

# The interweave of people and place: biocultural diversity in migrant and indigenous livelihoods around Mount Cameroon

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## SUMMARY

In order to further understanding of the links between biological and cultural diversity, this study examined the role of forest species and biodiversity in the livelihoods of indigenous Bakweri villagers and migrants to the Mount Cameroon region. Surveys of resources consumed and sold by 118 households were undertaken in five villages over the course of one year. The contributions of different habitats and management systems (compounds, farms, fallow, forest) and species (native and introduced; cultivated and wild-harvested) to local livelihoods were evaluated. The study showed that indigenous households depend to a much greater extent upon a range of habitats and species than migrant households, particularly for subsistence. Indigenous resource management systems grow from historical relationships between people and place, and promote resilience, well-being and adaptation in an area long characterized by environmental, social, political, and economic uncertainty. The managed landscapes of indigenous villages can contribute to broader conservation efforts in the region, including those associated with the newly established Mount Cameroon National Park.

Keywords: biocultural diversity, traditional forest management, Mount Cameroon, Bakweri, non-timber forest products

## Entremêlement humanité/location: diversités culturelles et biologiques dans les vies des indigènes Bakweri et des immigrants dans la région de Mount Cameroon , au Cameroun

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Afin de comprendre plus profondément les liens réunissant les diversités culturelles et biologiques, cette étude a examiné le rôle des espèces forestières et de la biodiversité sur les moyens d'existence des villageois indigènes Bakweri et des immigrants dans la région de Mount Cameroon. Une examination des ressources consommées et vendues par 118 foyers s'est effectuée dans cinq villages sur une durée d'une année. Les contributions des différents habitats et des systèmes de gestion (enceintes, fermes, jachères, forêts) des espèces (originaires de la région et introduites, cultivées et récoltées au naturel) jusqu'aux moyens d'existence locaux furent évalués. Cette étude montrait que les foyers indigènes dépendent beaucoup plus d'un assortiment d'habitats et d'espèces que les foyers d'immigrants, pour leur subsistance en particulier. Les systèmes de gestion indigène des ressources croissent à partir des relations historiques entre les peuplades et le site, et encouragent la persévérance, le bien-être et l'adaptation dans une zone depuis longtemps caractérisée par des fragilités environnementales, sociales, politiques et économiques. Les paysages gérés des villages indigènes peuvent contribuer aux efforts plus larges de conservation dans la région, ainsi qu'à ceux associés avec le Parc National de Mount Cameroon, récemment établi.

## Un entramado de personas y lugares: diversidad biológica y cultural en la vida de la población indígena Bakweri y la de inmigrantes en la región del Monte Camerún

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Para poder entender más profundamente los vínculos entre la diversidad biológica y la cultural, este estudio examinó el papel de las especies forestales y la biodiversidad en los medios de subsistencia de los habitantes de las comunidades Bakweri y de los inmigrantes en la región del Monte Camerún. Durante un periodo de un año se realizaron encuestas en cinco localidades a fin de contabilizar los recursos consumidos y vendidos por 118 hogares. Se evaluó la contribución individual de los diferentes hábitats y sistemas de uso del suelo (mixtos, agrícolas y ganaderos, barbechos, bosques) y especies (nativas e introducidas; cultivadas o silvestres) a los medios de subsistencia locales. El estudio mostró que los hogares indígenas dependen en mucha mayor medida de una variedad de hábitats y especies que los hogares de los inmigrantes,

especialmente en cuanto a su subsistencia. Los sistemas indígenas de gestión de recursos provienen de las relaciones históricas entre las personas y el lugar, y fomentan la resiliencia, el bienestar y la adaptación a una región que se ha caracterizado desde hace mucho por la incertidumbre medioambiental, social, política y económica. Los paisajes bajo el uso de las localidades indígenas pueden contribuir a los esfuerzos de conservación del resto de la región, como los relacionados con el recientemente establecido Parque Nacional del Monte Camerún.

## INTRODUCTION

Forests and biodiversity are central to indigenous livelihoods, health and well-being around Mount Cameroon. They are an integral part of complex and dynamic cultural systems that have adapted to enormous change over hundreds of years, including the forced removal of indigenous villages onto marginal lands to make room for German colonial plantations in the late 19<sup>th</sup> century (Ardener 1996, Kofele-Kale 2010). Despite this, more recent pressures on land and resources, and the forces of globalization, indigenous groups have nonetheless maintained sophisticated, multi-dimensional management and livelihood systems (Laird in press).

These systems integrate a range of habitats, species, and practices, accommodate and capitalize on seasonal change, and grow from local ecological processes. Similar management systems have been shown to retain significant forest cover and biological diversity, and replicate structural and functional elements of the forest (e.g. Alcorn 1989, Alexiades and Shanley 2005, Gomez-Pompa 1990, Redford and Padoch 1992, Peters 2000, Posey and Balee 1989, Posey 1999). They also conserve soil, regulate temperature, and resist pests and diseases better than more intensive agricultural systems, while contributing to genetic and species conservation, carbon sequestration, watershed protection, and wildlife habitat (Eyzaguirre and Linares 2004, Leakey and Tchoundjeu 2001, Sonwa et al. 2001, Zapfack et al. 2002).

Indigenous management systems around Mt. Cameroon do not primarily maximize the cash income possible from a given area, and instead aim to manage and maximize diversity as a way of reducing risk and maintaining a range of livelihood strategies in keeping with tradition, taste and personal preference. In this way, these systems provide a 'safety net' or 'natural insurance' during seasonal and cyclical food gaps, and during difficult years (Arnold and Ruiz-Perez 2001, Neumann and Hirsch 2000, Shackleton et al. 2011a), while also promoting resilience in an area long characterized by environmental, economic, political, social, and more recently accelerated climate, change. Migrant livelihood strategies vary depending upon how long families have lived in the area, where they came from, the extent of contact with forests, and other factors. On the whole, however, migrant households maximize gain to a greater extent, and use a far less diverse range of species and habitats, than indigenous households (Laird et al. 2007).

Indigenous people around Mount Cameroon are not 'noble' conservationists, nor are they a homogenous "community", however (Sharpe 1998, Burnham 2000). There is a great deal of variation in livelihood strategies and relationships to the forest within and between villages in the area. Many individuals will mine species when commercial

opportunity presents itself, as in the case of bushmeat, timber or the medicinal bark of *Prunus africana* (Cunningham and Mbenkum 1993, Ingram 2008). Others will rent or sell land to migrants for farms although this is socially frowned upon, and some local elites clear forests for plantations. Despite this, being a "son of the soil" or indigenous to the area has been used in recent decades by some to further political or economic ends in ways that alienate and disempower migrants, many of whom have resided in the area for generations and have developed their own close relationships with the local environment (Geschiere 2009, Konings and Nyamnjoh 2003, Jua 2001, Sharpe 1998).

As a whole, however, and within the context of a region undergoing dramatic and persistent change, indigenous knowledge and practices reflect uniquely deep historical and cultural connections to particular places and species. This paper examines these connections, and what is increasingly termed "biocultural diversity". "Biodiversity" is the variability among living organisms from all sources, including diversity within species, between species and of ecosystems (Convention on Biological Diversity 1992). "Culture" refers to the shared, learned and symbolically expressed aspects of human experience and society. Cultural relationships with forests include traditional ecological knowledge on flora and fauna, edible versus inedible foods, plant medicines, and forest management systems, as well as shared notions of kinship, marriage, prohibitions, cosmology and ritual (Balee 1994), and 'cultural diversity' describes variability in these relationships. "Biocultural diversity" is the interweave of biological and cultural diversity, people and place, and the continuing adaptation and co-evolution between natural landscapes and ways of life (Cocks 2006b, Maffi 2005, Maffi and Woodley 2010, Wilson 2008). It is not a concept reserved for indigenous peoples, and describes a range of relationships between local people and biologically diverse environments (Cocks 2006a and 2006b).

Cultural diversity and biological diversity have long been the subjects of distinct areas of study, with the exception of multi-disciplinary – and so often marginalized – fields like ethnobiology (eg Alexiades 1996, Alexiades 1999, Alcorn 1989, Balee 1994, Gadgil 1993, Gomez-Pompa 1990, Martin 1995, Posey 1999). It is increasingly more widely accepted, however, that the richness and diversity of indigenous livelihood systems and peoples' relationships with nature cannot be understood or productively examined as independent domains (Pretty et al. 2009). Conservation, livelihoods, health and well-being are linked and interdependent parts of a whole (Colfer 2008, Cunningham et al. 2008, Dounias and Colfer 2008, Hladik et al. 1990, Hladik et al. 1993, Karjalainen et al. 2010, Posey 1999).

This paper reports on an ethnobiological study that integrated different approaches and disciplines in order to

examine the role of species from different habitats and management systems in the livelihoods of indigenous villagers and migrants to the Mt Cameroon region. The objective was to better understand the interweave of biological and cultural diversity, but the limits of any one study or approach in addressing such a complex and wide-ranging topic are acknowledged. Specifically, the study sought to answer the following questions: To what extent are indigenous livelihoods dependent upon a range of species and habitats (and so biodiversity)? How do indigenous livelihood systems compare to those of people new to the area without traditional and historical ties to the forest, species, and landscapes in which they live? Are there important relationships between cultural and biological diversity around Mt Cameroon that can inform and contribute to plans for a new national park and conservation goals in the region?

## THE MOUNT CAMEROON REGION

The Mt Cameroon region is characterized by environmental, social and political change, and the lives of indigenous groups by adaptation and resilience. The largest mountain in West Africa, Mt Cameroon rises 4095 m from the Atlantic Ocean's Gulf of Guinea, on the southwest coast of Cameroon, to the summit 20 km inland. At 9.1 degrees east and 4.5 degrees north, it is the last active member of a range of volcanoes that extend from the island of Principe, around 100 km to the southwest, through Fernando Po of Equatorial Guinea (2850 m) to the highlands of Adamoua in Cameroon and Obudu in Nigeria. The Mt Cameroon region consists of two distinct peaks, Mt Cameroon (locally known as Fako) to the north-east, and the older Mt Etinde (1715 m) to the south-west (Letouzey 1968, Fraser *et al.* 1998).

Mt Cameroon comprises lowland and lower montane rainforest, upper montane and sub-alpine rainforest, and montane and sub-alpine grasslands (Ndam 1998; Cable and Cheek 1998). It is one of the most biologically diverse sites in Africa, with great altitudinal range, varied aspect and climate, and regular volcanic eruptions (including most recently in 1982, 1999 and 2000), producing a diversity of vegetation types and unusual levels of species endemism and richness (WWF 2001). This includes roughly 2500 indigenous and naturalized plant species (Cable and Cheek 1998), a recorded 370 species of birds including numerous endemics (Fotso *et al.* 2007), and important populations of large mammals, including forest elephants and chimpanzees, drills and other primates (Forboseh *et al.* 2007, Gadsby and Jenkins 1992). Mt Cameroon is part of what is known within the conservation community as the 'Guinean Forests of West Africa Biodiversity Hotspot'<sup>1</sup> (Conservation International 2011) and is an 'Important Bird Area' for Africa (Birdlife International 2011). Due to its extremely high species diversity and levels

of endemism, and threats to its forests and biodiversity, Mt Cameroon is considered a global and national priority area for conservation (Birdlife International 2011, Conservation International 2011, Myers *et al.* 2000, Oates *et al.* 2004, WWF 2001).

The indigenous groups living around Mount Cameroon include the Bakweri, Bomboko, Bakolle, Balong, Isubu, and Wovea. All have a long history of interaction with external groups. For hundreds of years, African and European traders, explorers, scientists, missionaries, German and British colonial administrations, and others have been drawn to the dramatic landscape, fertile soils, and natural wealth of the region. Portuguese traders first arrived in 1472, and gave the country its name, and in 1884 the Germans established a colony in Cameroon (Ardener 2002, LeVine 1971). Following a series of battles, in 1901 the Germans established their headquarters in Buea, at the heart of Bakweri territory. Bakweri villages were forcibly relocated, usually up the slopes of the mountain, and their lands taken in order to establish the tea, rubber, oil palm, banana and other plantations that remain to this day, managed in recent decades by the Cameroon Development Corporation (CDC) (Kofele-Kale 1981, Ardener 1996). Boundaries between villages and plantations continue to be negotiated as part of what is called the "Bakweri land question", and in the last decade some villages have re-acquired marginal lands taken from them more than 100 years ago. Privatization of the parastatal CDC brought the Bakweri land problem to the forefront, and in 2002 the Bakweri Land Claims Committee (BLCC) brought their case to the African Human Rights Commission (Kofele-Kale 2010, BLCC 2011). The case was returned to Cameroon in order to exhaust domestic remedies, but the government has yet to enter into negotiations with the Bakweri (Kofele-Kale pers. comm. 2011).

Workers on the plantations have long been drawn from other parts of Cameroon, including francophone Cameroon, Nigeria, the Bamenda highlands and other parts of Southwest Province (Ardener *et al.* 1960, Ardener 1996, Konings and Nyamnjoh 2003). Many migrants have resided in the area for generations, and others continue to settle in local towns and to farm. Regardless of one's personal or family history, however, all non-indigenes are known as "strangers", or "came-no-goes" in pidjin English, by indigenous groups that have resented the influx of migrants since the 1920s (Geschiere 2009). This in-migration meant that by 1960 indigenous groups made up only 30% of the population of what was then known as Victoria Division, on the southern slopes of Mount Cameroon (Ardener 1996). A more recent study estimated that the indigenous population now makes up less than a quarter of the roughly 250,000 people in the Mount Cameroon region (Schmidt-Soltau 2003), and that percentage is falling as the population increases. In more remote and

<sup>1</sup> The Guinean Forests hotspot includes an estimated 9,000 vascular plant species, about 20% of which are thought to be endemic; 785 bird species of which 75 species and 7 genera are thought to be endemic; and 320 species of mammals, representing a quarter of the roughly 1100 mammal species found on the entire continent of Africa, with 60 of these endemic to the region, including 18 species of primates (Conservation International 2011).

rural areas, however, and with the exception of the cocoa-growing frontier around the Bomboko Forest Reserve, many villages remain entirely indigenous.

In December 2009, the Cameroon government established a national park on Mt Cameroon covering 58,178 hectares. The objectives of the park include protection of biodiversity, wildlife and ‘non-consumptive’ natural resources, as well as ‘reducing pressure on the use of natural resources by introducing and promoting alternative sources of income to the local population’ (WWF 2010). This is a complex region, with a highly dynamic and diverse population, environment, politics and economy. Conservation programs will be most effective when they grow from significant understanding of this complexity and the natural resource management strategies that have grown up in its midst over hundreds of years. This paper is an effort to shed light on one part of the interface between culture and nature – the dependence of indigenous and migrant households on forests and biodiversity for food, medicine, construction and other needs.

**The study villages**

The study was undertaken in five villages around Mount Cameroon – Ekonjo, Etome, Likombe, Upper Buando and

Bova Bomboko (Figure 1). The first four villages are entirely indigenous Bakweri villages found on the southern slopes of Mount Cameroon. The study also included migrant farmers from other parts of Cameroon and Nigeria that rent or buy farm land in the vicinity of these villages but live elsewhere, including Cameroon Development Corporation plantation camps (Saxenhof Tea Estate camp) and in mixed indigenous and migrant villages closer to towns (Batoke and Wututu). By incorporating migrants farming on village lands, we could study differences in resource use and management in the same environments.

The fifth village, Bova Bomboko, is located at the north-eastern foot of Mount Cameroon. Originally an indigenous Bomboko village, it is now populated primarily by cocoa farmers from other regions of Cameroon (primarily Northwest, Southwest, West and Centre Provinces) and Nigeria. Bomboko make up less than 10% of the village population (Table 1). Bova Bomboko abuts the roughly 26,667 ha Bomboko Forest Reserve created in 1939 as the Bomboko Native Authority Forest Reserve, and now absorbed into the new Mount Cameroon National Park. The potential to farm cocoa, including in the Reserve, has attracted individuals from other regions of Cameroon and Nigeria with scarce land and greater poverty. It is unclear whether significant in-migration

FIGURE 1 Study area

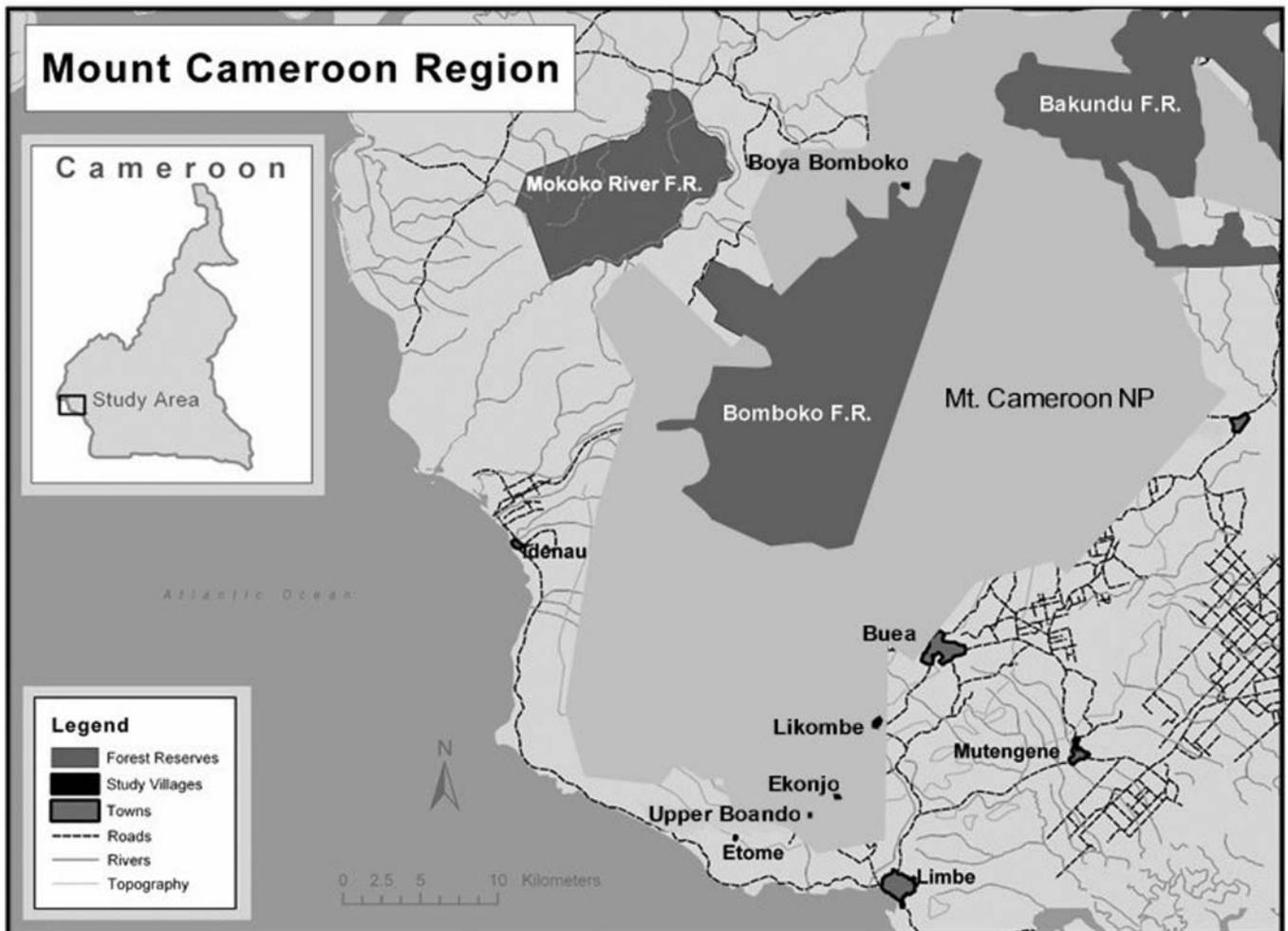


TABLE 1 Population, structures and households in five study villages in the Mount Cameroon region in 2000

Villages	Community type	Number of permanent residents	Number of separate structures or houses	Number of households living in village	Number of households in the household survey (# of individuals in these households)
Bova Bomboko	< 10% indigenous; remaining migrant	1151	129	212	48 (268)
Etome	Indigenous	67	18	10	10 (67)
Ekonjo	Indigenous	61	25	19	19 (61)
Likombe	Indigenous	265	79	61	23 (119)
Upper Buando	Indigenous	66	25	15	15 (66)

Source: village census

will continue if the new national park boundaries are more aggressively patrolled than were those of the Reserve.

Populations of the four indigenous Bakweri villages range in size from 61 to 265, with the mixed ethnicity Bova Bomboko being much larger at 1151 (Table 1). Bova Bomboko also has the youngest population of any village studied, with 89% of individuals under age 40 and 30% under the age of 10. Only 11% of the population is over the age of 40 (2% over the age of 60), compared with more than 30% of residents in Bakweri villages over the age of 40, and 11% over the age of 60. Some Bakweri villages have high proportions of older people, and smaller household sizes, and younger members of the community move in and out of the village, using it as a base of last resort when jobs fall through in local towns. Other villages with a more even spread of ages have more opportunities to earn a living while based in the village, and on average are more affluent.

## METHODS

The project employed a wide range of qualitative and quantitative ethnobiological methods including a village census, daily household surveys, market surveys, and a range of resource use and management studies.

### Village census

The initial phase of research included a village census, village mapping and household surveys of resource use. The census was undertaken in 2000 in the five study villages – Likombe, Etome, Ekonjo, Upper Buando, and Bova Bomboko – in a total of 317 households. Every household in each village was visited, and information collected on all members of the household and family, including: gender, age, ethnic group, relationship to household head, education level, residency (permanent, temporary, outside village), occupations, and relatives in village. For each household, sources of income were initially evaluated using pie charts (and at times stones, seeds, or other representations). Free-listing of species most widely used, valued, and most significant for household income, were undertaken. The total number of buildings in

each village, as well as the total number of active households, was recorded (Table 1). In addition, demographic surveys were undertaken of migrant farmer households farming lands rented by and in proximity to the four Bakweri villages, but living outside in Batoke and Wututu villages, and Saxenhof Tea Estate camp.

### Daily household surveys

Following the village census, intensive daily household surveys were undertaken to document resources gathered from farm, compound, fallow and forest for subsistence use and sale, as well as purchased items. The household survey allowed comparison of differences in resource use between ethnic and age groups, individuals with different occupations, and study villages of different size, geography, and proximity to forest, markets and urban centers. The daily household survey recorded all things collected and consumed, or sold, by households, and allowed us to move beyond identifying and listing what is generally reported as 'useful', to quantifying the nature of use. The products recorded include agricultural crops, wild foods (fruits, greens, mushrooms, spices, etc.), construction materials, fuelwood, medicines, protection and cultural species, and others.

In the larger villages, a sample of households was selected, stratified according to gender of household head, age of head, relative wealth, kinship, education level, source of income, and extent of reliance on forest (hunters, herbalists, weavers, and NTFP collectors, for example, depend more on the forest than those that primarily farm). In Likombe, 23 households were included in the household survey (29%), and in Bova Bomboko, 48 households (37%). In Etome, Ekonjo, and Upper Buando, household numbers are small enough that all households were included in the daily surveys. In each village, households were interviewed for five consecutive days, every other month, over the course of a year. With a total of 118 households included in the study, multiplied by 30 days across the year, a total of 3540 day surveys were administered. A total of 8779 entries for products (species) harvested and bought in local markets were recorded for all villages combined across the year (Table 2).

TABLE 2 Number of plant products harvested from compounds (home gardens), farms, fallow and forest and bought by households in each study village in the Mount Cameroon region over the course of one year<sup>a</sup>

Village	Products harvested	Products bought	Household type
Bova Bomboko	1226	944	<10% indigenous Bomboko; remaining migrant
Etome	519	232	indigenous
Ekonjo	690	455	indigenous
Likombe	1473	835	indigenous
Upper Buando	903	368	indigenous
Batoke	143	302	only migrant households surveyed
Saxenhof	225	197	only migrant households surveyed
Wututu	127	140	only migrant households surveyed

<sup>a</sup>Plant uses include food, medicine, spice, construction, fuelwood, symbolic or protective, and other uses.

Source: daily household survey

### Market surveys and valuing products

In order to calculate a monetary value for products harvested for subsistence, market surveys were undertaken. For each village, a study in the main local market was undertaken to account for variations in prices between markets. Markets vary enormously in size and specialization, from under fifty sellers to more than one thousand (e.g. Limbe)<sup>2</sup>.

Market surveys recording prices for products in both the rainy and dry seasons were undertaken because there can be significant seasonal variations in price. Fuelwood is not widely traded, but prices in local markets were obtained, and individuals in villages were asked how much they would be willing to pay for fuelwood. For plant medicines, wild greens and fruits, forest ropes, and other products that are not commonly sold, we selected a low figure (e.g. 100 CFA per bundle for medicines), or used a substitute product value. This approach undoubtedly undervalued these resources, but nonetheless allowed for their incorporation in the analysis (Campbell and Luckert 2002).

### Broader resource use and management studies

This paper reports on the results of household and farm surveys, but the discussion is informed by a larger qualitative and quantitative research project undertaken over a period of eight years with a primary emphasis on indigenous biocultural diversity and relationships to the environment. Additional research with indigenous villages included a range of free-listing exercises; resource-specific surveys and field collections (wrapper leaves, forest ropes, fish, greens/vegetables, yams, mushrooms, medicinal plants); village income, artifact (household products, musical instruments, game pieces), and resource rights surveys; and dozens of 'walks

in the woods', or interviews, with healers, basket-makers, hunters, NTFP gatherers, and others. Additional studies undertaken with both indigenous and migrant households include surveys and mapping of useful species found in compounds (home gardens) and cocoa and other farms, which provided finer detail on species use and management practices, and a "tree trail" exercise that helped to identify differences in plant knowledge across age, gender, occupation, ethnic group, and village.

## RESULTS AND DISCUSSION

### Brief overview of resource use and management systems

Drawing upon the larger study mentioned above, below we briefly review primarily Bakweri, and to a lesser extent Bomboko and migrant, resource use and management systems in order to provide a context for the quantitative data presented in subsequent sections.

#### *Farm management and establishment*

Bakweri management systems integrate a range of habitats, species and practices that vary by season. Households have on average between 3–4 farms, often in different locations around the village, in different stages of succession and management, and with varying crops depending upon soil fertility, altitude, and other factors. Individual farms tend to be 0.5–1 hectare in size, with the total area farmed by a single family usually between 2–5 hectares, although there is considerable variation. Most farms are cleared from fallow of around 6 years (fewer years than previously), and are farmed for roughly 5 years, depending upon the crop, before reverting to fallow

<sup>2</sup> Ekonjo sells and buys products mainly in Bonjongo and Limbe; Etome mainly in Batoke followed by Limbe; Likombe in Bokwango, Buea, Mile 4, and Wututu markets (and in the village to buyers coming from Douala to purchase wholesale bitterleaf and pepper, plantain and banana); Upper Buando residents sell and buy products in Limbe and Bobende; and Bova Bomboko is oriented towards Muyenge market.

again. Clearing farms from fallow takes place in the dry season, usually between December – March.

The vast majority of farms are inherited from parents or grandparents, with only a small number cleared from village land in the “black bush” (late secondary or mature forest). A few young men still clear new farms from black bush, since it allows them to claim land and the soil is fertile, but this practice remains an exception. Older individuals no longer have the strength to clear black bush, and others report a lack of time and the associated hardships: trees are large, black bush is often far from the village and uphill, and so transporting crops back is difficult, farms are exposed to animal predation, and tuber crops – central to Bakweri farming – do not do well in the first year due to tree roots in the soil.

Pressure on forest habitats for an expansion of “slash and burn” agriculture by Bakweri villagers is limited. Most households support their members with existing farms and fallow, and land held by the family. However, sale of land to migrant farmers living elsewhere or to local elites for plantations appears to be on the rise, and these result in both increased and often permanent forest clearance, and can involve the use of chemical inputs that reduce species diversity on farms. In the village of Bova Bomboko, the benefits for young migrants of clearing black bush for cocoa farms and to claim land far outweigh the costs. The result is farming systems that place significant pressure on the forest (Laird *et al.* 2007).

#### *Farm and compound products*

Cocoyam (*Colocasia esculenta*) and plantains (*Musa paradisiaca* varieties) are the main crops produced in all villages, complemented by dozens of others, most introduced to the region like banana (*Musa sapientum* varieties), cassava (*Manihot exculenta*), maize (*Zea mays*), and pepper (*Capsicum annuum*). In many Bakweri and Bomboko households indigenous crops like yams<sup>3</sup> and a wide range of cultivated and semi-domesticated native greens<sup>4</sup> are still important for both subsistence and to some extent sale (eg bitterleaf and sweet bitterleaf), but the bulk of agricultural crops farmed for subsistence and sale today – by both Bakweri and migrant households – are introduced to the region (Laird *et al.* in press).

As we discuss below, farms produce the vast majority of food for all villages and all ethnic groups, but indigenous households also rely extensively on species harvested from

compounds (home gardens), fallow and forest. Compounds incorporate medicinal and food species collected from the forest, fallow and farm, given by friends or neighbors, and planted at home for easy access, including during the extreme rainy season when moving beyond one’s compound can be difficult. They also include species intended to protect the home and its inhabitants.<sup>5</sup> Indigenous compounds symbolically may contain dozens of species collected from a range of sources over time, with healers’ compounds proving the most diverse. Migrants’ compounds tend to be extremely simple with one or two popular medicinal species, and perhaps a few crops (Laird *et al.* in press).

#### *Fallow and forest products*

Products harvested from fallows vary depending upon fallow age but include domesticated and semi-domesticated food, fruit, spice, fuelwood, medicinal, ‘protection’, and construction species like banana, plantain, pear (*Persea americana*), orange and lime (*Citrus* spp.), oil palm (*Elaeis guineensis*), raphia (*Raphia hookeri* – for ‘mbanja’ rope, thatches, palm wine), ‘plum’ (*Dacryodes edulis*) and other tree crops. Fallows are also home to a range of useful forest species that are not usually planted but might be nonetheless managed (e.g. retained, protected, and weeded). These include the spice and medicinal climber bush pepper, ‘veove’ (*Piper guineense*), and the spice trees ‘njangsang’ (*Ricinodendron heudelotii*) and bush mango, ‘maiva’ (*Iringia gabonensis*). Some tree species planted or retained on farms generations ago are still found in fallows, which can reflect layers of use and management across generations.<sup>6</sup> As we will discuss below, fallow is not extensively used by migrants, however the more widely-known and used species found in indigenous fallows are often planted or retained on migrants’ cocoa farms around Bova Bomboko (Laird *et al.*, 2007).

Other useful products found in fallow and forest, and harvested primarily by indigenous households, include mushrooms (e.g. *Pleurotus* spp., *Polyporus* sp., *Marasmius* spp.; and *Letinus* sp.); wild greens like ‘eru’ for sale, and more commonly those consumed for subsistence (e.g. ‘ngole’, ‘kalavanje’, and ‘wosango’, *Solanum nigrum*); and ‘wrapper leaves’ from the Marantaceae family used to wrap food.<sup>7</sup> Some species collected from forest or very old fallow are widely known and used, including wrapper leaves; wild fruits like ‘bwembi’ and ‘kaso’ (*Tetracarpidium conophorum*);

<sup>3</sup> Cultivated and wild-harvested yams include ‘yono’, *Dioscorea rotundata*; ‘evie’, *D. alata*; ‘lisua’, *D. dometurum*; ‘liwoko’, *D. bulbifera*; ‘kumbu’, *D. mummularia* (Laird in press). See the discussion in Dounias 1993 of Baka ‘paracultivation’ of yams in southern Cameroon, taking place at the interface of the domesticated and the wild.

<sup>4</sup> Cultivated native greens include bitterleaf, *Vernonia amygdalina*, sweet bitterleaf, *V. hymenolepsis*, and fluted pumpkin or ‘mojojo’, *Telfaria occidentalis*, and wild and semi-domesticated native greens include ‘eru’ *Gnetum africanum*, ‘kalavanje’ *Solanecio biafrae*, and ‘ngole’ *Celosia pseudovirgata* (Laird in press).

<sup>5</sup> Dounias 2010 describes the important role of homegardens in the “symbolic control of supernatural forces” in the lives of five ethnic groups in southern Cameroon; homegardens contribute in complex, multi-dimensional ways – ecological, spatial, social, historical, linguistic and symbolic – to household health and well-being.

<sup>6</sup> Examples include very old individuals of ‘wulule’ (*Kigelia africana*) on a cocoa farm in Bova Bomboko, and bush pineapple, ‘wokeku’, (*Myrianthus arboreus*), monkey cola, ‘mombwesi’ (*Cola argentea*) and ‘bwembi’ (*Treculia africana*) in Likombe fallow and farm margins.

<sup>7</sup> The main wrapper leaf species used in this region are ‘vendomba’, *Marantochloa ramosissima*, ‘esongo’, *Hypselodelphys scandens*, ‘eteve’, *Thaumatococcus daniellii*, and ‘ngongo’, *Megaphrynium macrostachyum* (Laird in press).

spices like bush mango, 'njangsang', and bush onion (*Afrostryax kamerunensis* and *A. lepidophyllus*); forest ropes like 'meveve' (*Cercestis mirabilis*); and timber species like iroko, 'momangi' (*Milicia excelsa*), camwood, 'ibwua' (*Pterocarpus soyauxii*) and mahogany, 'bou' (*Entandophragma cylindricum* and *E. angolense*). Other forest species are known and harvested primarily by individuals who spend a lot of time in the forest like operators and hunters (e.g. the subsistence foods monkey cola, 'mombwesi' *Cola* spp., and bush carrot, 'wonjonji' *Lavigeria macrocarpa*), or specialists like basket-makers and healers.<sup>8</sup>

This discussion is intended to broadly illustrate the range of species found in the four categories of 'habitat' used in the household survey and presented in the quantitative results below – compounds, farms, fallow, and forest. These distinctions are drawn sharply to identify and analyze broad patterns of habitat use, but are necessarily simplified and species are found and harvested from different sources – they are not only 'compound', 'farm', 'fallow', or 'forest' species<sup>9</sup>. Likewise, many species are not only 'wild' or "cultivated", and management often takes many intermediate forms. As found in similar studies around the world, habitats and management practices exist along a continuum rather than as distinct categories, and there is much nuance it was not possible to incorporate in the quantitative survey (e.g. fallow and forest of varying ages, different types and locations of farms, species that are not planted, but are retained and weeded on farms).

#### *Activities that generate cash income*

Subsistence farming and wild-harvesting dominate indigenous livelihoods. However, households also need cash to pay school fees, buy medicines, construction materials, kerosene, and various foodstuffs. In order to generate cash, most households grow and sell crops<sup>10</sup>, and many harvest forest products, hunt, or work as laborers outside the village. Others work as petty traders or in various trades (carpentry, plumbing, basket-making, healing), or undertake small-scale logging.

Forest (and fallow) product collection for sale in markets, primarily by women, also brings in cash income, and varies by village depending upon species availability, proximity to

forest and markets, and tradition. The main species collected for sale include 'mbanja' (*Raphia hookeri*) rope used to tie food, eru (*Gnetum africanum*) and wrapper leaves. 'Mbanja' ropes can be cleaned, coiled, and bagged, and wrapper leaves heated, stacked and packed during the evenings at home by women, with the children often helping. 'Mbanja' is produced by most households in Etome, and roughly a quarter of households elsewhere, and is collected mainly from fallow and farms, with 97% of collections sold and 3% for household use.<sup>11</sup> In Ekonjo and Upper Buando eru (*Gnetum africanum*) is more common in the forest than in other villages, and is more widely harvested and sold. Other NTFPs sold from these villages include 'bush pepper' (*Piper guineense*), 'kucha' (*Momordica cabraei*), and 'wrapper leaves'. In all villages, women also harvest and sell leaves from plantain and banana.

Basket-makers, mat-makers, hunters and healers also earn cash from their work, which is highly dependent upon a diversity of habitats and on biodiversity. For example, six men in Likombe village are healers of various kinds, with three earning a substantial part of their income this way (women also use medicinal plants and heal, but primarily for their families). Two older women are basket makers, and four men are active hunters, with three earning a significant income from hunting. One hunter is also a healer and an operator, as well as a farmer (typically, a range of activities contribute to household income, with some – like this household – more dependent upon biodiversity than others). In addition to generating cash, hunting contributes food for subsistence, with more than half of all bushmeat consumed in villages.<sup>12</sup>

In Bova Bomboko, livelihoods are oriented more towards generating cash income than to subsistence. The vast majority of individuals are primarily cocoa and food crop farmers, with more than 50% of all income coming from cocoa sales, and 40% from crops like cocoyams, plantains, and cassava. Ten percent of households are also petty traders or have jobs or a trade (eg electricians, plumbers, or carpenters). A small percentage (around 15%) of households harvest non-timber forest products (NTFPs) and earn roughly 5% of their income from about a half dozen NTFPs.<sup>13</sup> Subsistence use of NTFPs by migrants in Bova Bomboko is significantly less than

<sup>8</sup> Scores of medicinal species – for example 'kwave' (*Strychnos* sp.), 'liembemba' (*Palisota hirsute*), and 'mosongosongo' (*Clerodendron* spp.) – are collected almost exclusively by highly specialized healers.

<sup>9</sup> Household surveys documented the location of a product's harvest on a given day, and this might vary over time. In one day a household could also harvest the same product from two sources – e.g. plantains from the farm and compound – and the amounts harvested would be recorded separately under each habitat category.

<sup>10</sup> The main food crops grown for sale in all villages include plantain (*Musa paradisiaca* varieties) and banana (*Musa sapientum* varieties), cassava (*Manihot esculenta*), bitterleaf (*Vernonia amygdalina*), sweet bitterleaf (*Vernonia hymenolepis*), pepper (*Capsicum annum*), maize (*Zea mays*), palm nuts (*Eleais guineensis*), plum (*Dacryodes edulis*), mango (*Mangifera indica*), *Citrus* spp. and other fruits. Species produced vary by village, and depend upon altitude, climate and markets.

<sup>11</sup> In Etome, 'vendomba' (*Marantochloa ramosissima*), and to a much smaller extent 'esongo' (*Hypselodelphys scandens*) are the main wrapper leaves harvested, with more than 90% collected for sale.

<sup>12</sup> Bushmeat species reported most regularly in household surveys include flotambo, monkey, deer, rat mole, porcupine, bushcat and, on two occasions, chimpanzee.

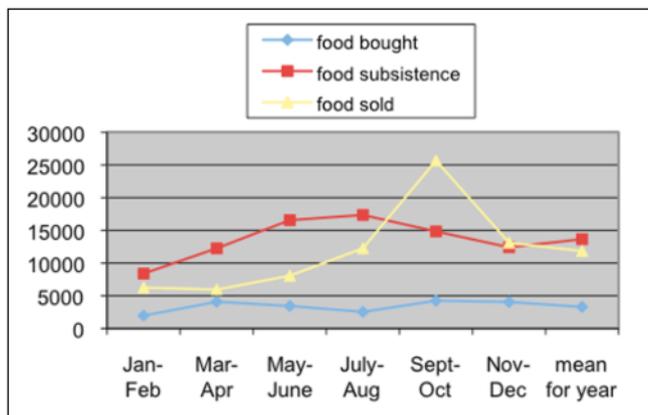
<sup>13</sup> The main NTFPs harvested in Bova Bomboko for sale in local markets include *Ricinodendron heudelotti* (njangsang), *Irvingia gabonensis* (bush mango), *Gnetum africanum* (eru), *Piper guineense* (bush pepper), *Cola lepidota* (monkey cola), *Garcinia kola* (bitter cola), and bushmeat.

TABLE 3 Variation by Seasons: The Average Value (CFA) per Household of Food Bought, Consumed for Subsistence, or Sold in the Villages of Etome, Ekonjo, Likombe, Upper Buando

	Food bought (CFA)	Food consumed for subsistence (CFA)	Food sold in local markets (CFA)
January – February	1,743	8,975	4,767
March – April	2,795	13,315	5,934
May – June	2,071	16,882	6,937
July – August	888	18,674	9,304
September – October	2,844	16,438	6,575
November – December	3,370	12,460	7,069
Mean for year	2,285	14,449	6,773

Source: household surveys

FIGURE 2 Seasonal Average Value (CFA) per Household of Food Sold, Bought, for Subsistence (Bova Bomboko, Etome, Ekonjo, Likombe, Upper Buando, and Migrant Farmers)



\* The peak in food harvested for sale in September–October reflects the sale of cocoa in Bova Bomboko.

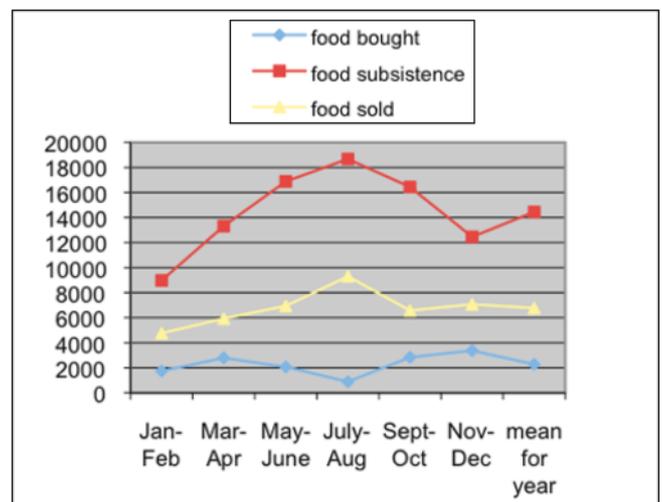
\*\* 500 CFA = approximately \$1

for Bomboko or Bakweri households, and species harvested for both subsistence and sale are those widely known and consumed throughout the forest zone of Cameroon (Laird *et al.* 2007).

**Food harvested for subsistence, sale, and bought for household consumption**

All villages included in this study produce more food for subsistence than they do for sale, or than they buy in local markets. The exception to this is Bova Bomboko in September–October, during the cocoa harvests (Figure 2). During this time, sale of cocoa surpasses the harvest of all other

FIGURE 3 Seasonal Average Value (CFA) per Household of Food Sold, Bought, for Subsistence (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)

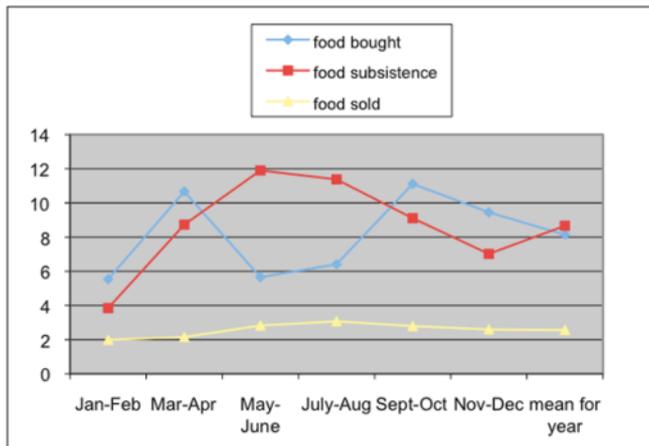


500 CFA = \$1

products combined in that village. In all villages, wild, semi-domesticated and cultivated food production peaks with the rainy season, between May and October. In the Bakweri villages of Etome, Ekonjo, Likombe and Upper Buando, the relationship between the harvest of food for subsistence and sale is more or less constant, with more than twice as much harvested for subsistence than for sale year round (Figure 3; Table 3). Food bought by households is consistently and significantly lower in value and number of items purchased than that harvested for sale or subsistence. Items bought by households drop significantly at the same time production from farms, and wild harvests from all habitats, increases, and so the need to buy food decreases<sup>14</sup>. (Table 3).

<sup>14</sup> The relationships between increased food harvested for subsistence and sale, and decreased purchase of food are significant. The quadratic component for 6 villages, value of products harvested (CFA):  $F(1) = 10.882, p = .003$ . The quadratic component for 6 villages, number of different products harvested:  $F(1) = 28.476, p = .000$ .

FIGURE 4 Average Number of Food Items Sold, Bought, Consumed for Subsistence by Households (Bova Bomboko, Etome, Ekonjo, Likombe, Upper Buando, and Migrant Farmers)



A much larger number (meaning diversity) of products are harvested for subsistence than for sale throughout the year. A core group of products like plantain and banana are sold consistently, but this group is far less diverse than those consumed for subsistence. The diversity of products harvested for subsistence is most apparent during the rainier half of the year, when wild fruits, greens, mushrooms, spices and other products become available (Figure 4).

Because many of these products are not sold in markets, and do not have high CFA values, numbers of items brought into households each day were compared, along with the value of those items. If a household sells 5,000 CFA of plantains, and consumes approximately a 100 CFA bundle of wild greens, and a 100 CFA handful of mushrooms, the importance of the latter two would be lost if only the CFA value were measured. Measuring the number of items brought into a household captures – albeit crudely – some of the biological diversity integral to peoples’ lives, and the importance of cultural as well as economic values that drive many seasonal subsistence practices, including taste, nutrition, tradition, health and well-being.

**The role of different habitats in livelihoods**

Villages around Mt Cameroon depend upon a range of different habitats and species. Farms dominate the livelihoods of both indigenous and migrant households, but natural forest, fallow and compounds also contribute significantly to subsistence and the generation of cash income, particularly for indigenous households (Table 4). The vast majority of all species harvested from compounds, fallow, and forest are consumed for subsistence; from all four sources more than three times as much of all food, medicine, construction, and fuelwood is harvested for subsistence than for sale.

As Table 4 demonstrates, combined indigenous household income (subsistence and products sold) from compounds,

TABLE 4 Annual mean CFA<sup>1</sup> contribution and number of items harvested per household from compound, farm, fallow and forest by indigenous and migrant farmer households in five villages in the Mount Cameroon region

	Number of households in survey	Compound (CFA)	Farm (CFA)	Fallow (CFA)	Forest (CFA)	TOTAL (CFA)	Compound (No.)	Farm (No.)	Fallow (No.)	Forest (No.)	TOTAL (No.)
Bakweri/Bomboko – indigenous households	72	104,016 a	799,491	89,924 a	313,832	1,307,263	123 a	354	116 a	56 a	649
Migrants – SouthWest <sup>2</sup>	11	19,179 b	1,730,565	63,487 a	115,030	1,901,261	45 b	380	22 b	24 b	471
Migrants – NorthWest (30), other parts of Cameroon (2), Nigeria (3)	35	16,504 b	1,225,237	27,078 b	72,548	1,341,427	36 b	325	26 b	29 b	416
All households surveyed	118	70,169	1,012,567	67,162	223,733	1,516,650	90	348	80	45	563
Significance (P)		<0.001	0.093	<0.001	0.463	<0.001	<0.001	0.647	<0.001	0.029	

Source: household survey, in 5 study villages; Laird et al, 2007.

Means in the same column that do not share a superscript are significantly different from each other by Tukey hsd.

<sup>1</sup>500 CFA = approximately \$1US

<sup>2</sup>Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon and have greater knowledge of species names and uses than other migrants.

TABLE 5 Seasonal Average Household Food Harvested (CFA) from Compound, Farm, Fallow, and Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)

	Compound	Farm	Fallow	Forest
January – February	910	12,109	507	216
March – April	2,435	15,623	738	456
May – June	3,313	18,333	491	1,676
July – August	3,694	21,477	313	2,500
September – October	2,749	17,644	1,200	1,362
November – December	1,269	16,343	297	1,627
mean for year	2,395	16,921	591	1,306

Source: household surveys in 5 study villages

FIGURE 5 Seasonal Average Value (CFA) per Household of Food Harvested from Compound, Fallow, Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)

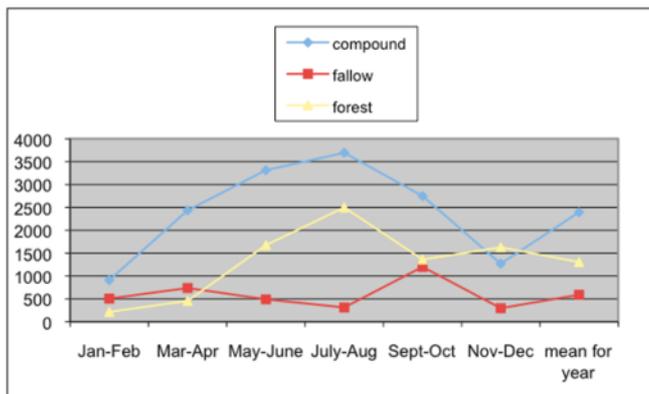
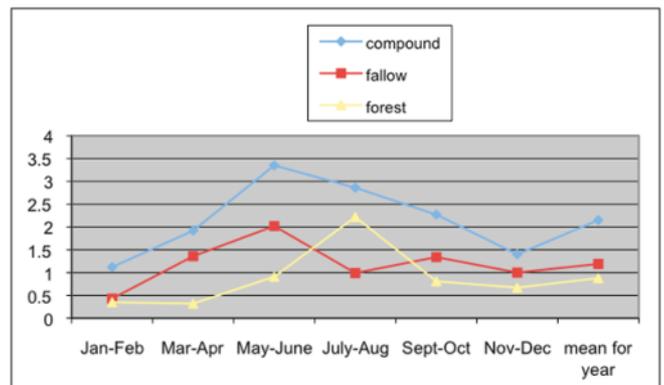


FIGURE 6 Seasonal Average Number of Items per Household of Food Harvested from Compound, Fallow, Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)



fallow, and forest makes up almost 40% of the value of products harvested from all sources, compared with roughly 10% for migrant households. Indigenous households also collect at least twice as many items in a year from the forest and five times as many from fallow than migrants to the region, with the exception of migrants who have come from neighboring areas in South West Province. These groups integrate more diversity into their livelihood strategies than other migrants, although still less than indigenous groups.

There are seasonal variations in the role different habitats play in local livelihoods. Farms provide the vast majority of food in all villages, across all seasons, and there is a very significant difference between the amounts of food produced from farms compared with other habitats.<sup>15</sup> For indigenous Bakweri villages, compounds follow farms in importance as a food source, then forest and fallow (Table 5). As noted above, compounds are an important source of food during the heavy rains in July and August, but all sources of food peak during the rainy months of May–October, and forests become an important wild food source (Figures 5 and 6). As the rains

begin in May and June, fallow also shows an increase in numbers of items harvested, likely due to wild green (vegetable) and mushroom harvesting, and spice and fruit trees, which account for a large number of collections in Bakweri villages, but are of relatively small cash value.

Actual values for species harvested by Bakweri households from forest and fallow are likely higher than those reported in our study. This is because high-value products like timber and bushmeat are often illegally harvested, and thus generally under-reported, and hundreds of species are difficult to adequately capture and value properly in household surveys because they are consumed inconsistently, seasonally, or for subsistence as medicine, spice, wild foods, and other purposes. Even given this likely under-valuing of these species, it is clear from both the value and number (diversity) of products harvested from different sources that indigenous livelihoods depend upon the active use and management of a broader range of habitats than do those of migrants to the region.

<sup>15</sup> The linear and quadratic components were both significant, suggesting real differences between farms and other sources of products:  $F(1) = 30.10, p = .000$ .

TABLE 6 Seasonal Average Value (CFA) of Fuelwood Harvested from Compound, Farm, Fallow, and Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)

	Compound	Farm	Fallow	Forest
January – February	172	170	1691	0
March – April	71	320	2664	32
May – June	945	1129	1845	95
July – Aug	59	1865	361	0
Sept-Oct	359	681	1374	16
Nov-Dec	275	454	1824	39
mean for year	314	770	1626	30

Source: household surveys in 5 study villages

#### Fuelwood and the role of different habitats

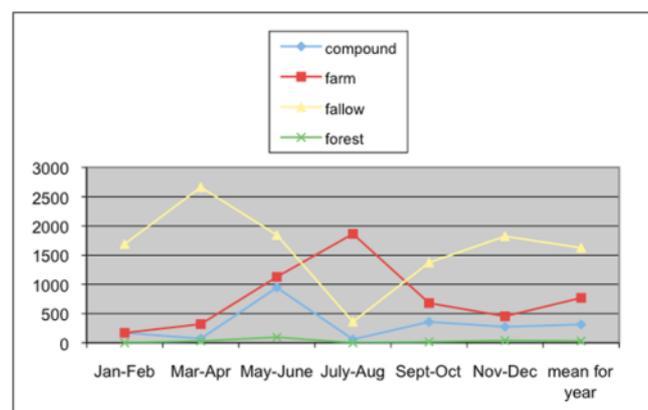
Fuelwood has been identified as a cause of forest degradation in the area by some conservation agencies, but in the Bakweri study villages the harvest of fuelwood for subsistence use in cooking is largely from fallows, followed by farms. Commercial fuelwood harvests (eg for the tea estate's driers) would appear to put pressure on forests (although this was not studied as part of this research), but subsistence fuelwood consumption in Bakweri villages does not depend upon the forest (Table 6, Figure 7)<sup>16</sup>. Fuelwood harvests in Bova Bomboko, on the other hand, are part of a land clearance and farming system that does cause forest loss and degradation. In this area, forest is available in what was the Bomboko Forest Reserve, forest abuts many cocoa farms and so is accessible to farmers as a source of fuelwood, and farms continue to be cleared from forest (Laird et al. 2007).

Total fuelwood harvesting in all villages remains fairly consistent throughout the year with a peak between March–June, and some variation in sources depending upon the season (Table 6). In December and January, fallow is cleared and fuelwood collected as part of clearing. In addition, large trees are burned at this time, and by April–May they are ready for felling and fuelwood is stockpiled for the rainy season, accounting for the peak in fuelwood harvests. In the rainy season fuelwood collection from fallow declines due to difficulties collecting and carrying fuelwood in rainy conditions, and fuelwood is harvested, if still needed, alongside crops from farms. Analysis of variance between sources of fuelwood indicated that differences between them are significant<sup>17</sup>.

#### The use of native and wild species

Indigenous households use a significantly larger number of species, for a wider range of purposes, than migrants to the

FIGURE 7 Seasonal Average Value (CFA) per Household of Fuelwood Harvested from Compound, Farm, Fallow, and Forest (Bakweri Villages – Etome, Ekonjo, Likombe, Upper Buando)



region. Bakweri villages use hundreds of species (more than 400 plant species are included in the checklist from this study alone), in order to meet almost every imaginable need, and these are sourced from a wide range of habitats and subject to varying degrees of management. In contrast, most migrant households in this study make regular use of only about 30 species. Migrants will harvest high-value non-timber forest products (NTFPs) like 'eru' (*Gnetum africanum*), 'bush mango' (*Irvingia gabonensis*), 'njangsang' (*Ricinodendron heudelotii*), 'bush pepper' (*Piper guineense*) and other species, as noted above, that are widely traded and consumed throughout the region, and those that are best studied to date (e.g. Awono et al. 2002, Awono et al. 2009, Ewane et al. 2009, Fuashi et al. 2010, Ndoye et al. 1997, Ndumbe 2010, Sunderland and Ndoye 2004, Sunderland et al. 1999, ). Migrants are, however, unfamiliar with the full range and diversity of useful species in their adopted home. This is not surprising given that many grew up in extremely different environments (e.g. grasslands of the North West Province), lack historical and cultural ties to species and the landscapes in which they farm, may not have access to many resources, and usually direct their livelihood strategies to maximize cash income, which supports large families and is returned in part to home villages.

Close to 100 of the more than 400 species used by indigenous households were introduced to the region, and agriculture is dominated by introduced species. However, the contribution of native species (cultivated, semi-domesticated, and wild-harvested) to indigenous household income is not far behind that of introduced species (Table 7), which is striking given the dominance of farm income, and the difficulties

<sup>16</sup> Preferred fuelwood species vary by village, but some of the most commonly collected from farm and fallow include 'bwangu' (*Bridelia micrantha*), 'yumbaenge' (*Allophylus africanus*), 'mbava' (*Anthonotha fragrans*), 'ebwebwe' (*Neoboutonia mannii*), 'ewowo' (*Macaranga occidentalis*), and 'mosenge' (*Macaranga monandra*).

<sup>17</sup> The quadratic component was significant, indicating significant differences between compound, farm, fallow and forest as sources of fuelwood:  $F(1) = 33.92, p = .000$ .

TABLE 7 Annual mean income in CFA<sup>1</sup> and annual mean number of items collected by indigenous and migrant households that were: 1. cultivated or wild, and 2. native or introduced species, in five villages in the Mount Cameroon region

Household type	Number of households in survey	Income from cultivated species (CFA)	Income from wild species (CFA)	Income from native species (CFA)	Income from introduced species (CFA)	Number of collections of cultivated species	Number of collections of wild species	Number of collections of native species	Number of collections of introduced species
Bakweri/Bomboko (indigenous households)	72	820,231 a	563,141	637,659	775,657 a	178	157 a	195 a	138
Migrants – SouthWest <sup>2</sup>	11	1,817,832 b	156,585	194,323	1,779,762 b	184	46 b	85 b	144
Migrants – NorthWest (30), other parts of Cameroon (2), Nigeria (3)	35	1,195,490 ab	127,993	145,115	1,176,682 ab	184	51 b	81 b	154
All households combined	118	1,024,533	399,580	450,237	988,208	180	115	151	143
Significance (P)		0.020	0.780	0.705	0.018	0.213	<0.001	<0.001	0.28

Source: household survey, in 5 study villages; Laird *et al.*, 2007.

Means within the same column that do not share a superscript are significantly different from each other by Tukey hsd.

<sup>1</sup>500 CFA = approximately \$1US

<sup>2</sup>Farmers from the South West Province share many species and traditions with indigenous households around Mount Cameroon and have greater knowledge of species names and uses than other migrants.

associated with adequately valuing native and wild harvested species in this study. Indigenous households also collect larger numbers of native and wild species over the course of a year than cultivated and introduced species, further illustrating the role of biological diversity in their livelihoods. When compared with migrant households, Bakweri households derive roughly 4 times the annual income from native and wild species, and bring 2–3 times as many wild and native items into the home (Table 7).

Bakweri households vary in their practices, with some making greater use of a mix of habitats, and native and wild species, than others. In some cases this can be explained by occupation (eg hunters and healers use a wider range of species and habitats), age (older individuals tend to know about and use more species, although they have a harder time accessing them), and other factors. But in many cases heavy reliance on biodiversity does not follow from community-wide trends as much as the internal workings of households, including personal taste and interests, and family tradition.

### **Biocultural diversity and conservation around Mt Cameroon**

The cosmopolitanism of indigenous groups around Mt Cameroon – their incorporation of introduced weeds and crops, plastics and zinc, their clothes, proximity to towns, their long contact and engagement with outsiders, and the participation by some in selling land and resource ‘mining’ to serve urban and overseas markets – is sometimes viewed as evidence of a lack of real connection with land, species, and place. After a brief spell during which the Germans saw the Bakweri as fierce warriors, colonial regimes viewed the Bakweri (now removed from their lands) as ‘indolent’ or apathetic and in decline (Geschiere 2009). The biological diversity of Mt Cameroon is widely remarked upon, but the cultural diversity and traditional practices interwoven with biological diversity remain poorly understood. Indigenous resource management is often assumed to negatively impact forests, albeit in vague and unquantified ways, and to be at the same time somehow inefficient and under-developed. As elsewhere in Africa (eg Fairhead and Leach 1996, Homewood 2004, Igoe and Brockington 2007, Sullivan 2002), some conservation programs in recent decades have sought to promote natural resource-based “alternatives” that increase income from the forest and “improve” forest management, while overlooking sophisticated traditional practices that instead minimize risk and enhance resilience and quality of life in an area characterized by uncertainty and change.

At the same time, traditional knowledge with deep roots in the local environment, including that associated with wild foods, medicinal plants, games, dance, musical instruments, secret societies, and weaving, is under pressure alongside biodiversity, and as a result of many similar causes. Growing local towns and increasing access to global media through cell phones and the internet make villages a last resort for young people. The blight of HIV and other health problems weakens indigenous societies and requires the purchase of expensive medicines. Extreme social and economic inequity

resulting from a broken and predatory government, liberalization of markets and the attendant uncertainties for commodity producers, and a breakdown of civil society mean that many local people struggle to make ends meet. Whether to pay school fees, buy food and medicine, purchase kerosene, cement, zinc or cooking pots, the pressure to generate cash is enormous.

Spikes in demand for forest products driven by urban and overseas markets combine with the need for cash and advances in technology and transportation to accelerate the depletion of bushmeat, medicinal plants, timber, and other forest resources. Migrants from poorer regions come to the Mt Cameroon area because it is relatively better off and has fertile soils, further taxing the forest. And centuries old demand from overseas for the natural resources of the area continues with a new suite of actors eyeing the fertile agricultural soils, timber and recently oil of the region. At the same time, traditional institutional structures and norms that control short-term exploitation at the expense of long-term health have weakened. Traditional knowledge and practices have adapted and accommodated external claims on forests, land and resources for hundreds of years, but the intensity of cultural and social change has perhaps never been greater.

Distinct from these pressures and the changes they have wrought in indigenous lives are elements of resource management systems and relationships to place that have adapted and evolved, but were handed down to current generations from parents and grandparents. Rather than directed towards quick gains, these systems place a premium on endurance, resilience and well-being over time. This is consistent with reports from tropical forest ecosystems from around the world. In environments so inherently complex and uncertain, traditional forest management commonly relies on strategies that minimize risk by incorporating diversity, accommodate uncertainty, and make use of mosaics of vegetation in different stages of succession to produce a range of products and services across seasons and years (e.g. Alcorn 1989, Balee 1994, Dove 1993, Falconer 1992, Parajuli 1999, Posey 1999, Redford and Padoch 1992, Richards 1999). In many areas, these systems have been shown to actually enhance rather than reduce biological diversity, and although it was not the subject of this study, seasonal and highly varied diets and traditional medicinal plant use would also appear to support local health and nutrition (Cunningham *et al.* 2008, Dounias *et al.* 2007, Shanley and Luz 2003, Sills *et al.* 2011, McGarry and Shackleton 2009).

There is a danger in extolling the virtues of indigenous resource management systems in an area with a long and recently highly active politics of identity that excludes migrants – many having lived in the region for generations – from access to economic and political resources based on criteria for belonging (Geschiere 2009, Konings and Nyanmjoh 2003, Sharpe 1998). As Geschiere (2009) argues, despite its apparent naturalness and self-evidence, the concept of autochthony, and having “come first”, is uncertain and pliable and has been used in Cameroon to not only marginalize migrants but also divide the opposition and bolster a corrupt regime. Around the world, the valorization of some forest

actors has served to undermine the legitimacy of others. In Brazil, for example, international and national conservation agencies have come to support indigenous peoples' and rubber tappers' claims to forest but remain cool on migrants and peasants (Campos 2006, Campos and Nepstad 2006). In South Africa, non-traditional groups living in peri-urban or urban environments consume wild resources but are often not considered part of the biocultural diversity of that country (Cocks 2006a). The point of this paper is not to contribute to a divisive dialogue but to instead build understanding of the biocultural diversity of Mt. Cameroon, which has been poorly studied to date. Even modified, and diminished in many households in recent decades, traditional resource management continues to form the backbone of rural indigenous livelihoods around Mt. Cameroon, and these practices and knowledge are tightly woven into the local landscape and its biological diversity.

Whatever its strengths, traditional knowledge and practices cannot address the primary causes of deforestation and biodiversity loss – poverty, political, economic and social inequity, and natural resource 'mining' – and local communities can do little to reverse the deterioration in government institutions over the last few decades, and the rise of corruption that contributes to forest and biodiversity loss (Assembe 2009, Burnham and Sharpe 1997, Egbe 2001, Laird *et al.* 2010, Pye-Smith 2010, Cerutti and Lescuyer 2011, Ndoye and Awono 2010, Transparency International 2010). In fact, indigenous resource management accounts for only a small part of the total Mt Cameroon area today. But traditional knowledge and practices can complement western scientific studies of species and ecosystems, and reveal and support approaches to conservation that embrace uncertainty, complexity, and change (eg Dove 1993, Fairhead and Leach 1996, Igoe and Brockington 2007, Parajuli 1999, Richards 1999). In a region as densely populated as Mt Cameroon, with enormous pressure on remaining forests, managed landscapes – including those of indigenous communities – will be integral to broader conservation efforts around the Mt Cameroon National Park.

## CONCLUSION

At first glance, the livelihood systems of indigenous and migrant households seem alike. With variations in emphasis, they rely on a similar suite of crops for cash income and subsistence, and collect similar high-value forest products known throughout the region. Upon closer inspection, however, it becomes apparent that Bakweri households use a much larger number and variety of species – native and introduced, wild and cultivated – and actively manage and use a range of habitats. The diversity inherent in these systems is greatest, but most invisible to the outside eye, as manifested in subsistence use. Products sold in markets for cash – whether crops or forest products – are drawn from a pool of resources that is small compared with those used for subsistence, and their harvest responds to external demand. Subsistence, on the other hand,

reflects long cultural ties to place, to the landscape, species, seasons, and history.

The arrival of mushrooms and wild greens at the start of the rains, visiting a favourite fruit tree planted by a relative when it bears briefly, or a healer's mixture of dozens of medicinal species, many collected from very particular locations at particular times – all speak to a system that not only generates cash, but also accommodates many other social needs, material as well as symbolic. For conservation to succeed in a region so densely populated, with fertile soil and rich in natural resources that bring outside groups, large and small, to the area, managed landscapes must be part of conservation planning. The managed landscapes of indigenous groups around Mt Cameroon cover only a small portion of the area today, but are expressions of long-standing, diverse and dynamic relationships between people and place, culture and nature and, rather than threats, can significantly contribute to biodiversity and forest conservation in the region.

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