WORKING PAPER

The bamboo production to consumption system in Cameroon

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Exchange rates

At September 2009	1.00 Euro = 655.957 CFAF /	1 CFAF = 0.00152449 EUR
	1.00 USD = 441.192 CFAF/	1 CFAF = 0.00226658 USD

INBAR's bamboo and rattan development programme

This study is part of the INBAR and World Agroforestry Centre project 'Enhancing opportunities for market-led bamboo-based development in West and Central Africa' from 2008-2009, financed by the Common Fund for Commodities. The project produced studies of the bamboo Production to Consumption Systems in Ghana and Togo, Cameroon, Nigeria and Sierra Leone. The findings were presented at a regional workshop in Yaoundé, 23-25 November 2009, to develop national and regional actionable recommendations for market-led, bamboo-based development in the region.

The application of bamboo and rattan in enhancing the economic and ecological wellbeing of resource-dependent communities in Asia has been extensive. Systematic studies of the potential of bamboo and rattan, previous and current uses, and the social, cultural and political perspectives of these resources have been invaluable in promoting their development through innovative and sustainable use. The International Network for Bamboo and Rattan (INBAR) plays a pivotal role in advancing the bamboo and rattan sector and has facilitated and coordinated research (including action-research) on biodiversity and genetic conservation, production systems, processing and utilisation and socio-economic and policy, while promoting capacity building at the national level. A number of rural development programs are being implemented in the region. INBAR has also been instrumental in promoting technology transfer and information exchange between network partners. The replicability of the successful commoditisation of bamboo and rattan in South and Southeast Asia, Latin America and Africa is yet to be assessed, despite the immense interest from the private sector, non-governmental organisations and government institutions in using bamboo and rattan to fuel rural development in the region. The dearth of information has been one of the main constraints on developing systematic and sustainable development programmes in this sector.

To do this, INBAR has commissioned national studies from selected countries in Africa and Central and South America. These national studies provide a thorough review of the current state and future potential of the bamboo and rattan sectors in each country. Certain standard indicators are documented to allow regional comparisons while other information will be country-specific. The national studies will help the experts decide the priority areas for study at local, national and regional levels. This in turn will help INBAR clearly define its role within these countries as a facilitator and coordinator.

INBAR has developed an outline for these national studies, to which this study conforms. The outline serves two purposes. Firstly, it is meant to facilitate the data collection process and, secondly, it should assist in formulating case study reports. The framework also guarantees that comparable information is provided in each national study. Information covered includes: general information on the country (geographical, topographical, climate, demography, political, environmental); the bamboo and rattan sector (biodiversity, production, utilisation, socio-economics, marketing, legislation); the institutional capacity at the national and local level; previous, ongoing and upcoming research and development interventions in the bamboo and rattan sector; and, finally, conclusions and recommendations.

After defining priority areas, case studies are undertaken in a number of carefully chosen, highly representative, locations within the country to collect raw data on all aspects of the present state of the bamboo and/or rattan sectors. The case studies investigate the Production to Consumption System; this involves the entire chain of activities, from the production of raw materials (including the input market, where one exists) through the various stages of intermediate sales and processing, to the consumer of the final product. The system includes the technologies used to process the material as well as the social, political and economic environments in which these processes operate.

After the raw data has been collected, it is analysed and classified into two focus areas: constraints and opportunities. Potential options to address the constraints or take advantage of the opportunities and thereby promote development are identified, and development plan formulated. This plan can then be developed into an action-research project, which is actually a micro- or mini-level rural development project. It effectively can be a trial project, and is intended both to test whether the interventions suggested by the study are appropriate and to obtain feedback from the local population on all aspects of

the programme. The methodology and development options (interventions) of these projects would be finalised at a stakeholders meeting in the country before to the project starts.

If an impact analysis study at the end of the action-research project indicates that the project is successful, and the community agrees, this would then form the basis for developing similar programs that could be expanded in scope and applied in similar situations throughout the region or nation. In this way we go in a short time from a fully tested, small-scale trial project to multiple projects with considerable impact. At the national or regional level, these programmes could attract investment from donors interested in poverty alleviation and rural development.

Abbreviations

ANAFOR	National Office of Reforestation
CIFOR	Center for International Forestry Research
CFC	Common Commodity Fund
CFAF	African Financial Community Franc (Franc de la Communauté Financière Africaine)
FAO	Food and Agriculture Organization of the United Nations
ICRAF	World Agroforestry Centre
INBAR	International Network for Bamboo and Rattan
MINADER	Ministry of Agriculture and Rural Development
MinFoF	Ministry of Forestry and Wildlife
MINPME	Ministry of Small and Medium Enterprises
MOCAP	Mount Cameroon Prunus africana Harvesting Company
NTFP	Non-timber forest products
PCS	production to consumption system
REDD	Reduced emissions from deforestation and degradation
TTRECED	Technical Training and Research Centre for Development

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Summary

Few data are currently available about bamboo production, processing and consumption in Cameroon. Baseline information is, however, critical to inform policymakers and practitioners, and guide decision-making on how to manage the development and implementation of interventions in the bamboo 'chain' from harvest though production, transformation, marketing and consumption of bamboo-based products. Therefore, as part of the International Network for Bamboo and Rattan's (INBAR) efforts to promote research, technology transfer, exchange of information and capacity building in the bamboo sector globally and in the framework of the 'Enhancing opportunities for market-led bamboo-based development in West and Central Africa program', CIFOR conducted a Production to Consumption System (PCS) study of bamboo in Cameroon between September 2009 and February 2010.

This study reviewed the current state of Cameroon's bamboo sector and the potential for development, taking a market-led perspective. The methodology involved first conducting a literature review and gathering general information on the country (geographical, topographical, climate, demography, political, environmental); the bamboo sector (biodiversity, production, utilisation, socio-economics, marketing, legislation); national and local institutional capacity; and, previous, ongoing and upcoming bamboo research and development interventions. To that end, 112 stakeholders were interviewed to verify the literature, understand the bamboo market chain and identify the main production areas and markets. Interviews were conducted with 149 harvesters, processors, traders and consumers in five regions (West, Northwest, Southwest, Littoral and Centre) of Cameroon. These data were entered into a statistical package and analysed. Additional data was collected in the East and Adamaoua regions and preliminary species identification was undertaken.

The study results indicate that although Cameroon has two bamboo species indigenous to Africa (the alpine bamboo *Yushina alpina* and savannah bamboo *Oxytenanthera abyssinica*), largely introduced, exotic varieties are used, particularly 'Chinese bamboo' (*Bambusa vulgaris*). These species were most probably introduced during colonial times around watercourses and settlements. The exception is the mountain forests of the Northwest, where an estimated 500 km^2 of *Yushina alpina* forest exists, which is used in 12 different ways, mainly locally around Oku, Belo and Fundong.

The PCS market chain consists of four types of stakeholders, with active actors being largely individual or micro and small enterprises of owners, collectors and harvesters; processer craftspersons; traders and retailers; and, consumers. Regulatory, support and control actors, such as local and central government ministries, are currently passive actors, although some traditional councils and chiefs are regulating use locally. The Ministry of Small and Medium Enterprises is stimulating small-scale crafts organisations, albeit not specific to bamboo. There appear to be no active actors with technical skills on processing or bamboo agroforestry in Cameroon. Also absent are development or support organisations.

Bamboo across the country is harvested and used directly by 77% of harvesters as well as being traded. *Harvesters* are typically middle-aged, married family men, originating from the collection area. They harvest using basic tools, dry the raw material outside or under roof eaves and sell bamboo year-round to local markets, from home or at collection points — with a low level of direct sales to urban markets. Harvest trips, which usually entail head-portering the poles, vary from a few hours to a full day. A small proportion of high volume 'professional' producers collect up to 6000 stems a year, but most harvesters operate at a small-scale and collect around 500 stems a year, earning on average 236 208 CFAF but varying from 1625 to more than 2 million CFAF. Mainly exotic bamboo, locally known as Indian or Chinese, 'large green' (*Bambusa vulgaris*) or 'large yellow' (*Bambusa vulgaris vitatta*) is collected. Quality is judged by maturity (related to size and colour) and resistance to rot and insects (both while growing and once harvested). Most is sold to processors, for agriculture and to traders, with only 15% of harvesters processing the bamboo themselves. Bamboo harvest is often a secondary activity, alongside farming, although a quarter of the harvesters interviewed consider bamboo to be their major source of income. Although harvesters' families are often involved in collection, harvesters usually work as individuals; only 13% belong to a bamboo-related organisation. Access and control differs across regions, with the Northwest and West regions most traditionally regulated. Most bamboo, however, is freely available, and is an 'open access' resource: one-third is either owned or permission is needed for harvest, and in 33% of these cases, payment is required

to traditional or village authorities. The majority (57%) of bamboo harvested is naturally regenerating; only 6% has been planted and 27% is a combination of natural generation and planting.

Processors are largely married men, schooled to primary level, on average aged around 36, and who have worked on average for 11 years in the sector. Craftsmen work mainly individually or with apprentices, with one-third being members of enterprises, associations or groups. They tend to source locally, specialise in bamboo crafts and also sell locally and on an informal, small-scale, typically earning a total income of around 150 829 CFAF a year. Most use *Bambusa vulgaris* to construct a range of products, chiefly furniture. These are sold mostly from the roadside or the workshop.

Bamboo *traders* include middlemen (17%), wholesalers (5%), retailers of unprocessed bamboo (78%), and retailers (92%) or wholesalers (8%) of processed products. Most traders sell unprocessed bamboo poles (56%); the remainder are processed into furniture and artefacts. A typical trader is a married, middle-aged male with primary schooling, native to the area of commerce with an average household size of five people. Bamboo sales are the major occupation for 32% of traders interviewed, and all traders have other income sources from trade and agriculture, and 20% also from crafts. Two-thirds of traders work individually or with family support. One-third are members of an association, mainly specialised in bamboo and rattan crafts. Sales are largely to local clients (77%), mostly from roadside sales points with on-the-spot, largely negotiated prices. Prices reflect demand, quantity of raw material used and product quality. Average annual revenues from bamboo amount to 709 000 CFAF, with a large range from 300 000 to more than 1.2 million CFAF.

Bamboo is c*onsumed* across Cameroon and is sold both unprocessed and after going through a series of basic primary and secondary processing activities. The result is at least 14 major product types with more than 43 different actual products. The majority of bamboo is used in construction (50%), furniture (30%), agriculture (22%), tools and utensils (21%) and fuel (12%). It is largely perceived as cheap, in comparison to other materials for equivalent products, but at the same time, produces high quality goods and consumers are open to more and different bamboo-based products.

The policy and regulatory framework around bamboo is largely absent. In the Northwest, West and parts of Adamaoua, local customary rules govern harvest and access. Revisions proposed to the current 1994 Forest Law need to be carefully considered concerning the classification of bamboo (currently neither timber nor a 'special forestry product'); its status, given the small-scale, local trade and high domestic consumption; and, low level of threat given the mainly exotic species used in trade. For Alpine bamboo, sustainable use and forest degradation may be an issue of concern requiring further research. Institutional coordination and concerted support is lacking for the sector.

Problems and constraints include injuries and insect bites, particularly for harvesters. All actors mentioned low demand, storage and product deterioration, lack of knowledge and skills to process and produce better quality and a wider range of products, coupled with the need for improved equipment. This could help address problems of low profits and low prices. Marketing, consumer awareness raising, training, organisation of the market and actors, and sustainable management were also named as opportunities. The growing membership of craftsmen and producer groups is also an encouraging sign of collective action and advocacy within and for the sector.

1. Introduction

Bamboo resources have been known and promoted to enhance the economic and ecological wellbeing of resource dependent communities in Asia. The same effort is recently and gradually being made in Africa, facilitated by the International Network for Bamboo and Rattan (INBAR). INBAR is at the centre of efforts to promote research (on production systems, processing, utilisation and socio-economic impacts), technology transfer (on processing techniques) and exchange of information and capacity building in the bamboo sector globally. This study forms part of INBAR's efforts to develop the bamboo sector in Africa and the Central African subregion in particular, in partnership with the Center for International Forestry Research (CIFOR) and local partners. Given the paucity of information in the bamboo sector in the Central African subregion, a major drive for this research was to provide baseline information that can help guide the development and implementation of relevant development interventions. This in-depth review of the current state and future potential of the bamboo sector in Cameroon has used standard indicators and a common reporting format that permits regional comparisons.

Objectives

The study's main objective is to conduct and analyse the Production to Consumption System (PCS) of Cameroon's bamboo sector and identify potential development interventions to improve local livelihoods. The specific objectives are:

- To provide detailed information on the types of raw material and products, quantity and quality of bamboo resources, and their production and marketing.
- To examine and report on the sustainability of current management and harvesting practices.
- To examine and report on the primary and secondary processing practices and technologies undertaken.
- To document existing infrastructures, bodies and processes for transportation and commercialisation of bamboo products in Cameroon.
- To provide a typology of stakeholders involved at all levels of the PCS, from farmers to consumers of the final products, and the benefits they derive.
- To review the existing policy environment, rules, regulations and their effectiveness.
- To identify constraints and opportunities for livelihood development of small holders and microenterprises, and develop practical recommendations for improving the bamboo sector.

Rationale for the study

Forests in Central Africa and Cameroon in particular are facing an annual deforestation rate of about 1%. One of the main drivers is logging for timber and other construction materials. This imposes pressure on forest resources if not properly managed. Pressure on the use of timber products may be reduced by increasing the use of bamboo, rattan and coconut shelves in furniture-making, a major use of wood raw materials in Cameroon (CRAC/GTZ-MINEF 1999). Planted bamboo can reach maturity in three years and can subsequently be harvested every two years for up to 120 years (Cuddeford 2007). This requires modest investment in planting in order to provide regular revenue. Bamboo fibres are said to be 10 times stronger than wood fibres for construction and bamboo is far lighter and easy to carry than wood (Cuddeford 2007). The social, economic and ecological impacts of the bamboo resource at the local and national level are unknown, however, bamboo has been long regarded as one of the neglected Non-Timber Forest Products (NTFPs) in Central Africa (Tabot-Tabot 2006), despite it being an easily domesticated, renewable resource with annual yields, readily accessible to rural people, and with potential to fuel rural development — an aspect long recognised in Asia (Belcher 1998, Marsh and Smith 2006, Ruiz Perez *et al.* 2009).

The role bamboo could play in sustaining local livelihoods has not been documented, despite its daily usage for producing handicrafts and household items, supporting agriculture, for local transmission posts, and many other uses. Bamboo's widespread usage implies that those who cannot produce themselves buy from those who can supply the resource, leading to a market situation of buying and selling bamboo-related products. This market and the main actors and beneficiaries remain poorly described in Cameroon. Thus, the need for a bamboo PCS study was deemed necessary to define the producers and products, the processors and products processed, the traders and products traded, and the consumers and products consumed — as well as identifying the possible constraints and opportunities in each link in the value chain.

Background to Cameroon

The Republic of Cameroon is located in Central Africa and covers a total land area of 466 326 km^2. It is bordered to the east by the Central African Republic (797 km), northeast by Chad (1094 km), west and northwest by Nigeria (1690 km) and south by the

Republic of Congo (523 km), Equatorial Guinea (189 km) and Gabon (298 km). The country lies between latitudes 2° and 13° N (about 1200 km) and longitudes 8°30' and 16° 10' E (Jonkers and Foahom 2004).

Climate, vegetation and topography

Cameroon has a tropical climate along the coast, becoming semi-arid, hotter and drier in the north. The country can be divided into four geographic regions on climate and topographic criteria. The southern zone, roughly between 2° and 6° N, has a four-season climate, rainfall over 1500 mm and two dry months. The Congo-Guinean forest zone has closed evergreen or semi-deciduous rainforest, forming an almost unbroken blanket in the south and splitting into islands north of the fourth parallel; it corresponds to the 'humid' and 'low and medium-altitude sub-humid' eco-floristic zones. The coastal zone is a 200 km-wide strip along the sea in which oceanic influences predominate. The single dry season is not very marked, and rainfall decreases from 4000 mm on the coast up to a maximum 10 000 mm at Debunscha near Mt Cameroon, to 2500 to 3000 mm some 50 km inland (Edea) and 2000 mm along the border of the humid lowland forest zone. It corresponds to the 'low- medium altitude very humid' eco-floristic zone, with an evergreen forest whose vegetation differs from the evergreen forest further inland. The coastal and southern zones make up Letouzey's (1985) 'Congo-Guinean' floristic region. The northern zone has a drier Sudano-Sahelian climate with annual rainfall between 500 mm and 1000 mm. The mountainous Cameroon Highlands zone is found along the volcanic chain from Mt Cameroon though the Northwest to Adamaoua and includes unique Afromontane forests above 2000 m, and rainfall between 1500 to 2600 mm varying with relief and altitude. The average temperature in the south is 25°C, 21°C on mountain ranges and plateau and 32°C in the drier north (Jonkers and Foahom 2009). The northern slope of the Adamaoua plateau is a clear boundary within the Soudanian zone.

Cameroon's terrain is diverse, with plains in the north and the southwest, the Adamawa plateau in the centre and high mountains in the west. The highest point is Mt Cameroon (4095 m) in the Southwest region and the lowest is sea level. For most part the country lies between 200 and 800 m above sea level. Lake Chad is in the far north and straddles the border with Chad. Three major rivers flow into the Atlantic: the Wouri, the Nyong and the Sanaga, which is formed from the confluence of the Lom (which flows from the northwest) and the Noun (which flows from the east). The Dja arises in the east and flows out of the country into Congo in the east. The Bénoué River flows north to Nigeria through Lagdo reservoir. Cameroon has bauxite, iron ore and petroleum resources.

Demography

Cameroon's population was estimated at 19.4 million as of 1 January 2010, a projection derived from the Population and Housing Census of November 2005. This is based on an estimated annual growth rate of 2.6%. A little over half (50.5%) of the population is female, and 43.6% of the population is less than 15 years old (Government of Cameroon 2010). The urban population is increasing with 52% now living in urban areas, up from 48.9% in 2000. The average population density is 35.2 inhabitants per km^2 (FAO 2007), but varies considerably per region, from less than five people per km² in some savannah and moist forest regions, rising to 90-100 people per km² in parts of the west. Three-quarters of the male population and 52% of the female population over 15 years old are literate. The male/female ratio for the population is 1.01. The main ethnic groups are the Cameroon highlanders (31%) and the Equatorial Bantu (19%), Kirdi (11%) Fulani (10%), the Northwestern Bantu (8%) and the Eastern Nigritic (7%) (Neba 1999, CIA 2009). There are more than 250 linguistic groups with strong cultural identities associated with the ecological zones where they live. The Bantus are the dominant farming populations in the humid forest zone while marginalised indigenous groups include the pygmies (Aka, Baka, Bakola and others) (Topa *et al*. 2009). About 25% of the population adheres to traditional religion (indigenous beliefs); about 22% is Muslim; the remaining majority is Christian (Jonkers and Foahom 2009). The official languages are English and French, with the latter dominating while the former is confined to the former British colony in the Northwest and Southwest regions.

Governance

Cameroon is a republic with a constitution and a legal system based on French civil law. Politically Cameroon divided into 10 administrative regions. Throughout Cameroon, political parties and associations have been superimposed on traditional structures. In the last two decades administrative functions have been decentralised, devolving power but not always corresponding financial budgets to local councils and communities (Topa *et al*. 2009).

Socio-economics

The GDP per capita is US$651 and real growth rate is 4.8% (FAO 2007), however 40% of the population lives under the poverty line. Agriculture accounts for 44% of GDP, industry for 16% and service industries for the remaining 40% (CIA 2009). Seventy per cent of the working population is employed in the agricultural sector. Cameroon is classified as a medium-income country, with a Human Development Index of 0.532 in 2008 (UNDP 2009) but many development

Table 1. Cameroon Human Development Indices

Indicator	Cameroon
Literacy rate	67.9%
Life expectancy at birth	50.8
Gross Domestic Product (GDP) per capita 2005 (purchasing power parity US$)	2.299
Human Development Index 1995-2005	Increase
Population living below:	
- US$1/day	17.1%
- US$2/day	50.6%
- National poverty line	40.2%
Births per woman	6.3
Population undernourished 1990/92	33%
Population undernourished 2002/04	26%
HIV prevalence (15-49 age group) 2009	5.4%
Cell phone subscribers (per 1000 people)	138
Net Official Development Assistance per capita (US$)	25.4
Net Official Development Assistance as % GDP 1990	4.0%
Net Official Development Assistance as % GDP 2005	2.5%
TI corruption perception index	2.4
Overall HDI rank (out of 177 countries)	**144**

Sources: United Nations 2007, 2009, United Nations 2008, World Bank 2009, Transparency International 2008

challenges remain (see Table 1). Because of its relative political stability, timber and oil resources and favourable agricultural conditions, Cameroon has one of the best-endowed, functioning primary commodity economies in sub-Saharan Africa.

Infrastructure

Cameroon has 34 300 km of roads of which 4288 km are paved. Plans to upgrade and connect Cameroon to the African international highway system are ongoing, with routes to Equatorial Guinea and Gabon in the south, and Central African Republic to the east completed, but not to Nigeria in the west. There is 1104 km of one-metre gauge railway with the main line leading from Douala on the coast through the capital Yaoundé and up to Ngaoundéré in the nation's centre. There are 11 airports with paved runways but only three (Douala, Yaoundé and Maroua) served with regular flights, and 39 with unpaved runways. There are about 2090 km of waterways, with the main ports of Douala, Limbe and Kribi on the Atlantic coast and Garoua on the river in the north, which handles exports to Nigeria. Cameroon is dependent on hydropower for 97.5% of its power. The fixed telephone system that was previously largely only available to business and government has been transformed in the last five years by mobile networks that cover the majority of towns and cities.

Cameroon's forestry sector

More than 47% of Cameroon's national territory is forested (de Wasseige *et al.* 2009). The forest is mainly closed tropical broad-leaved rainforest with three predominant types: lowland evergreen, lowland semi-deciduous, and montane. The closed forests are concentrated in the south and along the coast. Cameroon's dense forested zone covers 19.6 million ha, about 40% of the national territory, and is described as some of the most biologically diverse and most threatened forests (Topa *et al.* 2009, CBFP 2006, GFW 2005). Areas of mangroves are found in the Gulf of Guinea and *Acacia* savannah woodland occurs in the north. Cameroon has a modest area of plantation forest (Jonkers and Foahom 2009). While low by international standards, Cameroon has one of the highest Central African annual deforestation rates (0.14% in the humid zone), and an annual net degradation rate of 0.01% (de Wasseige 2009). However, when including the savannah zone, it is below the African average of 1%. The Government of Cameroon adopted a new forestry law in 1994, highlighting its strategies for making the forestry sector contribute to the nation's socio-economic development by involving local communities, NGOs, and economic operators, as well as international communities. The forest zoning plan in Cameroon now covers 14 million ha, with growing recognition of the customary rights and socio-economic welfare contributions of forests at local and national levels. The forest sector is Cameroon's largest employer outside the public sector, providing 13 000 formal and 150 000 informal jobs, and is the second largest source of export revenue after petroleum (29% and 26% of nonpetroleum exports in 2001 and 2004 respectively) (Topa *et al.* 2009). The total value of

Table 2. Cameroon forest key figures

Aspect	Figures	Date
Forest cover as % of total surface area	59%	2009
Public forest ownership	86%	2005
Industrial round wood production	2.3 million m^3	2006
Formal forestry sector employment	12-13 000	2006
Contribution forestry sector to GDP	6%	2004
Value of forest products exports	$488 million	2006

Sources: de Wasseige *et al*. 2009, Fometé and Cerutti 2008, World Bank 2009

forest products in Cameroon for which some statistics exist — timber, charcoal, *Gnetum* spp., gum arabic and *Prunus africana* bark — is about US$870 million, of which US$120 million is from NTFPs (Ingram 2009). In 1994, Cameroon introduced a number of forest policy reforms, both regulatory and market-based, to support a more organised, transparent and sustainable system for accessing and using forest resources (Topa *et al*. 2009). Policy and development focused attention has increasingly been directed towards the value chains of NTFPs in the last decade.

In Cameroon, the State defines forestry sector policies, forest management regulations and grants logging rights. Cameroon's forests are governed by the 1994 Forestry Law and its 1995 Decree of Application. Another important legal regulation on forestry and wildlife was the implementation of the National Zoning Plan and guidelines. The National Zoning Plan is an indicative framework for land use in the southern forested area. It acts as a tool for the planning, orientation and exploitation of natural resources within the area (Jonkers and Foahom 2004). Cameroon's forest is divided into permanent and non-permanent forest domains as defined in Cameroon's 1994 Forest Law. The permanent domain consists of protected areas, Council Forests and Forest Management Units (FMUs) — concessions designated for sustainable timber production. Non-permanent forests are forests that used for uses other than timber exploitation, and include other forests, community forests and privately owned forests. In non-permanent forest areas, the legal framework for usage rights permits a non-exhaustive list of traditional activities, which includes felling trees for fuel wood or construction, lopping, chopping protected species, gathering dead wood, collecting 'secondary' forest products (raffia, rattan, palm products, bamboo, food products, etc), gathering, hunting, fishing, grazing, farming, etc. (Nguiffo, Kenfack, and Mballa 2009)

Non-timber forest products

The forests of Central Africa and Cameroon are rich in non-timber forest products (NTFPs), which have long been an important component in the livelihood strategies of forest-dwelling people, providing subsistence needs, employment and cash income (Arnold and Ruiz-Pérez 1998). A number of 'guesstimates' (Calibre Consultants and SSC University of Reading 2000) propose that between one-in-four to one-in-six of the world's poor depend directly or indirectly on forests for their livelihoods (World Bank 2002, FAO 2008). Timber and other forests products provide 350 million people living in or around tropical forests with 50% or more of their household needs and also directly provide 10% of jobs in developing countries (Ames 1998). In a region where forests cover 44.6% of the land area (FAO 2007), about 62% of the rural population depends on access to forests to meet their daily needs for subsistence, employment and cash income (Tieguhong *et al*. 2009, Tieguhong and Ndoye 2004 and 2006, Arnold and Ruiz-Perez 1998). Most Cameroonians, particularly the rural inhabitants, depend on NTFPs for subsistence and cash income. At the household level, forests directly provide about 8 million rural and poor Cameroonians with traditional medicines, food, domestic energy and construction materials (Topa *et al*. 2009). For example, the value of the NTFP forest sector from just five NTFPs chains from the heart of the Congo Basin in Cameroon and Democratic Republic of Congo (Honey, *Gnetum* spp., *Irvingia* spp., *Dacryodes edulis* and *Prunus Africana)* were found to have a combined annual value of at least US$45 million, providing employment to 270 000 people from forests to urban areas (Ingram 2009).

There has been increased interest in the collection and marketing of NTFPs as an instrument for sustainable rural development (Tieguhong and Ndoye 2004). One approach has been to work with rural communities and participants involved in the NTFP value chains (Tieguhong *et al*. 2009). In Cameroon, the main NTFPs extracted by forest-dwelling people are fuelwood; poles used for house construction; wild fruits such as *Irvingia* spp. and *Ricinodendron heudelotii*, both used as condiments; medicinal plants such as *Prunus Africana*, used for treating prostate enlargement; fruits and leaves for food, such as *Dacryodes edulis*, *Gnetum africanum*, and stimulant nuts *Garcinia kola*, *Cola acuminate*; rattans and *Rhaphia* spp. palms for construction (Sunderland *et al.* 2002); and, numerous animal species, collectively known as bushmeat (Tieguhong *et al*. 2009, Ingram 2009, Ndoye and

Tieguhong 2004). However, the development of key NTFPs to constitute sustainable income generating forest-based enterprises has been hampered by inadequate political, economic, technical and legal arrangements. This is aggravated by the lack of statistics on the contribution of the various NTFPs to local, national and regional economies (Clark and Sunderland 2004, Tieguhong and Ndoye 2006). Many of the species recognised for their economic contributions to livelihoods and large scale trade are not sufficiently domesticated to ensure that supply is greater than market demand. This has led some wild species being classified as vulnerable and their international trade restricted to reduce the ecological pressures on wild populations. Examples are *Prunus africana* and *Pericopsis elata*. This is also relevant for bamboo and its products in both Cameroon and Central Africa, which according to Tabot-Tabot (2006) are a forgotten resource.

Review of bamboo sector in Cameroon

A literature review reveals remarkably little on bamboo in Cameroon. Dedicated journals such as the International Journal of Bamboo and Rattan and the Bamboo Journal have no data at all for Cameroon. The main botanic and ecology experts at the universities of Dschang and Buea, and the National Herbarium and Royal Botanic Gardens of Kew, do not know of any taxonomic or ecological study on bamboo in Cameroon, only for grasses in general (van der Zon 1992).

Therefore an extensive literature review was conducted, ranging across forestry, ecology, botany, socio-economics, culture and anthropology, to provide as much background data as possible to guide the second stage of the study — the stakeholder interviews and selection of sites for field work.

Bamboo species in Cameroon

A misunderstanding arises in Anglophone Cameroon due to 'bamboo' or 'raffia bamboo' being the common name for raffia poles and materials originating from *Raphia* palms, as shown in Figure 1. In pidgin 'Indian bamboo' is also used to denote Raphia and 'Chinese bamboo' is the term often used for bamboos of the *Graminae* family. This is even the case in areas such as Oku in the Northwest, where extensive stands of native bamboo are found. This classification can create widespread confusion during field work and even in the scientific literature (Gautier 1992) as to which plant species is actually being referred to. The species descriptions in Table 3 and Figures 1, 3, 4 and 5 serve as a field guide.

Figure 1. *Raphia mambilenses* or Indian bamboo

Compared to the Americas — which are collectively much richer in bamboo species than either continental Africa or Madagascar but have a lower diversity than the Asia-Pacific region, with approximately 430 species of New World woody bamboos — Africa is strikingly poorer in bamboo species, with the highest species richness found in northern Madagascar. Only *Arundinaria* occurs in both the Old and New Worlds. The highest potential species number recorded in South America was 35/km^2, while the corresponding figure for Asia is 144/per km^2. Africa has only three known native bamboo species, two of which can be found in Cameroon (Table 3).

Bamboo species belong to the Graminae (grass) family. Grasses are one of the most important plant families of Cameroon with a very rich flora represented by 433 species, in 125 genera and 19 tribes. The dry savannas of the North region and the mountainous areas of central and western Cameroon contain extensive grass areas which are important for cattle and fauna in general. The montane highlands and Adamou uplands possess the richest grass species diversity, as open vegetation in Cameroon is often dominated by grasses. Specimens from these areas are well represented in plant collections, particularly in the National Herbarium Yaoundé, Limbe Botanic Garden, Royal Botanic Garden Kew, Natural History Museum Paris, University of Wales Bangor. Garoua Wildlife School for the vegetation of northern Cameroon, the Highlands area in the Bambui research station, and in Limbe Botanic Garden for grasses from Mt Cameroon. Grasses from the rainforest zone are poorly represented in collections because of the low importance many forest botanists attach to grasses; they generally look upwards instead of downwards and think of grasses as secondary species.

Table 3. Bamboo species in Cameroon

Family Tribe	Genus	Species	Other names	Status*	Location in Cameroon	Reference	Botanic and habitat description	Physiology[1]
	Olyra	Olyra Latifolia		Introduced	?	(Ohrnberger 1999)	Features: (1) 3 - 4 (6) m / 1 cm / fl(+); culms erect, climbing and leaning in the vegetation, or decumbent. Distribution: an ubiquitous, weedy species, found throughout tropical America. Apparently introduced in Africa and Madagascar. Habitat: in rainforest, gallery forest, secondary forests, usually on margins	A >1000m
Guaduella	Guaduella	*Guaduella* Franchet	Yal-la (Gbaya)	Native	Lowland tropical, possibly around Ngoundal	(Ohrnberger 1999)	Small sized bamboos Habitat: forests Uses: weaving and in beehive construction	H 1 D Small
Poaceae Bambuseae	Ochlandra	Ochlandra travancorica	Kerala-Etta (West Africa)	Introduced	Lowland tropical — around Yaoundé and Douala	INBAR 2010	Features: erect, shrubby or arborescent, reed-like or gregarious. Culm greyish-green, roughly with inter-nodes 45-60cm long up to 1.5m long. Walls very thin 2.5m long, leaves broadly oblong-lanceolate, 9-30 cm long and 5-12cm broad often obliquely rounded at base into thick broad and somewhat concave. Distribution: seen in urban areas eg Yaoundé and Douala Habitat: ornamental	H 2-6m D 2.5-5
Puelieae	Puelia	Puelia Atractocarpa		Native	Southern Cameroon	(Ohrnberger 1999)	Small sized bamboo 0.2 - 1 m / ? cm / fl(+); culms herbaceous. Habitat: evergreen rainforest	
Poaceae Gramineae Bambusinae http://species.wikimedia.org/wiki/Poaceae	Bambusa	*Bambusa vulgaris* Schrad. from J.C.Wendl., 1808	Chinese or common bamboo, Bambou chinois Esisoŋ é nkáálé (Akoose-Bakweri)	Introduced 'Widespread'	SW, C, S, E, Littoral, Adamaoua	Brink 2008, (Hutchinson and Dalziel 1954-1972), Sunderland personal communication	Common throughout the tropical world. Open clump, culms spaced 30-60 cm apart. Culm cuttings root very easily. Leaf blades oblong-lanceolate 10-25 cm long 1-4 cm broad, rounded at end, shoulders of leaf sheath usually produced into tiny auricles, glabrous with very short bristles, culm sheath bearing auricles up to 1 cm long, blade broadly ovate 3-5 cm long, spikelets 1-2 cm long, in clusters 1-10 cm along branches of a spreading panicle, florets 4-12 Habitat: found often at village edges, stream sides, roadsides. Doesn't flower.	H 15.24 D 10.16 T-1 S 5 A

Family Tribe	Genus	Species	Other names	Status*	Location in Cameroon	Reference	Botanic and habitat description	Physiology[1]
	Oreobambos	Oreobambos buchwaldii K.Schum.	Bamboo, Bambou	Native to Africa, 1 species in Tropical Africa "Unknown"	Literature indicates only in East Africa: Malawi Zambia Tanzania, United Republic of Uganda	(Bystriakova, Kapos, and Lysenko 2002)	A robust tree-like bamboo, growing in small dense patches or solitary clumps but not straight, solitary clumps (sympodial). Usually drooping or spreading, rarely erect, green, hollow. Medium-sized green, hollow culms with culm-sheaths covered with appressed bristle-like hairs when young, fimbriate at the mouth, with a short subulate lamina. Leaf-sheaths glabrous at the mouth. Leaf-laminae 10-35 x 2·5-6 cm, lanceolate to oblong-lanceolate, very obscurely tessellate, usually glabrous, pale green or somewhat glaucous, apex acute to acuminate. Inflorescence very large, loose; clusters of spikelets 1·5-2 x 0·8-2·25 cm up to twice their length apart. Bracts 8-14 mm, long, ovate-elliptic, keeled, dark-brown, ciliate along the keel. Spikelets 12-15 mm. long, lanceolate to oblong-lanceolate in lateral view, brown, usually somewhat glossy. Superior glume 9-11 mm. long. Lemmas 10-13·5 mm long, broadly ovate to elliptic-ovate, with the apex obtuse or subacute. Paleas 8-12 mm long. Habitat: in clearings of evergreen rainforest, in swampy forests and along streams. Note: not much is known about the flowering habits. Greenway states that it can be seen flowering every year in parts of Tanzania. Nothing has been recorded from elsewhere.	H 18-20 D 5-10 A 300 - 1930m (Tanzania)
	Oxytenanthera	*Oxytenanthera abyssinica*	Bamboo, Chinese bamboo Savanna bamboo, West African bamboo Kok-ko (Gbaya)	Native in Africa widespread", 1 species in Tropical Africa. Oxy. genus also in India, Vietnam, Ethiopia	Adamaoua to Garoua area, in riverine gallery forests, planted in villages as ornamental plant and for domestic use, particularly by beekeepers. NW; Bamenda Highlands?	ALUKA 2010, Onana personal communication, van der Zon 1992, (Kilum Ijum Forest Programme 1997; Hutchinson and Dalziel 1954-1972), Ingram personal observation 2009 and 2010	Clumping lowland bamboo from the savanna woodlands of tropical Africa. Bright green, no thorns. Zigzag culms, sympodial bamboo, culm 6-16 m tall, 6-10 cm in diameter, internodes 20 cm; wall density 0.61 g/cm3, per ha 8000 living culms plus 4000 dead culms, average biomass of culms 70.3 tons/ha. The mean annual increment of oven dry culms is 10.1 tons/ha. Habitat: grassland and cultivated. In areas of annual rainfall higher than 1500 mm. Uses: beehive construction, building construction, handicrafts, beverages (planted for its leaves in drink *ulanzi*) and edible shoots in Tanzania — not reported in Cameroon as food use).	H 9.14 D 10.16 T -1 S 5 A 700-1800m (East Africa)

Family Tribe	Genus	Species	Other names	Status*	Location in Cameroon	Reference	Botanic and habitat description	Physiology[1]
	Yushania (formerly Sinarundinaria)	*Yushania alpina* (former name: *Arundinaria alpina K.Schum*.)	Mountain bamboo, Chinese bamboo, Indian bamboo Ntomtom (Oku), Ebtotom (Kom), Tomtom (Lamnso), kehweh (Fulfulde) (Knopfli 2001) proposes that the bamboo is *Phyllostachus bambusoides*	Native to Africa 1 species in Tropical Africa "Rare" Cheek personal communication	NW; Bamenda Highlands: Mt Oku, Kilum and Lake, Ijim Anyaua Forest, Bambutous, Awing Notable absence on Mt Cameroon[1] and not recorded in Mt Kupe-Muanenbgouba or Bali Ngemba.	ALUKA 2010, Brink 2008, (Viane 1986; Maisels and Forboseh 1999; Cheek, Onana, and Pollard 2000; Kilum Ijum Forest Programme 1997; Grimshaw 1999; Hutchinson and Dalziel 1954-1972)	Afromontane, spreading, monopodial thornless frost-hardy bamboos. Rhizomes pachymorph, often with long rootless necks, but also tillering, forming spreading thickets. Wind dispersed seeds. Culm 12-20m tall, 5-13 cm in diameter, internodes 30 cm, wall 5-16 mm thick with density (OD) 0.48 g/cm3, mature stand 5870 culms/ha, average biomass of the culms amounts to 51.3 tons/ha, annual increment 1000 new culms, yielding 8.6 tons/ha. Habitat: conspicuous element in the vegetation of most Central and East African mountains from Ethiopia, Southern Highlands of Tanzania and Malawi, Bamenda Mountains of Cameroon. Favours volcanic soils with rainfall in excess of 1250 mm/yr to 2500 mm. Temperature limiting, with bamboo and *bamboo-Podocarpus* forest confirmed to areas with a mean annual temperature of 10.6-15.9°C, with mixed forest in the range 12-14°C and does not occur in valleys where cold katabatic winds flow or cold air accumulates. Where conditions are favourable it can cover large areas. Well known to undergo cyclic sequences of development following mass-flowering.	H 7.32 to 10 D 5.08 T -7 and 10-20 S 5 A 1630 to 2200-3200 or 3500 m

[1] Physiology: H = Max height meters, D= Diameter (cm), M = Min and max temp, S= Sun tolerance (5 full), A = Altitude

Sources: ALUKA http://www.aluka.org/ Bamboo web http://www.bambooweb.inf, Eastern African Bamboo project http://www.eabp.org.et/About_Bamboo/divers.html PROTA http://database.prota.org/ , INBAR http://www.inbar.int/publication/txt

*None of these species are listed as threatened in the IUCN Red List of Threatened Species (Ref: IUCN 2009. IUCN Red List of Threatened Species. Version 2009.2. www.iucnredlist.org [20 November 2009] and Onana personal communication) or are listed as trade threatened species under CITES (Ref: http://www.cites.org/eng/app/appendices.shtml)

1 On Mt Cameroon at the altitude required for this species, no bamboo is found. The soils are either the wrong type (very free draining) or the bamboo has not been able to spread fast enough to avoid successive lava flows. This explanation has also been given for the absence of Podocarpus species on Mt Cameroon (Cheek personal communication).

The tribe Paniceae, with several grain-providing species, occurs everywhere but is less dominating — with a number of smaller bamboo-like groups that are shade-tolerant and occur in the rain forest. The southern limit of the vegetation zones, so obvious in the western Sahel, is hardly found in Cameroon where a more gradual vegetal transition is found along the Adamaoua plateau. *Andropogon gayanus* is a very clear indicator species here. Although the Extreme North region of Cameroon has recently suffered seriously from drought and the vegetation is degraded compared with a few decennia ago, no clear modification of the location of the vegetation zones is visible. Grasses are generally well adapted to fire, with seedling recruitment and regeneration seemingly little affected by wild fire. Frequent burning, as is commonly practised for agricultural land clearance and to provide new grazing pastures, causes grasses to dominate. When fires are prevented, vegetation tends to be dominated by woody species (van der Zon 1992).

No data about phenology and in particular flowering in Cameroon has been found. This is important given the characteristic of some bamboo species, where one massive flowering event causes all individuals to die. This can happen about once in every 100 years and has yet to occur in most of West and Central Africa. When it does, it could be catastrophic for the resource and livelihoods associated with it. In this respect, knowledge of which species is used where could be critical. Much of the bamboo used is non-indigenous *Bambusa vulgaris* and possibly other introduced species (Personal communications Sunderland, Cheek, Onana). However, in the Northwest, the montane species (formerly known as *Arundinaria alpina* and now *Yushina alpina*) is predominant, although *Bambusa vulgaris* has also been planted in the area. *Oxytenanthera abyssinica* is thought to be much less widely spread and used, but where it occurs in remote areas of Adamaoua, it is critical to livelihoods.

Resource quantities

Very little data on resource quantities exists in the literature. Although the mountain zone of bamboo in Kilum Ijum is documented (Cheek, Onana, and Pollard 2000; Maisels and Forboseh 1999), the surface area and biomass is not given. Based on maps and recent forest inventories (Foaham *et al.* 2009), approximately 2000 to 4000 ha of bamboo is estimated, out of the total area of forest of 200 km^2 (Figure 2 and Figure 19). In the Northwest in general, Figure 20 provides a guide, although land use changes over the last 45 years have seen the bamboo in Awing and the Bamboutous Mountains diminish substantially. From these two maps an estimated 4000-5000 ha of bamboo is estimated to still exist in the Northwest. Data on bamboo resource availability in other parts of Cameroon is unavailable and was not part of the Terms of Reference for this study, presenting a major gap in knowledge and highlighting the need for at least a resource inventory of the major production zones, or a national inventory.

Sustainability of current management and harvesting practices

In Cameroon there are no guidelines or standards for sustainable harvesting of bamboo. A review of the literature revealed only one source on the sustainability and harvesting of African bamboo generally. In Uganda, where the shoots of the mountain bamboo (formerly *Arundinaria alpina* and now referred to as *Yushina alpina*) are eaten, it has been difficult to assess whether or not harvesting is at a sustainable level (ETFRN 2003). Threats to mountain species in heavily populated areas — typical for Alpine bamboo — are well known. Pressure occurs from firewood collection (for heating and cooking) which is a major contributor to forest degradation. Fires of human origin are common along forest edges in submontane areas and can cause substantial changes in forest structure. Hunting is also common and has a direct impact on faunal populations and an indirect impact on forest cover, as hunters regularly burn the vegetation at forest edges (and sometimes the forest itself) to ease access and to concentrate grazing animals in areas of young vegetation. Significant areas of montane cloud forests have also been converted to agriculture and plantations, especially in submontane areas in Africa, where agriculture is found as high as 2400 m in altitude and pastures as high as 2000-3000 m (Letouzey 1985, Doumenge *et al.* 1993), as is the case around Mt Oku. As both the forest type and threats are exactly the same in the Bamenda Highlands where *Yushina alpina* is also found (Parrott and Parrott. 1989; Abott *et al.* 2001; Whinconet 2005; Ingram and Jam 2008), it is anticipated that similar threats for this species are present in Cameroon, given its 'rare' status in the mountains of the northwest Cameroon highlands (Cheek, Onana, and Pollard 2000). An important factor will be the level of management. As the species is not regulated officially (see section on regulatory and customary rules), the customary rules governing harvest and actual practices are critical. Reports on forest management in the Kilum Ijum forest (Cunningham *et al.* 2002) indicate there has been, and still is, some level of control on harvesting. For the non-native *Bambusa vulgaris* no data was found on customary management.

Edouard *et al.* in Belcher (1998) note that intensively managed NTFP production systems may completely displace the natural vegetation within the management unit, as is frequently the case for bamboo. However, the impacts at the landscape or local level are less clear for some of the less intensively managed cases. In most cases, the ecological and biodiversity impacts have not been measured or even estimated and assessing impacts needs a clear baseline. Belcher (1998) also questions if

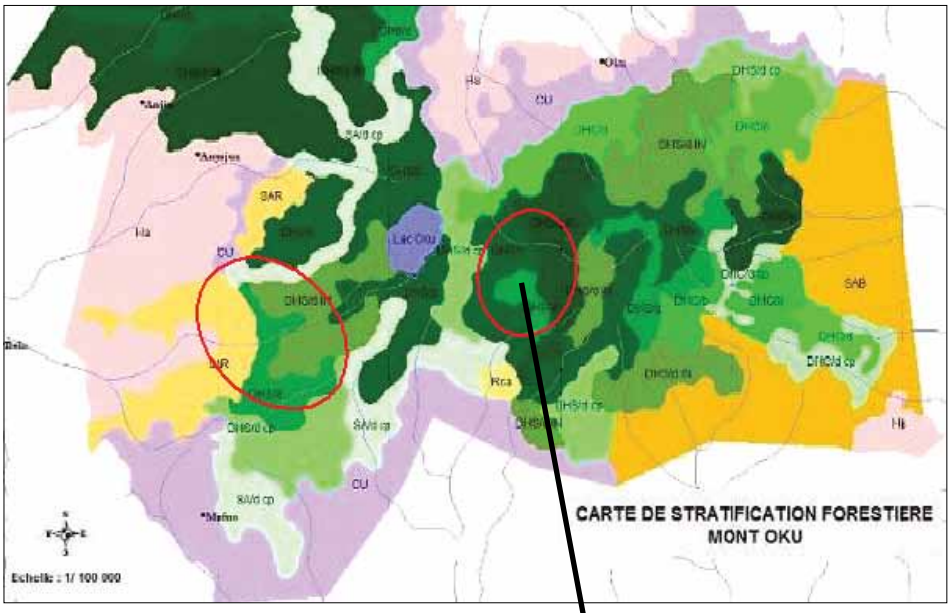

Figure 2. Stratification of Kilum Ijum forest, NW Cameroon

Map source: Foaham *et al*. 2009

Figure 3. Yushina alpina groves in Kilum Ijum forest, Northwest

Figure 4. ***Bambusa vulgaris***

Figure 5. ***Yushania alpina***

Figure 6. ***Oxytenanthera abyssinica***

Figure 7. ***Ochlandra travancorica***

Ochlandra travancorica Small diameter, 'green' bamboo
Mainly used ornamentally and for fencing, also for some crafts

Top to bottom: Large green (*Bambusa vulgaris*), Yellow (*Bambusa vulgaris vitatta*), Small green (*Ochlandra travancorica*), Small yellow (unidentified)

Figure 8. ***Bambusa vulgaris vitatta***

Yellow bamboo
Bambusa vulgaris vitatta

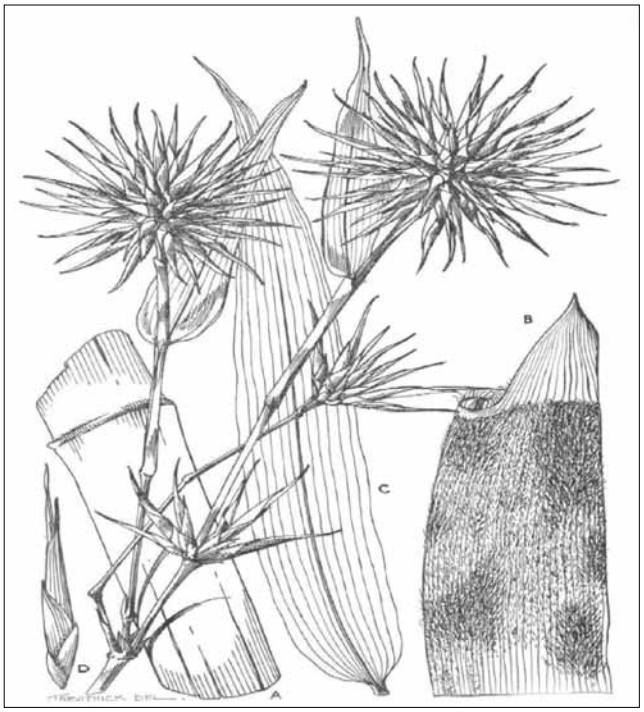

Figure 9. ***Oxytenanthera abyssinica***

Source: Hutchinson and Dalziel 1954-1972

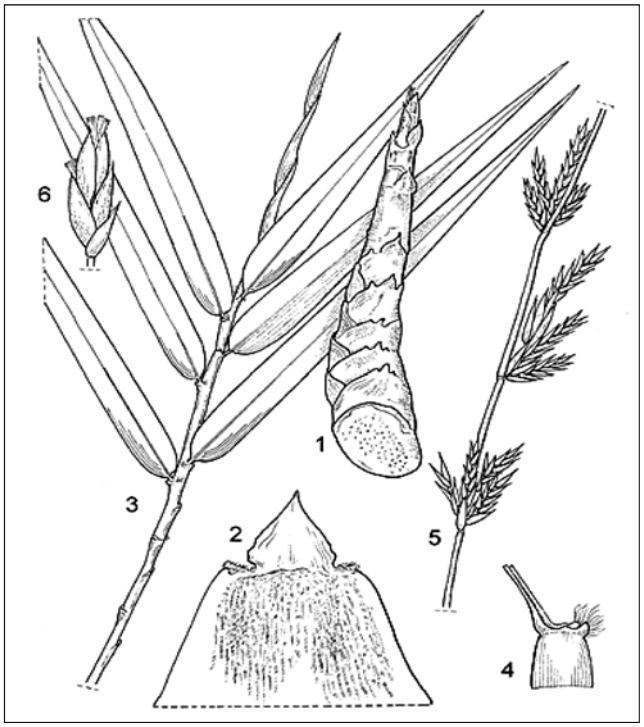

Figure 11. ***Bambusa vulgaris***

Bambusa vulgaris: 1. young shoot; 2. stem leaf; 3. leafy branch; 4. upper part of leaf sheath; 5. flowering branchlet; 6. spikelet.

Source: Brink 2008

Figure 10. Yushania alpina

Yushania alpina: 1. leafy branches; 2. flowering branches; 3. spikelet; 4. grains.

Source: Hall and Inada 2008

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Other countries offer interesting and applicable experiences concerning sustainable harvesting practices. While these encompass general, good silvicultural practices, they need to be researched and tested before implementation in Africa.

In India, guidelines have been developed for *Dendrocalamus strictus (*Rajahmundry 2003), and highlight that an understanding of species ecology is key to sustainable harvesting. These guidelines have been developed in Box 1. Although bamboo is a perennial species with underground rhizomes throwing up new shoots every rainy season that grow into culms, new culms may take two to three years to mature into a strong bamboo. The production of new culms in the clump depends on the vigour of the underground rhizome, its growth activity and stored food in the previous growing season. Therefore, each clump needs a sufficient number of green culms with adequate foliage to manufacture and store food in the underground rhizome. Repeated harvest reduces the productive capacity of clumps. Removal of congestion in the clumps, ensuring the underground rhizome is protected

from rotting, fire and other damages, increases the clumps' productive capacity.

The best silvicultural system found, which satisfies all the requirements for maximum productive capacity of the clumps, is selective felling of mature culms combined with tending clumps to reduce congestion. A three-year felling cycle was found to be satisfactory to maintain productivity, with a three-month rest period in the rainy season to protect the rhizome from disturbance and prevent damage to tender bamboo shoots during the monsoon. Felling rules include three annual coupes, demarcated by natural features such as streams, tracks, block boundary lines and bridges. A culm selection system for working the bamboo coupes is recommended, where a clump is the unit of management. Mature culms are extracted depending upon the total number of mature culms and the productivity capacity of the clumps. The main objective is to ensure maximum production without impairing the clumps' vigour and to protect bamboo to ensure sustained growth and productivity.

Experiments with *Guadua angustifolia* in South America show that bamboo can be propagated rapidly by the 'chusquin method', where culms are cut at ground level during harvesting. This causes many small shoots and new plants to grow around the original plant. Similar findings were made by INBAR[2] in China with *Qiongzhuea tumidinoda* (Qiongzhu). A major difficulty both regions faced was a low acceptance rate of introduced sustainable harvesting methods by harvesters, due to the reduced number of stems prescribed as harvestable in the short term. Locally adapted training and awareness raising measures were reported as essential to change habits and practices in the long term.

As bamboo can be an aggressive invader of nearby forests and land, replacing local species and often creating a less biodiverse monoculture, management and control are key measures (Kleinn 2006, Malin and Boehland 2006). Management practices include ensuring newly planted bare areas that can potentially create soil loss in erosion prone areas until well established, are covered and clumps are continually managed to limit spreading and invasion. Short term economic incentives for farmers not to overharvest include training on the benefits of soil stabilisation and product valorisation.

Markets

On a global level, by region, the biggest exporter is Asia with market share of 68%, followed distantly by Europe (27% share), which is comprised mainly of re-exports of processed products (Table 5). Other regions have much smaller shares. The dominance of Asia is even more apparent after 2000 with its annual growth rate of 11.75% and greater market share of 68.27%. Comparatively, Europe's market share and growth rate have declined. Despite its small trade, Africa's commerce has increased with an annual growth rate of 29.21% and market share of 1.59% after 2000, compared to 12.11% growth and 0.87% market share, respectively, before 2000. The biggest importers ranked by market share are Europe, North and Central America and Asia: comprised of mainly developed countries such as Japan and Singapore. Europe and North and Central America have increasing import shares since 2000 of 40.16% and 32.73%, respectively. Consequently, Asia's import share declined. Africa, despite being a small player, had a large annual growth of 31.38% and improved import share of 2.13%; the latter larger than those of Oceania and South America (Pabuayon 2009).

2 http://www.inbar.int/show.asp?BoardID=83&NewsID=508

Box 1. Sustainable harvest guidelines

1. All current year culms should be retained.
2. A minimum of six culms over 1 year old, spaced uniformly over the clump should be retained. When there are large clumps, proportionately more mature culms should be retained.
3. Culms should be felled between the 1st and 2nd internode from ground level.
4. A sharp instrument should be used when felling to avoid splitting and damage of culms.
5. All dead and dry bamboo and high cuts should be removed first.
6. Cutting bamboo to feed livestock or otherwise is prohibited.
7. Clumps having six or less mature culms (i.e. more than one year old) should not be harvested. Only broken, dead, dry or badly damaged and twisted bamboos should be removed.
8. Rhizomes should not be damaged nor the clump uprooted.
9. All cut debris should be removed at least one metre away from the periphery of each worked clump.
10. Bamboo forests should be protected from fires, especially during the year of harvest and the year post-harvest.
11. When flowering is sporadic, all flowered clumps within working coupe, and which have shed their seed, should be clear felled.
12. When there is gregarious flowering, all clumps which have flowered, irrespective of felling cycle, should be clear felled, after the seed has been shed. The felled material should be removed. These areas should be strictly prohibited for grazing and should be fire protected at least for 5 years to ensure establishment and regeneration. Cattle proof trenches should be dug wherever needed.
13. Cutting should be prohibited in the dry season.
14. Congested bamboo clumps should be clear felled by forming segments. A maximum of three segments of congested clump may be worked, and at each working, not more than one segment will be cut. Where three segments are formed, the middle segment will be in the shape of the triangle having apex at the periphery and base formed by 1/3rd of the periphery. This segment should be felled at the first working. In subsequent cycles leftover side segments should be felled.
15. No mounding is required, only loosening of soil around the clump to ensure quick rhizome spreading
16. Training and awareness raising of owners and harvesters on the long term benefits of sustainable harvesting, including long term increased productivity, carbon sequestration and soil erosion control.

Table 4. World bamboo and rattan export and imports

Bamboo and rattan export and import COMTRADE data, 2000 (US$1 000)

Commodities	HS Code	Export	Import
Raw materials		128 547	179 399
Bamboo	140110	39 602	59 590
Rattan	140120	49 548	75 923
Vegetable plaiting materials	140190	39 397	43 886
Products		2 417 839	2 740 750
Plaits and products	460110	17 777	13 909
Mats and screens	460120	219 404	170 210
Plaited materialos, not mats	460191	29 933	122 545
Basketwork	460210	713 799	932 795
Seats of cane, osier	940150	371 366	423 166
Furniture of cane	940380	1 065 560	1 078 125
Vegetables (shoots)		2 541 748	2 490 194
Vegetables, including shoots	070990	1 156 968	1 112 536
Vegetables, fresh or chilled	071190	259 281	293 681
Vegetables, mixed	200590	1 125 799	1 083 977
Total		5 088 134	5 410 343

Source: FAO 2003

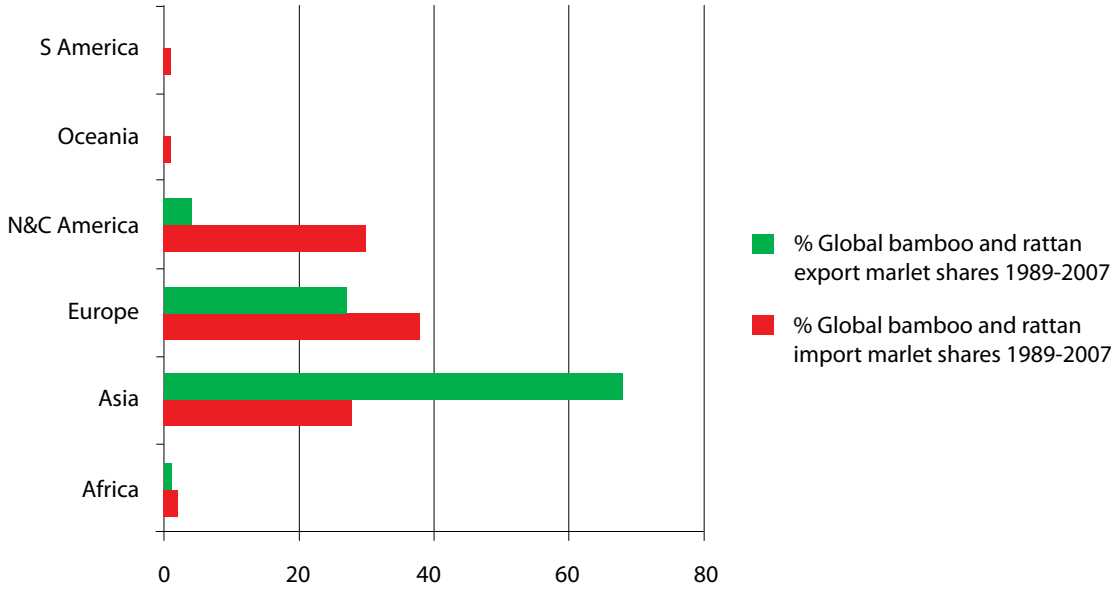

Figure 12. Global bamboo and rattan export and import market shares 1989-2007
Source: Pabuayon 2009

Figure 13. Bamboo market trader *Yushina alpina* storage 'jars', Oku, Northwest

2. Methodology

Definition of the Production to Consumption System

The main method employed during this study was the Production to Consumption System (PCS). The PCS approach assesses and describes the chain of activities from the production of raw material, through various trading nodes and processing to the final consumer of derived products. According to Belcher (1995), the term 'production to consumption system' is the entire chain of activities from production of raw material through various stages of intermediate sales and processing, to the consumer of the final product. The PCS includes the technologies used to process the material as well as the social, political and economic environment in which these processes operate. The PCS concept was the framework adopted by INBAR for conducting the study. A basic principle underlying the PCS framework is the differentiation of the system flow into subsystems. This is to enable the identification and redress of the major bottlenecks hampering the optimum economic performance of any particular aspect of the system. The interventions developed to address the constraints must assist participants to overcome the constraints and increase benefits earned from their enterprises and resources. The system includes the technologies used to process the material as well as the social, political and economic environments in which these processes operate. In order to generate data specific to the bamboo sector, priority areas were defined through a stakeholder consultation process ascertained from the literature review and responses from key stakeholders (ministries, conservation and development organisations) (Appendix 1). Production areas were chosen for the collection of data on all aspects of the present state of the bamboo sector in those locations.

Study areas

Interviews were carried out primarily in five regions in Cameroon: Centre, Littoral, West, Southwest and Northwest where bamboo production, processing and utilisation are common. Additional data on species location, uses and markets was collected in two regions: Adamaoua and the East. The main data collection locations are shown in Figure 15.

Figure 14. Bamboo (*Bambusa vulgaris*), Korup, Southwest

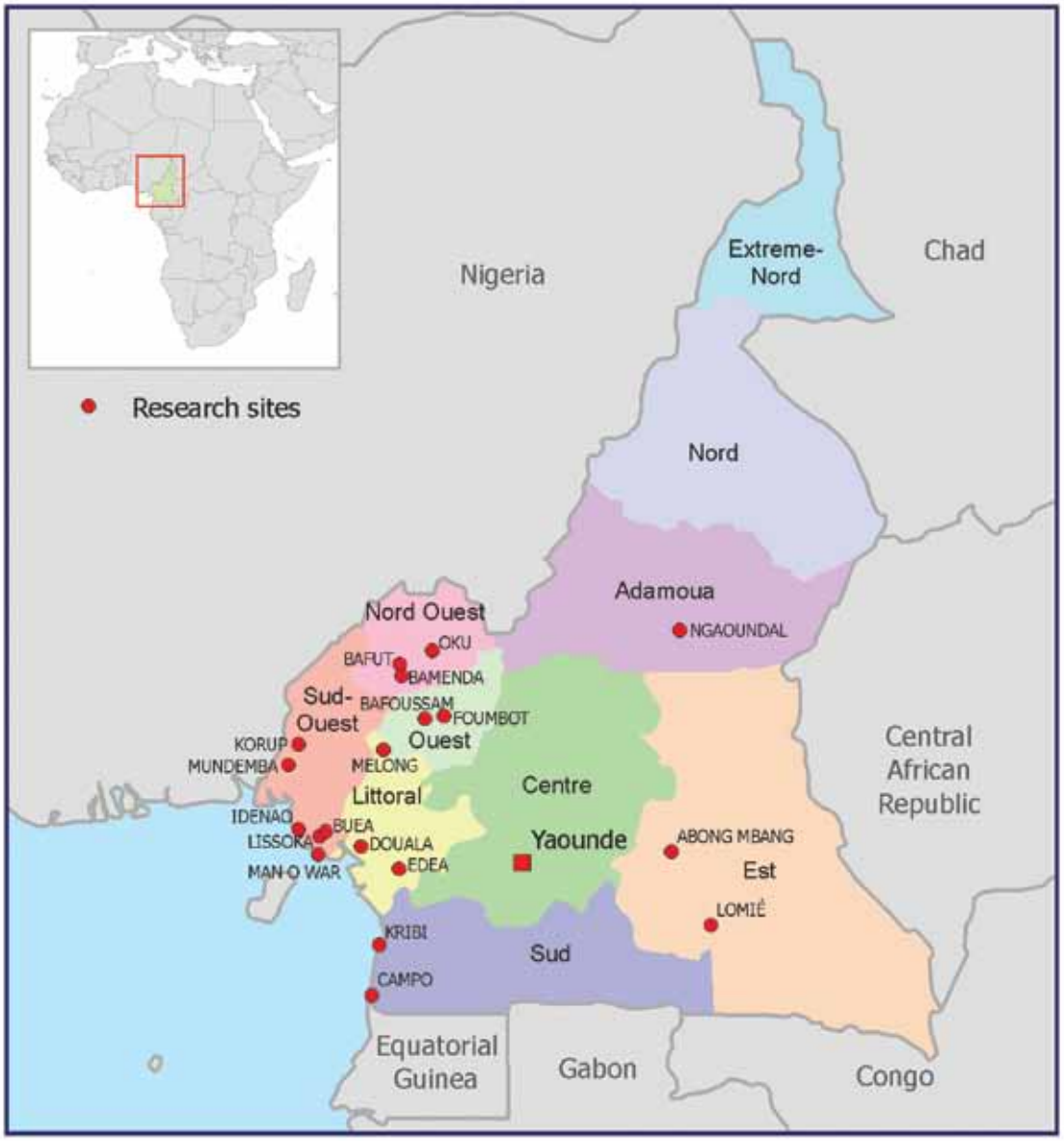

Figure 15. Map of main bamboo harvesting areas in Cameroon

Data collection parameters

General information was sought on the country (geographical, topographical, climate, demography, political, environmental); the bamboo sector (biodiversity, production, utilisation, socio-economic and marketing, legislation; the institutional capacity at the national and local level; and, previous, ongoing and upcoming research and development interventions in the bamboo sector.

As major actors in the bamboo PCS in Cameroon include rural and urban harvesters, transporters, processors, traders and consumers and support stakeholders (Figure 29), information was sought from each of group and collected using semi-structured questionnaires (Appendix 2). Field visits were made to key sites (Figure 15) for observation, consultation and focus group interviews. Actors interviewed are shown in Table 5.

Sampling techniques

At each site, collectors, traders, processors and/or consumers were randomly selected based on their willingness to collaborate in this research. Some actors in the chain, in particular processors in Douala, expressed research fatigue (they provide information to researchers but never get feedback or assistance), however most were willing to cooperate, expressing optimism that collaborating with researchers and development partners was important for the sector's improvement.

Table 5. Bamboo PCS actors interviewed

Actors	Number interviewed	% of total actors
Harvesters	39	15%
Processors	38	15%
Traders	31	12%
Consumers	41	16%
Stakeholders	112	43%
Total	261	100%

Given the study's time and resource boundaries, the number in each group of actors interviewed was less than 40, which represents a small sample size. It is not possible to indicate the proportion of actors in the Bamboo PCS chain that this sample represents. Instead the study aimed to cover a broader geographical area, to provide a current status of the PCS in Cameroon and a basis for future, more in-depth studies.

Data analysis

The collection of data from the field was followed by data entry (using CSPro Version 3.1 computer software), which was checked and then analysed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics were mainly used, as regression analysis could not give meaningful results due to the small sample sizes. Frequency tabulation was used to present the collected information on the various aspects of the PCS. Aggregation and extrapolations were used to pinpoint the bamboo sector's importance to the livelihoods of collectors, traders and processors. Constraints and opportunities were analysed for all actors, but particularly for consumers to furnish information on the development of new products and demand. Potential solutions to the constraints identified and to take advantage of opportunities were identified for collectors, traders and processors. Equations were used to estimate the values of variables for the impact of bamboo-related activities on the livelihoods of actors, with the following equations used:

Collectors' data

(Eq. 1) Total number of bamboo collected per year = Number of trips per month*Number of bamboo collected per trip*number of months in activity per year

(Eq. 2) Total earned per year from bamboo = Total number of bamboos collected per year*unit price of bamboo

(Eq. 3) Total expenditure from hired labour = Total 1+ Total 2 + Total 3
Where:
Total 1 = number of trips per week*4* number of months worked per year* amount paid per person* number of persons paid per trip
Total 2 = number of trips per week*4* number of months worked per year* other expenses per trip*
Total 3 = expenses for royalty/fee/council tax per year

(Eq. 4) Total expenditure = $\sum$ (total expenditure X)
Where X = {hired labour + food + clothing + house rent + school fees medical fees + entertainment + others socials expenditure}

Processors' data

(Eq. 5) Total expenditure on raw materials X per year = Quantity of X used per month* Unit price of X*number of months in activity per year
Where X = {Bamboo, Plywood, Nails, Glue, Vanish, Gas, Petrol and Thinner}

(Eq. 6) Total expenditure on apprentices per year = Number of apprentices* Wage rate per month*number of months worked per year

(Eq. 7) Total other expenditure on Y per year = Quantity of Y used per year* unit price of Y
Where Y = {Knives, Brushes, Benches/tables, Sprayer}

Traders' data

(Eq. 8) Total expenditure = $\sum$ (total expenditure X)
Where X = {goods purchased, transportation of goods, Government taxes/levies/market tolls, store/stall rent, association dues, food, clothing, house rent, school fees, medical fess, funerals, entertainment, other social expenses}

(Eq. 9) Total revenue = $\sum$ (total expenditure Y)
Where Y = {goods (bamboo), farm production, trade in other goods, government work, labourer, remittances, livestock, fishing, others}

3. Results

This section reports on the main findings of the field work, providing first an overview and then detailed information on each group of the main actors.

Overview of the PCS

Actors

Five major groups of actors are found in the bamboo PCS in Cameroon. These actors consist of individual owners of bamboo stands, collectors, processors, traders and consumers. The system in Cameroon is relatively simple with direct links between many of these groups. Indirect actors include those with authority over harvesting bamboo (village chiefs, traditional councils and councils) (Figure 16). It is notable that government authorities are largely absent in the control or regulation of the system's production side, mainly being involved in supporting traders and consumers. Also remarkable is the similarity with the rattan PCS in Cameroon (Sunderland 2001, p250).

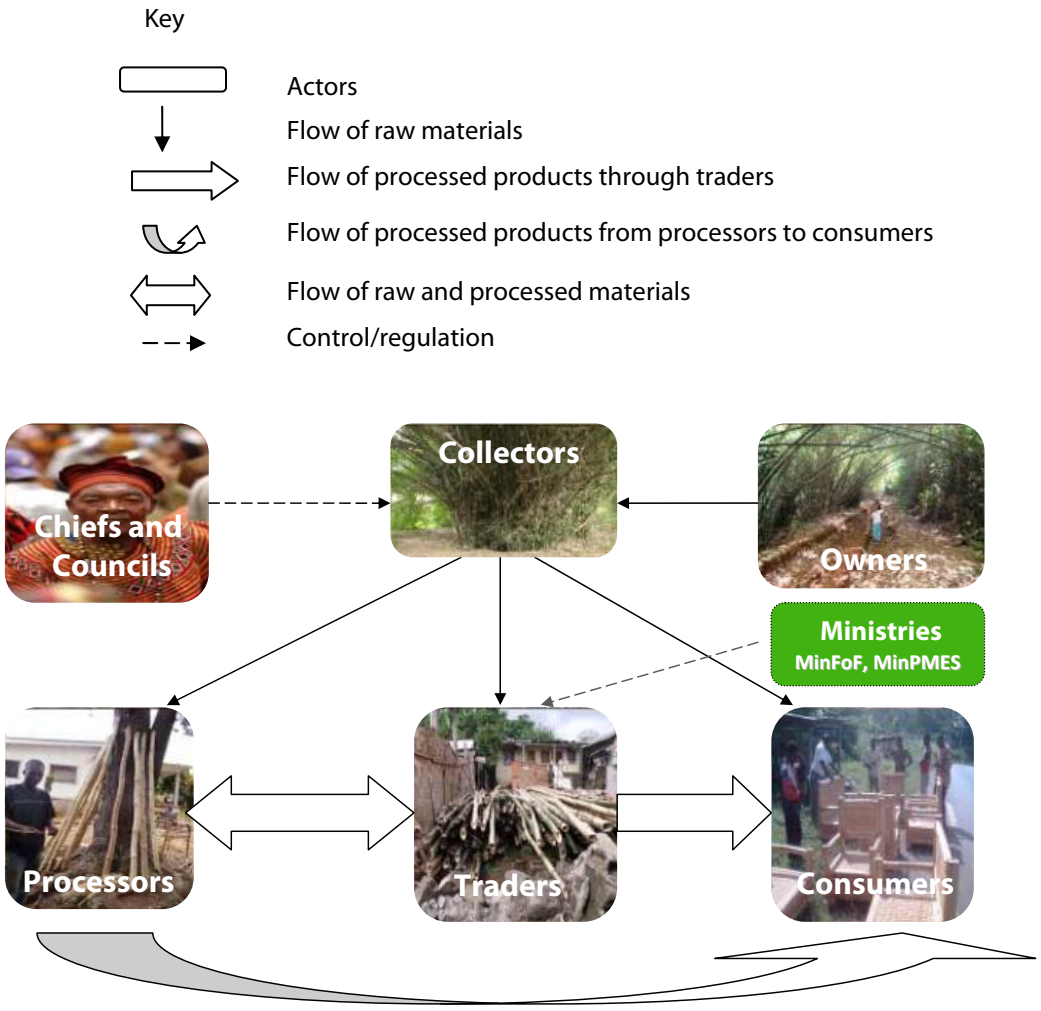

Figure 16. The bamboo PCS in Cameroon

Figure 17. Bamboo (*Bambusa vulgaris*), Yaoundé-Edea road

Location of production and consumption zones

The review of literature and the field work highlighted the geographical areas where bamboo is found in Cameroon, its uses, the actors involved and their contacts. These are described in detail in Table 6. The main production zones in Cameroon are shown in Figure 18, and include the Littoral region around Douala and Edea, in the Northwest around Bamenda, Bafut and Oku, the Southwest around Limbe and the Centre around Yaoundé, with small-scale, local production and consumption in the East around the main towns such as Abong Mbang and Lomie. As the field work did not include Adamaoua, North and Extreme North, bamboo may also be found in these areas but is not included.

Interviews, particularly with key stakeholders, revealed that the non-native *Bambusa vulgaris* is predominately found along rivers and streams and adjacent to current or former settlements. This relation and frequent proximity can be explained by its planting during colonial times and subsequently. A number of stakeholders mentioned that the Germans were particularly influential in introducing bamboo, for agricultural use as supports/poles in plantations. The Limbe Botanic Garden is the best documented example and still exhibits bamboo introduced by the Germans in the 1880s. It appears very likely from emerging ethno-botanic-archaeological research that the majority of bamboo throughout the coastal zone and around the major towns originates from this colonial introduction (Personal communication Marliac).

Trade circuits

As shown in Figure 20, the major and longest trade circuits flow from the production areas to the two major cities in Cameroon; in the Centre, raw bamboo and some processed products are traded from the Edea area to Douala, and from Mblamayo towards Yaoundé. There are also routes to the provincial capitals such as Kribi, Buea and Bamenda from nearby sources. The shortest local routes are from sources in the villages to local consumers e.g. in the East and in the Northwest, such as Oku.

Processing

The literature indicates that the main processing practices and technologies in Cameroon are basic. For

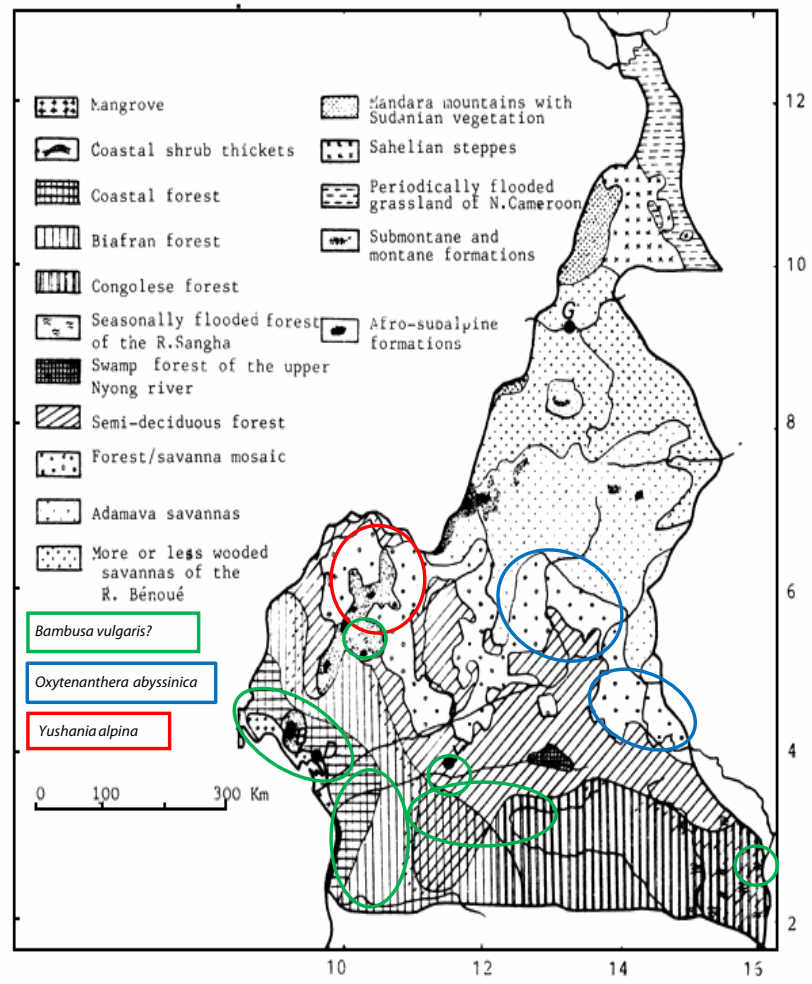

Figure 18. Major bamboo production zones in Cameroon
Source: Adapted from Letouzy 1985

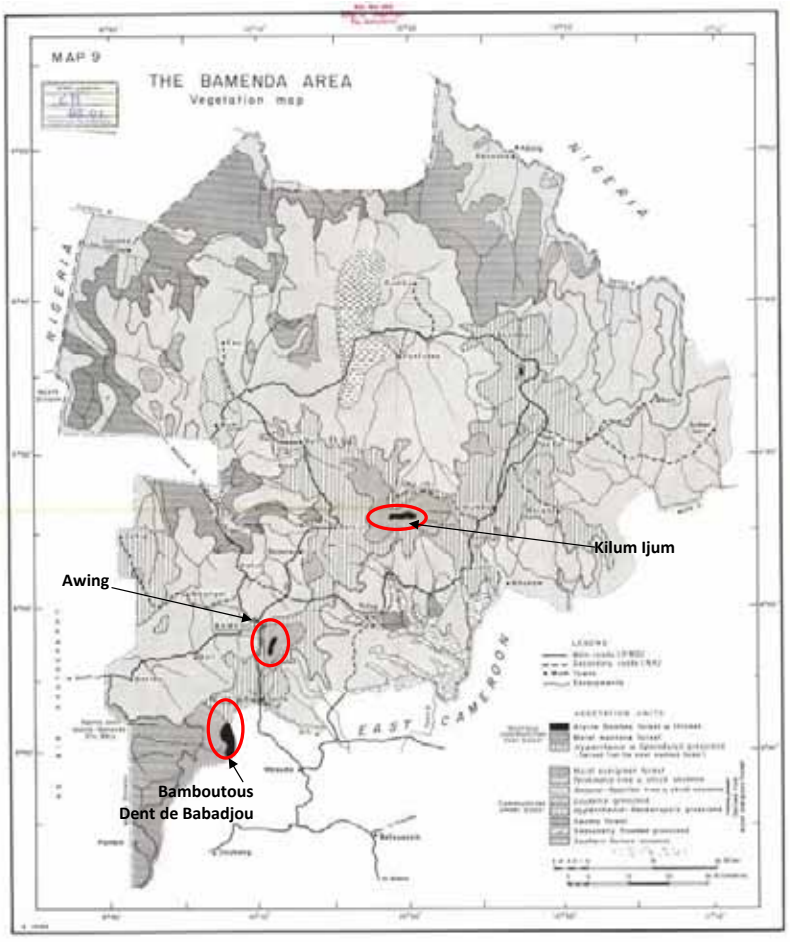

Figure 19. Major bamboo production zones in the Northwest region
Source: Hawkins and Brunt 1965

Table 6. Geographic location of bamboo production, processing and consumption in Cameroon

Geographical area		Uses	Species	Contact	Reference
Region	Village or area				
Southwest	Ekok-Mamfe road, Mamfe-Otu road	Bamboo for construction and smoking/ processing of *Irvingia* spp.		University of Buea	Nkwatoh 2005, Nkwatoh personal communication
	Buea, Muea, Molyko, Bokwango, Bonananjo, Bonakanda and Bokwai	Used in agriculture (supports for yams and plantains), roofing and cladding of houses, TV antennae masts and occasionally for fencing.	Locally called 'Ekoko', 2 species locally differentiated by colour: green and yellow.		Field work
	Bimbia, Tiko, Mutengene, Limbe and Idenau	House construction — particularly decoratively in bars and restaurants, fences, TV masts, supports and tools for the large scale rubber and banana plantations.	*B. vulgaris,* commonly called Indian bamboo	Cameroon Development Corporation/Del Monte banana plantation	Field work
	Kumba			CWU Cane Workers Union	Dione *et al.* 2000
	Takamanda, Mamfe	Bamboo fish smoking racks			Mdaihli, Schmidt-Soltau and Ayeni 2002, Comiskey, Sunderland and Sunderl and-Groves 2003
	Korup	Bamboo fish smokers, poles, construction		Korup Naitonal Park, Kreo Krogan NGO	Ingram personal observation
	Mt Kupe			Kew Botanic Gardens, National Herbarium	Cheek *et al.* 2004
	Bimbia Bonadikombo, Manyu and Meme Divisions extensively along the Kumba Mamfe stretch, in Buea, Limbe, Lebialem and Mundemba.	House construction, smoking fish, tools		Bimbia Bonadikombo Community Forest	Mokoua personal communication 2009, Ako personal communicaiton 2009
	Bachuo'ntai and Eyumojock — Manyu Division, Buea, Limbe	Construction, furniture, poles, crafts		Centre for the Environment and Human Development (CEHDev), Presraft	Tabot Tabot 2006; CERUT-AIDEnvironment 1999, Ingram and Tieguhong personal communication
	Ejagham, Ossing , Kembong, Besong-Abang	Construction and smoking/processing of Irvingia			Tchoundjeu, Atangana, and Degrande 2005

Geographical area		Uses	Species	Contact	Reference
Region	Village or area				
South	Bidjap, Nko'ovos, Ondodo	Construction and smoking/processing of Irvingia			Tchoundjeu, Atangana, and Degrande 2005
	Campo and Maan	House construction, smoking fish, tools		Village heads in Nko'leon, Ebodje, MinFoF and WWF in Campo	Field work Ingram personal observation2009
West	Badeng		Exotic small diameter	Chief Badeng	Field work
	Bafoussam	Transformation almost nonexistent, one single basket maker specialised in Bamboo. Support for agricultural crops. Ornamental plant and hedges	Exotic? Thin B. vulgaris?		Field work
	Foumbot	Agricultural supports, houses and fences for livestock	B. vulgaris, medium and small diameter		Field work
	High plateau Dschang, Bamboutous	Fencing, construction			Gautier 1992
	Santchou and Dschang Bangante	Construction; water pipes — for agricultural irrigation and for livestock; fencing in compounds and supports for party tents for funerals		APADER Bangangte	Ingram and Tole personal observations, Kwidja personal communication 2009
Littoral	Douala to Limbe route (Littoral to SW)	Poles to support banana trees as props and keep upright	B vulgaris sourced from swampy areas	CDC and/or employees? Unclear who collects/owns/ harvests	Tole personal communication, Nwatoh personal communication, Assenge Ze personal communication
	Edea to Douala Song Longe, Ekitie	Fences, television antennae, supports for agriculture, fencing, verandas and fuelwood, supply for craftspersons in Douala	B. vulgaris	Mr. Hubert NTSAMA	Field work
	Melon	Fencing, porches, supports for agriculture and TV antennas	Small diameter clumps	Two species, large and small diameter	Field work
	Kribi and route to Douala	Fencing, supports for agriculture, TV antennas			Field work
	Douala Mboppi, Marché de Fleur and Bisegué. Nkolouloun market	Trade centre for bamboo for poles, utensils, furniture and crafts, dining tables, shelves, beds, stools, flower pots, cabinets, chairs, doors, blinds. Sourced from environs of Douala and Edea	B. vulgaris	AVACA cane and bamboo craft union - 2 harvesters	Tieguhong and Assenge Ze personal communications

Geographical area		Uses	Species	Contact	Reference
Region	Village or area				
East	Abong Mbang	Support and protect plantains, musical instruments, locally used, not sold	B. vulgaris		Field work
	Djembe and Lobeke	Locally for construction, a favourite food for elephants which browse on the bamboo leaves at night	B. vulgaris	WWF Djembe and Mambila Poste, Lobeke National Park	Field work
	Bouno, Gribi	Bamboo for construction and smoking/ processing of Irvingia			Tchoundjeu, Atangana, and Degrande 2005
	All swampy forest areas	Pygmy children use as whistles for fishing to attract fish	Small size, finger thin, grows only in swampy areas in dense forest		Tole personal communication 2009
Centre	Nkom I, Elig-Nkouma, Ngoumou	Construction and smoking/processing of Irvingia spp.			Tchoundjeu *et al.* 2005
	Mbalmayo	Furniture, house construction		Ferrudjal	Chupzei personal communication, Ndongo personal communication
	Zamakoe	Furniture and small household articles, intense harvest and some planting, unorganised craftspeople			Field work
	Bipindi-Akom II	House construction	B. vulgaris		van Dijk 1999
	Yaoundé (Omnisport, Orthodox Church, Nkol-Eton, Bastos and Mvog Mbi)	Furniture and small craft articles	B. vulgaris and exotics	RAVAN - Cane Workers Union, GIC Unibakou	Dione *et al.* 2000. Françoise Nwatoh personal communication, Come personal communication Field work
Adamaoua	Ngoundal	Hives for beekeeping, construction and tools	Oxytenanthera abyssinica in groves and isolated clumps, often swampy river areas, also planted	Paella/Guiding Hope	Soukontoua, Mfomou, and Howard 2007, Ingram personal observation

Geographical area		Uses	Species	Contact	Reference
Region	Village or area				
North West	Bamenda	Cups, whistles, flutes, wind charms, door-curtains, and blinds — sometimes combined with raffia nuts, raffia twine and raffia wood	B. vulgaris	NW Craft Association NOWECA Cane and Bamboo Group CABCIG Cane and Bamboo Workers Common Initiative Group, PRESCRAFT, Bamenda Handicraft Centre	Dione *et al.* 2000, Nwatoh personal communication, http://www.paco.el-puente.de/Prescraft/about.html http://artisanwork.org/artisan-profile/prescraft, http://www.bamendahandicraft.org/product_category/bamboo Field work
	Bali	Cups, whistles, flutes, wind charms door-curtains, and blinds — sometimes combined with raffia nuts, raffia twine and raffia wood — locally sold and for export/retail sale	Y. alpina	Prescraft	Field work
	Bamenda, Kumbo, Oku, Bali Nyonga, Cross River	Construction of houses and palaces, traps, fencing, animal cages, flutes and musical instruments, baskets; cultural implications e.g. use in masks and in palaces (Preston 1981, Warnier 1993)	B. vulgaris Some Y. alpina (Often confused with Raphia)	WHINCONET (particularly former KIFP and BHFP staff)	Cheek, Onana, and Pollard 2000; Maisels and Forboseh 1999; Lauber 1990 Field work
	Bafut, Wum	Small craft articles, musical instruments, cups, whistles, flutes and blinds, basic furniture- often with rattan	Three types, green and differentiated by size — one B. vulgaris	Fons palace Prescraft	Field work
	Oku	Paper making, hair combs, cups, traditional spears, containers, water conduits, musical instruments	Y. alpina	Kilum Forest Craft Paper Cooperative (KFCPC), Bamenda University of Science and Technology (BUST)	Knopfli 2001, http://www.flickr.com/photos/nathanconkey/sets/72157607083425700/ Field work

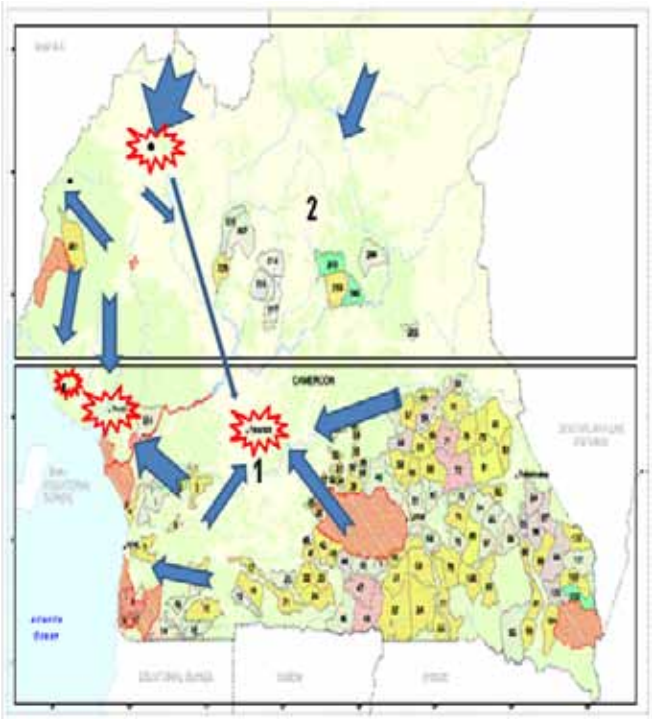

Figure 20. Major trade circuits
Source: Adapted from GFW 2005

Figure 21. Bamboo herb drying rack, Babungo, Northwest

construction use as **poles** and for **furniture**, the only processing appears to be cutting and some rudimentary air drying (in the open or under the eaves of houses). For **tools, utensils** and **crafts,** basic (air or under eaves) drying and processing has been noted, followed by crafting, burning, carving, lacquering and fabrication — often in combination with other materials e.g. wood, rattan and metal.

In Kilum Ijum near Oku, bamboo has been used for **paper making**; the technology was introduced by the Kilum Ijum project in the 1990s (Nurse *et al.* 1995)

While a number of articles mention in passing that bamboo is used in Cameroon for construction, little specific information exists on the actual products, location or markets (Burgener 2007), with only two main types of products and their uses distinguished:

1. Where indigenous bamboo is found (notably in the Northwest and Adamaoua), there is a longer history of use, particularly for **house construction,** and **infrastructure** such as **water conduits/ pipes** and **containers (beehives)**. Recorded use of bamboo dates back about 60 years to the British colonial administration period (Kaberry 1952) for **firewood,** and diverse products including **household tools, traps, baskets and traditional rucksacks, crafts and musical instruments**.
2. Where introduced bamboo is found, it is used mainly for the most 'obvious' use of **construction, furniture** and a variety of **tools, containers** and **utensils**. However, even given at least a 30-year history of use for construction (Mundi 1978), the range of bamboo products produced in Cameroon is narrow when compared with Asia.

The level of processing found in the literature review was confirmed during the field work, as predominantly basic two-stage processing (Figure 22). Primary processing is conducted largely by the processors themselves and consists of cutting and drying. During the drying process, infestation and storage can be a problem with several processors (particularly in the more humid and wetter areas such as Edea and Oku) reporting losses due to rot or insects. The secondary processing stage is to transform bamboo directly into products though carving, carving, fabrication, lacquering and, the most complex process encountered, into paper. The range of processed products typically is limited to specialisation — with very few producers creating a wide range of different products. Thirteen groups of bamboo products, totalling 44 product types, are created in Cameroon (Box 2).

Stakeholders

The major stakeholders in the chain are shown in Figure 14, and can be classified into four main groups:

1. **Active:** Owners, harvesters/collectors, producers/ craftspersons and traders/retailers.
2. **Passive:** Regulatory, support and control by the government could currently be described as passive with no active policies or regulation by competent ministries such as the Ministry of Forestry and Wildlife (MINFOF), the National Agency for Reforestation (ANAFOR) or the Ministry of Agriculture and Rural Development (MINADER). Within the craft sector, the Ministry of Small and Medium Enterprises provides some indirect support for production from small and medium

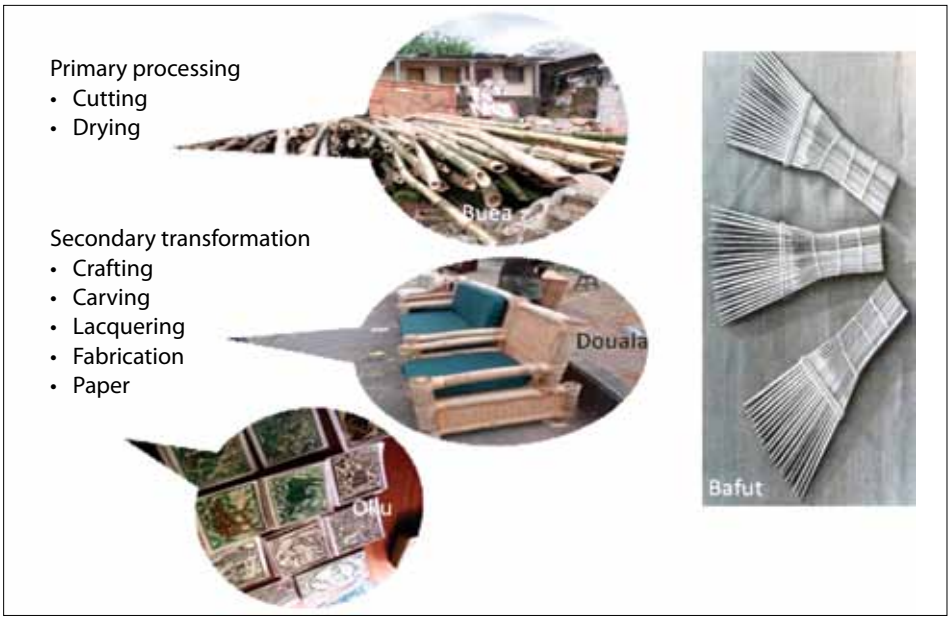

Figure 22. Bamboo processing in Cameroon

Box 2. Bamboo products produced in Cameroon

1. Furniture (tables, stools, chairs, sofa, beds, shelves, cupboards, racks, hanging screens)
2. Fencing and hedges (live and poles)
3. Construction material (poles, house supports, doors, scaffolding, roofing, ceilings, wall cladding, TV aerial/ antenna masts)
4. Utensils (combs, drying racks, smoking racks [fish and *Irvingia spp*.], cups, containers, soya sticks, small tools and handles)
5. Baskets and containers (food containers, flower pots, beehives)
6. Hunting implements (spears, traps, cages, bow and arrows)
7. Agriculture supports (beans, bananas and rubber)
8. Water pipes
9. Musical instruments (whistles, flutes, rattles, wind chimes)
10. Ornamental and decorative planting
11. Fuelwood
12. Paper
13. Food (wild animals, particularly elephants)

crafts enterprises, but this is not specifically for bamboo. No regulation or standards apply to consumption e.g. furniture standards or safety of bamboo scaffolding.

3. **Unconnected:** This group of stakeholders is present or active in Cameroon and possesses technical knowledge and skills concerning bamboo, and related topics such as agroforestry, but members are currently not active in the sector or have no or little connection with other stakeholders, specifically on the topic of bamboo.
4. **Absent:** No development or support organisations are currently working in the sector. In the past, the

Figure 23. Bamboo and mud wall, Oku, Northwest

Figure 24. Traditional bamboo spear, Oku, Northwest

Figure 25. Bamboo clad restaurant and furniture, Buea, Southwest

Figure 26. Bamboo and rattan chairs, Douala, Littoral

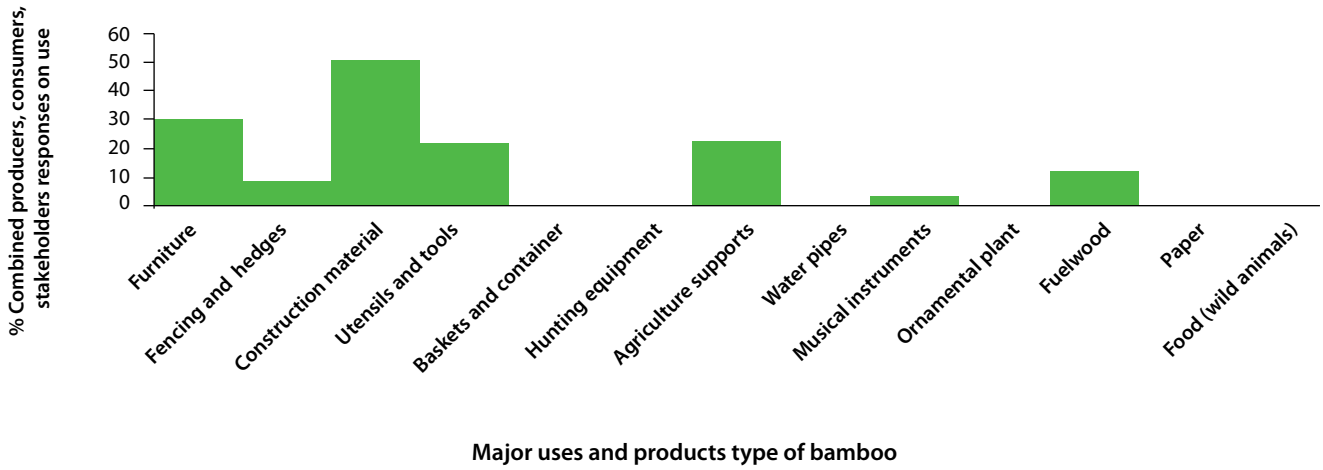

Figure 27. Frequency of bamboo product types/uses in Cameroon

Figure 28. Bamboo based paper making process, Oku, Northwest

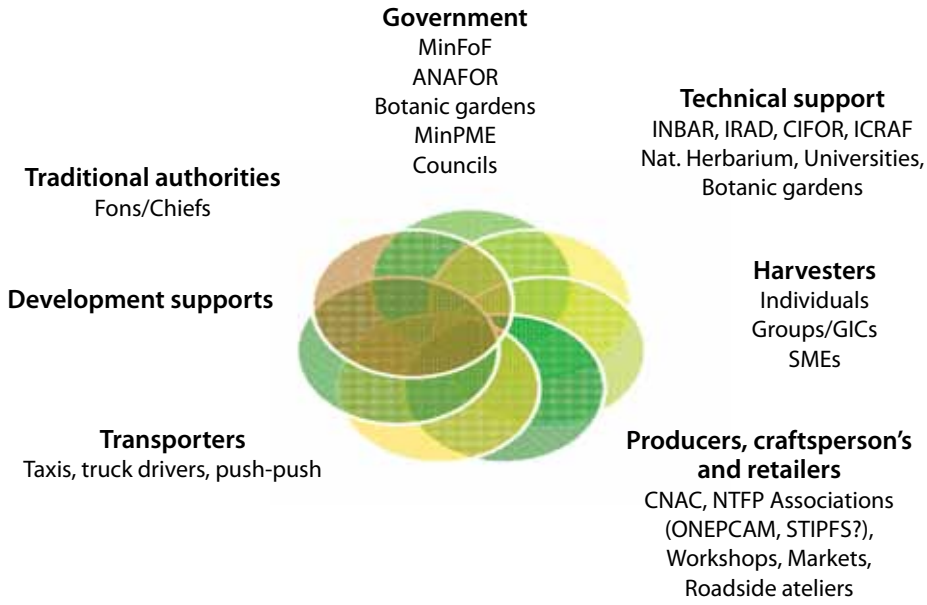

Figure 29. Stakeholders in the bamboo PCS Cameroon

only known development stakeholder was the paper making expert from the Kilum Ijum Forest Project in Oku around 2000.

Actors in the PCS

Bamboo harvesters

Socio-demographic profile of harvesters

In the five regions of Cameroon, 39 bamboo collectors were interviewed: 36% from the Southwest, 3% in the Northwest, 18% in Littoral, 10% in the Centre and 33% in the West regions.

Most of the bamboo collectors were males (90%); 85% of the collectors were native to the collection area, while 15% were migrants. In general, harvesters have a low level of education, with 13% having no formal education and only 3% with a university education, as shown in Table 7.

Income generation sources for bamboo harvesters
Farming was the major source of revenue for 56% of harvesters, with bamboo contributing to 18% of household incomes (Figure 30).

Slightly more than a quarter (26%) of harvesters classify bamboo collection as their major occupation or activity, alongside farming (23%), unskilled labour (10%) and herbal practices (10%) (Figure 31).

Analysis of the number and gender of household members involved in bamboo collection (Table 8) indicates that the number of men, women, boys and girls in a given household varied from 1-5 (mean=1.28, SD=0.83), 0-7 (mean=0.51; SD = ± 1.3), 0-7 (mean=0.31; SD= ± 1.24), and 0-2 (mean=0.05; SD= ± 0.32) respectively. Most bamboo collectors (77%) asserted that bamboo covered less than 33% of their community land. The estimated land area covered by bamboo in each community varied from 1-20 ha with a mean of 6.05 ha (SD=4.94 ha), totalling 115 ha.

Description of the bamboo harvest system

Land tenure and access to bamboo

The harvesting of bamboo is carried out in a team, comprising the harvester and transporters. The majority of bamboo is open access (69%) and not 'owned' by individuals unless it is found on their land (31%) (Table 9).

For collectors who own bamboo stands, the size varied from 1-20 ha, with a mean of 9.25 ha (SD= ± 4.99 ha). When bamboo is owned it is usually a grove claimed by a village or individual, sometimes physically with a sign, such as in Nko'oleon near Campo-Maan national park and Bimbia Bondadikondo community forest near Limbe in the Southwest. Around the Southwest towns of Buea and Limbe, and villages of Muea, Molyko, Bokwango, Bonananjo, Bonakanda and Bokwai, bamboo harvesting is free, but verbal authorisation from the landowner or caretaker must be sought. In Muea consumers also buy from neighbouring villages. When asked who controlled or owned the bamboo land, 62% of the harvesters said the land belonged to the landowner, 21% indicated it belonged to the chief and 8% said that bamboo land was the property of everybody in the community (Figure 32).

Table 7. Education level of harvesters

Educational status	Frequency	Percentage
None	5	13
Primary	19	49
Middle	4	10
Secondary school	10	26
University	1	3
Total	39	100

Concerning harvesting rights, 56% of collectors stated that only local people from the area were permitted to harvest bamboo, while 44% indicated that anyone could. According to the harvesters, access to bamboo harvest rights in their communities could be by permission (48.72%), negotiation (25.64%), open access (17.95%) and purchase (7.95%). Payment for collection was made in the form of royalties (33%), rent (15%), council tax (11%) or a proportional commission based on quantity collected (7%). The total amount of money paid per year as rent, tax, royalty or commission ranged from zero to 21 000 CFAF, with mean of 7537 CFAF (SD = ± 6566 CFAF), totalling 203 500 CFAF for 27 collectors. In terms of proportion, 44% of this amount was paid to chiefs, 28% to land owners, 22% to councils and 6% to compensate collectors' family members. Most collectors (39%) were of the opinion that the payments were cheap, 28% thought payments were reasonable while 33% considered such payments to be exorbitant.

Access to bamboo differed between harvesters. The majority (45%) were of the opinion that they did not need to pay to collect bamboo, as it is considered to be the property of the whole community. However, 22% indicated that bamboo was invasive and was destroying agricultural land, thus collecting it constitutes a 'fight' against the extension of the area of community or personal land covered by bamboo, and 22% believed that bamboo was under-valorised in their community, while 11% had social ties with the chief, which permitted them to harvest freely.

Management and control of bamboo stands

When collectors were asked how bamboo stock in their area was regenerated, 57% stated naturally, 6% planted and 28% indicated both natural and planted. In terms of local regulatory mechanisms and practices that govern the management of available stock, collectors mentioned that only the chief authorised harvesting (46%), only people with long experience in bamboo harvesting were allowed (46%) and a small 8% said that open harvesting was permitted.

Level of harvesters association

The harvesting of bamboo is most often made up of a team (collectors and transporters); however these people usually work together and share payment, or work for a fixed fee, but do not share profits. Of the 39 collectors interviewed, only 13% belonged to an association related to bamboo. A total of five associations were mentioned by collectors in the five regions studied. Membership varied from two to 60 people, with a mean of 27 people (SD=26 people), totalling 134 people for the five associations. Sixty per cent of associations were mainly for collectors while 40% also included some processors. These associations (names were not registered by enumerators) were created between 1985 and 2009, including two created in 2002. A cross-table of the type of association and its objectives showed that collectors formed associations with the intention to develop and render the bamboo sector more dynamic. Improving living standards and the dynamics of the bamboo sector were the reasons for creating or joining processors' associations (Table 10).

For collectors within associations, the benefits gained or expected from the associations included acquiring capital (60%), easier access to raw materials (20%) and assistance to build a house (20%).

Seasonality and quantity of bamboo collected

Most bamboo collectors (51%) harvest bamboo throughout the year. Others harvested only in the dry season (44%) while 5% harvested in the rainy season only. The approximate number of months spent in collecting bamboo per year ranges from 2 to 12 months, with a mean of 8 months (SD=4.4 months). The number of trips per month varied from once a month to every day with a mean of nine trips (SD=8.05 trips per month). The duration of a bamboo collection trip varied from 30 minutes to 12 hours, with mean of 4.08 hours (SD=2.74 hours). The number of bamboo stems harvested per collector also varied from a minimum of five to a maximum 6000 bamboo stems with a mean of 601 bamboo stems (SD=1144 bamboo stems). For the 39 bamboo collectors, a total of 23 425 bamboo stems was collected per year.

Totalling the number of bamboo stems collected per year indicates that most collectors harvest on a small-scale. The majority of collectors (74%) harvest less than 500 bamboo stems per year while about 8% harvest more than 2000 bamboo stems per year. The species collected and the number of stems collected showed that most collectors that harvested large green bamboo actually harvested less than 500 bamboo stems per year. Those that harvested small-sized bamboo tended to harvest more than 1000 bamboo stems per year (Table 11).

Species preferences and reasons

The most common bamboo species were large, dark green bamboo (*B. vulgaris*) (74%), followed by small-sized green bamboo (16%) (the species was not

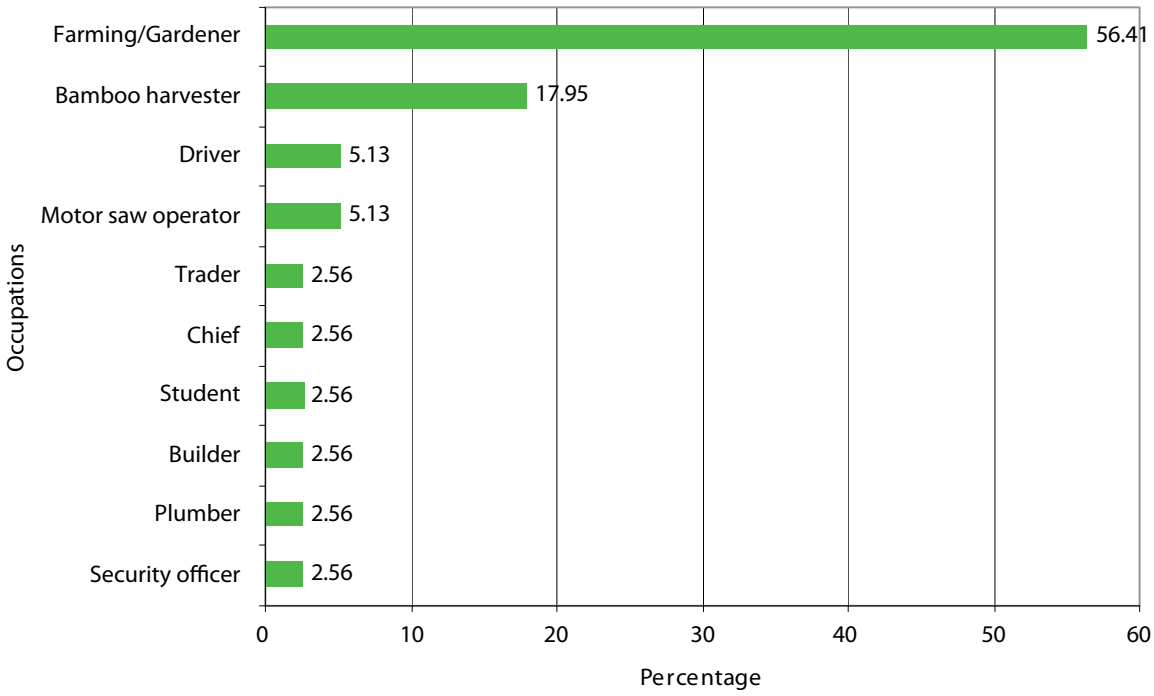

Figure 30. Sources of income for bamboo harvesters

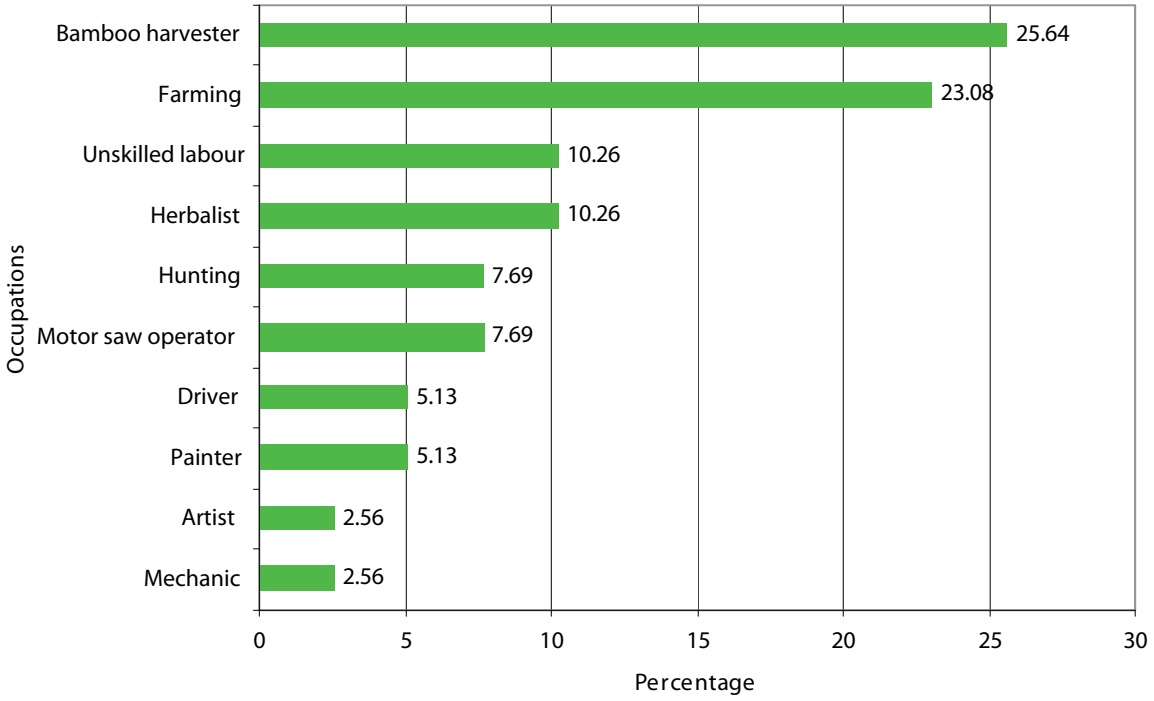

Figure 31. Stated profession of bamboo harvesters

Table 8. Socio-economic profile of harvesters

Variables	N	Minimum	Maximum	Sum	Mean	Std Deviation
Age of respondent	39	19	84	-	44.03	17
Gross income major occupation per month	39	5000	300000	1774000	45487	50559
Gross income minor occupation per month	20	5000	80000	669000	33450	22975
Household size	39	1	47	265	6.79	8
Men >15years	39	0	10	82	2.10	2
Women >15years	39	0	12	81	2.08	2
Children: boys <15 years	39	0	8	50	1.28	2
girls <15 years	38	0	17	53	1.39	3
Number and gender of household members involved in bamboo co	39	1	11	81	2.08	3
Men	39	1	5	50	1.28	0.8
Women	39	0	7	20	0.51	1
Children: boys	39	0	7	12	0.31	1
girls	39	0	2	2	0.05	0.3
Approximate area community land (ha)	19	1	20	115	6.05	5

Table 9. Ownership status of bamboo stands per region

	Do you own any bamboo?			
Region	Yes	No	Total	Percentage of total respondents
Southwest	7	7	14	36
Northwest		1	1	3
Littoral	1	6	7	18
Centre	2	2	4	10
West	2	11	13	33
Total	12	27	39	100
Percentage	31	69	100	

determined), yellow bamboo (*B. vulgaris* variety *vittata)* and medium-sized green (species not determined, probably *B. vulgaris*) bamboo (5% each).

The most preferred bamboo species (Figure 33) were the large green 'Indian' bamboo (41%), medium-sized green bamboo (13%), small-sized bamboo (23%) and yellow bamboo (23%). The reasons stated included attractiveness (28%), availability (28%), ease of transportation (21%) higher demand (18%) and higher resistance (5%) (Table 12). This may also be linked to availability, as these are the most common species.

Harvesters quality criteria

Collectors identified six quality criteria: maturity, age, height, resistance to insects and rotting, size and the colour of leaves (Table 13).

Collectors mainly differentiate between species by colour, size or diameter (62%) and by colour alone (38%). According to the collectors, the length of bamboo harvested varied from 3-20 m, with an average of 7.15 m (SD=3.65 m).

The tools and inputs required for bamboo harvesting include both commonly used tools, such as a cutlass (used by 100% of harvesters), and more specialist utensils such as files (used by 39%) and saws (3%). According to harvesters, bamboo harvesting is a three-step procedure: making the area accessible, looking for mature bamboos and then carefully cutting. Harvesters perform repeat harvests in the same area. However, only 26% of harvesters were aware of a sustainable harvesting method for bamboo (defined by harvesters as not destroying the total plant and roots). The remainder of harvesters were not aware of this term's meaning.

Distance to harvest sites and transport methods

Head-portering was the most common means of transporting bamboo, reported by 85% of harvesters; 13% used vehicles while 3% used motorbikes.
The distance from the village to the bamboo resource varied from 1-20 km, with an average of 3.23 km (SD=3.83 km).

After collection, bamboo was normally stored near the harvester's house (36%), at the place of harvest in the forest (33%), transported to the village centre (26%) or assembled in a school premise (5%).

The amount spent per person in collecting bamboo per trip varied from 200-3000 CFAF, with an average of 1132 CFAF (SD=919 CFAF). The total amount spent by 17 harvesters per trip was 19 250 CFAF. The number of people in a bamboo collection team varied from one to nine, with mean of three (SD=1.82), totalling 115 people for the 39 collectors.

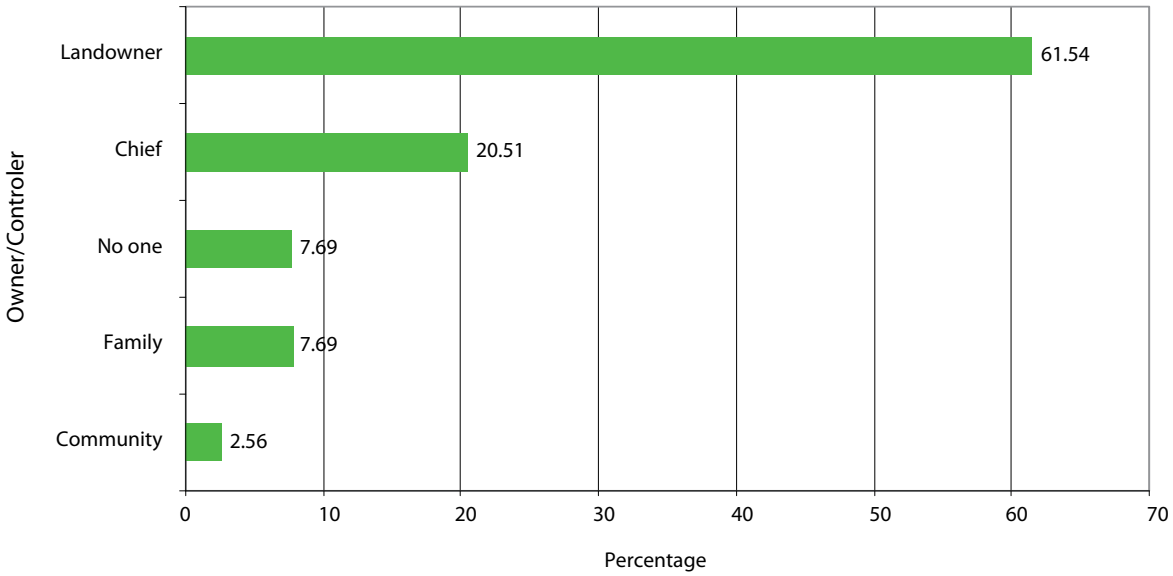

Figure 32. Land ownership status

Bamboo harvesting was financed from three sources: advanced payment from clients (47%), sales of farm products (41%) and sales of handicrafts (12%). The majority (64%) of harvesters reported that sometimes they reject stems; on average seven bamboo stems (SD=10), with a wide range from one to 50 bamboos, were rejected totalling 166 stems per trip by 25 collectors. The main reasons included immaturity (56%), accidental harvest such as unintended cutting of stems, often due to poor tools (28%) and bad quality (16%).

Own consumption and factors influencing harvest

Some 77% of collectors used at least some of the bamboo for their own household use. About 80% used it to construct huts, fences, yam props, supports for plantain and bananas, etc. Seven factors affect the quantity of bamboo harvested per giving period, most importantly accessibility (33%), followed by resource availability and demand (18%) (Figure 34). The season and labour availability were also significant factors, whereas the quality, infestation and snakebites were the least deterrents. The type of disease or infestation observed include unspecified insects (67%), stains (23%) and rot or decay (10%).

Markets for bamboo

Bamboo collectors largely sell their bamboo in local markets (41%), at home (28%), at collection point (21%) and in urban markets (10%). The main buyers are processors (44%), farmers for agricultural use (23%), middlemen (18%) and builders (15%). Direct cash payment prevails as the main purchasing arrangement for 62% of transactions, followed by advance payment (33%) and credit (5%). Around Buea and Limbe, collectors consume a proportion themselves and sell upon demand to clients who are mostly bricklayers in Buea and Muea, who use the bamboos for scaffolding.

Contribution of bamboo to harvesters' livelihoods

The annual total net household income for the 39 bamboo collectors interviewed was 9 899 425 CFAF. There was, however, a wide variability, ranging from 700 CFAF to 2 700 900 CFAF, with an average of 252 831 CFAF (SD=447 927 CFAF).

The vast majority (79%) of collectors were satisfied with the income they earned from bamboo harvesting; but 72% had no idea whether bamboo grading could command a better price. Only 15% of harvesters also

Table 10. Types of harvesters associations and objectives

Main objective of this association	Type of bamboo association		Total	Percentage of respondents
	Collectors	Processors		
Develop and dynamise the bamboo sector	3	1	4	80
Improve living standard of members		1	1	20
Total	3	2	5	100
% of respondents	60	40	100	

Table 11. Quantity of stems harvested per year and species

Bamboo species	Total number of bamboo stems harvested annually					Total	Percentage of respondents
	0 - 500	1000 -1500	1500-2000	500-1000	>2000		
Large green (B. vulgaris)	25	1		2	1	29	74
Medium sized green bamboo	1		1			2	5
Small sized green bamboo	1	2		1	2	6	15
Yellow bamboo (B. vulgaris)	2					2	5
Total	29	3	1	3	3	39	100
%	74	8	2	8	8	100	

Table 12. Preferred bamboo species and reason

Most preferred species	Reason					Total	Percentage of respondents
	Higher demand	Attractive	Availability	More resistant	Easily transported		
Large green (B. vulgaris)	2	5	6	1	2	16	41
Medium-sized green bamboo	3	2	2		2	9	23
Small-sized green bamboo	1	2	1	1		5	13
Yellow bamboo (B. vulgaris)	1	2	2		4	9	23
Total	7	11	11	2	8	39	100
%	18	28	28	5	21	100	

Table 13. Factors determining bamboo quality

Factor	Frequency	Percentage of respondents
Maturity	17	44
Resistance to insects	4	10
Age	7	18
Height	7	18
Size	3	8
Leaves (colour)	1	3
Total	39	100

processed part or all of their harvest into other products: the majority sold only raw bamboo.

Eight income portfolios were identified in the household revenues of bamboo collectors. Annual household income from bamboo varies widely ranging from 1625 CFAF to 2 880 000 CFAF, with a mean of 236 208 (SD=467 712 CFAF). This variability was consistent for all income sources and is shown in Table 14. The primary source of collectors' household income was from bamboo (36%), followed by agriculture (32%).

Household expenditures

Among the work-related expenditures, hired labour/tax/area rents incurred during bamboo collection were the largest source of expenditure (60%) followed by purchasing food (Table 15).

Figure 33. Samples of bamboo species found in Cameroon

Processors

Socio-demographic profile of processors

A total of 38 processors, also known as craftsmen, all males, were interviewed. The majority (87%) were native to the area of activity and 13% were migrants. More than 80% of those interviewed were in the Littoral and Centre regions of Cameroon (Table 16).

The educational status of processors is generally slightly higher than collectors, with 3% of processors

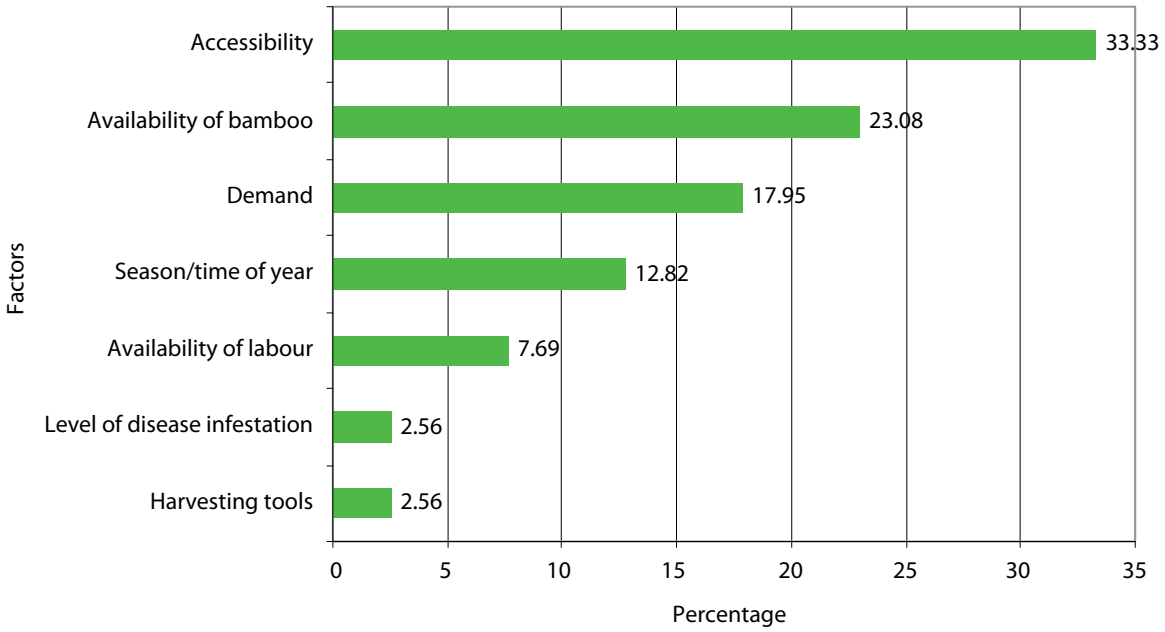

Figure 34. Determinants of quantity of bamboo harvested

having no formal school while 53%, 16%, 24% and 5% respectively had primary, middle, secondary or university education. Their ages ranged from 19 to 38 years old with a mean of 36 (SD= ±10.9 years). Similar to processors, 32% were single and 68% married. On average, processors have been in the sector for 11 years with a large variation from 1-30 years (SD= ± 6.9 years)

Crafts were the main source of income for processors, followed by farming (Table 17), indicating the high level of specialisation in this profession.

The mean household size for a processor is 5.55 inhabitants (SD=3.37), varying from one to 14 people. The average amount of time processors have been working in the sector is 11 years (SD= 6.9 years), with a wide range from 1-30 years. No entry barriers into the bamboo processing business were identified, as most processors are motivated by their friends (21%), because they lack alternative employment opportunities (18%) or are encouraged by an expatriate (5%) (Figure 35).

Source of bamboo

Processors in Yaoundé mainly obtain get their bamboo within 40 km from the city centre along the route to Mblamayo, including Bankolo, Nsimalen, Soa, Nkolbison, Nkol-mefou I, Mokombou, Nkol-Afamba and Ekali II. Processors in Douala sourced their bamboo from the collection centre at Nkololoun market, which in turn comes from around Edea. Foumbot was a major source of bamboo for processors in the West region while Wum and community lands in Bafut constitute the major sources of in Bamenda. Bamboo in Oku was sourced from bamboo forest zones in the Kilum—Ijum forest, and, in the Southwest, Man-O-War Bay is a major source for the Muea market in Buea.

Organisation of bamboo processing enterprises

An analysis of the position of processors within their enterprise indicates that 76% owned their workshops, 16% were assistants, 5% were chief assistants/ apprentices and 3% were overseers/supervisors.

Only 13% of the workshops were legally registered. This situation of informal, small enterprises is comparable to other sectors in Cameroon, notably NTFP processors and harvesters and small processors and crafts, where the majority operate informally (Northwest Crafts Association personal communication, Ingram 2009). Among those that were registered, 40% were registered with the Chamber of Commerce, while 40% were Common Initiative Groups — a legal form of small enterprise in Cameroon — such as GIC FARMROLI (20%) and APVF/GIC PROFOPEC (20%). A fifth (20%) of organisations were registered with the Ministry of Small and Medium Scale Enterprises (MinPME). An example is the association of processors, Prescraft Bafut, where processors come together to share ideas and organise the market for their products. People from other villages come here and buy young bamboo for transplanting in their villages.

The majority of processors work alone, with only 32% belonging to an association or group (Table 18).

Most of the associations (83%) were composed of processors, while 17% also included some collectors. These associations have been created between 1985 and 2009, although half (50%) were created in 2009. This can be attributed particularly to awareness raising campaigns, particularly around Douala, by

Table 14. Income sources for bamboo harvesters

Source of revenue	N	Minimum (CFAF)	Maximum (CFAF)	Mean (CFAF)	Std (CFAF)	Sum (CFAF)	Percentage of total revenue
Bamboo	39	1625	2 880 000	236 208	467 712	9 212 125	36
Farming	39	10 000	800 000	209 064	224 612	8 153 500	32
Trading	17	10 000	960 000	198 823	255 756	3 380 000	13
Remittance	39	0	500 000	39 102	87 741	1 525 000	6
Livestock	15	5000	240 000	89 400	78 895	1 341 000	5
Labourer	24	2000	100 000	33 291	27 928	799 000	3
Timber company	4	34 000	600 000	198 500	270 522	794 000	3
Hunting	6	16 000	78 000	51 000	23 849	306 000	1
Summary	183	0	2 880 000	131 923 774	112 341	25 510 625	100

Table 15. Harvesters' expenditure

Source of expense	Minimum (CFAF)	Maximum (CFAF)	Mean (CFAF)	Sum (CFAF)	Std (CFAF)	Percentage of total expenditure
Hired labour, tax and rent	7200	1 951 000	264 115	10 300 500	383 077	60
Food	20 000	300 000	128 231	5 001 000	71 615	29
School fees	0	60 000	12 654	493 500	14 553	2
House rent	0	120 000	12 462	486 000	29 759	2
Clothing	2000	30 000	10 846	423 000	6643	2
Medical fee	1000	30 000	7644	298 100	7150	2
Entertainment	0	10 000	1951	76 100	2840	0.4
Other expenses	0	10 000	487	19 000	2126	0.1
Summary	0	1 951 000	54 798	17 097 200	98 436	100

Table 16. Distribution of bamboo processors by region

Region	Frequency	Percentage of respondents
Southwest	4	11
Northwest	1	3
Littoral	17	45
Centre	15	39
West	1	3
Total	38	100

MinPME encouraging and informing on the benefits of setting up craftspersons' associations (Eben personal communication). The most common objectives of associations include valorising bamboo processing and promoting bamboo products (Table 19).

The main benefit derived or expected from collective action and joining a processors' association, is the exchange of ideas and experiences during meetings, seminars and training sessions (Table 20).

Processed bamboo products and bamboo species used

The materials used in processing are locally purchased, with common tools being machetes, saws, hammers, rulers and nails.

Large 'Indian bamboo' (*Bambusa vulgaris*) was the species mostly used in processing (92%), followed by yellow bamboo (*Bambusa vulgaris vitatta*) (5%) and a medium-sized bamboo (species unidentified) (3%). Characteristics that encouraged the processing of certain species above others included hardiness (42%), higher demand (40%) and increased resistance to rot and insects (18%). According to processors, factors determining quality include maturity (68%), size and diameter (22%), colour (8%) and length or height (3%).

Most furniture (chairs, beds, cupboards and tables) are made from large green Indian bamboo, whereas cups are mostly made from medium-sized bamboos (Table 21). Some clients include bricklayers who use the poles as measures and for scaffolding.

Processing wastes and management

Wastes generated during bamboo processing include unused small bamboo (58%), peelings from the outer elum (the stem) (34%) and shards of split bamboo (8%). These wastes are usually thrown away (61%) or used used for fuelwood (39%).

Market for processed products

Most processors (63%) graded their products prior to sale, while the remaining small group did not practice

Table 17. Income generation sources for bamboo processors

Major occupation	N	Minimum	Maximum	Mean	Sum	Std deviation ±	Percentage of respondents
Craftsperson	34	10 000	650 001	141 985.32	4 827 501	158.632	92
Farming	4	50 000	150 000	100 000.00	400 000	40.824	8
Total	38	10 000	650 001	137 565.82	5 227 501	150.829	100

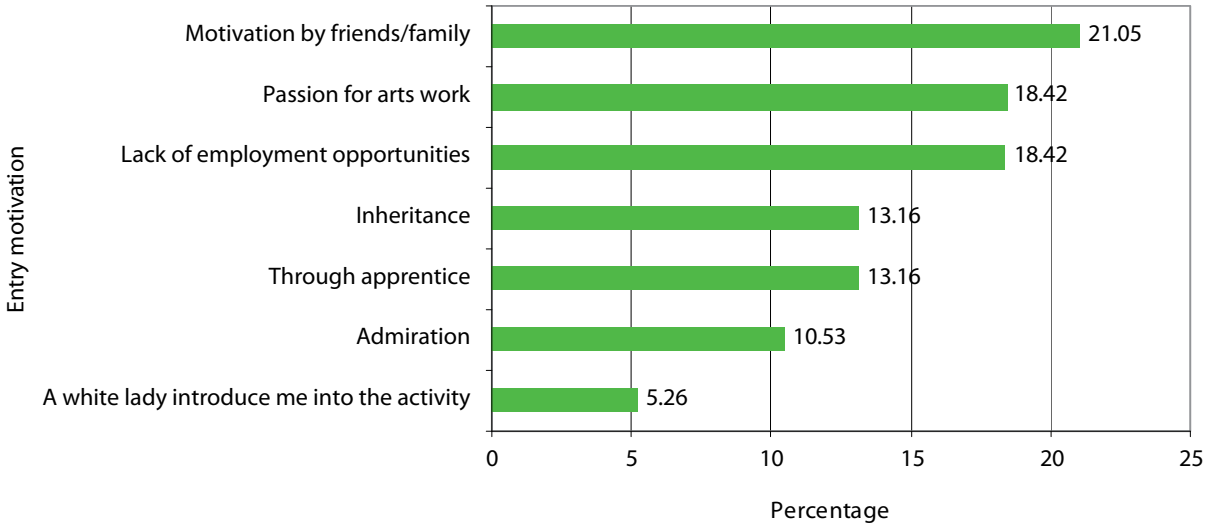

Figure 35. Motivation to process bamboo

this marketing strategy. Processed products were largely sold along roadsides (82%), in workshops (10%), urban markets (5%) and in local markets (3%). In local markets, bamboo products were purchased mainly by passers-by, known as 'tourists' (meaning they are not local) (96.36%), with a small proportion purchased by wholesalers (3.3%). Prices are commonly set by the processors themselves, with nine factors determining price setting, predominantly the quantity and quality of bamboo, materials used and labour time employed (29%) (Table 22).

Apart from the women present in the processors' household, only 8% of processors employed other women to assist them in their enterprises; 32% of processors' children also assisted in cleaning and varnishing activities.

Contribution of bamboo to processors' livelihoods

Processors were found to have up to five sources of revenue, including bamboo processing. However, bamboo processing is a specialised and primary activity for the majority of processors, contributing to about 90% to the household income, with farming in a distant second position (Table 23). This may be linked to the fact that 31% of processors are based in urban areas, close to markets, where farming is not a primary activity.

Figure 36. Bamboo and rattan processor craftsmen, Yaoundé

Table 18. Processors' associations

Name of association	Percentage of respondents belonging to an association
APVE (Association de la Protection et de la Valorisation)	8
APVF (Association de Protection et de Valorisation Forest)	8
Cercle des Jeunes de Zamakoe	25
ASVAMF (Association des Vanniers du Mfoundi)	25
ASAPROF (Association des Artisans des Produits Forestier)	8
Prescraft Bafut	17
Association of Bamboo and Rattan	8
Total	100

Table 19. Objectives of processors associations

Objectives	Frequency mentioned	Percentage of respondents
Valorise the activity	5	42
Promote craft/art work	2	17
Gain support from government and international organisations	1	8
Improve upon the standard of living of members	1	8
Sensitise actors on the importance of NTFP and valorise these	1	8
Work as a group to contribute to development	1	8
Opening cooperatives and product exhibition centres/showrooms	1	8
Total	12	100

Table 20. Derived/expected benefit from associations

Derived/expected benefits	Frequency mentioned	Percentage of respondents
Exchange of ideas and work experience during seminars	6	50
Improve living standard	2	17
Creation of groups to concentrate/support efforts	2	17
Expect assistance from government or NGOs	1	8
Bulk buying of raw materials and collective work	1	8
Total	12	100

The majority of (65%) of processors' annual income originates from manufacturing large household furniture, such as chairs, tables and cupboards. Smaller items such as flower pots, whistles and small sticks for grilled meat, known as 'soya sticks', contributed the remainder of a small proportion of total household income (Table 24).

Processors' household expenditures

Overall, bamboo processors' expenses are a combination of inputs and household needs. Raw materials are the largest proportion of expenses, followed by household needs, labour, miscellaneous items and equipment (Table 25).

A further breakdown of raw materials expenses shows that most processors spent their money procuring bamboo, followed by materials such as plywood and nails, glue and varnish. The remaining expenses were incurred on items such as gas and petrol thinners (Table 26).

Apprenticeship was common among processors and formed the main source of expenditure on labour. This is in contrast to the rattan sector where parents usually pay the artisans to train the apprentice (Sunderland 2001). The average annual expenditure on labour was 161 368 CFAF (SD=269 005 CFAF) with a range from zero to a maximum of 1 080 000 CFAF.

Generally, the equipment used by processors, similar to that used by collectors, is rudimentary; commonly available crafts tools include rechargeable sprayers, brushes, wooden benches/tables and knives. The most expensive equipment is varnish sprayers (Table 27).

Table 21. Bamboo products and species

Bamboo products	Bamboo species used (1)			Total	Percentage of respondents
	Large green Indian (B. vulgaris)	Medium size (Species?)	Yellow bamboo (B. vulgaris)		
Chairs	10			10	26
Beds	4	1		5	13
Cupboards	3		1	4	11
Tables	15	2		17	45
Cups		1		1	3
Soya sticks	1			1	3
Total	33	4	1	38	100
%	87	11	3	100	100

Table 22. Price determinants for processed bamboo

Factors	Frequency mentioned by respondents	Percentage of respondents
Quantity of material used	27	71
Quality of material	9	24
Size	6	16
Beauty	28	74
Market demand	7	18
Labour (time)	11	29
Type of product	3	8
Cost of raw materials	23	61
Labour (time)	11	29

Table 23. Processors' annual sources of household income

Source of household revenue	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std deviation ± (CFAF)	Percentage of respondents
Bamboo processing	26 000	2 600 000	67 694 900	445 361	412 501	89
Farming	12 000	300 000	5 550 000	146 052	73 189	7
Remittances	60 000	300 000	760 000	190 000	106 771	1
Other trade	20 000	300 000	735 000	91 875	90 748	1
Labourer	20 000	200 000	565 000	70 625	57 410,	0.7
Summary	12 000	2 600 000	75 304 900	358 595	380 216	100

Table 24. Income from different bamboo products

Source of revenue	N	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std (CFAF)	Percentage of respondents
Chairs	23	120 000	2 500 000	17 410 800	756 991	548 039	26
Tables	29	200 000	1 500 000	15 227 300	525 079	244 392	22
Cupboards	17	110 000	2 600 000	12 634 300	743 194	640 755	18
Beds	26	72 500	972 000	11 141 400	428 515	293 949	16
Cups	17	26 000	629 500	3 427 500	201 618	149 049	5
Door blinds	11	120 000	710 000	2 954 600	268 600	196 671	4
Whistles	9	50 000	299 000	1 300 000	144 444	91 948	2
Wind charm	5	80 000	480 000	1 240 000	248 000	163 195	2
Flower pots	7	45 000	255 000	1 208 000	172 571	84 774	2
Soya sticks	8	32 000	520 000	1 151 000	143 875	160 497	2
Summary	152	26 000	2 600 000	67 694 900	445 361	412 501	100

Table 25. Processors' expenditures

Sources of expenditure	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std (CFAF)	Percentage of respondents
Raw materials	0	558 000	24 732 060	72 316	98 069	47
Household expenses	0	580 000	17 956 000	94 505	117 280	34
Labour	0	1 080 000	6 132 000	161 368	269 005	12
Miscellaneous	3000	100 000	2 538 500	22 268	16 159	5
Equipment	500	34 000	1 294 600	8517	9880	2
Total	0	1 080 000	52 653 160	62 982	108 485	100

Table 26. Processors raw material costs

Source of expense	N	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std (CFAF)	Percentage of respondents
Bamboo	38	86 400	558 000	11 119 980	292 631	116 426	45
Plywood	38	39 600	192 000	3 718 800	97 863	4274	15
Nails	38	12 000	206 400	3 669 600	96 568	5460	15
Glue	38	24000	258 000	2 630 400	69 221	39 899	11
Varnish	38	8400	180 000	1 724 700	45 387	35 282	7
Others	38	10 000	72 000	1 092 000	28 737	17 413	4
Gas	38	0	30 600	347 775	9152	7082	1
Petrol	38	690	15 600	241 305	6350	3858	1
Thinner	38	1200	14 400	187 500	4934	2842	1
Total	342	0	558 000	24 732 060	72 315	9806	100

Table 27. Processors' equipment costs

Source of expense	N	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std (CFAF)	Percentage of respondents
Equipment (sprayer battery, etc)	38	10 000	34 000	910 000	23 947	7377	70
Brushes	38	1200	12 000	183 600	4832	3142	14
Benches/tables	38	500	6000	103 900	2734	1453	8
Knives	38	500	8000	97 100	2555	1611	7
Total	152	500	34 000	1 294 600	8517	9879	100

Table 28. Processors' miscellaneous costs

Source of expense	N	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std (CFAF)	% in sum
Transportation (year)	38	10 000	55 000	1 113 000	29 289	12 595	44
Land/workshop rent (year)	38	5000	60 000	750 500	19 750	11 203	30
Overheads	8	10 000	100 000	304 000	38 000	30 701	12
Taxes	12	3000	80 000	217 000	18 083	20 318	9
Others fees/levies paid	13	3000	13 000	105 000	8077	2957	4
Interest on loans	5	5000	14 000	49 000	9800	3492	2
Summary	114	3000	100 000	2 538 500	22 267	16 159	100

Annual miscellaneous expenses for processors included transportation, land and/or workshop rental, overheads, fees and interest on loans. Among these, the highest proportion of expenses (43%) involved transportation, followed by renting land/workshop space (Table 28). Taxes are often a contentious subject for small enterprises, particularly due to the sector's informality and problems with corruption. Inconsistencies arise where while nearby markets or sales points may be formal, regulated and taxed, some enterprises and products are not. For example, some craftsmen in Tunnel Mboppi, Douala, do not pay taxes but those selling at the Marché des Fleurs are regulated and pay fees.

Household expenses

The main household expenses named by processors were all basic needs predominantly food (60%), house rent (21%), followed by children's school fees, clothing and medical treatment (Table 29).

Bamboo Traders

Socio-demographic profile of traders

This study was not intended as a comprehensive assessment of bamboo traders in Cameroon. As detailed in the Methodology section, a random sample of traders was selected in locations across Cameroon that were assessed to be major trading and consumption areas. A total of 31 traders were interviewed, with the majority (35% each) located in the West and Southwest regions. Littoral, Centre and Northwest accounted for only 13%, 10% and 6% of the traders interviewed respectively. The average trader's age is 36 years, ranging from 22-63 years. Only 7% of traders are women. Three per cent had no formal schooling, 45% had primary schooling, 26% had secondary, and 10% each had obtained middle school and university studies and 6% polytechnic/ training college. The majority (84%) were natives of the area where they traded, while 16% were migrants. Most (77%) were married and nearly a quarter (23%) single. A trader's household size varied from one to 14 people with average of five (SD=± 3 persons).

Major occupation

Bamboo trading was the major occupation for 32% of traders, closely followed by handicraft and farming (Figure 37). This indicates a lower level of professionalisation and specialisation, compared to craftsperson processors who focus on bamboo and rattan. It is, however, a similar proportion to collectors, showing how these two groups depend on multiple sources of income for their total annual household revenues.

Agriculture was a minor activity for 55% of the bamboo traders, (which is unsurprising given that 90% of traders are located in urban areas), followed by handicraft (19%) and unskilled labour (16%) (Figure 38).

Level of traders' organisation

Similar to craftpeople, the majority of traders work individually, with nearly one-third (32%) belonging to an association. The types of associations ranged from youth groups to specialised product groups and cooperatives (Table 30).

The associations' objectives ranged from ensuring collective work and improving the bamboo sector to assisting members in seeking national and international aid (Table 31).

The perceived benefits of joining an association include an expectation of improving living standards (40%), the possibility to access support through an association (30%) and free training on better production techniques (30%).

Products traded and markets

Bamboo traders include middlemen (17%), wholesalers (5%) retailers of unprocessed bamboo (78%), and retailers (92%) or wholesalers (8%) of processed products. Most traders sell unprocessed bamboo poles (56%), 28% sell processed chairs and 11% benches (Table 32).

Six major product types were sold, predominantly chairs (45%), bamboo poles used as television masts and electricity posts (32%), bamboo benches (10%), cups (7%), flutes and beds (3% each). The informality and low level of marketing is evident in the large proportion who sell from roadsides (54%), followed by selling from home (32%) and markets, which form a very small proportion (3%) as do showrooms or stores. This marketing strategy both creates and reinforces the low quality product image of bamboo artefacts and at the same time, makes products widely and openly available, particularly for poorer households (Table 33).

On average, the majority (77%) of traders' clients are local customers while the remainder originate from across the country. Prices are often not fixed and not advertised, particularly at the roadside selling points, where prices are largely determined (48%) at the time of sale. Traders reported that the sale price they offered depended on the type of buyer and their perception of the price they could or would be willing to pay. Prices are commonly negotiated, as is common for many other crafts, agricultural and NTFP products in Cameroon. A small proportion (16%) of traders based the selling price on the type or model of products to be sold, 13% according to going market price and 23% were not clear, stating that selling prices fluctuate and are not 'exact'.

Table 29. Processors' household expenses

Source of expense	N	Minimum (CFAF)	Maximum (CFAF)	Sum (CFAF)	Mean (CFAF)	Std (CFAF)	% in sum
Food	38	128 000	580 000	10 710 000	281 842	104 722	60
Household rent	38	10 000	480 000	3 762 000	99 000	92 618	21
School fees	38	0	180 000	1 546 000	40 684	36 725	9
Clothing	38	10 000	80 000	1 115 000	29 342	16 965	6
Medicals	38	3000	65 000	823 000	21 658	15 104	4
Summary	190	0	580 000	17 956 000	94 505	117 280	100

Table 30. Traders associations in Cameroon

Name of association	Percentage of respondents
Association of Bamboo and Rattan Collectors	30
Cercles des Jeunes de Zamakoe	10
APVF (Association de la Protection et de la Valorisation)	10
ASVAM (Association des Vanniers du Mfoundi)	20
Bamenda Handicraft Cooperative	10
Prescraft Bafut	10
Association des artisans des produits forestiers	10
Total	100

Table 31. Objectives of traders associations

Objectives of associations	Percentage of respondents
Collective work	10
Sensitisation of the youths and modernisation of the handicraft	10
Improve the bamboo sector	30
To join bamboo harvesters together	20
Improve members' standard of living	10
Assist in the sales of the members' products	10
Assist members in seeking national and international aid	10
Total	100

Table 32. Proportion of traders and bamboo products

Category of trader	Bamboo products				Total	%
	Bamboo bench	Flutes	Chairs	Bamboo sticks		
Middleman			2	1	3	17
Wholesaler			1		1	6
Retailer	2	1	2	9	14	78
Total	2	1	5	10	18	100
%	11	6	28	56	100	

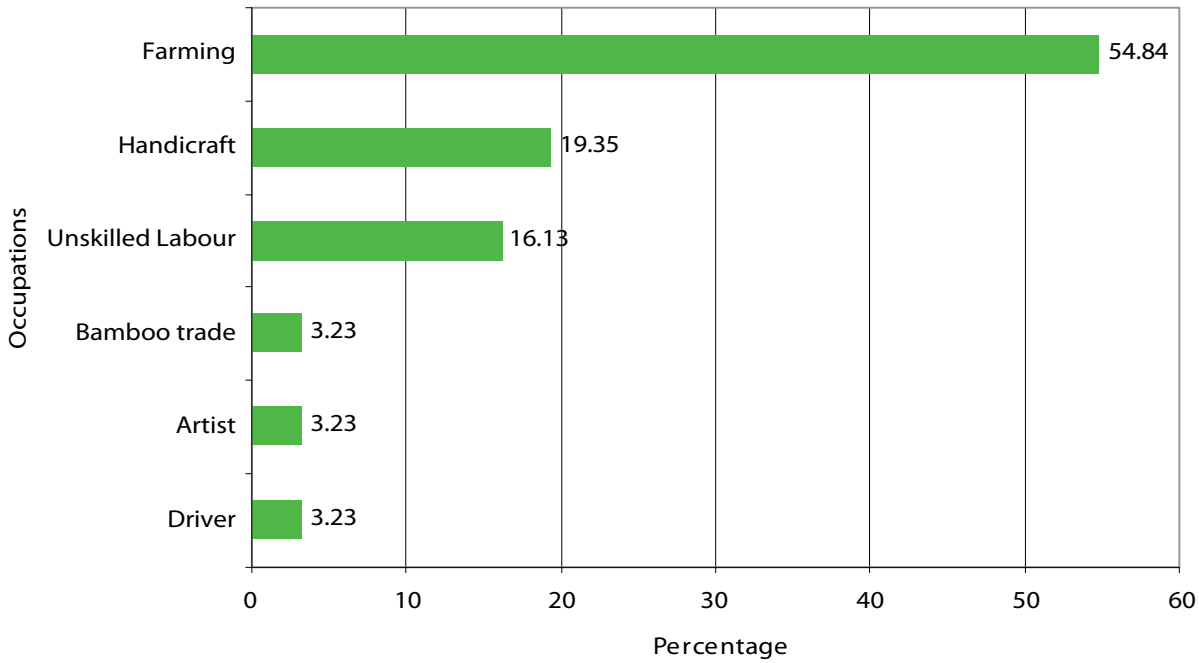

Figure 37. Bamboo traders' major income sources

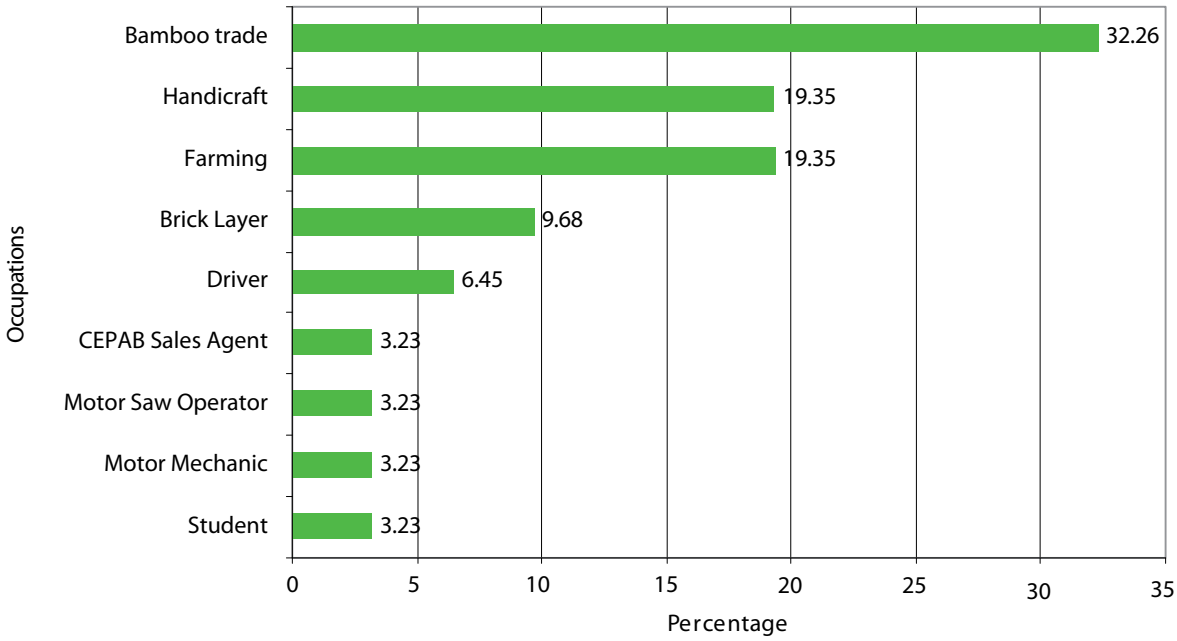

Figure 38. Minor income sources for bamboo traders

Table 33. Bamboo products and markets

Products	Market type				Total	Percentage products found in markets
	Roadside	Market	Home	Store		
Bamboo bench	1	2			3	10
Cups	1	1			2	6
Flutes				1	1	3
Beds			1		1	3
Chairs	13		1		14	45
Bamboo sticks	2		8		10	32
Total	17	3	10	1	31	100
%	55	10	32	3	100	

Table 34. Product price determinants

Determinant	Frequency	Percentage
Demand	12	39
Quantity of raw material used	6	19
Quality of products	5	16
Beauty of product	4	13
Time spent	4	13
Total	31	100

Table 35. Traders' preferred species and reasons

Species	Reason				Total	%
	Demand	Resistance	Easy to use	Availability		
Large green bamboo	13	4	3	5	25	81
Medium-sized green bamboo	2				2	6
Yellow bamboo	1	3			4	13
Total	16	7	3	5	31	100
%	52	23	10	16	100	

Table 36. Trader's income sources

Source of revenue	N	Minimum (CFAF)	Maximum (CFAF)	Mean (CFAF)	Std (CFAF)	Sum (CFAF)	Percentage of respondents
Bamboo and products	31	330 000	1 240 000	709 032	247 256	21 980 000	75
Farm	31	20 000	557 000	170 687	155 868	5 291 300	18
Labourer	7	34 000	130 000	83 571	34 563	585 000	2
Livestock	5	40 000	200 000	94 000	6220	470 000	2
Trade other goods	8	20 000	100 000	58 125	29 270	465 000	2
Remittances	4	10 000	80 000	53 500	30 914	214 000	0.73
Fishing	3	12 000	140 000	57 333	71 703	172 000	0.59
Others	3	5000	17 000	9667	6429	29 000	0.10
Summary	31	5000	124 000	317 460	3 308 723	29 206 300	100

Table 37. Expenses incurred by bamboo traders

Source of expense	N	Minimum (CFAF)	Maximum (CFAF)	Mean (CFAF)	Sum (CFAF)	Percentage total expenses
Store/stall rent	31	50 000	960 000	466 129	14 450 000	53
Food	30	19 000	300 000	153 567	4 607 000	17
Association dues	31	10 000	600 000	72 806	2 257 000	8
House rent	20	15 000	150 000	63 400	1 268 000	5
Transformation of goods	31	5000	100 000	4083	1 266 000	5
Goods	31	1750	150 000	33 621	1 042 250	4
Clothing	32	5000	98 000	31 000	992 000	4
Medical fees	14	9000	100 000	48 500	679 000	2
School fees	8	20 000	130 000	55 375	443 000	1
Taxes/levies/market tolls	9	4000	75 000	30 444	274 000	1
Summary	31	1750	960 000	115 098	27 278 250	100

Table 38. Uses of bamboo per region

Uses of bamboo	Responses per region*			Total	Percentage of respondents
	Littoral	Southwest	West		
Supports for agriculture	4	7	6	17	22
TV aerial mast	1	10		11	15
Building decking		9	1	10	13
Fuelwood	1	5	3	9	13
House roofing	2		6	8	10
Fencing		3	3	6	8
Electric posts		4		4	5
Band			3	3	4
Building houses	2		1	3	4
Furniture	1		1	2	3
Ladders		1	1	2	3
Bow and arrows		1		1	1
Flutes			1	1	1
Soya stick		1		1	1
Total	11	41	26	78	100
Percentage	14	53	33	100	

*Consumers only from Littoral, Southwest and West

Price determinants of bamboo products

Traders named five factors that determine product price, with demand (39%) being the major consideration, followed by the quantity of raw material used (19%) (Table 34).

Trader perceptions of bamboo species

Traders' preference for different bamboo species was clear (Table 35), with most favouring large green Indian Bamboo (81%), followed by yellow bamboo (13%) (both species of Bambusa *vulgaris*) and only a small percentage preferring medium-sized green bamboo (6%). Interestingly, availability was not mentioned as a determinant of preference. The reasons for these preferences are based on demand (52% of traders) and to a lesser extent the ease of using the raw material (10%). Traders believe that bamboo quality is determined by maturity (68%), size/diameter (19%), height (10%) and leaves (3%).

Contribution of bamboo to traders' livelihoods

The bamboo trade constitutes a major source of annual revenue for traders with a mean of 709 032 CFAF (SD=247 256 CFAF) and a range from 330 000 to 1 240 000 CFAF. Trade in bamboo raw materials and/or processed products constituted 75% of traders' incomes, followed by farming (18%) and other income sources (7%) (Table 36).

Traders' expenses

Ten types of annual household expenses were identified (Table 37). The largest proportion of annual expenses is spent renting business premises (53%) and on food (17%).

Consumers

Bamboo consumption, preference and suggestions

A total of 41 consumers of bamboo were interviewed in the West (33%), Southwest (53%) and Littoral regions (14%). Fourteen possible uses of bamboo were identified, with bamboo largely used in construction and tools in all regions, specifically as supports for agriculture, masts for television antennae, decking for houses, fuelwood, roofing and fences (Table 38).

In terms of quality, most consumers asserted that the majority of bamboo products were of high quality (51%), with 22% indicating that they perceived bamboo products as being of average quality, 17% as of low quality, 7% as durable and 2% easily flammable, compared to other products of similar applications (Table 39). Although a comparison is made between different products and materials and prices, an important factor is that in Cameroon bamboo is substitutable for a number of materials, including wood, plastic, metal and other NTFPS such as rattan and palm fibres.

In terms of price, all consumers believe that bamboo products are cheaper compared with equivalent wood or plastic products, with 66% stating that bamboo products and tools are durable, solid and resistant to insects while 34% believe they are not durable, lasting only a few years. Nearly a quarter (24%) of consumers stated that bamboo products were more attractive than comparable products of other materials, 73% stated they were not attractive enough and 3% appreciated the lighter weight of bamboo compared to similar products made of other materials. Most bamboo consumers (90%) feel that the amount they pay is proportional to product quality, while 10% believe the contrary.

Most consumers expressed interest in seeing a wider range of bamboo products on the market, with the major items of interest being large furniture and household construction and furnishing materials (Table 40).

Figure 39. Roadside bamboo furniture marketing, near Mbalmayo

Table 39. Quality comparison of bamboo vs. other products

Quality standard	Frequency	Percentage
Low quality	7	17
High quality	21	51
Average	9	22
Durable	3	7
Flammable	1	2
Total	41	100

Table 40. Consumer ranking of potentially interesting bamboo products

Item	Number	Yes (%)
Chairs	41	37
Tables	41	32
Cupboards	41	29
Beds	41	20
TV stands	41	5
Ceilings	41	2
Plates	41	2
Walking stick	41	2
Pipes for water	41	2
Spears	41	2
Total	41	100

4. Development of the bamboo sector in Cameroon

Problems, constraints and opportunities in the bamboo sector

Belcher (1998) and Ruiz-Pérez (1999) note that successful trade requires a minimum set of skills and assets, including business contacts and knowledge of the ways of doing business. Poor people typically do not have those skills and assets and so, when new commercial opportunities arise, they may be out-competed by local 'elites', with more power and capital to invest, better connections, and better skills, or by competitors from other areas. Research in China shows differential benefits to different farmers and harvesters depending upon local conditions and their level of development. In the early stages of PCS development as opportunities in the bamboo sector increased and farmers intensified their management, better-off households gained the largest share of the increased earnings, and poorer households gained the least. As areas develop, middle income farmers tend to get proportionally more income from bamboo (Ruiz-Pérez *et al*. 2009).

Whether the market is newly established or traditional, efforts to support trade need to understand the structure and function of the entire production to consumption system (Belcher 1998). The most effective interventions have been evaluated as those with a simultaneous impact on many similar firms, termed 'leverage'. Thus, policy-level interventions that encourage investment in processing and trade may be the most effective way to support raw material producers, as seen very clearly in the case of the China Bamboo sector (Ruiz-Pérez *et al*. 2004), and given the current situation in Cameroon (Tieguhong and Ndoye 2004; Laird, McLain, and Wynberg 2009), is expected to be similar. The size and nature of the market are crucial factors to consider. Goods and services that are primarily exported outside the producing region tend to have significantly larger markets and can act as a powerful engine for economic growth, as in the case of bamboo production and processing in Anji County, China (Fu and Yang 2004, cited in (Belcher and Schreckenberg 2007) — which may have similar repercussions for the trade in Cameroon.

Apart from the general concerns raised, specific and related concerns and opportunities were reiterated by each group of actors (collectors, processors, traders) as well as ways forward. Consumers also suggested some possible ways forward that can enhance the development of Cameroon's bamboo sector.

Constraints and opportunities in harvesting

Collectors cited six major problems faced (Figure 40)

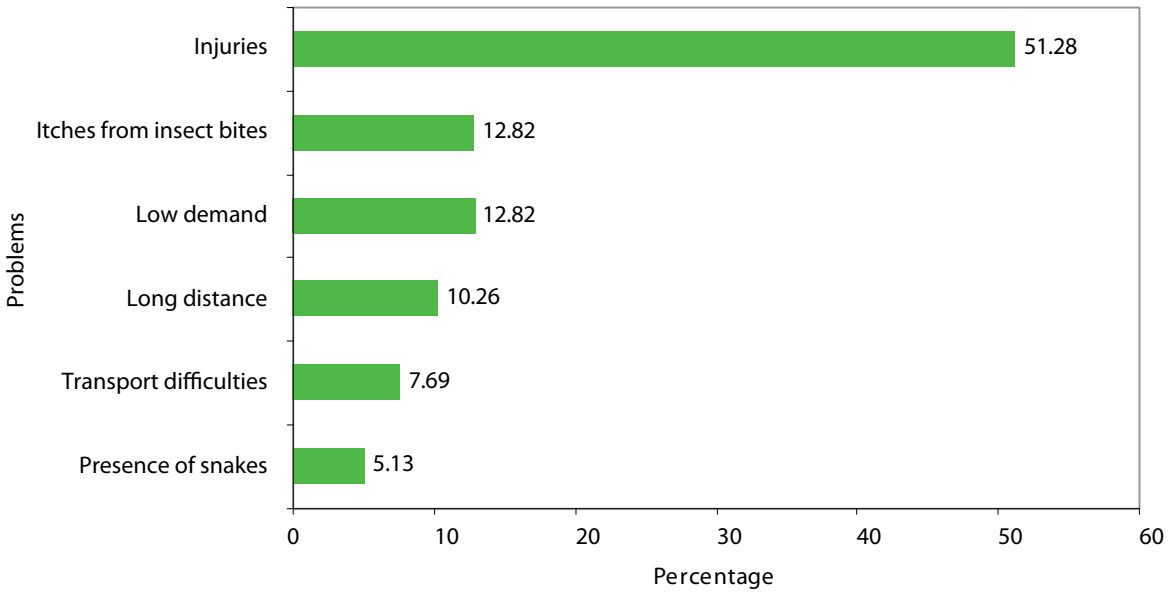

Figure 40. Problems faced by bamboo harvesters

Table 41. Problems faced by bamboo processors

Problems	Frequency	Percentage
Low prices	18	47
Low demand	13	34
Unorganised market	12	32
Very low profits	12	32
Jealousy among actors	7	18
Lack of capital	5	13
Transportation	5	13
Consumers ignorance of bamboo products	4	11

Table 42. Problems and practical solutions

Problem	Solution					Total	%
	Chemicals disinfection	Use good saw	Use glue	Expose to sunlight	Use gloves		
Infestation leading to easy splitting	21		2			23	60
Moulding of bamboo during rainy season				4		4	11
Injuries	5				3	8	21
Very hard to cut		3				3	8
Total	26	3	2	4	3	38	100
%	68	8	5	11	8	100	

while collecting bamboo, ranging from injuries (51%) to threats from snakes (5%). Bamboo appears to attract snakes and particularly the poisonous green mambas, which presents a problem during harvesting. Focus group discussions also indicated a lack of knowledge on diversification for construction and other uses, and a lack of knowledge on the appropriateness of different species for different uses.

Most of the collectors felt helpless about the daily problems they face, but some suggested three possible solutions including buying anti-venom (either traditional remedies or pharmaceutical drugs) and bite drugs (49%); financial support (21%); use of medicated soaps and the provision of trucks to ease transport difficulties (15% each).

Constraints and opportunities in processing

Processors cited eight major problems for which they had no immediate solutions or means to resolve (Table 41). These include low demand for their products (34%), leading to long product turnaround times and resulting in higher chance of insect damage to both raw and processed products, and also correlated to low prices (47%), unorganised markets (32%) and low profits (32%)An interesting comparison can be made here with the rattan sector in Cameroon, where commissioned furniture products (produced on command for customers) constitute the majority of trade.

Problems with storage (insect damage and infestation, mainly by weevils and termites) were mentioned by processors, but also by collectors who store for longer periods, as well as retailers. Few or no effective pesticide products were on the market (depending on location, especially outside the cities of Douala and Yaoundé) for protection or treatment. Processors suggested various solutions, from only producing on demand, to searching for assistance to obtain capital and ways to ease transportation by acquiring vehicles. For insects, while some chemicals are on the market, good treatment is not always available and advice could be sought from experts.

Although these constraints were seen as are hard to manage, some processors identified ways to deal with them. Table 42 shows how problems of infestation and split are being dealt with using chemicals and glue. Problems related to moulding are dealt with by exposing products to sunlight, and injuries by using gloves and disinfecting the wounds. Very hard bamboo is cut with a saw instead of a cutlass.

Constraints and opportunities in bamboo trading and marketing

Major constraints on trade and marketing of bamboo products range from low demand to price fluctuations and rudimentary or bad quality working tools and substitution of inferior materials, or 'counterfeiting' (Figure 41).

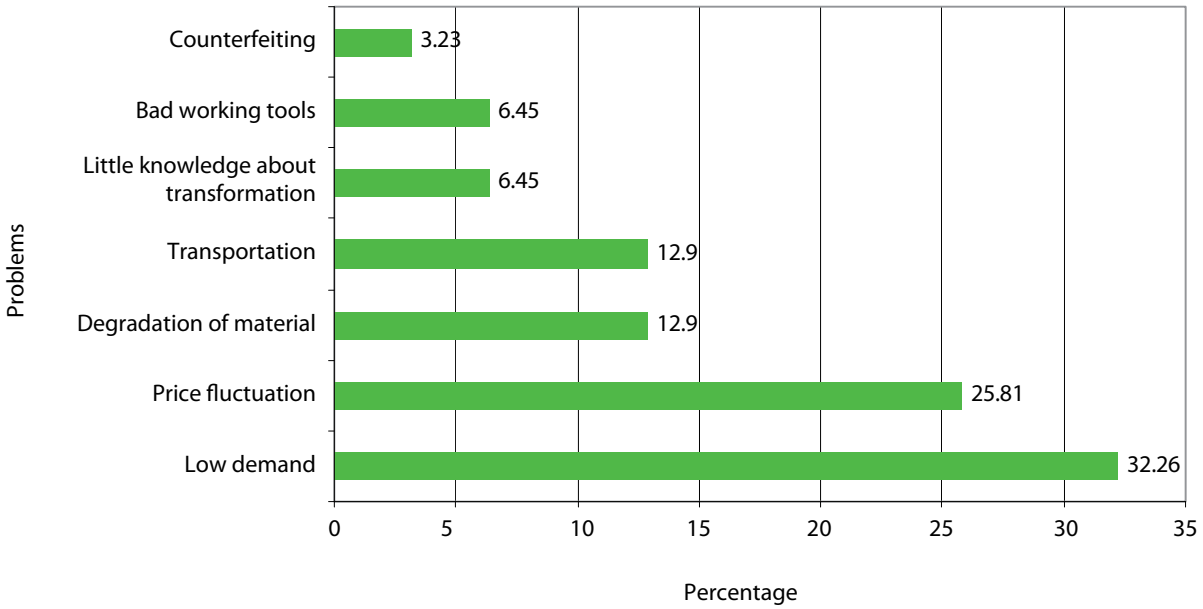

Figure 41. Constraints faced by traders

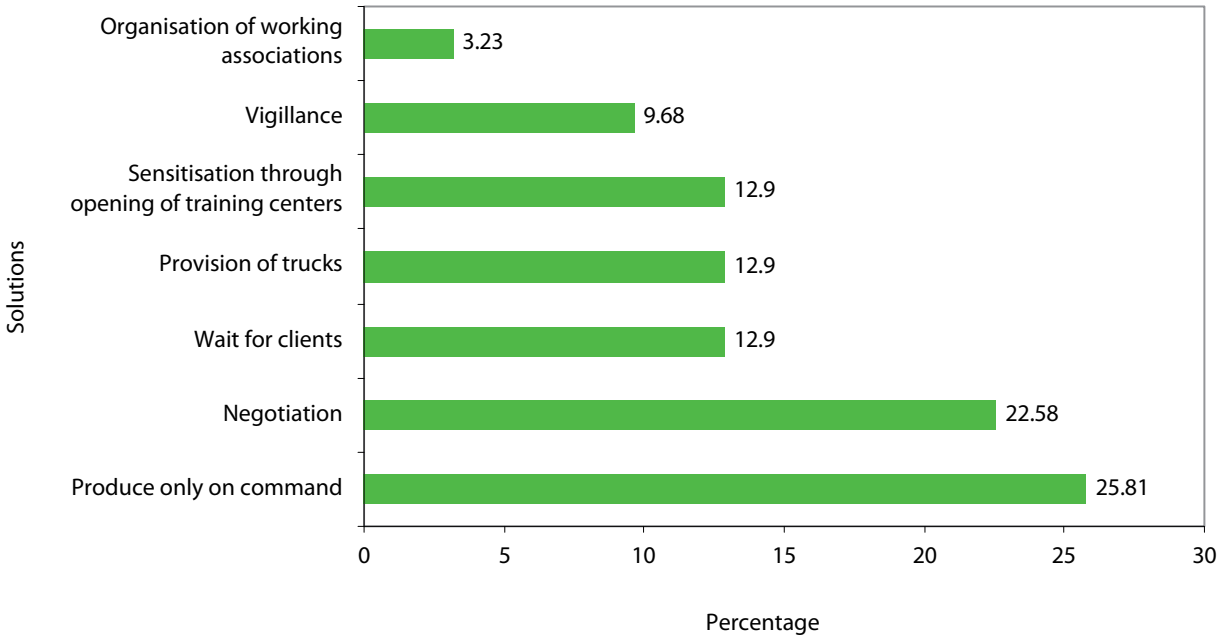

Figure 42. Solutions to problems faced by traders

During the field work, many actors also raised general opportunities for the sector, which are elaborated below and in Figure 42:

- Capacity building on technical skills, especially for processors but also in harvest and retail trade, due to the current low level of knowledge and skills.
- Combating infestation to produce marketable and durable products.
- Setting grading standards for products to ensure quality and attract potential buyers.
- Establish functional training centres or courses for craft artisans and processors.
- Exchange ideas through organisation of seminars.
- Subsidies or provision of start-up capital and reduction in taxes.
- Construction of showrooms to exhibit bamboo products.
- Strengthening the value chain, especially bamboo processing.
- Planting more bamboo to alleviate the reducing resource quantities, especially in urban areas like Yaoundé.
- Production only on demand.
- Organisation of associations.
- Vigilance to reduce issues such as theft, infestation and a term used to mean attending to customer requirements.

5. Policy and institutional framework for the bamboo sector

Policy environment

Cameroon currently has no specific policy to promote the bamboo sector either at the local or national level. However, a policy appears to be emerging. A five-member official delegation from Cameroon, headed by the Secretary General of the Ministry of Forestry and Wildlife (Mr Koulagna Koutou Denis), visited China from 19-29 July 2009, to explore cooperation with INBAR and to study the Chinese experience in developing its bamboo sector. There was also a strong presence and interest from the Cameroon Government delegation and actors from the sector at the International Workshop on Enhancing Opportunities for Market-Led Bamboo and Rattan Based Development in West and Central Africa, held 23-25 November 2009 in Yaoundé and organised by INBAR, ICRAF and regional partners.

Regulations

Regulation and policy in Cameroon does not address bamboo specifically, rendering it an 'invisible product'. It is not mentioned within the framework of the forestry and environmental laws in Cameroon (1994 Forestry Law or 1996 Framework Environmental Law), either as a timber or non-timber forest product. It is not listed as a Special Forestry Product in the Decree of 2006 nor has it ever been included in the annual lists of special forestry products. The most recent and comprehensive reviews of NTFPs in Cameroon did not address bamboo at all (Betti 2007; FAO, GTZ, and COMIFAC 2008).

The 1994 Forestry Law addresses the issue of resource rights removed by the 1974 Land Ordinance, by providing customary user rights (*droit d'usage)* to forest communities. These rights allow communities to collect 'all forest, wildlife, fisheries products freely for their personal use, except protected species' (Forestry Law 1994, Section 8). This right can be exercised in all unprotected areas, and includes subsistence fuel wood and wood for construction. Timber sales are not included as a user right. Instead, it is regulated under systems of smallholder titles or through the community forestry process created by the 1994 law. Several articles in this law are relevant to the bamboo PCS;

> Article 40 indicates that an inventory of forest resources is a prerogative of the State, but the State has not conducted an inventory of bamboo. This study indicates that an inventory (along the lines proposed for timber exploitation) would be difficult given the dispersed nature of bamboo across Cameroon.
>
> Article 43 states that the Government can mark and preserve any tree that it judges useful for conservation or regeneration needs, in an area intended for exploitation. The definition of a tree might present some problems for how bamboo is dealt with, as it is, strictly speaking, a grass.
>
> Articles 45 to 74 concern timber exploitation in production forests and granting authorisation to exploit, for a fixed period, a precise volume of standing timber which may not exceed the annual logging potential. Again, the use of the term 'timber' effectively excludes bamboo.

The Ministry of Forestry and Wildlife (MinFoF), together with a range of stakeholders, is currently revising the 1994 Law. MinFoF has indicated that it is considering how and where to deal with bamboo. Some of the issues raised by stakeholders during interviews and during the INBAR November 2009 workshop in Cameroon, and possible solutions, are listed in Table 43.

Customary rules

Customary, local management practices are known from the Kilum Ijum forests areas in the Northwest (obsIngram personal observation, (Cunningham *et al*. 2002). The local communities around the forest have traditionally depended a great deal on the forest for secondary forest products, especially firewood, medicinal plants, beekeeping and bamboo. This is epitomised by the all-important role that the forest plays in the people's rich cultural life, and was institutionalised in agreed forest-wide rules for the Fondoms of Kom, Oku and Nso for the Kilum-Ijim forest (held at Oku from 6 January 1999 to 3 March 1999), the process of which was supported by the Bamenda Highlands Forest Project. Livestock keeping (cattle and goats) inside the forest on Mt Oku was banned by both the traditional authorities and the government administration in the 1990s but is now practised by a few 'elite' individuals. Some unsustainable forest exploitation practices have long been controlled by the region's Traditional

Table 43. Legal and regulatory issues and recommendations

Issue	Recommendation
1. Classification As bamboo is largely used in a similar way to timber (e.g. construction, furniture, fuel), should it be classed as a timber species and treated in the same way? Or should it be classed as a NTFP?	Bamboo is a member of the grass family and is not a tree species. The 1994 law does not, however, make a distinction between forestry products based on their species or woodiness or non-timber forest product. The main distinctions for forest products (Forestry Law 1994, Section 9(2)) are based on 'value': certain forest products, such as ebony, ivory, wild animals, as well as certain animal, plant and medicinal species or those which are of particular interest and shall be classified as special.
2. Trade or subsistence It is not a heavily exploited or large volume, high value heavily traded product, in comparison with much more widespread NTFPs that have known markets and a long history of exploitation NTFPs (e.g. Gnetum (okok), Irvingia spp., Dacryodes edulis (safou), Raphia spp., etc).	Given the small, mainly local use and trade; the use of predominantly exotic (introduced) species; and the agroforestry, semi-cultivated nature (33% of bamboo is owned, and 35% is managed or planted), it could be considered a crop more than a forest product. An argument can therefore be made to maintain bamboo harvesting as a customary user right. An exception may be in non-protected areas where native species occur, but the resource maybe under threat (e.g. Kilum Ijum forest). However, when customary management, user and collection rights provide sufficient control and the quantities are small, the threat may be judged as sufficiently low and harvest permitted.
3. Use Bamboo's main use in furniture and construction suggests that bamboo should be treated as timber equivalent.	Bamboo is used in a similar way to timber (for construction, furniture and crafts) and for fuelwood. Timber, however, is not regulated in Cameroon according to end-use but due to its economic value (specifically export value), with certain species assigned specific tax values (Article 66). If treated as timber, revisions may need to be made; for example, bamboo is not listed as requiring a fFelling tax (Tax d'abbatage). However, given the low price of bamboo poles (200-1000 FCFA), a tax per pole would be difficult to implement both socially and economically.
4. Threats Bamboo is not currently listed or recognised as a threatened, protected or endangered species and is not a CITES listed product	4.1 The main species used in larger volumes and preferred species for trade are exotic, introduced species of Bambusa vulgaris. While harvesting levels in some local areas may not be sustainable, this exotic species is not under threat and regenerates easily. No special conservation or protection measures are therefore recommended. 4.2 As bamboo also provides food for wildlife, it may be a suitable species to promote in protected areas and buffer zones to avoid damage to crops by browsing elephants. Equally, it may attract elephants out of protected forest into less protected buffer zones where they can be hunted more easily. 4.3 An exception may be the Alpine bamboo (Yushina alpina) in the Highlands. This may be under threat from conversion of forest to grazing pasture and farmlands, fires and degradation due to over-exploitation (Cheek *et al*. 2000, Ayodele and Tsi 2002, Solefack 2009). Monitoring changes in the area and density of montane Bamboo in the Highland areas, particularly Kilum Ijum, is therefore recommended.

Authorities. Recognising the grazing problem, in July 1993 the Oku Clan Council decreed that all domestic animals should be removed from the forest. Finally, a Prefectural Order (an Administrative Order issued by the Senior Divisional Officer, Government of Cameroon) was passed in 1993, which prohibited the following activities within the forest boundary: lighting bushfires, tree felling, cutting young alpine bamboo, farming, hunting/trapping animals in the forest reserve (unless rats, using traditional methods) and rearing and grazing domestic animals. Rule No 16 stipulates that only mature or dry Indian bamboos should be cut. In cases where fresh young bamboos are needed, the community must be consulted. Thus, both the traditional authorities and the Government recognise that grazing livestock within the forest boundary is detrimental to the long-term survival of the forest and montane vegetation.

Also in the Northwest, around Bafut, where 'wild' and planted bamboo exist, strict control and regulations for harvesting are enforced by the local chief, the Fon. In most cases, these result in monetary fines and payments for rights to harvest. Around Ngoundal in Adamaoua, where bamboo is an integral material for traditional beehives, there are no customary rules for small-scale harvesting and most bamboo is located in 'open access' forests. In only one village, where there are no beekeepers but several large clumps of bamboo, have beekeepers from neighbouring Wendoka made arrangements with the village chief to harvest and collect cuttings for transplant to riverine areas nearer their village, to ensure security of their resource.

Reports (Tcahana and Mboui personal communication, (Soukontoua, Mfomou, and Howard 2007) of customary use in the Ngoundal area of Adamaoua indicate that the declining quantity of the resource and increasing distance villagers have to travel to harvest it, have encouraged recent protection of bamboo groves. Regeneration efforts in land demarcated as community regeneration zones that are protected specially for

Raphia and bamboo under order of the local chief, with agreement of the villagers, have been introduced in the last 2 years in four villages around Ngoundal.

Institutional and administrative framework

The institutional framework guiding bamboo and its exploitation in Cameroon is weak because of the lack of competent authority, law and regulations.

If bamboo was considered a forest product, it would fall under the auspices of the Ministry of Forestry and Wildlife. As there is no definition of timber and non-timber forest products, there is no obvious classification category for bamboo in the current framework. Due to the relatively current small size and local trade of bamboo — compared to other non-timber forest products and timber in Cameroon (Ingram 2009) — it does not appear either beneficial to MinFoF or the sector to include bamboo on the list of Special Forestry Products.

Bamboo could alternatively be considered as an agricultural product, due to its frequent occurrence as a planted crop. In this case, the institutional framework would be under the Ministry of Agriculture and Rural Development.

The Ministry for Small and Medium Enterprises, Social Economy and Craftspersons (MinPME) has interactions with craftspeople and traders in bamboo and rattan, partially in Littoral around Douala, and in the Northwest around Bamenda. While this is general support for small enterprises, it has been recognised that the small furniture producers provide livelihoods and respond to consumer demand for both cheap and increasingly higher quality furniture (Pers comm delegate MinPME).

The main organisation associated with craft and furniture bamboo products in Cameroon is the Cameroon National Corps of Craftspersons/Corps National des Artisans (CNAC). This federation of regional associations has member unions and CIGs in the West, Littoral and Northwest regions working with cane and bamboo products.

While certification of bamboo is not common worldwide, certification according to Forest Stewardship Council (FSC) standards is in progress for bamboo by SKAL International in India (Burgener 2007). Burgener (2007) and Shanley (2008) both note the difficulties in certification of non-timber products, particularly when they are traded on a small-scale in local markets. However, in the case of bamboo in Asia, where it is traded internationally, it is often for specific industries (namely food and construction) and is on a large scale. However, for popular NTFPs such as palm hearts, brazil nuts and some medicinal plants, certification has greater potential. Bamboo and rattan were seen as resources with such potential, but as the trade in bamboos from Africa is on such a small-scale (INBAR/BOTA/ABS 2009), a case by case basis is necessary and it is difficult to say how useful it is for such a wide group of products included in NTFP.

In Cameroon there is no known certification for bamboo or its products, although FSC standards for timber exist with some 11% of forest concessions covered. FSC standards have been developed — but not yet applied — for community forest timber in Cameroon but not for any other forest products. The only organic certification that currently exists in Cameroon is for an agricultural product (French EcoCert for pineapples). For forest products, honey has been certified as organic by the UK Soil Association since 2008. In the last decade in Cameroon, a number of agricultural products such as cocoa, coffee and cotton, apiculture products and handicrafts have been fair trade-certified.

6. Development opportunities and ways forward

Developing the Cameroon bamboo sector

To map out development opportunities for the bamboo PCS, actors were asked questions such as 'What should be done to enhance the bamboo industry in the country?', 'How do you see the market in the future?', 'As a consumer, what improvements in the transformation of bamboo are needed?', and 'Do you need any urgent technical assistance?' When collectors were asked the general question as to what could be done to enhance the overall bamboo industry, most of them (64%) indicated a need for open, good training centres for bamboo-based activities; 23% stated the need to make the public aware of how to regenerate bamboo, while 13% suggested the construction of warehouses and sales centres. Processors also indicated the need for training centres (70%) and publicity campaigns (10%) and for direct financial assistance (20%). Traders mentioned the need to stimulate demand (3%) and increase customer awareness of bamboo products (74%), and believed business was slow, giving few chances for development. In addition to these suggestions, consumers added the dimension of producing more attractive products (51%), capacity building and raising the awareness of consumers about bamboo products (39%) and the need for sustainable management (10%). Combining these responses into common categories, four main themes can be seen, with the priority being marketing and raising consumer awareness of products, their uses and values, followed by training and capacity building of processors and harvesters (Figure 43).

Among the 38 processors interviewed, 63% expressed the need for technical assistance while the rest were indifferent. For those wanting assistance, 67% named cleaning machines, 17% cutters and splitters while 8% each stated that vehicles for transporting raw materials and products and shaping machines are most needed. Processors indicated that assistance could be sourced from NGOs (25%) and purchases from local or urban markets (75%). No mention was made of the Government as a source of support for the sector.

Recommendations

Drawing on the actors' suggestions, the study findings and the November 2009 workshop, the following recommendations are proposed as next steps to develop Cameroon's bamboo sector:

1. Given the lack of data on the availability of both native and introduced species, **inventories**

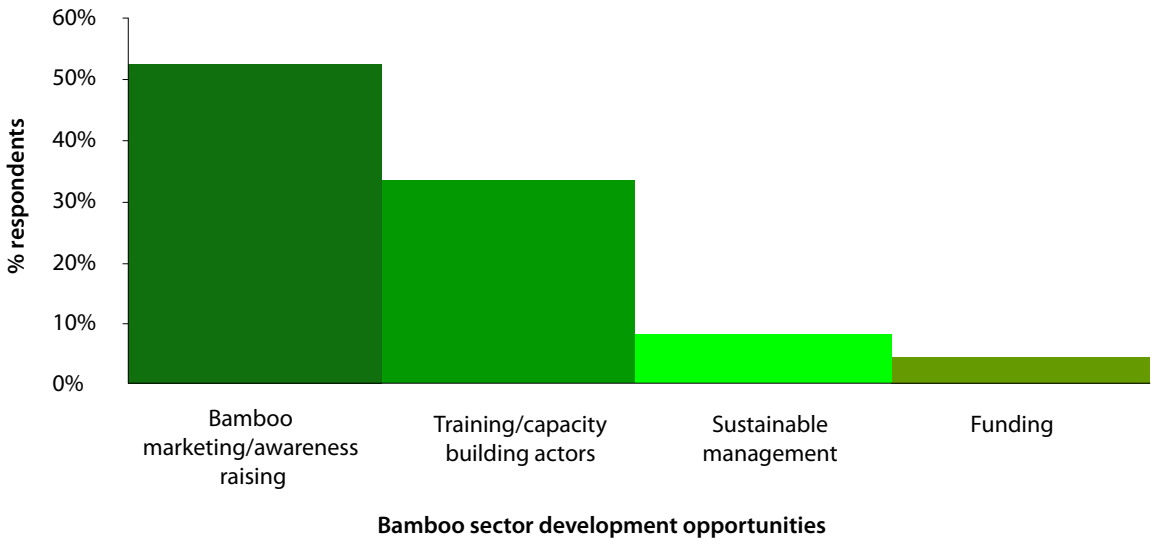

Figure 43. Development opportunities proposed by actors

are essential for long term, sustainable resource management. The minimum data required is an inventory of the quantity and species found in the main production areas. A national level inventory of bamboo resources across Cameroon is advised to provide a complete picture.

2. **Regeneration** does not appear to be a major priority, given current market demand and availability of resources. However, if more emphasis is placed on the consumption and production side of the chain, resulting in increased demand, it is essential that regeneration and management of bamboo resources occurs in parallel with market-led development. The sustainable harvest guidelines proposed need to be tested and tried to support adequate regeneration. Particulate emphasis should be placed on the species for regeneration with a conscious selection of both native and introduced species depending on the end use.

3. Although neither of the two native African bamboo species are classified as endangered, for alpine bamboo (*Yushina alpina*), the **level of threat** and **species vulnerability** needs to be assessed. This is important given the high level of deforestation and degradation threat to the habitats where most of this species is located in the Bamenda Highlands.

4. As bamboo is easily grown, **agroforestry** and **domestication** appears a feasible, low cost, potential route to ensure long term sustainable bamboo supply and management. A route which has proved successful for other NTFPs in Cameroon is disseminating germplasm from suitable species, combined with training of harvesters, owners and farmers in domestication, nursery and propagation techniques. A good partnership between INBAR, ICRAF, local nurseries and ANAFOR already exists which could support this activity technically

5. As just under half of bamboo harvested is open access, the **tenure of land** containing bamboo and **ownership** of specific bamboo clumps made need clarification (in common with other forested areas which communities believe are their lands), as bamboo becomes more valuable.

6. Bamboo has been shown to contribute significantly to the **livelihoods** of a small number of harvesters, processors and traders. Revenues from bamboo are also used to meet mainly basic needs and therefore can be seen as a contribution to attain the Millennium Development Goals. Developing the PCS to increase the number of those employed and their incomes is recommended based on a value chain approach that encompasses the entire PCS chain. A fuller **baseline** is needed of the numbers of people involved across Cameroon. Attention can also be particularly focused on the weakest links in the PCS chain by:
   a. Introducing suitable species for different and multiple uses.
   b. Increasing consumer and processor awareness of bamboo's properties and multiple uses.
   c. Increasing the product range and design.
   d. Support for innovations in design and processing.
   e. Professionalisation and training of actors — particularly harvesters and marketing.
   f. Business training and competitive pricing.
   g. Addressing problem areas, particularly storage.

7. Increasing the currently limited **product range** and the basic **marketing** methods indicates **an untapped market potential.** Learning lessons from both innovative design, appropriate materials and the range of uses and designs from leading countries in Asia could aid in diversifying incomes, adding value to products and the prestige of bamboo in general.

8. **Consumer** attitudes to bamboo highlight that many customers are positive about bamboo and believe its products are high quality, but believe it is not durable and less attractive than equivalent materials. A marketing campaign using the knowledge of producers and harvesters, and targeted particularly at consumers in the major urban markets, address these perceptions and improve bamboo's image, together with improved product design, treatment and selected species to address durability issues.

9. The **enabling environment** in terms of potential partner organisations in Cameroon is positive, despite their current lack of involvement in the sector. There is interest from the two main competent Ministries of Forestry and Wildlife and Small and Medium Scale Enterprises. Additional government stakeholders such as the Ministry of Agriculture and Rural Development could be beneficial partners. Funding agencies and development partners could potentially include those focusing on themes such as artisan crafts, building materials, biofuels and renewable energy, reforestation and carbon sequestration and rural development. For the native bamboo, forest and conservation organisations could also be potential partners. Public-private partnership and investment from foreign processors of bamboo products could provide a boost by acting as a pilot or demonstration model for the sector.

10. The majority of stakeholders in the bamboo chain operate informally and are both unregistered and unorganised, although the number of groups appears to be increasingly recently with

support from the Ministry of Small and Medium Scale Enterprises, and an improved business environment. Efforts to **professionalise the sector** could be successful when they address common goals and needs such as marketing, consumer education on bamboo and its products and uses, crafts training and business skills development. Problems of safety and accidents due to inappropriate tools could also be addressed by collective action and organisation which may increase access to credit, enabling harvesters and processors to buy better equipment.

11. A change is needed in the current 'silent' **policy framework** concerning bamboo by the Ministry of Forestry and Wildlife and ANAFOR, to a more active promotion of bamboo. Clarification of its non-special status is advised. Given that largely exotic species are used, the current low level and estimated minor total volume and value of trade (compare to other non-timber and timber products) and its importance for subsistence use, indicate that bamboo's classification as a special forestry product is not necessary. As bamboo tends to be as much a planted as a wild forest product (in the major production areas in the Southwest, Centre and Littoral regions), the involvement of the Ministry of Agriculture and Rural Development and other stakeholders in agriculture, could enhance the domestication of bamboo in Cameroon.
12. Opportunities exist to use bamboo's **ecological characteristics** positively to combat soil erosion and capture carbon, particularly in areas of degraded soils and eroded land such as the West, Northwest and Adamaoua, and in carbon sequestration and reforestation projects such as REDD.

References

Abott, J.I.O., Thomas, D.H.L., Gardner, A.A., Neba, S.E. and Khen, M.W. 2001 Understanding the links between conservation and development in Bamenda Highlands, Cameroon. World Development 29: 1115-1136.

Ames, M. 1998 Assessing the profitability of forest-based enterprises. *In*: Wollenberg, E. and Ingles, A. (eds) Incomes from the forest: methods for the development and conservation of forest products for local communities. CIFOR, Bogor, Indonesia.

Arnold, J.E.M. and Ruiz-Pérez, M. 1998 The role of non-timber forest products in conservation and development. *In*: Wollenberg, E. and Ingles, A. (eds) Incomes from the forest: methods for the development and conservation of forest products for local communities, p17-42. CIFOR, Bogor, Indonesia.

Ayodele, I.A. and Tsi, E.A. 2002 Forest fragmentation and the loss of birds, an issue of immediate attention at Kilum-Ijum Community Forest, Cameroon. Nature et Faune 18.

Belcher, B. and Schreckenberg, K. 2007 Commercialisation of non-timber forest products: a reality check. Development Policy Review 25(3): 355-377.

Belcher, B.M. 1998 A production to consumption systems approach: lessons from the bamboo and rattan sectors in Asia. *In*: Wollenberg, E. and Ingles, A. (eds.) Incomes from the forest: methods for the development and conservation of forest products for local communities, p56-84. CIFOR, Bogor, Indonesia.

Betti, J.L. 2007 Stratégie/plan d'action pour une meilleure collecte des données statistiques sur les produits forestiers non ligneux au Cameroun et recommandations pour les pays de la COMIFAC. Project report. http://cameroun-foret.com/system/files/18_89_76.pdf (30 September 2010).

Brink, M. 2008 Bambusa vulgaris Schrad. ex Wendl, J.C., Protabase. In: Louppe, D., Oteng-Amoako, A.A. and Brink, M. (eds) Plant Resources of Tropical Africa/Ressources végétales de l'Afrique tropicale. Wageningen, Netherlands.

Burgener, M. 2007 Trade measures - tools to promote the sustainable use of NWFP? An assessment of trade related instruments influencing the international trade in non-wood forest products and associated management and livelihood strategies. Non-Wood Forest Products Working Document N° 6 F. Department: 145. Food and Agriculture Organization, Rome.

Bystriakova, N., Kapos, V. and Lysenko, I. 2002 Potential distribution of woody bamboos in Africa and America. *In*: Working Paper 43, United Nations Environment Program-World Conservation Monitoring Centre (UNEP-WCMC), Cambridge, UK.

Cable, S. and Cheek, M. 1998 (eds.) The plants of Mount Cameroon — a conservation checklist. Royal Botanic Gardens, Kew, UK.

Calibre Consultants and Statistical Services Centre at the University of Reading 2000 Numbers of forest dependent people: a feasibility study. *In*: DFID's Forestry Research Programme. University of Reading, Reading, UK.

CERUT-AIDEnvironment 1999 The wealth of forests in Cameroon. *In*: Results of field testing: a methodology for the valuation of non-timber forest products (NTFPs) in North-West and South-West Cameroon, 137. CERUT and AIDEnvironment.

Cheek, M., Onana, J. and Pollard, B. 2000 The plants of Mount Oku and the Ijim Ridge, Cameroon: a conservation checklist. Royal Botanic Gardens, Kew, UK.

Cheek, M., Pollard, B.J., Darbyshire, I., Onana, J.-M. and Wild, C. 2004 The plants of Kupe, Mwanenguba and the Bakossi Mts, Cameroon — a conservation checklist. Royal Botanic Gardens, Kew, UK.

Central Intelligence Agency 2010 World Factbook, Cameroon, https://www.cia.gov/library/publications/the-world-factbook/geos/cm.html (7 June 2010).

Clark, L.E. and Sunderland, T.C.H. 2004 The key non-timber forest products of Central Africa: state of the knowledge. *In*: Clark, L.E. and Sunderland, T.C.H. (eds) SD Publication Series Technical Paper 122. US Agency for International Development, Office of Sustainable Development, Bureau for Africa, Washington, DC.

Comiskey, J.A., Sunderland, T.C.H. and Sunderland-Groves, J. (eds) 2003 Takamanda: the biodiversity of an African rainforest. Smithsonian Institution, Washington, DC.

CBFP (Congo Basin Forest Partnership) 2006 The Forests of the Congo Basin, State of the Forest 2006. COMIFAC,Yaoundé, Cameroon:. http://www.cbfp.org/ (30 September 2010).

CRAC/GTZ-MINEF 1999 Note de conjoncture environnement. Document for the project 'Conseiller auprès du Ministère de l'Environnement et des Forêts (MINEF)'. Gesellschaft für Technische Zusammenarbeit (GTZ), Yaoundé, Cameroon.

Cuddeford, V. 2007 Fiche descriptive sur le bambou. Réseau de radios rurales des pays en développement, Pochette 80 (4) March 2007.

Cunningham, A.B., Ayuk, E., Franzel, S., Duguma, B. and Asanga, C. 2002 An economic evaluation of medicinal tree cultivation: *Prunus africana* in Cameroon. People and Plants Working Paper 10: 1-39.

Dione, A.M., Tamnjong, I., Ndam, N. and Blackamore, P. 2000 Socio-economic case study of the production-to-consumption system of the rattan sector in Cameroon. International Network for Bamboo and Rattan http://www.inbar.int (20 September 2010).

Doumenge, C., Gilmour, D., Ruiz-Pérez, M., Blockhuis, J., 1993 Tropical montane cloud forests: conservation status and management issues. http://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_6/b_fdi_35-36/41295.pdf (20 September 2010).

European Tropical Forest Research Network (ETFRN) 2003 Mountain forests. ETFRN News. http://www.etfrn.org/etfrn/newsletter/news38/nl38_oip.html (20 September 2010).

Food and Agriculture Organisation (FAO) 2010 Forests and poverty reduction website. http://www.fao.org/forestry/livelihoods/en/ (6 June 2010).

Food and Agriculture Organisation (FAO) 2003 Bamboo and rattan statistics. Non-Wood News 10: 104. FAO, Rome.

Food and Agriculture Organisation (FAO) 2007 State of the world's forests. FAO, Rome.

Food and Agriculture Organisation (FAO), Gesellschaft für Technische Zusammenarbeit (GTZ) and COMIFAC 2008 Directives sous-régionales relatives a la gestion durable des produits forestiers non ligneux d'origine végétale en Afrique Centrale. In: GCP/RAF/398/GER Renforcement de la sécurité alimentaire en Afrique Centrale à travers la gestion et l'utilisation durable des produits forestiers non ligneux. Yaoundé, Cameroon.

Foaham, B., Samba D., Ingram, V. and Awono, A. 2009 Inventaire de *Prunus africana* dans les provinces du Sud-ouest et du Nord-ouest du Cameroun, novembre 2007 — novembre 2008. CIFOR, Yaoundé, Cameroon.

Fometé, T. and Cerutti P. 2008 Verification in the forest sector in Cameroon. Verifor Country case study 11., Overseas Development Institute, London.

Gautier, D. 1992 Bamiléké hedges and agriculture: an example from the Bafou district (W. Cameroon). Cahiers de la Recherche Developpement 31(1): 65-78.

Government of Cameroon 2010 Third Population and Housing Census 2005. Government of Cameroon, Yaoundé, Cameroon

Grimshaw, J.M. 1999 The afromontane bamboo, *Yushania alpina*, on Kilimanjaro. Journal of East African Natural History 88: 79-83.

Hall, J.B. and Inada, T. 2008 *Sinarundinaria alpine* (K.Schum.) C.S. Chao and Renvoize, Protabase. In: Louppe, D., Oteng-Amoako, A.A. and Brink, M. (eds.) PROTA (Plant Resources of Tropical Africa/Ressources végétales de l'Afrique tropicale). Wageningen, Netherlands.

Hawkins, P., and Brunt, M. 1965 The Bamenda area, vegetation map, map 9. *In*: The soils and ecology of west Cameroon (with special reference to the Bamenda Area). Food and Agriculture Organiszation, Rome.

Holmes, Karen (ed.) 2005 Interactive forestry atlas of Cameroon: an overview. World Resources Institute, Washington, DC.

Hutchinson, J., Dalziel, J., Keay R.W.J. and Hepper, F.N. 1954-1972 Flora of West Tropical Africa, Vols 1-3. Whitefriars, London and Tonbridge, UK.

INBAR/BOTA/ABS (International Network for Bamboo and Rattan - Bamboo of the Americas - American Bamboo Society) 2009 Constructing and conserving with bamboo. Round Table Discussion at World Forestry Congress 13, Buenos Aires, Argentina, 18-23 October 2009. http://www.bambooftheamericas.org/?p=138 (30 September 2010).

International Network for Bamboo and Rattan (INBAR) 2009 *Ochlandra travancorica:* INBAR.http://www.inbar.int/publication/txt/tr17/Ochlandra/travnacorica.htm (November 2009).

Ingram, V. and Jam, A.N. 2008 Cameroon Highlands eco-monitoring and survey results 2006—2007. Working paper. Western Highlands Conservation Network (WHINCONET) and Netherlands Development Organisation (SNV), Bamenda, Cameroon.

Ingram, V. 2009 The hidden costs and values of NTFP exploitation in the Congo Basin. Paper presented at the 13th World Forestry Congress. Buenes Aires, Argentina, 18-23 October.

Jonkers, W.B.J. and Foaham, B. 2004 Sustainable management of rainforest in Cameroon. Tropenbos-Cameroon Series 9. Tropenbos International, Wageningen, Netherlands.

Jonkers W.B.J. and Foahom B. 2009 Sustainable management of rainforest in Cameroon. The Tropenbos-Cameroon Programme, Kribi. Tropenbos-Cameroon Series 9.

Kaberry, P.M. 1952 Women of the grassfields: a study of the economic position of women in Bamenda, British Cameroons. Her Majesty's Stationery Office, London.

Kilum Ijum Forest Programme 1997 Kilum- Ijim Forest Project: Plant List. Ecological Monitoring Programme. Birdlife International 15.

Kleinn, C., Yang, Y., Weyerhäuser, H. and Stark, M. 2006 The sustainable harvest of Non-Timber Forest Products in China. Strategies to balance economic benefits and biodiversity conservation. Paper presented at Sino-German Symposium at Bejing.

Knopfli, H. 2001 Baskets and Calabashes, Palms and People. Basel Mission, Basel.

Laird, S., Ingram, V., Awono, A., Ndoye, O., Sunderland, T.C.H., Lisinge, E. and Nkuinkeu, R. 2010 Bringing together customary and statutory systems: the struggle to develop a legal and policy framework for NTFPs in Cameroon. *In*: Laird, S.A., McLain, R. and Wynberg, R.P. (eds.) Wild product governance: finding policies that work for Non-Timber Forest Products. Earthscan, London.

Laird, S.A., McLain, R. and Wynberg, R.P. (eds.) 2010 Wild product governance: finding policies that work for Non-Timber Forest Products. Earthscan, London.

Lauber, W. 1990 Palaces and compounds in the grasslands of Cameroon: traditional wood architecture of a West African country. Karl Krämer & Co. Verlag, Zurich, Switzerland.

Letouzey, R. 1985 Carte Phyogeographique du Cameroun 1:500 000. I. d. l. R. Agronomique. Toulouse, France.

Maisels, F. and Forboseh, P. 1999 Phenology of the major tree and shrub species of the Kilum Ijim forest. Ecological Monitoring Programme. K.-I. F. Project. Cameroon, BirdLife International and the Ministry of Environment and Forestry.

Malin, N. and Boehland, J. 2006 Bamboo construction: is the grass always greener? Environmental Building News, March 2006.

Marsh, J. and Smith, N. 2006 New bamboo industries and pro-poor impacts: lessons from China and potential for Mekong countries. *In*: Oberndorf, R., Durst, P., Mahanty, S., Burslem K. and Suzuki, R. (eds) A cut for the poor — International conference on managing forests for poverty reduction: capturing opportunities in forest harvesting and wood processing for the benefit of the poor. Food and Agriculture Organisation (FAO), Netherlands Development Organisation (SNV), the Center for People and Forests (RECOFTC), Ho Chi Minh City, Vietnam.

Mdaihli, M., Schmidt-Soltau, K. and Ayeni, J.S.O. 2002 Socioeconomic baseline survey of the villages in and around the Takamanda Forest Reserve. Program on Forests (PROFOR):54.

Mundi, E.K. 1978 Construction and building materials industry in the United Republic of Cameroon. International Forum on Appropriate Industrial Technology, New Delhi/Anand, India.

Neba, A. 1999 Modern geography of the Republic of Cameroon. 3rd ed. Neba, Bamenda, Cameroon .

Nkwatoh, A.F. 2005 Production and marketing of non timber forest products (NTFPs), a major source of rural and national income in the South West Province of Cameroon. 17th Commonwealth Forestry Conference, Colombo, Sri Lanka, 25 February — 5 March 2005.

Nurse, M.C., Mckay, C. R., Young, J.T. and Asanga, C.A. 1995 Biodiversity conservation through community forestry, in the montane forests of Cameroon. Rural Development Forestry Network (RDFN) paper.

Ohrnberger, D. 1999 The bamboos of the world. Elsevier, Amsterdam the Netherlands..

Pabuayon, I.M. 2009 The changing market for NWFPs and strategic directions for the bamboo and rattan sector. 13th World Forestry Congress Buenos Aires, Argentina, 18-23 October 2009.

Parrott, J, and Parrott, H. 1989 Report on the conservation of Prunus (Pygeum) africanum in Cameroon. *In*: Report, Kilim Ijum Forest Project. Kilum Mountain Forest Project, Bamenda, Cameroon.

Preston, G.N. 1981 Africa's Cross river: art of the Nigerian-Cameroon border redefined. African Arts 14(3): 78-79.

Rajahmundry 2003 Bamboo harvesting and marketing in VSS areas in North Coastal districts. Paper presented at workshops 17-18 October and 14-15 November, PMRC, Rampachodavaram, East Godavari District, India. http://forest.ap.nic.in/JFM%20CFM/CFM/Special%20Reports/VSS%20Worskhops%20on%20Bamboo%20Harvesting.htm (30 September 2010).

Ruiz-Pérez, M. and Byron, N. 1999 A methodology to analyse divergent case studies of Non-Timber Forest Products and their development potential. Forest Science 45(1): 1-14.

Ruiz-Pérez, M., Belcher, B., Fu, M. and Yang, X. 2004 Looking through the bamboo curtain: an analysis of the changing role of forest and farm income in rural livelihoods in China. International Forestry Review 6(3-4): 306.

Ruiz-Pérez, M., Maoyi, F., Belcher, B., Xioasheng, Y., Mertens, B., Hua, L. and Jinzhong, X. 2009 The socio-economic and environmental roles of bamboo in rural China. *In*: Abe Kem-ichi, J.E.N. Good earths: regional and historical insights into China's environment. Kyoto University Press and Trans Pacific Press, Melbourne, Australia.

Soukontoua, Y., Mfomou, E. and Howard, R. [2007] Report of the socio-economic study based on beekeeping in Adamoua. Paella, E. Cameroon, Ngoundal, 31. Unpublished report

Shanley, P., Pierce, A., Laird, P. and Robinson, D. 2008 Beyond timber: certification and management of Non-Timber Forest Products. CIFOR, Bogor, Indonesia.

Sunderland, T.C.H. 2001 The taxonomy, ecology and utilisation of African rattans (Palmae: Calamoideae). University College, London, UK.

Sunderland, T.C.H., Besong, S. and Ayeni, J.S.O. 2002 Distribution, utilisation and sustainability of Non-timber Forest Products from Takamanda Forest Reserve, Cameroon. *In*: Consultancy Report, Protection of the Forests around Akwaya (PROFA). http://cameroun-foret.com/fr/system/files/18_89_04.pdf (20 September 2010).

Tabot Tabot, Ebenezer 2006. Strengthening forward and backward linkages in the Rattan and Bamboo sectors in Africa: the case of South West Region of Cameroon. Paper presented at ITTO/ ICBR / INBAR International Workshop on Sustainable Development of Global Rattan Sector, 1st Bamboo and Rattan Standardization Training Workshop, 23—27 July, Beijing, China.

Tchoundjeu, Z., Atangana, A.R. and Degrande, A. 2005 Indigenous methods in preserving bush mango kernels in Cameroon. American Journal of Applied Sciences 2(9): 1337-1342.

Tieguhong, J.C. and Ndoye, O. 2004 Development of trade and marketing of non-wood forest products for poverty alleviation in Africa. A report prepared for the project Lessons Learnt on Sustainable Forest Management in Africa. CIFOR, Yaoundé, Cameroon.

Tieguhong, J.C. Ndoye, O. Vantomme, P., Zwolinski, J. and Masuch, J. 2009 Coping with crisis in Central Africa: enhanced role for non-wood forest products. Unasylva 233(60): 49-54.

Topa, G., Karsenty, A., Megavand, C. and Debroux, L. 2009 The rainforests of Cameroon: experience and evidence from a decade of reform. *In*: Directions in development. Environment and sustainable development. World Bank, Washington, DC.

Transparency International 2009 Corruption Perceptions Index 2008. Transparency International http://www.transparency.org/policy_research/surveys_indices/cpi/2009 (20 May 2009).

United Nations Development Program (UNDP) 2008 Human development report 2007/2008. Fighting climate change: human solidarity in a divided world. UNDP, New York.

United Nations Development Program (UNDP) 2009 Human development report 2009. Overcoming barriers: human mobility and development. UNDP, New York.

van der Zon, A.P.M. 1992 Graminées du Cameroun. PhD dissertation no. 1511, Wageningen Agricultural University, Wageningen, The Netherlands.

Warnier, J.-P. 2006 Techniques du corps et esthétique de l'art royal en Afrique. Revue de Philosophie et de Sciences Humaines 17.

de Wasseige C., Devers, D., Marcken P., Eba'a Atyi R., Nasi R. and Mayaux Ph., (eds) 2009 The forests of the Congo Basin, State of the Forest 2008. Office des publications de l'Union Européenne, Congo Basin Forest Partnership, Yaoundé, Cameroon.

Wilkinson, K. and Elevitch, C. 2009 Non-timber forest products: an introduction. The Overstory 53.

World Bank 2002 Sustaining forests: a development strategy. Washington DC.

World Bank 2009 Doing Business. World Bank, Washington DC.

World Bank 2009 Cameroon at a glance. At a Glance Series. World Bank, http://web.worldbank.org/wbsite/external/datastatistics/.

Appendices

Appendix 1. List of actor and stakeholder interviews

No	Name	Organisation/ Location	Contact/Email	Date
1	Tole, Desire and Ewusi, Bruno	ANAFOR	desiretole2005@yahoo.fr desireiboureu@ymail.com	11-18/11/ 2009
2	Kwidja Roger	APADER	Bangante 99787771	24/11/09
3	BOMBA Denis	APVF	Handicraft, Tunnel Mboppi 76384790	22/11/09
4	NG'AMOUGOU François Marie	Association de Protection et Valorisation Forestière (APVF), GIC PROFOPEC	Handicraft, Tunnel Mboppi 99256375	23/11/09
5	VUNYOH Christopher	Association des Artisans des Produits Forestiers (ASAPROF)	Craftman, Nkol-Eton	08/12/09
6	Lucien ATANGANA	Association des Vanniers du Mfoundi (AVAM)	Handicraft, Bastos 77 20 73 70	04/12/09
7	Luc ONDOBO	Association des Vanniers du Mfoundi, Yaoundé	Nouvelle route Bastos, between UNDP office and Resto Fines Epices lucondobo@yahoo.fr 77881703	25/11/09
8	EYEYA	ASVAM	Handicraft, Mvog-Mbi 77338499	05/12/09
9	MBIDA Antoine	ASVAM	Handicraft, Bastos	05/12/09
10	ONDOBO Luc	ASVAMF	Handicraft, lucondobo@yahoo.fr, 77 88 17 03, Omnisport	08/12/09
11	YOR David	Badeng	Farmer, Bafoussam(Badeng)	29/11/09
12	YOUBI Verdiane	Badeng	Farmer, Bafoussam(Badeng)	29/11/09
13	KENGNE Jean Pierre	Badeng	Farmer, Bafoussam(Badeng) 74277450	29/11/09
14	KAGNE Chantal	Badeng	Farmer, Bafoussam(Badeng)	29/11/09
15	TATOK	Badeng	Farmer, Bafoussam (Badeng) 94020131	29/11/09
16	TALLE Philippe	Badeng	Farmer, Bafoussam (Badeng)	29/11/09
17	Abdouraman NAMEKONG	Bafoussam	Handicraft, Bafoussam 79743978	28/11/09
18	TIAM Zacharie	Bafoussam	Farmer, Bafoussam 94739444	28/11/09
19	KUETCHE Blaise	Bafoussam	Collecteur, Bafoussam 99818828	30/11/09
20	POKAM B.	Bafoussam	Collecteur, Bafoussam 79579211	30/11/09
21	TIYA Alain	Bafoussam	Handicraft, 99561714, Bafoussam	30/11/09
22	CHESOH George Ambe	Bafut	Bamboo, Bamenda (Bafut) 75081097	14/12/09
23	Afuokeze NGUM	Bamenda	Handicraft, B'da 77384256	14/12/09
24	MBARGA EVOUNA	Bamenda	Handicraft, Douala 95248798	23/11/09
25	KOBONG Mercy	Bamenda Handicraft Cooperative	Manager, Bamenda	14/12/09
26	TEFO Maurice	Bastos	Handicraft, Bastos 77 25 19 84	04/12/09
27	Janvier MOKOUA	Bimbia Bonadikombo Community Forest	Council office, Limbe bbcommunityforest@yahoo.com	18/02/10
28	PENDA Max	Bokwango	Farmer, Buea (Bokwango)	22/11/09
29	PA NJIE Lium M.	Bokwango	Plumber, Bokwango	22/11/09
30	Luan NJIE	Bokwango	Farmer, Bokwango	22/11/09
31	Peter MANDALO	Bokwango	Farmer, Bokwango	22/11/09
32	MBOME Petet N	Bokwango	Driver, Bokwango	22/11/09
33	MOSOUGE Ernest	Bonakanda	Farmer, Bonakanda	23/11/09

No	Name	Organisation/ Location	Contact/Email	Date
34	NJIE Ngando	Bonakanda	Farmer, Bonakanda	22/11/09
35	Gostave LIVANA	Bonakanda	Farmer, Bonakanda	22/11/09
36	Pete MBUA	Bwassa	Farmer, Bwassa	24/11/09
37	Njoh Augtine	Bwassa	Farmer, Bwassa	24/11/09
38	NCHIE Ikome	Bwassa	Farmer, Bwassa	24/11/09
39	Ebenzeer TABOT TABOT	CEHDev Cameroon	cehdev@justice.com	06/11/09
40	LEKEADJO Cecile	Centre de Promotion des Artisans de Bafoussam (CEPAB)	Gérante de la salle d'exposition CEPAB, 33 02 77 09 / 33 44 46 17 / 99 31 22 05 cepab40@hotmail.com, Bafoussam	30/11/09
41	MBIDA Celestin	Cercle des Jeunes de Zamakoe	Handicraft, Zamakoe	02/12/09
42	MFOMO Gabriel	Cercle des Jeunes de Zamakoe	Handicraft, Zamakoe	02/12/09
43	Terry SUNDERLAND	CIFOR	t.sunderland@cgiar.org	Nov. 2009
44	Micheal TCHANA, Yves SOUKONTANA, Paul MBOUI	Guiding Hope	guidinghope@ yahoo.fr	01/10/09
45		CIRAD		25/02/10
46	TEYTSA Alain	Douala	Handicraft, Tunnel Mboppi 96418875	24/11/09
47	ESSOMBA Réné	Douala	Handicraft, Ndocbat 74435024	24/11/09
48	OUMAROU BOBO Jean	Douala	Handicraft, Marche Tunnel Mboppi 75742409	24/11/09
49	DJOUMESSI	Douala	Handicraft, Marché des fleurs 5099140799	23/11/09
50	ESSOMBA Afred Saker	Douala	Handicraft, Douala Koumassi 96033617	23/11/09
51	Evaritus	Douala	Handicraft, marché des fleurs	23/11/09
52	ESSOMBA Hubert	Douala	Handicraft, Tunnel Mboppi	23/11/09
53	MBIDA Clavert	Douala	Handicraft, Tunnel Mboppi	22/11/09
54	MBESSEGUE AMBASSA	Douala	Handicraft, Tunnel Mboppi	22/11/09
55	ESSOMBA Norbert	Douala	Handicraft, Tunnel Mboppi	22/11/09
56	MBONGOLO Honoré	Douala	Handicraft, Bonapriso	22/11/09
57	NYANWA Réné	Douala	Handicraft, marché des fleurs	22/11/09
58	Ngembo MOTUTU	Ewonda	Farmer, Ewonda Village	23/11/09
59	Elvis Paul TANGEM	FAO	tangemelvispaul@yahoo.co.uk	25/11/09
60	Armand ZE Assenge	FAO	assengze@yahoo.fr	24/11/09
61	Irine Ako MANYI	FAO	irineako@yahoo.com	05/10/09
62	NDONGO Leopold Aime	Ferrudjal	Mbalmayo leopoldaimendongo@yahoo.fr	24/11/09
63	FOTSO Alphonse	Foumbot	Cultivator, Foumbot	28/11/09
64	NGON BA'A Idrissou	Foumbot	Famer, Foumbot	29/11/09
65	AGBOR Justine	Foumbot	Farmer, Foumbot	29/11/09
66	FANFON Adrian	Foumbot	Gardener, Foumbot	28/11/09
67	Françoise	GIC ASCARTES	Yaoundé	18/11/09
68	SEIDOU	GIC FAMROLI; Espace métier	Handicraft, marché des fleurs 74704014	23/11/09
69	Adjongo COME DJOKO Martin OTLU Ole, Joesph	GIC Unibarod, Yaoundé	unibarod@yahoo.fr 99614716 9189980 79 42 5024	25/11/09
70	ADJONGO Come	GIC Univers du Bambou et du Rotin (Uni BaRo)	Handicraft, unibarod@yahoo.fr 99 61 47 16, Bastos	08/142/09
71	Micheal TCHANA Paul MBOUI	Guiding Hope	guidinghope@yahoo.fr	05/10/09

No	Name	Organisation/ Location	Contact/Email	Date
72	Jean Michel ONANA	Herbier National du Cameroun	(237) 99 74 38 78 Jjmonana2002@yahoo.fr	18/11/09
73	Dr. Alain MARLIAC	Institue Recherche and Développement IRD, Yaoundé	Quartier Elig Essono, 01 B.P. 1857, Yaoundé Tél: (237) 220 15 08, Cameroun@ird.fr	24/02/10
74	Philip MOSOKA	Likombe	Bulleles, Likombe	24/11/09
75	IKOME Daniel	Likombe	Bricklayer, Likombe	24/11/09
76	TOTE Lorance	Likombe	Farmer, Likombe	24/11/09
77	Sako IDOGO	Likondje	Timber Dealer, Likondje	24/11/09
78	TANWI Eric	Limbe	Craftman, Limbe	25/11/09
79	Martin ATENDONG	Limbe	Handicraft, Limbe	25/11/09
80	MOLONA Isaac	Lysoka	Securty offices, Lysoka	24/11/09
81	IOKER Elvis	Lysoka	Timber exploitation, Lysoka	24/11/09
82	YAMTEM John	Lysoka	Farmer, Lysoka	24/11/09
83	Alain MUDUNJIE	Lysoka	Farmer, Lysoka	24/11/09
84	NTSAMA Hubert	Marché Nkolouloun	Collecteur, Marché Nkolouloun 96424272	23/11/09
85	WANDJO David	Marché Nkolouloun	Collecteur, Marché Nkolouloun 94888129	23/11/09
86	WANDJA Michel	Melon	Agriculture, Melon	30/11/09
87	KINGOKO Joseph	Melon	Agriculture, Melon	30/11/09
88	TAGNE Brigitte	Melon	Agriculture, Melon	30/11/09
89	DJEMELI Paul	Melon	Agriculture, Melon	30/11/09
90	WAGUIA Michel	Melon	Agriculture, Melon	30/11/09
91	Damien PIAL	MinFoF	Responsable de Poste de Djembe, Lobeke	26/02/10
92	Paul WAMBA	MinFOF	paulwamba1@yahoo.fr	11 and 18 /11/09
93	Jacques NYAM Eben	Ministry Petites Moyens Entreprises, Inspection General, Yaoundé	77691393 ebennyam@yahoo.fr	25/11/09
94	PA Isaac Tie	Muea	Craftman, Muea	25/11/09
95	AKUH Moses	Muea	Farmer, Muea	23/11/09
96	SUH John	Muea	Farming, Muea	25/11/09
97	MBUA M.	Muea	Motor machine	23/11/09
98	BELINGA Jean Didier	Mvog-Mbi	Handicraft, Mvog-Mbi	05/12/09
99	AMBASSA AMBASSA Denis	Mvog-Mbi	Handicraft, Mvog-Mbi 74 44 99 00	05/12/09
100	FOUMANE	Mvog-Mbi	Handicraft, Mvog-Mbi 74392627	05/12/09
101	Pascaline, Angeline Njoutu	North West Crafts Association Bamenda	nowecanet@yahoo.com www.wagne.net/noweca/dossiers/ http://www.cnac-cameroun.org/	05/10/09
102	CHESOGH George A.	Presscraft Bafut	Handicraft, Bafut	14/12/09
103	NGAH Frédérie	Regroupement des Artisans Vanniers	Handicraft, Tunnel Mboppi	24/11/09
104	Martin Cheek, Tom COPE, Grace, Olwen	Royal Botanic Gardens Kew	M.Cheek@kew.org	20/11/09
105	TIEGUHONG Julius Chupezi	Technical Training and Research Centre for Development (TTRECED), Yaoundé	chupezi@yahoo.co.uk	01/11/09
106	Marc PARREN	Tropenbos International, Cameroon	Marc.parren@yahoo.com	October 2009

No	Name	Organisation/ Location	Contact/Email	Date
107	NKWATOH, Athanasius Fuashi	University of Buea	nkwatohaf@gmail.com	21/11/09
108	NGOUA Cyrille	University of Buea	Student, Muea	25/11/09
109	Felix MEUTCHIEYE	University of Dschang, FASSA Campus A	99901009/ 79679789 meutche@ yahoo.fr	25/11/09
110	ABANDA Marcel	Zamakoe	Handicraft, Zamakoe	02/12/09
111	ATANGANA Germain	Zamakoe	Handicraft, Zamakoe	02/12/09
112	NANGA ALOUA Ivan Bertran	Zamakoe	Handicraft, Zamakoe	02/12/09
113	MESSI Mathew	Zamakoe	Handicraft, Zamakoe	02/12/09
114	FOUDA Robert	Zamakoe	Handicraft, Zamakoe	02/11/09

Appendix 2. Questionnaires

Questionnaire for collectors (Urban and Rural)

Questionnaire No.: …… Interviewed by.....

Region……..District……..Village/town .....

Name of Respondent……Date of Interview .....

Socio-demographic Information

1. Age of respondent……Gender……. M/F
2. Educational status: Nil ( ) Primary ( ) Middle/JSS ( ) Secondary/SSS ( )

   Polytechnic/Training college ( ) University ( ) Others…….
3. Ethnic origin: Native ( ) Migrant ( ) Settler ( ) Specify ethnic group.....
4. Major occupation……Gross income.....
5. Minor occupation……..……..Gross income .....
6. Marital status: Single ( ) Married ( ) No. of spouses……, Divorced ( ) Widowed ( )
7. Household size……..: Men >15years……Women>15years …..……

   Children: boys <15 years…….. girls<15 years ……
8. Number and gender of household members involved in Bamboo collection:……

   Men……Women……Children: boys……girls……..
9. Type of Bamboo collection activities household members engage in:

Activity	Men	Women	Children
Collection			
Transportation			
Marketing			
Processing			

10. Gross income from Bamboo collection (per trip/week/month/annum) .....
11. Other sources of income (Please state and specify amount/month) .....

    .....
12. What is the approximate area or size of your community land you collect Bamboo from? .....

    .....

13. What proportion of the community land is covered by Bamboo? 100% ( )

    >50% ( ) 33% ( )<33% ( )… Others ……

14. What proportion of the community land covered by Bamboo is harvested every year? .....

15. Who controls or owns the Bamboo land you exploit or work on? Chief ( ) Community ( ) Family ( ) Landowner ( ) Government ( ) No one ( )

16. Who has the right to harvest Bamboo? Natives only ( ) Any one at all ( )

17. How do you obtain the right or access to harvest the Bamboo? .....

    .....

18. Do you own any Bamboo area? Yes ( ) No ( )

    (i) If yes, state the size of area owned .....

    (ii) If no, how do you pay for the area harvested? Royalty ( ) Commission ( )

    Tax ( ) Rent (….) bamboo produce ( ) Nothing ( )

    (iii) How much do you pay per year? .....

    (iv) To whom do you make the payment? .....

    (v) What is your opinion of the level of payment? .....

    (vi) If nothing is paid give reasons .....

19. How is the Bamboo stock locally regenerated?..a). natural ( ) (b) planted ( ) (c) both a and b ( )

    .....

20. What local regulations and practices are there for managing the available Bamboo stock? .....

    .....

    .....

21. Do you belong to any Bamboo association? Yes ( ) No ( )

    (i) If yes, what type of Bamboo association? Collectors ( ) Processors ( ) Manufacturers ( )

    Others .....

    (ii) What is the main objective of this association? .....

    (iii) Number of people belonging to the association? .....

    (iv) Since when established? .....

    (v) How long have you been a member? .....

    (vi) Benefits gained or expected from the association? .....

Bamboo Collection

22. Where do you or other members of the community normally collect Bamboo from?

    Natural production forest ( ) Forest reserve ( ) fallow farm land ( ) Community land ( ) Others .....

23. What time of the year do you normally collect Bamboo? Dry season ( ) Rainy season ( )

    All year round ( ) Please specify the months .....

24. How many months do you harvest Bamboo during the collection season? .....

25. Please state: (i) Number of trips in a month…… (ii)Duration of a trip .....

26. How many bundles of Bamboo do you collect per trip/week/month? .....

27. What are the most common Bamboo species collected?. (.....)

    (.....)

    (.....)

28. Which species do you prefer most? (.....)

    Why.....

29. What factors determine good quality Bamboo species?.....

    .....

    .....

30. How are you able to differentiate between species? .....

    .....

31. What is the average length of Bamboo collected? .....

32. List tools and other inputs required for Bamboo harvesting .....

    .....

    .....

33. Please describe the Bamboo harvesting process.....

    .....

    .....

    .....

34. Do you know any sustainable harvesting method? Yes ( ) No ( ); If No, what technique do you think can be sustainable? .....

35. How do you transport the harvested Bamboo? Vehicle ( ) Bike ( ) Head ( ) Truck ( ) Others.....

36. How far from your village is the Bamboo found?…Distance (km)..... Time (Minutes).....

37. Where do you normally assemble the harvested Bamboo? .....

38. How far from the point of assembly is the Bamboo found (km) .....

39. How much do you spend per person in collecting Bamboo per trip? .....

40. What is the average number of people in a collection team? .....

41. Where do you obtain finance for Bamboo collection? .....

42. Do you sometimes reject Bamboo collected? Yes ( ) No ( )

    (i) If yes, how much is rejected per trip? .....

    (i) Give reasons for the rejection.....

43. Do you sometimes use some of the Bamboo collected for household purposes? Yes ( ) No ( )

    If yes, how much is used .....

    Please state purpose(s) .....

    .....

44. What factors affect the volume of Bamboo harvested? Availability ( ) Harvesting technique ( )

    Accessibility ( ) Season/time of year ( ) Level of disease infestation ( )

    Labour availability ( )

    Others.....

45. What kind of infestation do you normally see? Stain ( ) Insects ( ) Decay ( )

    Others.....

46. How do you treat the infestation?.....

47. What chemical(s) do you use for the treatment? .....

    .....

48. What problems do you face with Bamboo collection and How do you solve or think these problems can be solved?

Problem	Solution

49. List regulations/controls on Bamboo collection by government dept. or association .....

.....

Costs and Revenues

50. Costs in Bamboo collection (per trip)

Activity/Item		Amount (FCFA)
Labour No. of people per trip	No. / Rate	
No. of trips per week		
Expenses per trip (food and transport)		
Rent/Fee/Royalty/Commission/Access tax		
Transportation (assembling point to market)		
Tools		
Marketing (expenses incurred in selling)		
Other inputs		
Other expenses		

51. Household Expenses (per week/month / year)

Item	Amount (FCFA)
Food	
Clothing	
Rent	
School fees	
Medical fee	
Funerals	
Entertainment	
Other social expenses	
Total	

52. Revenue from Bamboo collection (per trip)

Average bundles of Bamboo collected per trip	Av. No. of trips per day/week/ month/year	Selling price per bundle	Total earned per year

53. Other Household Incomes (per month/year)

Item	Amount (FCFA)
Farm production	
Trading	
Government work	
Labourer	
Remittances	
Livestock	
Fishing	
Hunting	
Timber company work	
Apprenticeship	
Retired worker	

Marketing of raw Bamboo

54. Where do you sell the Bamboo harvested? *Please name town/village.....

    Home ( ) Local market ( ) Collection point ( ) Urban market ( )

    Others.....

55. Who buys the Bamboo harvested? Processor ( ) Middle man ( ) Others .....

    .....

56. What is the purchasing arrangement? Cash payment ( ) Advanced payment ( ) Credit ( ) Barter ( )

57. Are you satisfied with the income you earn from Bamboo collection? Yes ( ) No ( )

    reasons .....

    .....

58. Do you grade the raw Bamboo before sale? Yes ( ) No ( ) Why?.....

    .....

    .....

59. If yes, how is the grading done?.....

    .....

Processing

60. Do you carry out any processing activities on the raw Bamboo? Yes ( ) No ( )
    If yes,
    (i) Specify type of activities .....

        .....

    (ii) Describe the process .....

        .....

        .....

    (iii) List tools and other inputs required for processing and their uses

Tools / Inputs	Use

61. Type of processing activities that household members are engaged in:

Activity	Men	Women	Children

62. Please state quantity processed (per trip/day/week) .....

63. What product(s) do you produce? .....

.....

64. Please list costs incurred in Bamboo processing

Item	Cost/amount (FCFA)

65. How much do you earn from the processed Bamboo?

Product	Quantity sold per trip/day/week/month	Price/Amount (FCFA)

66. Who buys the processed Bamboo? Middleman( ) Wholesaler ( ) Retailer ( )

Processor ( ) End user ( ) Others .....

Where do they come from? .....

.....

67. Where do you sell the processed Bamboo? Name of town/village .....

68. What should be done to enhance the Bamboo industry in the country? .....

.....

.....

Questionnaire for Processors

Questionnaire No.: …… Interviewed by.....

Region……..District……..Village/town .....

Name of Respondent……Date of Interview .....

A. Proprietor

Socio-demographic Information

1. Age of respondent……Gender…….M/F
2. Educational status: Nil ( ) Primary ( ) Middle/JSS ( ) Secondary/SSS ( )

   Polytechnic/Training college ( ) University ( ) others .....
3. Ethnic origin: Native ( ) Migrant ( ) Settler ( ) Specify ethnic group (…….....)
4. Major occupation……Gross income…….……
5. Minor occupation……..Gross income……
6. Marital status: Single ( ) Married ( ) No. of spouses ( ) Divorce ( ) Widowed ( )
7. Household size…….. Men >15years……Women>15years …..……

   Children: boys <15 years…….. girls<15 years ……
8. Number and gender of household members involved in Bamboo processing:……

   Men……Women……Children: boys……girls
9. Type of Bamboo processing activities household members engage in:

Activity	Men	Women	Children
Drying			
Scraping			
Bending/varnishing and fashioning			
Marketing			

10. How did you enter the Bamboo processing business? .....
11. How long have you been in the enterprise? .....
12. Position in the enterprise: Owner ( ) Manager ( ) Chief apprentice ( )

    Overseer/supervisor ( ) Others.....
13. Is the enterprise registered?……With which organisation? .....
14. Are you a member of any Bamboo association? Yes ( ) No ( ) Name of association .....

15. If yes, which type? Collectors ( ) Processors ( ) Traders ( ) Others .....

16. What is the objective of this association? .....

.....

.....

17. How many people belong to the association? .....

18. When was it established? .....

19. How long have you been a member? .....

20. What benefits have you derived or are you expecting from the association? .....

.....

.....

Bamboo Processing

21. Which of the following types/stages of Bamboo processing do you do?

    (i) Primary processing: Cleaning ( ) Curing ( ) Fumigation ( )

    (ii) Secondary processing: Scrapping ( ) Peeling ( ) Splitting ( ) Weaving/manufacture ( )

    (iii) All of the above ( )

22. What Bamboo species do you process most? (.....)

    Why? (.....

    .....)

    Which other species do you use? (.....)

23. Where do you get them from? .....

24. What factors determine good quality Bamboo species? .....

.....

.....

25. What Bamboo products do you produce, species used and respective volume of production

Type of product	Bamboo species used	Source of Bamboo species used	Quantity produced per day/week/ month

26. What problems do you encounter in processing Bamboo and how do you solve these problems?

Problem	Solution

27. List tools used in processing and uses

Tool	Uses

28. Describe how you process the Bamboo .....

.....

.....

29. Name common chemicals used in processing and for what purpose

Chemical	Use/purpose
Glue	
Petrol	
Lacquer	
Vanish	
Thinner	
Others	

30. What kind of waste is generated from processing? .....

31. What do you do with the waste generated .....

32. Does the enterprise have any pressing need for technical assistance? Yes ( ) No ( )

33. If yes, what type of technical assistance? .....

34. Where do you get it from?.....

How much do you pay? .....

Marketing of processed Bamboo

35. Do you grade processed Bamboo before sale? Yes ( ) No ( )

36. If yes what prices are paid for the various grades?

Grade	Price

37. How is the grading done? .....

.....

38. Where do you sell your products? Local market ( ) Road side ( ) Urban market ( ) Workshop ( )

Foreign/export market ( ) Others .....

39. Who buys your products? Middlemen ( ) Wholesalers ( ) Retailers ( )

Local end users ( ) Tourists ( ) Others.....

40. Where do your clients come from and what quantity of products do they purchase? (tick as appropriate)

Client	Resident status	Type of product purchased	Quantity purchased per day/wk/mth	Destination
Middleman	Rural dweller			
	Urban dweller			
	Foreigner			
Wholesaler	Rural dweller			
	Urban dweller			
	Foreigner			
Retailers	Rural dweller			
	Urban dweller			
	Foreigner			

End users	Rural dweller			
	Urban dweller			
	Foreigner/Tourist			

41. Who sets the price for your products? Self ( ) Union/association ( ) Others.....

42. What is considered in price setting?

    Quantity of material used ( ) Quality of material ( ) Size ( ) Beauty ( )

    Type of product ( ) Market demand ( ) Cost of raw materials ( ) Others.....

43. What problems do you encounter in marketing Bamboo products and how do you solve or think these problems could be solved?.....

44. Cite major problems you face and how you think they can be solved

Problem	Solution

Employment

45. Employment status (Please specify below)

Status	Weeks available/month	Months available	Wage paid
Full-time			
Part-time			
Sub-contract			
Piece-wise			

46. Other fringe benefits (specify below)

Status	Leave credits	Productivity bonus	Insurance	Health care	Other
Full-time					
Part-time					
Sub-contract					
Piece-wise					

Inputs

47. Material inputs

Input	Source	Quantity used per wk/month	Unit price	Method of payment
Bamboo				
Chemicals • Glue • Petrol • Lacquer • Vanish • Thinner • Others				
Plywood				
Gas				
Nails				
Others				

48. Investment capital

Amount of capital	Name of source	Interest rate	Repayment period

Costs and Revenues

49. Costs

a. Costs in Bamboo processing
i) Raw materials

Item	Quantity purchased per week/ month	Unit price	Amount
Bamboo			
Chemicals • Glue • Petrol • Lacquer • Vanish • Thinner • Others			
Plywood			
Gas			
Nails			
Others			

ii) Labour

Labour category	Number	Wage rate / allowance (day/week/month)
Apprentice		
Contract (daily/wkly/mthly/seasonal		
Overseer/supervisor		
Manager		
Others		

iii) Equipment

Equipment	Use(s)	Quantity	Unit price	Amount
Knives				
Brushes				
Benches/tables				
Gas cylinder				
Gas blower				
Sprayer				
Others				

iv) Miscellaneous

Item	Amount (FCFA)
Land/workshop rent	
Transportation cost	
Interest on loans	
Overheads (maintenance, etc)	
Taxes	
Other fees/levies paid	
Ticket	
Association dues	
Susu	
Equipment rentals	
Others	

b. Household expenses (per month/year)

Item	Amount (FCFA)
Food	
Clothing	
Rent	
School fees	
Medicals	
Funerals	
Entertainment	
Other social expenses	

50. Revenues

a. Revenue from Bamboo processing

Product	Amount earned (per day/week/month)

b. Other incomes

Source	Amount (FCFA)
Farm produce	
Other trades/petty trading	
Government work	
Labourer	
Remittances	
Others	

51. Apart from women from your household, do you involve other women in the enterprise? .....

In what capacity?.....

52. How do women generally perform compared to their male counterparts?

.....

53. Do you involve other children? .....

In what capacity?.....

54. State/list regulations and controls by government dept., association, etc on

(i) Acquisition of raw materials .....

.....

(ii) Processing .....

.....

(iii) Marketing of Bamboo products .....

.....

55. What should be done to enhance the Bamboo industry in the country? .....

.....

.....

Questionnaire for Traders

Questionnaire No.: …… Interviewed by.....

Region……..District……..Village/town.....

Name of Respondent……Date of Interview .....

Socio-demographic Information

1. Age of Respondent……Gender……..M/F
2. Educational status: Nil ( ) Primary ( ) Middle/JSS ( ) Secondary/SSS ( )

   Polytechnic/Training college ( ) University ( ) Others……..…….
3. Ethnic origin: Native ( ) Migrant ( ) Settler ( ) Specify ethnic group (…….)
4. Major occupation……..Gross income.....
5. Minor occupation……Gross income .....
6. Marital status: Single ( ) Married ( ) No. of spouses.....
7. Household size…….. Men >15years……Women>15years …..……

   Children: boys <15 years…….. girls<15 years ……
8. Number and gender of household members involved in Bamboo processing:……

   Men……Women……Children: boys……girls
9. Number and gender of other household members involved in Bamboo trade.....

   Men ……Women…….Children: Boys……Girls…….
10. Type of bamboo trading activities that household members are engaged in.

Activity	Men	Women	Children
Transportation			
Exhibition			
Selling			
Others			

11. Are you a member of any Bamboo association? Yes ( ) No ( )
12. If yes, name the association .....

    .....
13. What is the objective of this association? .....

    .....

14. How many people belong to the association? .....

15. When was it established? .....

16. How long have you been a member? .....

17. What benefits have you derived or are you expecting from the association? .....

.....

.....

Bamboo Trading

18. What category of Bamboo traders do you belong to?

a) Unprocessed/Raw Bamboo: Middleman ( ) Wholesaler ( ) Retailer ( ) Others .....

b) Processed Bamboo: Middleman ( ) Wholesaler ( ) Retailer ( ) Others.....

c) Finished Bamboo products: Middleman ( ) Wholesaler ( ) Retailer ( ) Others .....

19. What Bamboo products do you trade in? .....

.....

20. Which species do you prefer most?.....

Why? .....

.....

21. What factors determine good quality Bamboo species?.....

.....

.....

22. Where do you sell your goods? Roadside ( ) Market ( ) Home ( ) Store ( )

Others.....

23. Who buy(s) your goods? .....

.....

24. How is the price fixed? .....

.....

25. What factors control prices of your goods? .....

.....

.....

26. Please specify quantities traded on local and export markets

Product	Local Market		Foreign/Export Market	
	Quantity traded per day/week/month	Price per unit	Quantity traded per day week/month	Price per unit

27. Clients and Average quantities of goods purchased?

Client	Goods traded	Location/ destination	Quantity purchased per day/ wk/mth	Unit price	Marketing costs	Marketing arrangements
Wholesaler						
Retailer						
End-user						

**Client = the person who purchases the raw Bamboo or processed Bamboo or finished product from the trader
**Market arrangement = whether goods (i) Supplied on contract (ii) Anytime available (iii) Transported to client (iv) Client purchases at source or market (v) Payment made in advance (vi) Payment made at time of purchase (vii) Payment made later Others.....

28. What problems do you encounter in Bamboo trading and how do you solve or think these problems could be solved? (Quels problèmes vous rencontrez dans le commerce bambou et comment vous résolvez ou pensez qu'ils pourraient être résolus)

Problem	Solution

29. How do you see the market in the future? (Please explain) .....

.....

What rules and regulations affect the trade? (Règles et loi qui affectent le commerce du Bambou)

a) Government (e.g. Forestry Dept, Metropolitan assembly, Export Promotion council etc).....

.....

.....

b) Non-governmental (e.g. Association, clubs, etc).....

.....

.....

Costs and Revenues

30. Bamboo trading costs (Coûts de la marchandise de bambou)

Item	Amount (FCFA)
Goods purchased (per day/week/month)	
Transportation of goods	
Government taxes/levies/market tolls	
Store/stall rent	
Association dues	
Susu (daily/weekly/monthly savings)	
Others	

31. Household Expenses (per month / year) (Dépenses de ménage (par mois/année))

Item	Amount (FCFA)
Food	
Clothing	
House rent	
School fees	
Medical fee	
Funerals	
Entertainment	
Other social expenses	

32. Revenue from Bamboo trade (Revenu du commerce en bambou)

Goods/products	Amount earned per day/wk/month

33. Other Incomes (per day/week/ month/year)

Item	Amount (FCFA)
Farm production	
Trade in other goods**	
Government work	
Labourer	
Remittances	
Livestock	
Fishing	
Others	

**State other goods traded.....

Énoncez d'autres marchandises commercialisées .....

39. What should be done to enhance the Bamboo industry in the country?

Que devrait être fait pour améliorer l'industrie en bambou dans le pays ?.....

.....

Questionnaire for consumers of bamboo products

1. Quels produits (meuble) de bambou avez —vous acheté ces derniers jours?

   Which bamboo products have you purchased these days?.....

   .....

2. Quel produit de bambou utilisez-vous dans votre ménage ?

   Which bamboo product does your household use?.
   a. Furniture (chairs, tables, beds…)
   b. Fencing
   c. Supports
   d. TV antennal posts
   e. Decking storey buildings
   f. Fuelwood
   g. Roofing houses
   h. Food
   i. Electric posts
   j. Handicarft (utencils, woven materials)
   k. Others (please, specify)

3. Vous utilisez le bambou pour faire quoi? .....

   What do you use the bamboo for?.....

   .....

4. Comparez-vous les produits issus du bambou avec d'autres produits? .....

   .....

   Do you compare the products from bamboo with other products?.....

5. En terme de qualité?.....

   In terms of quality? .....

6. En terme de prix?.....

   In terms of price? .....

7. En terme de résistance (durée de vie de l'outil)?.....

   In terms of resistance (lifespan of the tool)?.....

8. En terme d'attraction sur la clientèle?.....

   In terms of attraction on the customers?.....

   .....

9. Avez-vous le sentiment que le montant que vous payez, est proportionnel à la qualité du produit reçu? [Oui]

   [Non]:.....

Do you have the feeling that the amount you pay is proportional to the product quality received?
Yes ( ) No ( )

10. Sinon expliquez SVP:

If No please explain: .....

.....

11. Quels autres produits aimeriez-vous voir fabriquer à base du bambou? .....

Please, list other bamboo products you would like to see being manufactured? .....

.....

.....

12. En tant que consommateur, quelle amélioration dans la transformation du bambou pourrait conduire à des bénéfices substantiels ?
As a consumer, what improvement in the transformation of bamboo is needed?

.....

Appendix 3. Terms of Reference

Aim

Study of Production to Consumption System (PCS) of bamboo in Cameroon

Conduct a study of the Production to Consumption System (PCS) of bamboo in Cameroon that will include determination and analysis of:

a. The types, quantity and quality of bamboo resources and their production
b. Sustainability of current management and harvesting practices
c. Primary and secondary processing practices and technologies undertaken
d. Types of products produced and their markets
e. Infrastructures, bodies and processes for transportation and commercialisation
f. Stakeholders involved at all levels of the production chain, from farmers to consumers of the final products and the benefits they get from it.
g. Policy environment, rules, regulations and their effectiveness
h. Constraints and opportunities for livelihood development of small holders and microenterprises and the development of a set of practical recommendations for improvement of the sector.

Timescale

By 31 December 2008

Methodology and activities

1. Literature review of PCS of bamboo in Cameroon
2. Preliminary work;
   a. Identification of key study areas: At least three provinces of Cameroon shall be visited for this study with major markets and production zones identified, Tentatively, provinces under consideration include: Southwest, Centre, South, Littoral, West and Northwest.
   b. Development of questionnaire
   c. Elaboration of field work plan and budget to CIFOR
3. Elaboration of a draft Table of Contents (using the Ghana PCS as a guide)
4. Field work: visits to key sites for observation and interview questionnaires (focus groups and individuals)
5. Consultation meetings with stakeholders (communities, government, local administration, craftspeople etc)
6. Consultation with national level stakeholders (MinFoF, ANAFOR, National Cameroon crafts organisation - Le Corps National des Artisans du Cameroun (CNAC) etc)
7. Data inputting (Excel/SPSS) and analysis
8. Reporting
9. Incorporation of comments
10. Final Report

Output Verifications

- List of site visits made, stakeholders interviewed and focus group meetings with date/place and number of attendants and key contacts (provided as Annex in the Report)
- Guideline interview questionnaires developed (focus groups and individuals) in consultation with CIFOR team leader
- Map of main PCS locations and flows (using GPS),
- Diagrams of PCS with actors, types, quantities and volumes
- Photos from field site visits
- Copy of SPSS database

This study is part of the INBAR and World Agroforestry Centre project 'Enhancing opportunities for market-led bamboo-based development in West and Central Africa' from 2008-2009, financed by the Common Fund for Commodities. The project produced studies of the bamboo production to consumption systems in Cameroon, Ghana, Nigeria, Sierra Leone and Togo. The findings were presented at a regional workshop in Yaoundé, 23-25 November 2009, to develop national and regional actionable recommendations for market-led, bamboo-based development in the region.

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