prominently among African botanical species deemed capable of generating value in European commerce (Fairhead and Leach 2006, 94-95; Chalfin 2004, 129). The burgeoning shea nut export market stemmed from the product's use in the food industry in margarine and as a substitute for cocoa butter in chocolates (Elias et Carney 2004; Chalfin 2004, 134).

Commercial demand for shea instigated considerable research on the tree's biogeographical range and the environmental factors affecting its growth (Chalfin 2004). Colonial scientists mapped the distribution of *V. paradoxa* trees and estimated potential nut yields (Vuillet 1911; Chevalier 1911). J.M. Dalziel saw a vast reservoir of nuts for prospective export, estimating that seventeen million shea trees occurred naturally in French West Africa (Dalziel 1937, 350). But colonial officials believed the amount would be even greater were trees not destroyed on land that was burned annually for agriculture or grazing. Low fruit yields were similarly blamed on deleterious land-use practices (Chevalier 1928; Irvine 1934; Dalziel 1937).[3] Anticipated nut exports allegedly depended on protecting trees from the adverse effects of African agro-pastoral land-use practices and population pressure.

Views of anthropogenic forest destruction pervaded imperial resource management policies and led to direct interventions in the colonies where the shea nut tree grew (Bergeret 1993). These initially aimed to reduce tree loss from cutting and burning. In 1914, French administrators imposed restrictions to prevent farmers from Upper Volta (Burkina Faso), West Africa's largest shea exporter, from cutting *V. paradoxa* trees in their fields (Pehaut 1976). The objective was the preservation of existing specimens in order to augment the export volume of nuts. The ban on clearing

shea trees, however, was superimposed upon longstanding local conservation practices (Pehaut 1976) and conflicted with key management principles of the indigenous shea agroforestry system that protected trees with specific traits while culling undesirable specimens (Maranz and Wiesman 2003).

With the prohibition on tree cutting in place, French officials encouraged farming households to sell shea nuts and butter, which would contribute revenue for payment of the head tax (Marchal 1980). The ability of farmers to pay their taxes was closely linked to the sale of just a few commodities, principally, cotton and shea. The monthly reports of colonial administrators attest to the difficulty of tax collection in years of poor shea yields or low prices. When shea prices fell, rural households saw no benefit in selling nuts beyond what was needed for subsistence or for petty cash (Marchal 1980; Conti 1979). This created a dilemma for French officials over how to increase peasant nut sales in the context of declining market prices.

Before World War I, annual nut exports from Upper Volta averaged less than one thousand tons (Pehaut 1976). But shea's importance among the colony's exports rose sharply after 1924 (Saul *et al.* 2003) in response to escalating metropolitan demand for tropical vegetable oils in the manufacture of industrial lubricants, soaps, candles, and food (Hopkins 1973; Pehaut 1976). Policy measures contributed to the increased export volume. The forceful means adopted by French colonial administrators to promote the shea trade are evident in one report from the country's northwest Yatenga province:

> In his rounds, the colonial administrator remarked that the natives had neglected their cotton fields, which were overrun by weeds, and that they had failed to harvest the first ripe cotton. That was also the case for shea, of which a large quantity was left at the foot of trees. Orders were immediately given to the African district chief, who accompanied the administrator, to tell the population that it had been granted an extension of one week to carry out the cotton harvest and collect the fallen shea nuts. The population is expected to deliver twenty tons of shea, well below the amount actually gathered if collection occurs in the fashion indicated by the administrator during his talks in all of the district's villages (Marchal 1980, 132 [authors' translation]).

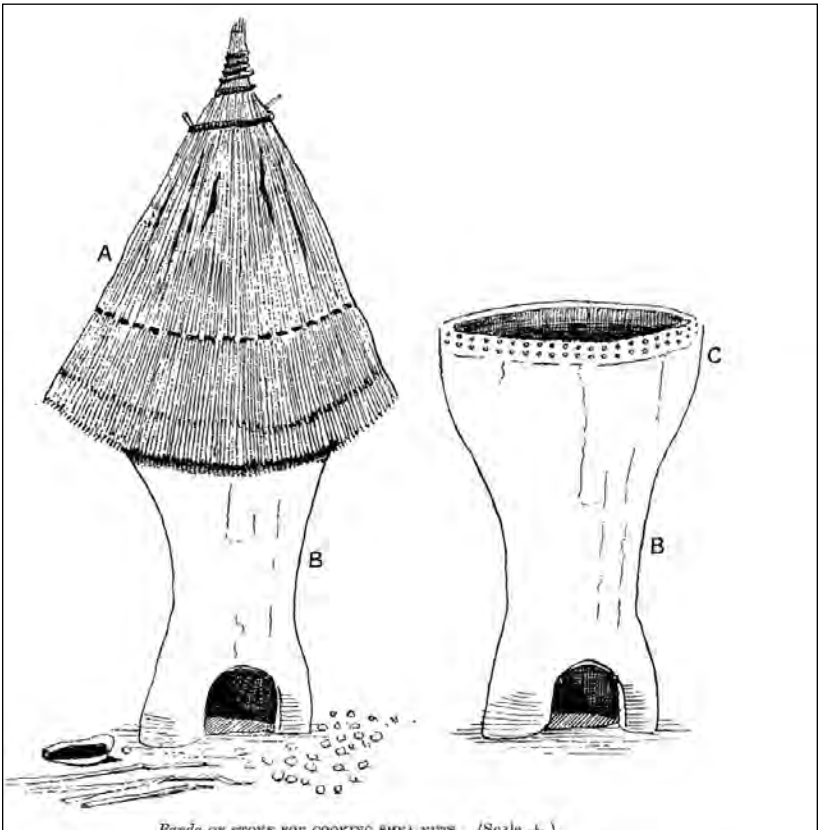
Such measures may explain in part why exports continued during the Great Depression. Even at its height in 1937, the colony exported 8 451 tons of shea nuts and 2 927 tons of shea butter from the key producing areas of Ouagadougou, Bobo, and Gaoua in the central and western parts of Upper Volta (Massa 1995).

While the most productive shea areas were concentrated in the French colonies, English food manufacturers and chocolatiers also placed demand on the African colonies for supplies. Colonial officials responded to metropolitan commercial interests by devising an ambitious program to augment nut and butter exports from the northern Gold Coast (Ghana) and Nigeria, where the tree concentration was greatest, and then to establish shea in the Gambian colony, where growing conditions were also suitable. In the 1920s they surveyed the location of the highest yielding trees, setting aside stands of *V. paradoxa* as experimental plots for study. Agricultural and forestry officials experimented with growing the tree in dense concentrations, the effects of burning on tree growth and yields, and methods of nut gathering and butter preparation. They replicated traditional female collection methods, such as gathering nuts from fallen fruit rather than picking immature ones from the tree itself, to see if it improved butter quality (Chalfin 2004, 110-17). Local processing devices that might make butter production more efficient also drew their interest. P.G. Harris' (1930) sketch of a clay kiln, used in some areas for roasting the kernels, reveals the intent to find more efficient technologies to convert nuts to butter (Figure 1).

As in the French colonies, British colonial policy aimed to augment nut availability. In 1924, the superintendent of Agriculture and Forestry in the Gold Coast endeavored to incite "all women and girls over the age of six," to gather "every possible nut from every tree, working every day for the ninety-day shea fruiting season." Colonial officials mis-takenly believed that the nut's commercial prospects would attract men to its collection and trade (Chalfin 2004, 117). However, both female and male household members resisted attempts to reconfigure their labor to the export objectives of the colonial state, which low producer incentives abetted (Chalfin 2004).

Colonial research on the methods females used for picking and processing shea nuts consequently did not represent a growing interest in local knowledge systems, as Europeans did not generally

consider Africans to be skilled landscape managers (Aubréville 1932; Fairhead and Leach 2003). While agricultural experts strove to understand why some shea trees yielded better than others, or produced a superior product, the differences were seldom seen to derive from indigenous resource management systems. F.R. Irvine's (1934, 200) identification of two distinctive shea fruit types (one round and not as sweet as an additional elongated one), for instance, regarded the traits as inherent botanical properties rather than as the expression of anthropogenic selection for specimens with desirable fruit characteristics.



Banda OR STOVE FOR COOKING SHEA NUTS. (Scale $\frac{1}{8}$.)

A. THATCH TO ENABLE THE COOKING TO BE CARRIED ON DURING THE RAINS.

B. THE ACTUAL STOVE, MADE OF BAKED MUD WITH A FIREPLACE AT THE BOTTOM. THE STOVE IS HOLLOW FROM BOTTOM TO TOP, EXCEPT FOR A MUD GRILLE AT C.

C. GRILLE ON WHICH THE SHEA NUTS ARE RESTED AND COOKED.

Figure 1: Image of Clay Kiln Used for Roasting Shea Nuts
Source: Harris (1930, U57, Plate VIII

Colonial research on the shea tree and processing laid the foundation for establishing it during the 1930s in Gambia, which shared a similar climate and environment with other African shea-producing areas, but where the tree was not naturally present. Gambians were well acquainted with shea as a regional trade item, as Mande-speaking (Juula, Bambara, and Mandingo) caravans had carried it to the Gambia River during the Atlantic slave trade (Curtin 1971, 1975, 230; Ashcraft-Eason 2000). The overland trade routes converged in central Gambia, where the River forms a broad arc.

Today, the region still shelters a large stand of shea trees originally established in the 1930s by British colonial administrators. The trees are located at the Yoroberikunda agricultural station just south of MacCarthy Island (Carney, fieldwork 2004). In 1937, agricultural officials received fourteen thousand shea seeds from colonial administrators in Nigeria. The seeds were planted in each of the country's agricultural research stations but principally targeted for distribution to the rural populace. Hoping to promote the tree's diffusion throughout rural Gambia, the colonial authorities distributed seeds to male household heads in fifty-three villages from one end of the country to the other (NAG *Annual Reports* 1937-38).

Despite this considerable effort, the seed distribution scheme did not succeed in encouraging households to adopt the shea tree for the production of vegetable butter or making the colony a nut exporter. Gambians already possessed a ready source of cooking oil derived from palm trees *(E. guineensis)*, with cuisines adapted to its flavor. Colonial officials attributed the program's failure to the presumed conservatism of the peasantry, who resisted the adoption of new species into their farming systems (NAG *Annual Reports* 1937-42; NAG *Agriculture Files* 1940-42; Anonymous 1943).

Today, all that remains of the seed distribution program is the one surviving grove at the agricultural station in central Gambia. However, a few isolated tree specimens have been independently established over the past half-century along the north bank of the River near the Atlantic Coast. In communities where the tree is found growing, villagers attribute its presence to the settlement of immigrant ethnic groups from shea areas of Mali and Guinea (Steven Maranz, personal communication, 18 January 2004). This

point is also made in recent studies that attribute the expansion of the species to the westward migration of people from shea-producing societies of the interior (Hall *et al.* 1996; Maranz and Wiesman 2003). Interviews in households with shea trees indicate the presence of female family members who make shea butter (Carney, fieldwork 2004).

The shea tree had moved beyond its customary range through the actions of women interested in establishing and protecting the arboreal resource. In this instance culture, rather than necessity, explains the species' establishment outside its traditional range, as does the presence of women who prefer the taste of food cooked in shea butter.

Throughout the areas where shea trees grew, colonial officials failed to link indigenous knowledge, especially that held by women, for the tree's regional significance. The Gambian interviews confirm the importance of cultural, and gendered, heritages in shaping indigenous agroforestry systems. Such observations also substantiate a growing body of agroforestry research in sub-Saharan Africa that underscores the critical role of women in managing economically valuable trees, which they typically hand water and protect from livestock damage (Rocheleau 1987; Fortmann and Bruce 1988; Schroeder 1999).

Gendered Indigenous Knowledge of Shea

Shea Parklands: Biogeography and Indigenous Management Practices

Indigenous knowledge and management of shea parklands are ancient. *Vitellaria paradoxa* is conventionally described as a wild species, as its regeneration is chiefly natural and its presence on the landscape is thought to result from minor modification of the surrounding environment (Chevalier 1948; Hall *et al.* 1996; Boffa 1999). Yet, this perception conceals the significant and deliberate human influence on shea tree incidence and traits. In fact, the species' biogeography, density and characteristics are shaped by climatic and environmental factors as well as human influence (Boffa 1999). An analysis of historical chronicles, archival information, paleobotanical evidence, and oral accounts reveals an extension of shea's distributional range with human assistance. For

Figure 2: Shea Parklands

instance, the species is presently abundant on the Labé and Mali plateaus of Guinea's Fouta Djalon highlands (Maranz and Wiesman 2003), where it was allegedly sparse during the colonial period (Ruyssen 1957). In Nigeria, the abundance of shea trees where wooded grasslands have replaced forests suggests *V. paradoxa* dispersal beyond original population limits (Hall *et al.* 1996). The southern spread of shea involved the suppression of other species, such as *Isoberlinia doka,* and their substitution by communities of savanna species (including shea) bearing important nutritional, economic, ecological, and cultural value to local populations (White 1983).

Palynological and archaeobotanical evidence from northern Burkina Faso indicates that *V. paradoxa* tree management was already occurring by 1000 ACE (Neumann, Kahlheber and Uebel 1998; Kahlheber 1999). In the contemporary period, farmers eliminate most trees on cultivated fields but protect this key economic species, thereby increasing its relative abundance on agricultural land with respect to other woody species (Figure 2) (Boffa 1995; Maranz and Wiesman 2003). In southern Burkina Faso, the relative occurrence of shea trees in cultivated fields is

five times greater than in uncultivated savanna. In northern Ghana and Burkina Faso, shea accounts for more than eighty percent of the woody specimens on farmed land (Boffa 1999; Lovett and Haq 2000a), but only sixteen percent of those in uncultivated bush (Boffa 1995). Cultivated areas where one or a few well-spaced arboreal species are maintained due to their value to the local population are termed parklands (Maranz and Wiesman 2003). *V. paradoxa* represents the most common parkland species of semi-arid West Africa (Breman and Kessler 1995). It occupies over a quarter of the total land area of Burkina Faso, with densities estimated between six and nineteen trees per hectare (Kessler et Geerling 1994). Protected shea trees typically attain a diameter double those of the same age that grow in uncultivated areas (Boffa 1995). Selection has led to a larger proportion of mature productive trees (Lovett and Haq 2000a). Because of the tree's slow growth rate and long life, landscapes dominated by aged specimens are indicative of longstanding protection by local populations (Boffa 1999). However, anthropogenic management of shea trees extends beyond species protection to the selection of preferred individual specimens. Trees with robust growth patterns and desirable fruit and nut traits are deliberately selected and protected while undesirable individuals are culled for firewood or construction. This process has resulted, over centuries, in a substantial increase of indigenously valued traits in the shea genepool (Maranz and Wiesman 2003, 1507).

In a recent study, Maranz and Wiesman (2003) describe genotypic changes in *V. paradoxa* due to tree selection in cultivated areas of Mali and Burkina Faso. They compare three locally valued fruit and nut traits: namely pulp sweetness, fat content of the seeds, and type of fat in the kernel. Examination of the nut's fat traits, which affect shea butter properties, is particularly telling about the role of women in shea tree management. Selection for trees bearing fatty nuts suggests that females are involved in tree selection, as they are exclusively the ones engaged in nut collection and processing and knowledgeable about desirable nut qualities (Elias et Carney 2004; Lovett and Haq 2000a).

Studies reveal that strong local selection has led to a convergence of preferred traits in certain shea populations, with a concentration of desirable qualities appearing in the most intensively

managed parklands. In Burkina Faso, a gradient in observed trait values occurs in an east-west direction, perpendicular to the north-south climatic gradient. Shea trees with the highest kernel fat and sweetest pulp are predominantly located on the Mossi plain (Maranz and Wiesman 2003; Maranz *et al.* 2004).[4] Nuts bearing a high fat percentage are prized because they yield a greater amount of fat per given amount of labor (Maranz *et al.* 2004). Shea trees on the central plain also display an unusually high ratio of stearic acid to oleic acid, which provides a measure of fat hardness and confers shea butter its firmness even when temperatures reach 50 degrees Celsius. Fat hardness is valued in West Africa as it eases the molding and transport of shea oil for sale (Maranz and Wiesman 2003, 1509). Selection for this harder shea butter has resulted in an increase in the stearic acid trait.[5] This strong local selection for trees with specific characteristics thus contributes to perceived differences in oil quality, which is the purview of women. The impact of this selection over time is so pronounced that Maranz and Wiesman (2003) suggest that the Mossi plain may represent a center of domestication of *Vitellaria paradoxa.* This makes sense in light of the central role the species plays among the Mossi, and of longstanding Mossi occupancy of the area. The centralized, hierarchical socio-political structure of Mossi society has long provided security and stability to the central plain and facilitated permanent residence, which permitted the evolution of highly anthropogenic and densely inhabited landscapes (Boffa 1999).

Lovett and Haq (2000b) describe a similar regional gradient in fat production among Ghanaian shea trees, due to anthropogenic selection for trees yielding fatty-seeds. Trees bearing nuts with a high fat content are mainly located in the northern parts of their small and environmentally homogenous study area. While surveyed male farmers were unable to associate seed traits with oil-content, women, who are experienced in nut gathering and shea butter production, recognized that small seeds yielded more oil (Lovett and Haq 2000a).[6] This instance exemplifies the gendered nature of the knowledge farmers possess regarding agro-silvicultural resources.

Brenda Chalfin's (2001, 217) research on market women in northern Ghana reveals their attention to regional and ethnic differences in nut and oil quality. There are recognizable shea

butter traditions among localities, with some locales specifically renowned for the quality of their product. While this is the outcome of different methods of food production, it also reflects local knowledge systems that promote the protection of trees with specific traits (Maranz and Wiesman 2003). The differences that affect product quality have also been observed with other valuable agroforestry species, such as the African locust bean or *néré (Parkia biglobosa),* which women prepare for food (Gutierrez et Juhé-Beaulaton 2002, 468). Nut and oil quality are additionally affected by the locale where fruit collection takes place. Trees in cultivated fields have undergone considerable selection pressure to yield fruits with desired traits while those in uncultivated land often have not. Such trees are typically of smaller diameter (Boffa 1999) and produce fruits with nuts of lesser quality. Nonetheless, women also collect nuts from uncultivated areas to fill their baskets.

A woman's right to harvest shea nuts varies considerably throughout West Africa (Saul 1988; Boffa *et al.* 1996). In Ghana, a woman collects nuts from her husband's plots, while wives elsewhere gather shea from trees in fallowed fields (Fobil 2003). In Mali, rights to shea nuts in farmed fields are granted to every woman, regardless of land claims (Gakou, Force and McLaughlin 1994). Throughout the region access to shea trees on uncultivated fields is customarily open to all women (Elias 2003; Fobil 2003; Elias and Carney 2005). Nut collectors who do not hold access rights to trees on farmed fields use open access uncultivated areas for gathering, which further accentuates differences in nut and oil quality. Besides the tenure arrangements that regulate access to fruit, shea nut collection is mediated by socio-cultural conventions and local institutions.

Indigenous Institutions: Promoting Sheanut Tree Conservation

Use and management of shea trees are regulated by socio-cultural conventions, which vary over time, regionally, and by ethnicity. Indeed, the variation in West African landscapes reported by early European explorers reveals how the dominant species of an agroforestry system is associated with specific climates, agricultural practices, ethnic groups, and customs (Pélissier 1980; Boffa 1999, 29). In African villages, trees located in spatial proximity to the family compound testify to their protected status. Those present on

farmed fields reveal their value to specific ethnic groups, who select for them (Boffa 1999). While shea and *néré* parklands are important to sedentary farming societies for their food value, they are less prized by herders who use animal butter and therefore favor the acacia tree *(Faidherbia albida)* for shade and animal feed (Seignobos 1982; Breman and Kessler 1995; Boffa 1999; Schrekenberg 1999; Gutierrez et Juhé-Beaulaton 2002).

Owing to its highly valued product among agricultural societies, oral histories throughout the shea region accord the tree a sacred status. Shea assumes an eminent place of honor in legends that commemorate Sundiata, whose decisive military victory in 1235 ACE led to the founding of the Mali Empire. Reputedly born a cripple, the legend tells how Sundiata's parents asked blacksmiths to forge crutches from iron so they would not break under the boy's weight. Just before he raised himself to walk at the age of seven, Sundiata's mother applied shea butter to his legs. This effected a miraculous healing, which enabled the boy to cast aside the crutches and to walk unaided (Sommerfelt 1999, 107). Sundiata went on to create sub-Saharan Africa's greatest empire. The significance of shea in the Mali Empire was not forgotten. It remained a symbol of regal power. Coronation ceremonies reportedly concluded with the king climbing a shea tree, where he publicly proclaimed his power (Johnson 1992, 116).

The legendary role of shea in the Mali Empire underscores the product's association with healing, well-being, and vitality. It also reveals the broader ecological view of environmental resources that remains evident in Mande-speaking communities (Freudenberger, Carney and Lebbie 1997; Fairhead and Leach 2003). However, the shea tree has also been sacred to ethnic groups, such as the Mossi, which were absorbed by the Malian Empire. Shea butter's use in religious ceremonies across the region was reported early in the colonial period (Vuillet 1911), and access to the trees in some areas is still controlled by traditional religious figures. In some parts of Ghana and Burkina Faso, earth or land priests regulate access to shea trees located in sacred groves (Chalfin 2004, 47; Sanou 2003). An individual woman gains permission to gather nuts in such areas by paying a user fee in cash or kind.

Local taboos also operate for conservation objectives in many agricultural communities of the shea belt (Lovett and Haq 2000a).

The Bobo of western Burkina Faso, for instance, prohibit the clearing of shea trees during the rainy season when they bear fruit (Sanou 2003). A strict two-week ban on early fruit harvesting is still found in many communities of rural Burkina Faso. Mossi earth priests in Watinoma request that those consuming fallen fruits leave the nuts in place. Their action is thought to protect the nuts for oil extraction (Boffa 1999). The fruit-harvesting ban additionally encourages survival of mature oilseeds that fall quickly and germinate, which are discarded when quality shea butter is desired (Lovett and Haq 2000a, 285-6). This practice serves the ecological function of promoting the regeneration of shea trees in the surrounding parkland. Similar prohibitions on early nut collection exist elsewhere in the shea belt (Boffa 1999; Lovett and Haq 2000a).

Seasonal bans on the early harvest of tree products of economic value have been reported among indigenous conservation measures in other areas of West Africa (Freudenberger, Carney and Lebbie 1997). Such bans promote cultural cohesion as well as ecological objectives. The interdiction on gathering shea fruits as they become mature also reveals how indigenous institutions become responsive to the seasonal labor bottlenecks facing rural women. In prohibiting nut collection at the onset of the rainy season, the ban keeps outsiders from removing shea fruits when local women are busy preparing agricultural fields for sowing (Elias and Carney 2005). Once the ban is lifted, nuts are present for those with privileged access rights.

Shea Butter Production

The key objective of *V. paradoxa* conservation is the species' value as vegetal oil. Shea butter production is a lengthy process requiring physical strength and female expertise (Figure 3). Oil producers spend eight to ten hours transforming ten kilograms of shea nuts into approximately one kilogram of butter, in addition to the time spent in the collection of shea nuts, firewood, and water utilized in oil extraction (Crélerot 1995; Faucon, Sauvageau et Bahl 2001; Elias 2003). The quality and quantity of the extracted oil reflect the cultural and gendered heritages involved in nut selection, collection, and processing. The properties of collected nuts, their age, and how they are prepared for storage vary across Africa's shea belt

Figure 3: Shea butter production

(Chalfin 2004). Diverse nut transformation methods, which yield shea butters of different quality, have similarly evolved according to local knowledge and ethnicity (Elias et Carney 2004). The assortment of methods reflects culturally specific seasonal demands on female labor and regional availability of natural resources required in the production process.

Shea trees fruit during the rainy season, when food reserves are scarce and agricultural labor most exacting. At this time, women gather shea nuts on their way to and from their fields. They may walk fifteen kilometers or more, with head-loads occasionally surpassing twenty-five kilograms of nuts (Crélerot 1995; Schreckenberg 1996). Given the high demands on female labor, the transformation of gathered shea nuts typically occurs in two stages. Nuts are first prepared for storage until producers are free to make shea butter, with the actual oil extraction occurring in the second stage.

The first stage is carried out during the four-month shea fruiting season. Germination of the nuts is arrested via boiling or by burying the ripe fruits in pits covered with moist earth. The interred fruits ferment and after about two weeks, the nuts are easily separated from the pulp. The burial method reduces labor demands as well as the need for firewood during the rainy season. It is prevalent among Mossi women in central Burkina Faso (Maranz and Wiesman 2003), who bear large agricultural responsibilities compared to other Burkinabé ethnic groups, such as the Lobi or the Gourounsi (Crélerot 1995). However, this method yields a butter of inferior quality when compared to boiling.

Stage one concludes with drying the nuts for storage. This is

achieved in one of two ways. During breaks in the rains, nuts can be sun dried intermittently for five to ten days. Alternatively, they can be roasted over a fire in a clay kiln (Hyman 1991). Park (2000, 215) observed that it takes three days to dry the nuts in this way over a constant wood fire. The roasting method requires a substantial amount of firewood and labor for supervision (Elias and Carney 2005; Hyman 1991). Once the nuts' moisture content is below thirty percent, they can be stored for up to two years without spoilage (Fobil 2003).

The demands of shea butter preparation on female labor and environmental resources become increasingly evident in the second processing stage, which consists of oil extraction. While women engage in some extraction during the rainy season to allay immediate consumption and income needs (Gosso 1996; Chalfin 2000), the bulk of the nuts is gradually processed over the dry season, when cereal crops are harvested and labor burdens eased.

The process begins with removal of the nut's outer shell with a stone, wooden mallet, or roller to release the oil-bearing kernels. The latter are then crushed one by one with a wooden mallet, and roasted in a pot over a fire while stirred. Roasting concentrates the oil in the kernel and accelerates latex coagulation (Fobil 2003). Warm kernels are then pounded by one or more women in a mortar with a pestle. The resulting paste, similar to peanut butter, is thinned to release the oil. Women perform this step on their knees by grinding the paste with a stone over rock surface.

In the remaining steps, women ease the labor burden through work carried out collectively and a generational division of labor. Younger women collect and carry well water to the area where the butter is being made. Older women assist in cutting and gathering firewood. Young women stir and knead the mixture, while older women supervise and provide expertise for achieving the quality desired in the final product (Chalfin 2004).

The coarse-grained paste is placed in a large basin, in which water is gradually added. Two or three young women vigorously knead the mixture until a semi-solid mass results. A greasy foam rises to the surface and is removed for additional processing. The extracted material is subjected to repeated washings to yield a product with the desired consistency and color. The number of washings depends on water availability and is one of the factors

determining butter quality. Excess moisture and impurities are removed by boiling the residue in a pot. Melting and boiling the solid fat until it is clear and bubbly clarifies the butter. The top layer is skimmed off and decanted, and the fat is poured into a basin where it is left to solidify. After a few days' cooling, this process results in butter of a beige-gray to yellow-white color that is shaped into balls for storage or sale. West African shea butter remains semi-solid at room temperatures, remarkably even when temperatures reach 50 degrees Celsius. If properly made and stored, shea butter can be kept for several years.

Processing techniques additionally reveal the importance of local knowledge of environmental resources that contribute to a quality product. For instance, in Ghana the small savanna plant *Ceratotheca sesamoides* is added to the shea butter. Its juice accelerates the rate of oil separation by causing aggregation of suspended particles, thereby hastening sedimentation of the heavier non-oil residue (Fobil 2003). Use of the *Ceratotheca* plant is another way to reduce fuelwood demand during oil extraction.

Labor and the availability of environmental resources represent key bottlenecks in shea butter production. One study from rural Mali estimates that 8.5 to 10 kilograms of fuelwood (Hyman 1991, 1250) are burned when producing one kilogram of shea butter by traditional methods. Additionally, access to water can be problematic when carrying out oil extraction during the dry season in villages where sources are seasonal or distant. Crélerot (1995, 116) notes that Lobi women in southwestern Burkina Faso spend three to five hours collecting water during the dry season. They consequently reduce or suspend shea butter production during the dry season months. Techniques promoted by NGOs, such as supplemental washing and boiling, demand extra fuelwood and water to achieve a product of superior quality (Elias 2003).

Because of such constraints, shea butter producers in some villages have acquired improved technologies for nut processing. These include labor-saving manual and mechanized shea presses and mills, which require less firewood while increasing the yield of oil (Compaoré 2000). Despite these technical improvements, most steps in the oil extraction process are still performed according to traditional methods.

Low returns on labor as well as competing demands for

women's work during the agricultural season contribute to maintaining low levels of shea butter production. Oil extraction primarily serves family needs, but surpluses are sold in local markets — also the source for international sales of shea nuts and butter. Petty traders purchase shea products from women for modest sums. However, a new market for shea butter is emerging, which links local producers to international importers, often with the help of NGOs. This market is also shaping the shea agroforestry landscape and processing practices.

Contemporary Shea Commercialisation

Global shea exports have substantially increased since the colonial era, providing a diversified revenue base to cash-strapped West African nations. In the 1970s, shea represented the third largest foreign-exchange generator in Burkina Faso, Africa's leading shea exporter (Saul *et al.* 2003). But the international demand for nuts grew increasingly erratic in the 1980s as market value was tied to declining commodity prices for cocoa butter and other vegetable-oil substitutes in the food-manufacturing sector (World Bank 1989; Saul *et al.* 2003). Throughout the twentieth century, low shea butter prices as well as more demanding product standards and transportation bottlenecks kept the emphasis on unprocessed nut exports.

Since the 1990s, shea butter has been gaining importance as an ingredient profiled in lines of cosmetics and skin care (Compaoré 2000). Seizing this market opening, shea projects have become a favorite recipient of African development assistance. The UN, bilateral aid agencies, and NGOs train female shea butter makers to produce high-quality oil that meets international quality norms via standardized processing techniques (Hyman 1991). Projects then link shea producer associations with cosmetics firms, such as The Body Shop or L'Occitane, willing to pay superior prices for quality oil produced by African women.

Selling processed oil over raw nuts can increase the transfer of profits to female producers, yet it raises the problem of labor bottlenecks. Contracts directly linking producers with global cosmetics firms are frequently unresponsive to rural women's cyclical labor constraints (Elias 2003). This is particularly concerning as the period of shea collection coincides with peak work demands of the agricultural season. After all, many of the techniques women

developed to prepare the nuts for storage and later processing arose in response to this problem. Expansion of shea butter production for foreign markets can potentially exacerbate female work demands, which novel technologies for nut processing can lessen. However, these technologies threaten to weaken women's long-standing control of shea production. Technology reduces the need for specialized female knowledge in shea processing, and renders oil extraction practicable by all entrepreneurs (Biquard 1992). In a pattern similar to what Chalfin (2004) observes with shea marketing in Ghana, individual men and women financially poised to take advantage of new opportunities are able to gain control over the mechanical technologies designed to benefit the producers (Compaoré 2000; Biquard 1992; Chalfin 2003). Whether new machinery works towards raising the incomes of traditional producers or concentrating profits in the hands of those in command of processing technologies remains to be seen.

A parallel issue arising from international shea butter sales concerns the nut reserves and large quantities of firewood required for oil extraction. Production of shea butter ultimately depends upon the regeneration of shea trees, which is threatened when limbs are cut for firewood, nuts overexploited so they do not germinate, or the land subject to agricultural intensification, decreased fallow periods, and draught animal traction (Kessler 1992; Boffa 1999). Donor enthusiasm for shea butter projects thus far appears divorced from such environmental considerations.

At present, despite projections that the cosmetic demand for shea will surpass current production, the supply far exceeds the limited opportunities for higher prices offered by the industry. In 1999, Burkina Faso alone exported 271 tons of shea butter (ONAC 2001), while the international cosmetics industry imported only two hundred tons. The potential of this new global market niche has yet to reach peak production, forecast at fifteen hundred tons annually (Boffa 1999). In the meantime, the availability of surplus shea butter in global markets signals excellent opportunities for food manufacturers in the North who are poised to purchase the oil produced from women's work and African environmental resources. Even within the cosmetics industry, approximately half of the shea butter incorporated in beauty products is first captured in West Africa at low prices by agro-food companies.

These companies in turn sell the oil to cosmetics firms at double the price they paid for its use in chocolate (Boffa 1999).[7]

The rapid growth of global shea butter sales will undoubtedly broaden its use in mass-market commodities. In 1997, chocolate manufacturers accounted for ninety percent of the international demand for shea for its use as a cocoa butter substitute (UNIFEM 1997). Since then, the European Union's ruling, in 2000, to allow up to five percent cocoa butter substitutes (such as shea) into chocolate has increased the demand for alternative vegetable oils among chocolate manufacturers (Fold 2000). This threatens to engender a downward price spiral for cocoa, shea, and other cocoa butter equivalents, as their respective markets are closely linked. In years of poor cocoa yields or high cocoa prices, the shea market benefits, while the opposite holds true during years of high cocoa production and low cocoa prices. Will shea fare better than royal bee jelly, jojoba, collagen, and similar emollients previously popularized in cosmetics, in raising the economic hopes of African women?

Conclusion

This article has highlighted the close association between shea and female farmers, whose expertise involves the selection of nuts, methods of nut preservation, and subsequent processing techniques. Selection for shea fruit with sweet pulp and fat content of superior quality is observed. Women rather than men hold the knowledge of nut traits associated with high fat yields. This evidence underscores the elaborate and gendered knowledge system associated with shea agroforestry.

There is still much to learn from African management of arboreal resources. Diverse and dynamic management practices are articulated through the differentiated knowledge of rural populations, which includes the repositories handed down through generations of women. The process of how this occurs remains under-appreciated. Understanding the gender-specific knowledge and expertise involved in the selection, protection, and conservation of desirable species will contribute to environmental protection strategies. Shea agroforestry systems, along with those based on the African locust bean and gum Arabic *(Faidherbia albida),* point the way towards research that could promote ecological sustainability in the region.

The significance of fire and anthropogenic factors in the forma-

tion of agroforestry parklands also demands attention. Few studies examine the deliberate establishment of shea seedlings, even though pilot plantations are currently underway in Burkina Faso (Saul, Ouadba and Bognounou 2003). The effort echoes earlier attempts to develop shea plantations during the colonial period in Gambia (1930s) (NAG 1937). But the current emphasis on shea also follows an even earlier, and less understood, history of diffusion in the nineteenth-century that reveals the tree's deliberate establishment by individuals to new locales, especially those whose cultures valued shea butter for cooking and religious observance (Beaufort 1842). Were these individuals women, as the Gambian interviews suggest? The answer remains unknown. Current research on shea parklands reveals that we are only beginning to understand the elaborate and longstanding role of Africans, both male and female, in shaping vegetation history.

Notes

[1] Shea-producing countries include Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Ghana, Guinea, Mali, Niger, Nigeria, Senegal, Sudan, and Togo. Over the past half-century, the sheanut tree has spread to the Democratic Republic of the Congo, Gambia, and Uganda due to human migration, colonial policies, and economic incentives (Hall *et al.* 1996; Maranz and Wiesman 2003; Elias et Carney 2004).

[2] Shea butter sales are estimated to generate from twenty to one hundred percent of rural female revenues in key producing countries such as Burkina Faso, Benin, and Ghana (UNIFEM 1989; Schreckenberg 1999; Chalfin 2004).

[3] It is now believed that the quantity and quality of shea fruit production varies over short-term climatic cycles (Chalfin 2000, 992).

[4] The Mossi plain is commonly referred to as the central or Mossi Plateau of Burkina Faso. However, the region's topography is more accurately described as a plain than as a plateau. The central plain (latitude 11°N to 14°N, longitude 3°W to 1°E) (Batterbury 2005) covers one quarter of Burkina Faso's territory (70 668 square kilometers) and encompasses half of the Burkinabé population (Maatman, Schweigman and Ruijset 1996). It is flanked by two lateral plateaus.

[5] *Vitellaria paradoxa* subspecies *nilotica* populations in Uganda are known for a lower proportion of stearic acid, which results in a less viscous butter that does not hold its form. It is usually sold in liquid form in plastic jugs (Maranz and Wiesman 2003, 1511).

[6] Male farmers cited tree health, yield, fruit characteristics, growth, competitive effect on other crops, and resistance to mistletoe as factors affecting tree selection (Lovett and Haq 2000a).
[7] Statistics on the international shea market for the food industry are difficult to obtain due to the few firms that dominate production and to the secretive manner in which they conduct their activities. Four large European importers — namely Aarhus, Karlshamns, Unilever, and Van Dermoortele — dominate the shea market.

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