Governing Forest Commons in the Congo Basin: Non-Timber Forest Product Value Chains

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ABSTRACT
Probably eaten by dinosaurs 130 million years ago, today eru (*Gnetum africanum and bucholzianum* leaves are harvested from the humid forests of Central Africa: the basis of a lucrative US$14 million dollar regional trade and marketed to the African diaspora in Europe. An important source of nutrition in popular dishes and used in traditional medicine, it is remarkable that *Gnetum* has survived; let alone being the focus of a significant trade. But for how long? Increasing demand and unsustainable harvests have resulted in decreasing availability if this forest vine. These leaves are one example of non-timber forest product (NTFP) chains originating from the Congo basin. Based on value chain analysis, this paper illustrates the variety of arrangements, values, actors and processes involved in getting nine NTFPs including bee products (honey, wax, propolis), bush mango, pygeum, raffia, gum arabic, cola nuts, raffia, bamboo and wild plums from forests to consumers. The study shows that how the forests and the NTFP trade are governed is critical for the continued survival of species and the livelihoods of those dependent upon them. These value chains operate in extremes of regulation as well as, paradoxically, voids. Public actors perform market functions and private actors undertake regulatory responsibilities, both in the absence of effective or efficient formal institutions and with multiple, overlapping customary and formal centralised and devolved or decentralised institutions, rights and responsibilities governing forest access, exploitation and trade. The mechanisms used to fill these gaps and create more favourable chains, the values of these products and impacts on livelihoods and forests are described, analysed and discussed.

Keywords: *Forest, governance, non-timber forest products, value chain, trade, regulation, livelihoods*

INTRODUCTION

The Congo Basin forest is the second largest intact dense tropical rainforest area in the world. Two countries, Cameroon and the Democratic Republic of Congo (DRC) lie at its heart, both having high levels of forest cover (de Wasseige et al. 2009), low levels of development with significant poverty and inequality levels, high corruption, difficult business operating environments and over half of their population living in rural areas (**Error! Reference source not found.**). Increasing pressures from shifting agriculture, population growth, extractive industries and plantation industries are accelerating land-use change and forest degradation. Migration due to the former conflicts and insecurity are also contributing pressure in Eastern DRC. The net forest loss in Africa exceeded 4 million hectares annually between 2000 and 2005, with increasing deforestation and degradation rates resulting in a 9% loss of forested area from 1990 to 2005 (Duveiller et al. 2008). The forest is however a vital economic resource, with 23% of its 288 million forested hectares allocated to commercial timber leases (de Wasseige et al. 2009), providing a significant source of domestic and export revenues and contribution to GDP

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(Table 1).Statistics for non-wood or non-timber forest products (NTFPs)[2], are largely missing or ''grossly undervalued'' according to the FAO. This is despite being seen as important benefits provided by forests. Similarly for the Congo Basin, data on NTFP values largely does not exist, except for a handful of endangered or protected species. In Cameroon for example, incomplete trade statistics exist for *Prunus africana*, due to its Convention on International Trade in Endangered Species listing, scarce data can be found on five other exported products, with limited data on exploitation licenses for thirteen products.

Table 1 Development, forest and governance indicators for DRC and Cameroon

	Indicator	DRC	Cameroon
Development	Country classification [D]	Low income	Lower middle income
	Population living below US$2/day [D]	79.5%	44.1%
	Population density / km^2 (2008)[F](2005) [B]	26	39
	Urban population 1975[A]	29.5%	26.9%
	Urban population 2010[D]	35.2%	58.4%
	GDP per capita (US$ 2007 PPP) [D]	794	2,979
	GDP (US$ billions 2007 PPP) [D]	18.6	39.4
	Overall HDI rank [D]	120	95
Forests	Total forest area (ha) [H]	176,672,637	27,351,387
	Forested landscapes (all types) % [H]	76	59
	Annual net deforestation rate % national [H]	0.2	0.14
	savanna [I]	n/a	1.0
	montane [J]	n/a	0.4
	Annual net forest degradation rate %	0.12	0.01
	Public forest ownership [C]	100%	86%
	Contribution forest exports to GDP (2008)	1%	6%
	Timber fiscal export value (million $) [H]	2.3	85.5
	Annual export/formal timber exploited (m^3 thousands) [K]	333	600
	Domestic timber sales value (million $) [K]	-	58.0
	Annual domestic timber exploited (m^3 thousands) [K]	1700	900
Gov	Inequality measure (Gini index)[D]	44.4	44.6
	Ease of doing business [E]	175	168
	Averaged rank Worldwide Governance Indicators [L]	3	19
	Corruption [G]	162	146

[A] UNDP Human Development Report 2005 (177 countries), [B](Government of Cameroon 2010), Population Census 2005, [C]MINFOF and FAO (2005), [D]UNDP Human Development Report 2009 (182 countries), [E]World Bank Doing Business 2011 (183 countries), [F]United Nations World Prospects Report (2008), [G]Transparency International Corruption Perception Index 2009 (180 countries), [H]de Wasseige et al. 2009 [II](UNDP/ARPEN 2006),[J](Solefack 2009), [K] (Lescuyer et al. 2009)[L] (Kaufmann et al. 2010) (average 6 indicators, rank for 213 countries 3 'high' 1= 'low', 1996-2009).

Across the Congo Basin, about 550 plants and at least 75 animals are known to provide NTFPs (Ingram et al. 2011 forthcoming). Most species are unevenly distributed

[2]***Non-timber Forest Products (*NTFPs**)** are defined here as goods of biological (plant or animal) origin from natural, modified or managed forested landscapes. NTFPs include fruits and nuts, vegetables, fish and game, medicinal plants, resins, essences and barks and fibres such as bamboo, rattans, and other palms and grasses. FAO prefers the term non-wood forest products, excluding all woody raw materials, including fuelwood and small woods used for domestic tools/equipment, covered by the term NTFPs.

geographically across ecosystem types and their use varies widely due to culture, socioeconomic status, forest access, markets and price and to an extent (particularly for bushmeat[3]) with the legality of their harvest. The majority of animals, and the largest proportion of plants, comprising some 120 species, are used for food, although the number varies dramatically by country and community, as does frequency and type of use. For example, 88% of Cameroonian pygmies in Centre Province and between 20 and 80% of households in the Cameroon's Southwest region, and 80% of households in Equateur and Bandundu in DRC indicate everyday use (Ambrose-Oji 2003; Tieguhong et al. 2008). The second most common use of plant based NTFPs is medicinal, with at least 400 species known (Ingram et al. 2011 forthcoming; Toirambe 2006), for example 80% of Cameroonians in the Centre region use over 300 species (van Dijk 1999), whereas 18 species are used in the Tikar Plain (Zapfack and Nkongo 1999) and 102 species in Dja (Betti 2004). Other uses include leaves, vines and saplings for construction, particularly rattans and *Raphia* spp., oils from nuts and seeds for cooking and cosmetics, and leaves, such as *Afromomum* spp. for food wrapping. Many plants, particularly trees, have multiple uses, with around 13% of species also used for their timber. Some 50% of the NTFPs in DRC and Cameroon used by local populations are also traded, with 44 products marketed locally or internationally (Walter 2001; Ingram et al. 2011 forthcoming). In Cameroon, at least 129 plant-based products (consisting of over 59 species), are both highly traded and valued for their subsistence use and socio-cultural relevance, with 67% of these 'key' species having multiple uses (Ingram et al. 2011 forthcoming).

Despite this array of uses by both rural and urban consumers and their globally documented economic, environmental, social and cultural importance, their value in terms of products and benefits, in common with NTFPs worldwide, is largely not quantified or qualified. Provisioning services provided by NTFPs (products, employment, cash), as well as regulating and cultural ecosystem services, are [MR2]not included in trade figures or national accounts. Values that do appear, are often portrayed as insignificant (Foppes 2008). The costs are also largely unrecorded, such as unsustainable harvesting practices and conversion of forest to agricultural land - contributing to resource depletion that may ultimately threaten long-term species survival (Luoga et al. 2000; Dovie et al. 2005), negative health and social impacts (Schure et al. 2010; Coad et al. 2010) and resource conflicts – particularly with timber (Ndoye and Tieguhong 2004; Guariguata et al. 2010). This is despite the contribution of forest products to wellbeing, development and poverty alleviation globally being well documented (Angelsen and Wunder 2003; Belcher et al. 2005; Belcher 2005; Anderson et al. 2006), although paradoxically, high forest dependency by the poorest on such products can be both act as a poverty trap (Delacote 2009), but also as a safety net [MR3](Shackleton and Shackleton 2004).

[3] **Bushmeat** is defined as any non-domesticated wildlife (mammals, birds, reptiles, amphibians, insects, crustaceans, mollusks and fish) hunted and harvested for food, medicinal, and/or cultural use from forested areas. Hunting is defined as the extraction of any animal from the wild, by whatever means and for whatever purpose. The term bushmeat here does not include animals hunted as trophies (often for skins, teeth, antlers and horns) or as pets (particularly primates, birds and reptiles).

One major reason for the lack of attention is the lack of methods to value NTFP products on a multiple scales, particularly when they are often non-cash contributions to household livelihoods (Angelsen and Wunder 2003; Luckert and Campbell 2002). Evaluations that have been done tend to lack quantitative data (Jensen 2009) or focus predominantly on pure economic valuation, ignoring social-cultural, environmental or ecosystem costs and benefits (Ingram and Bongers 2009).Standardized NTFP valuation would enable comparative studies, which can integrate national and regional policy and facilitate the role of NTFPs in poverty alleviation at community and household levels. A holistic valuation of NTFPs can influence cross-sectoral policies to take into account NTFP market chains in influencing conservation, development and trade. Knowledge about the real value of NTFP market chains can facilitate resource allocation decisions related to the areas where NTFPs are found (Tewari 2000).Reiterating the management adage ‘’you can’t manage what you can’t measure’’, the question is how can forests and their non-timber products be effectively governed when such basic data does not exist?

NTFPs in the Congo Basin have not played a prominent role in tropical forest policy and management. More than half of the Central African countries have introduced forestry policies and laws in the past 15 years, and two-thirds now have active forestry management programmes in place, which set out NTFP regulation. However the classification, regulation, controls and monitoring varies widely and implementation and enforcement of these measures remains weak, mainly due to lack of financing, weak national institutions and poor governance (Topa et al. 2009; de Wasseige et al. 2009). Living up to their other name as ‘minor’ or ‘secondary’ forest products, NTFPs often take a back seat to timber, which has been the major preoccupation of regulating institutions until recently. Since 2006, largely pushed by regional institutions, bilateral and donor organisations, NTFPs are now being specifically addressed in the Convergence Plan for the Harmonization of Forestry Laws by the Central African Commission on Forests (COMIFAC) (COMIFAC 2008). Practical problems to integrate NTFPs however stem from the incompatibility of the current raft of legal exploitation rights which often conflict with customary access and traditional land tenure arrangements, particularly in timber concessions and protected areas. There is also a general lack of knowledge of the regulations, controls and enforcement mechanisms by local populations and regulators on the differences between subsistence and commercial use (Guariguata et al. 2008; Laird et al. 2010). This has meant that in practice, current laws render many NTFP–based incomes technically illegal, or impose onerous administrative requirements on small-scale users, resulting in poor people becoming ensnared in “criminal” or corrupt activities, with unsustainable exploitation being the business-as-usual scenario, although essential for day to day survival. Thus resource dependency becomes locked in a downward spiral, driven by internal and external forces, in which poverty is exacerbated and resources unsustainably exploited. Because these ‘illegal’ activities are deeply embedded in local customs, enforcement is likely to target poor people rather than larger, more powerful forest operators. As a result, a blunt law enforcement approach can reinforce existing injustices and inequities rather than promote the interests of the poor, hampering economic development, rather than enhance it. Parallel laws outside forestry that protect communities’ rights are often weak, ambiguous, or ignored. These social, regulatory and political governance arrangements that are in

place are little studied or understood, particularly their interaction with formal regulation and effect on sustainable livelihoods.
This study seeks to address these gaps by investigating the governance arrangements of nine non-timber forest product chains originating from the developing economies of the Congo Basin – from a local to international level – and how these arrangements impact the value, survival of these species and livelihoods of those dependent upon them.

THEORETICAL FRAMEWORK

A large body of social sciences literature explores the connections between forests, goods, people and places over time, from different perspectives. Multi-disciplinary concepts were therefore used to frame this study, with value chain analysis, commons governance and sustainable livelihoods forming the core framework.

Value chain analysis (VCA), and closely related concepts such as production-to-consumption systems, *filières* or market chains, and commodity chains, offer a useful framework to analyse the activities and processes involved in taking a product from the forest, eventual production, transformation and processing to delivery to final consumers and ultimately disposal. VCA embraces a wide framework for mapping and categorising economic processes, understanding why, how and where states, institutions, organisations, households and individuals are positioned in processes and networks. VCA pays attention to situation-specific geographical scales, from households up to the global level. Territoriality is an important factor in that activities, nodes and flows within a chain are geographically situated and have implications for actors at different locations (Gereffi and Humphrey 2003). Territoriality also influences the relative share and perception of value (Rammohan and Sundaresan 2003). VCA focuses on the actors and their relations at all levels and their often complex networks. Once a product becomes commoditised, the actors involved increase the network of governance relationships, introducing agents that can affect value but who may be motivated by non-commercial objectives (Le Heron and Hayward 2002). The role of NTFPs in household livelihood strategies in general has been well documented (Belcher et al. 2005; Chamberlain et al. 2007; Vedeld et al. 2007), also in the Congo Basin (Merode et al. 2003; Tieguhong and Zwolinski 2009). Specific literature on NTFP markets from and in the Congo Basin also exists (Pérez et al. 2000; Tabuna 1998; Ndoye et al. 1998). However the connection between individuals, households and markets, taking an integrated and value chain approach to forest products is less well studied.

Valuing market chains has predominantly focused on economic value – with factors such as the number and type of actors involved, the volume and the prices of the products, commercialisation margins, how and when value is added and distributed, and the economic profitability of each actor in the chain related to fixed, variable and labour costs (Marshall et al. 2006; Jensen 2009).It is important to acknowledge different products originating from the same source (e.g. honey, wax and propolis from bees) and to view them as separate value chains with different values, as NTFPs often have multiple uses and processing routes. A high level of product transformation and processing does not necessarily result in a higher product value or economic value for

actors, as value can be added by consumer perception, the historical, cultural and religious significance and origin (Jensen 2009).This has often been overlooked due to a strong economic focus, ignoring also the regulating, supporting, cultural-social and environmental values.Dorp et al. (1998) stress the need for a holistic approach including socio-economic, environmental and socio-cultural values and functions, that echoes closely the sustainable livelihoods approach. Sheil and Wunder[MR10] (2002) point out that value is not the inherent property of an entity: it is a measure of a relationship between a subject and the object of valuation within a specific time frame and geographical context. These terms define and delimit the measurement of value and inevitably involve balances between individual versus societal perspectives, involving normative judgments about which outcomes are socially preferable (Costanza and Folke 1997)[MR12].

Governance is critical in determining who controls what along a value chain. Power relations, both between actors and institutions, can[MR13] have significant effects on the value gained from products by different actors in the chain (Velde et al. 2006), as well as on the distribution of costs and benefits (Larson and Ribot 2007; Ribot 2005). Decentralisation and devolution of power are relevant in this respect (Etoungou 2003; Oyono 2004; Oyono et al. 2009; Ribot et al. 2006; Ros-Tonen 2003). Embedded issues in power relations include the structure of tenure, regulation of access and control of resources. These influence how the value chain for a product is initially set-up and the values derived (Barry and Meinzen-Dick 2008; Larson et al. 2010), the sustainability of the product and ecosystem it originates from and, ultimately, the resilience of the ecosystem (Weiland and Dedeurwaerdere 2010; Dietz et al. 2003). Governance arrangements also determine how the value chain is organised and coordinated, including social constructs such as organic, fair- and ethical trade certification, which influence the arrangements and value (Harilal et al. 2006; Hughes et al. 2008).Four typologies used by the ILO (2006) offer a classification framework for relationships in the value chain[MR14]:

(a) Market-based: firms deal with each other in “arms-length” exchange transactions; there are many customers and suppliers, repeat transactions are possible[MR15], but information flows are limited and there is no technical assistance;
(b) Balanced network: firms form networks in which no one firm exercises undue control over others; suppliers have various customers; there is an intense information flow in both directions, and both sides have capabilities and commitment to solve problems through negotiation;
(c) Directed network: firms form networks directed by a lead firm; for example a buyer-driven chain in which there is one major buyer of at least 50% of output and the customer defines the product and provides technical assistance. In a directed network there is imbalance of information;
(d) Hierarchy: firms are vertically integrated; the parent company controls its subsidiaries who have limited autonomy to take decisions.

Despite formal forest property in the Congo Basin being vested in the state (Table 1), in practice, the forests remain ‘commons’. Explanatory variables include the characteristics of resource systems, users, institutional arrangements, external environment, availability of necessary information, ability to deal with conflict,

compliance with rules, provision of technical, institutional and physical infrastructure, and ability to adapt and change (Agrawal 2007). Recent research indicates that sustainable forest governance is associated with secure rights, institutions fitting the local context, monitoring and enforcement. Another governance aspect is how the chain is regulated, enforced and the role of regulating institutions, as regulations, if present, set the rules of the game and determine the playing field for value chains, defining access and control, creating opportunities and constraints (Larson and Ribot 2007). This has been shown to be important in value chains (Raikes et al. 2000), particularly where multiple regulatory systems, such as customary and statutory laws,[MR16] confuse power and access rights, and have been shown not to succeed in balancing multiple conservation, development, government revenue and community income generation objectives (Laird et al. 2010).

VCA can be used to change governance arrangements by identifying appropriate opportunities, entrance and leverage points for technical assistance in the chain. It can also detect change agents for external and internal (product-specific) factors influencing the chain in time and space as well as processing and management (Kaplinsky and Morris 2000; Keane 2008). Inclusion and/or exclusion conditions (Bush and Oosterveer 2007; Smith 2009) are[MR17] arguably critical in allowing stakeholders who wish to participate and benefit from a chain, particularly if poverty alleviation is aim of intervention. For example, highly governed chains can be successful in reducing production costs, increasing quality and production speed, and providing information to improve skills and production flows[MR18]. Changes in governance can also improve the distribution of gains along the chain [MR19](Humphrey and Schmitz 2001). The control of access and the range of actors in commodity chains, as well as the types of mechanisms used by these actors to gain and control access are critical factors in VCA.

Commons[MR20] theory highlights the role of collective action. This is particularly relevant for the rural, isolated individuals and communities typically in or adjacent to forests. The level of conditional cooperation[MR21] within groups is correlated with an increased likelihood of successfully managing forest commons, including “costly” cooperation enforcement (Rustagi et al. 2010; Vollan and Ostrom 2010).Collective action can empower individual and group chain actors to ensure and assert control over a resource, resulting in higher profits, property and access (Mwangi et al. 2007; Donovan et al. 2008; Seixas 2010).

The concept of sustainable livelihoods (Chambers and Conway 1991; Krantz 2001) integrates assets, vulnerability contexts[MR22], structures and processes to allow poverty at household level to be understood more holistically. A livelihood comprises the capabilities, capitals or assets[MR23] and activities required for a means of living and is sustainable when it can cope with and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (Scoones 1998). The livelihoods framework does not represent reality or people’s own perceptions of their livelihood and poverty, particularly when life is lived literally day to day, hand to mouth. However it provides an analytical structure to view the complexity of livelihoods, poverty and where interventions are

possible. NTFPs are usually used as only one of an often extensive range of assets that constitute a livelihood (Ambrose-Oji 2003; Ros-Tonen and Wiersum 2003)[MR24]. The choice of activities and how asset-building is constructed are driven by a multitude of factors, by preferences and priorities, vulnerabilities, shocks (such as drought), overall trends (e.g. in resource stocks and prices), seasonal variations and access to any of the types of capital. Livelihood options are also determined by structures (eg government or private sector) and processes (such as institutional, policy and cultural factors). Conditions that determine access to assets, and the way these are converted into outcomes – poverty and/or opportunities to alleviate it – therefore depend on these variables. The framework distinguishes five types of assets: human, natural, economic/financial, social and physical, which can be material or intangible. These building blocks are to an extent substitutable; social capital such as friends may be used when financial capital is not available. Capital use is a dynamic process, with often unpredictable changes in context, constraints and opportunities, as do are household strategies and activities, varying across time and space (Farrington et al. 1999). When NTFPs move from subsistence use to commercialisation, the livelihoods of actors in the chain become interlinked through demand and supply interactions. The sustainable livelihood concept provides an alternative view of the term ''adding value''. Value is not only economically increased by harvest, but may change. Upon harvest, a product (and the ecosystem it originates from) acquires new and multiple values, derived from its processing and trade, for both direct and indirect stakeholders.

METHODOLOGY

Study sites and products

The study focuses on nine major NTFP production areas in the humid, lowland dense forest, humid savannah and montane tropical forest ecosystems in Cameroon and DRC (Figure 1 and 2)**Error! Reference source not found.**. Cameroon has a tropical climate, becoming semi-arid, hotter and drier in the north with maritime influences along the coast. The Congo-Guinean forest zone has closed evergreen and semi-deciduous rainforest, forming an almost unbroken blanket in the south and splitting into islands north of the fourth parallel, classed as 'humid' and 'low and medium-altitude sub-humid' eco-floristic zones. The single dry season is not marked. This 'low- medium altitude very humid' eco-floristic zone is an evergreen forest whose vegetation differs from the evergreen forest further inland. The coastal and southern zones together are classified as the 'Congo-Guinean' floristic region. The northern zone has a drier Sudano-Sahelian climate. The volcanic Cameroon Highlands chain includes unique Afromontane forests. The northern slope of the Adamaoua plateau forms a boundary with the Soudanian zone. Population density is highest in the large urban centres, the western highlands, and the North-eastern plain, with Douala, Yaoundé, and Garoua being the largest cities. The Adamawa Plateau, South-eastern and Southern Cameroon are sparsely populated[MR26] (Government of Cameroon 2010). The DRC straddles the Equator, experiencing high precipitation upwards of 2,000 mm in some places, sustaining the lowland humid forest which covers most of the low-lying central river basin. This area is surrounded by plateaus merging into savannahs in the south and southwest, by mountainous terraces in the west, and dense grasslands extending beyond the Congo River in the north. High, formerly glaciated mountains are found in the eastern region.

DRC's population is very unevenly distributed with highest densities (over 100 inhabitants per km²) along the eastern borders with Uganda, Rwanda and Burundi and in the south-west around the city-province of Kinshasa and Bas-Congo province (République Démocratique du Congo 2006). The nine NTFPs, shown in Table 2, were tracked from their sources to major markets and consumption areas in Central Africa, shown in **Error! Reference source not found.** and **Error! Reference source not found.**.

Table 2 Overview of NTFP characteristics of the nine value chains studied

NTFP Scientific name	Common name	Vernacular names	Production Location	Market chain	Life form	Ecosystem	Parts used	Use
Gnetum africanum Gnetum buccholzianum	Gnetum	Eru, okok, koko	Cameroon SW, Littoral	Major cities Cameroon & Nigeria	Climbing vine to 10m	Humid forest, primary, secondary forest and farm bush	Leaves	Vegetable, medicine
		Fumbwa	DRC Oriental, Kinshasa	Major cities DRC				
Apis mellifera, Cera alba	honey/ miel, wax/cire, propolis/propolis,	d'or des abeilles	Cameroon NW, Adamaoua	Major cities Cameroon, CAR, Europe	Insect (only secondary hive products used)	Afromontane forest, humid savannah	Honey, wax, propolis	Food, medicinal, cosmetics, material
			DRC Bas Congo, Kinshasa	Local towns DRC		Humid savannah		
Irvingiagabonensis Irvingiawombulu	Bush mango/magnum sauvage	Ndo'o, andok	Cameroon Centre, South East, Littoral and SW regions	Local and major cities Cameroon, Equatorial Guinea, Nigeria, CAR, Gabon	Evergreen tree to 40m	Closed-canopy humid forest; planted/left on farm	Fruit, seed, bark, timber	Condiments, oil, medicinal, dye, construction, fuelwood
Prunus africana	Pygeum, African cherry, red stinkwood	Pygeum	Cameroon NW, SW, Adamaoua	Major cities Cameroon, Europe, USA, China	Evergreen tree to 40m	Afromontane forest, secondary forest, planted on farm	Bark, seeds, leaves, timber	Medicinal, carving, timber, fuelwood,
Acacia senegal, Acacia polyacantha, Acacia laeta, Acacia seyal, Acacia sieberiana	Gum arabic	Gum, gum acacia, gomme arabique	Cameroon, North & Extreme North	Nigeria, Europe & USA	Deciduous tree 5-12m height, 10m diameter	Dry savannah forest	Resin, bark, leaves, timber	Cosmetic, food, medicinal, material, forage, timber
Cola acuminata Cola nitida, Cola anomala	Cola nuts	Abel, cola, goro	Cameroon NW, SW, West, East	Local & major cities Cameroon, Chad, Nigeria	Evergreen tree, 20m height 50cm diameter	Afromontane and humid forest	Seeds, bark	Food (stimulant), medicinal
Raphiafarinifera, Raphiavinifera, Raphiahookeri, Raphianegalis	Raffia	Raffia, cane 'bamboo', [MR27]mimbo	Cameroon NW, SW, West, East	Local and major cities Cameroon	Palm 10m tall 30cm diameter	Riverine/swampy and gallery forests, planted	Stems, sap, leaves, seeds	Materials, construction, tools, crafts, wine, food
Bambusa vulgaris, Yushina alpina, Oxytenanthera abyssinica	Bamboo	Bamboo, chinese bamboo, kok-ko	Cameroon NW, SW, West, Centre, Littoral, East, Adamaoua	Local and major cities Cameroon	Grass up to 10m height, 10m clump diameter	*Y. alpina*montane, *O. abyssinica* in savannah riverine, *B. Vulgaris* exotic	Stems	Materials, construction, tools, crafts, paper, fuelwood,
Dacryodesedulis	Wild plum, african plum	Safou	DRC Equateur	DRC	Tree 15 m height, 80cm diameter	Lowland forest, cultivated & fallows	Fruits, leaves	Food, medicinal

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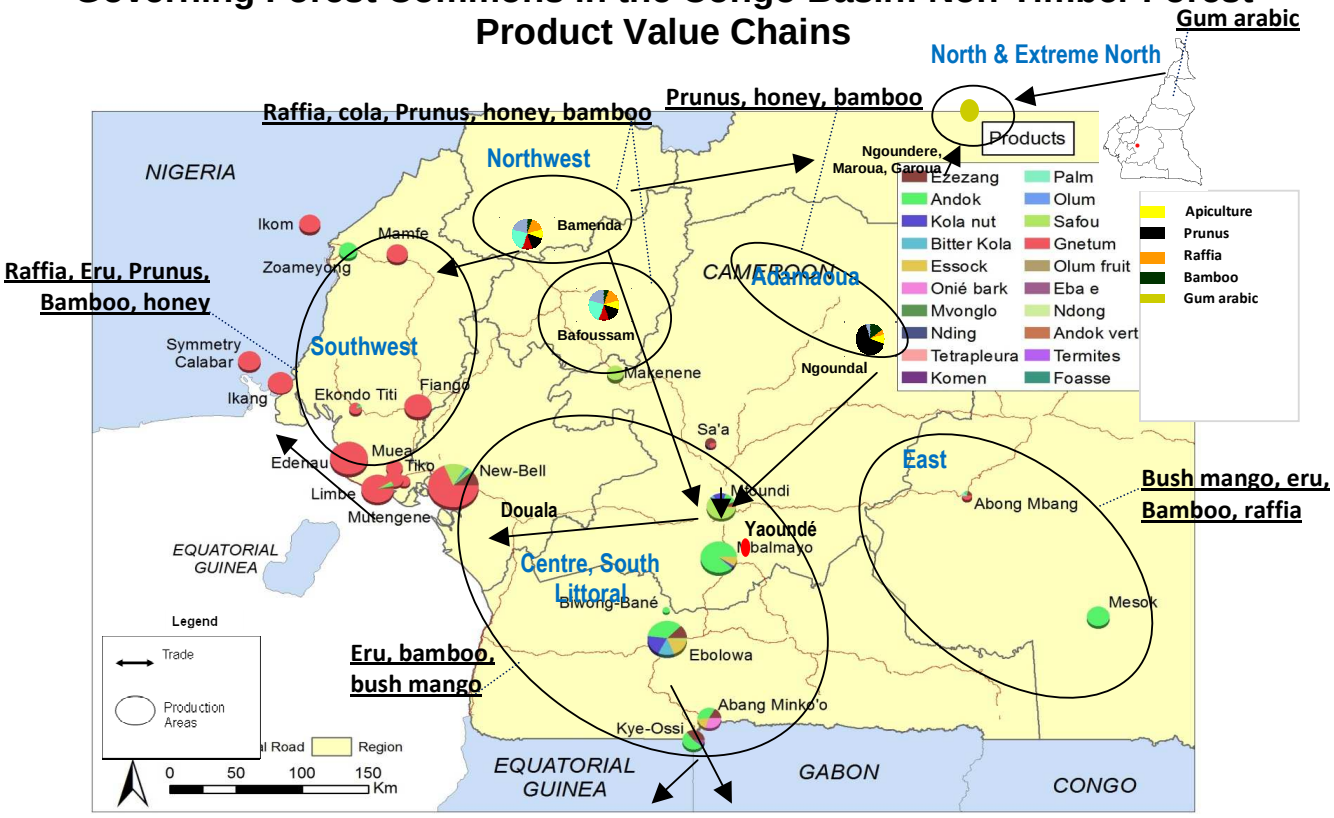

Figure 1 Production area and market study sites, Cameroon

Figure 2 Production areas and market study sites, DRC

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Methods

Analyses of the nine NTFP market chains were conducted between 2006 and 2010. Firstly, a review of literature identified major economic market chains in both countries. Chains then were selected using 16 criteria (including knowledge of the chain and products; an existing, high value chain; involvement of gender and ethnic groups; feasibility to enhance positive impacts and build actor capacities; presence of project partners; and accessibility)at a consultative meeting of the FAO-CIFOR-SNV-ICRAF project[4]. Literature reviews of specific products and their value chains were then conducted. Structured questionnaires were developed and tested, based on a methodology for valuing NTFP chains (Ingram and Bongers 2009). Chain actors were identified by rapid assessment and key informant interviews, from which a random, purposive selection of 25% of actors was made. Semi-structured interviews, administered by trained interviewers in their local language and English or French, used product-specific questionnaires (covering economic, social, governance and environmental aspects) with 2,960 harvesters and processors (based in 165 villages in the main production areas – see Figures 2 and 3), wholesalers, traders, exporters and importers (located in 72 markets, areas shown in Figure 2 and 3). 41 focus group interviews using semi-structured questionnaires were conducted in these production areas and in markets to verify and clarify data. Stratified random interviews [MR31]were held with 677 consumers in the major markets in DRC, Nigeria and Cameroon. Seven situation/problem analysis and market chain development workshops with multiple stakeholders (n = xx) were held in Kinshasa, Yaoundé, Buea, Ebolowa and Bamenda from 2006 to 2010.

Additionally participatory action research (PAR) was conducted from 2006 to 2010 to provide more in depth data on the honey and Prunus chains in Cameroon. PAR is a collaborative method to test specific, new ideas and issues identified by local people and implement the results directly (Sithole 2002). It involves direct participation in a dynamic research process, while monitoring and evaluating the effects of the researcher's actions with the aim of improving practice. It is based on a continuous cycle of systematic planning, taking action, observing, evaluating (including self-evaluation) and reflecting prior commencing the next cycle (Greenwood and Morten 1998). PAR aims to increase understanding of how change in actions or practices can mutually benefit a community of practitioners, avoiding traditional extractive research with limited or no feedback, impact or accountability to research subjects (Shanley 2009). Outcomes are difficult to predict initially, challenges can be sizeable and achievements depend on the researcher's and the target community's interaction and market study sites. Problems in the honey sector were first identified in 1989 (Paterson 1989) for the Northwest honey sector and then from 2006 to 2008 as part of local, regional and national problem solving workshops and situation analysis meetings, largely led or supported by SNV in collaboration with local beekeeping and apiculture producer organisations (Erasmus et al. 2006; Niba Fon 2009; WHINCONET 2006). For Prunus, problems were identified in 2005 (WHINCONET 2005), which lead to a baseline

[4] See acknowledgement for project details.

situation and problem analysis workshop (Awono et al. 2008; Ingram, Awono, Che et al. 2009). These analyses were then used to develop interventions, feed discussions, stimulate actions and act as intervention pathways for multiple actors in the chain to stimulate change, provide benchmarks to aid monitoring and reflection, and seek support of other partners for the chosen pathways. Numerous formal and informal meetings and training events, observation and accompanying actors during harvest, processing and market seasons took place during the study period.

Interview data was entered into databases (Statistical Package for Social Sciences SPSS Version 16.0 and Microsoft Excel),cleaned and analysed using statistical, quantitative and qualitative analysis. Market prices for two chains (honey and Prunus) were tracked from 2006 to 2009. Prices were verified against CIFOR's NTFP market database (1997-2003) and an NTFP Market Information System for 2008- 2010(SNV 2010, 2009) for Cameroon. Preliminary research findings were verified with stakeholders in twenty informal and two formal consultative meetings and workshops between 2007 and 2010 and cross checked with peers[5]. Outputs included detailed chain baseline reports, NTFP sheets, policy briefs, inventories, botanic assessments, harvest guidelines, processing and training courses, exchange visits, management plans (for honey and Prunus) and value chain maps. These were shared as part of PAR and verified with actors on an on-going basis in person, during meetings, through associations and unions, by e-mail, internet forums and during three dissemination workshops in 2010.

RESULTS

The value chain analyses provide insights into how different chains are shaped by social-economic, cultural, spatial, political, regulatory and institutional interplays, plus the technical and ecological aspects of the product.

Regulatory, institutional and political framework

In DRC, the regulatory and political framework for forest products is set by the 2002 Forestry Code[6], 2002 Nature Conservation law[7] and 1982 Hunting Law[8]. These provide for customary forest use rights and local traditions for populations adjacent to forests, to freely exploit NTFPs for individual and collective domestic needs within the letter of the law. In protected areas customary rights are limited subject to those described in a forest management plan. Commercialisation of NTFPs (plant or animals) harvested according to traditional rights is not authorised, unless the product is included in the list of permitted products by the provincial governor. A quantity based, one year 'Ordinary' harvest permit, for an area up to five hectares, or a hunting permit for animals, is required for the majority of common NTFPs, and Special permits are required for protected or Convention on International Trade in Endangered Species (CITES) listed species, obtainable from the provincial governor. Exports also require similar ordinary or special permit. Taxes[9] are payable for these permits. A new, revised forestry code has

[5]COMIFAC, government representatives, FAO, ICRAF and national research organisations
[6]Law N° 011/2002 of 29 August 2002, articles 36-44 of the Forestry Code
[7]Ordinance N° 69-041 of August 22 2002 concerning nature conservation
[8]Law n°82-002 of 28 May 1982 concerning hunting
[9] Set by Interministerial decrees N°066/CAB/MIN/FIN-BUD and N°067/CAB/AFFET/2003 of 27 March 2003

been expected since 2008, which may cover international trade, and introduce an improved permit system for commercialising NTFPs. Experiments with community forests and development of a supporting regulatory framework have also started. The Ministry of Environment, Nature Conservation, Water and Forests, with national, provincial and local structures is at the centre of the institutional framework. As these laws and policies are yet in their infancy and the ministry is weak and understaffed, although heavily supported by international NGOs, the laws are little enforced, and so in reality, have only to date had a marginal influence on the harvest and transport of NTFPs. In practice, the more devolved the government, the less present officials are and in this institutional void, customary practices rule. Thus access may not be free, but subject to payment to local chiefs who consider themselves owners. In reality, trade is largely formally unregulated, with an estimated 60% of harvests made without a permit , due to a lack of monitoring, enforcement and knowledge about them (Kabuya 2004). Instead NTFP trade is subject to euphemistically named "informal taxes", corroborated by other studies (Klaver 2009; Vundu 2006; Bauma 1999). This corruption adds significant, irregular and unpredictable costs, particularly for wholesalers (see Table *3*) during transport to market at road blocks by single or mixed patrols of police, gendarmes, army, local government and occasionally, Ministry of Environment staff.

In Cameroon, layers of customary and statutory laws regulate land and resource rights, reflecting the cultural, political and economic diversity of the country. Statutory land rights grew from a mixed colonial heritage, with three successive laws reinforcing the nationalisation of land and natural resources enacted in Cameroon since independence. The 1974, 1976, and 1994 land tenure legislations abolished traditional land tenure systems and prescribed formal land and resource use procedures, progressively tilted to individual freehold type ownership and transferring a large number of hitherto communally managed lands to state control. The 1974 Land Ordinance classified land into *public state,* often plantations which became state property, land registered as *private* and *national domain (*all land not registered), comprising vacant land and land occupied and worked by indigenous populations. New forms of tenure emerged in 1994[10], such as community forests, allowing access, but not ownership, for a period up to 25 years. These are however biased towards timber harvesting and subject to onerous and complicated management plans. The 1994 Forestry Law[10] also addressed resource rights removed by the 1974 Ordinance, providing customary user rights to forest communities, allowing collection of 'all forest, wildlife, fisheries products freely for their personal use, except protected species' in all unprotected areas, and including subsistence fuelwood and wood for construction needs. *Free access*, a usufruct right, may be exercised in communal and community forests. *Paid access* encapsulates the right to exploit an NTFP following receipt of an exploitation permit from the government, which was elaborated over a decade later in 2006 and covers an assortment of 13 *Special Forest Products*[11]*,* stated as 'certain forest products, such as ebony, ivory, wild animals, as well as certain animal, plant and medicinal species or those which are of

[10]Law No. 94/01 of 20 January 1994 and decrees of application: No. 95/466-PM of 20 July 1995 on wildlife and No. 95/531-PM of 23 August 1995 on forestry.

[11] Decision No 0336/D/MINFoF 6 July 2006, setting the list of special forest products of particular interest to Cameroon

particular interest and shall be classified as special' to the government. The forestry regulations do not define NTFPs, preferring instead the terms 'minor', 'secondary' or 'forest produce other than timber', for which no criteria or definitions are provided. This creates confusion about what 'special' actually means and to whom, given the extremely diverse products from everyday (i.e. fuelwood) to highly specialised medicinal products and the process. Annual product based quotas, usually not location specific, are given upon a 30 upfront payment of calculated value, mainly to large enterprises on a on-demand basis, unsupported by resource assessments. Permits are subject to minimal, if any, monitoring or enforcement. The result in practice is that the intention of law in terms of management and revenue collection is largely non-existent in the field, reinforcing the 'minor' perceived value of NTFPs, and means the playing field is open to corruption, contributed to by the majority of officials, harvesters and wholesalers being unaware of regulations. This creates significant costs, largely during transport to market, where on average 22 roadblocks and checkpoints from the Southwest to the Nigerian markets and 10 from Littoral region form the main collection points. It also means that many special products are harvested with no government control unless customary traditions exist that govern access, rights and techniques. Payments for access may be paid to village chiefs for commercial harvests and for harvest by non-locals are common, sometimes spatially, quantity or time bound. Where management plans for community forests exists, NTFP quantities are often not agreed or inventoried, even if access to specific species, such as *Prunus africana*, is regulated.

Table 3 The costs of corruption in NTFP chains in DRC and Cameroon

Product	Location	Actor	Average annual cost of corruption US$	% of total costs
Safou (*Dacryodes edulis)*	Kinshasa	Retailer	96	5
	Kinshasa	Wholesaler	566	23
	Bas Congo	Retailer	85	9
	Bas Congo	Wholesaler	219	20
Eru *(Gnetum* spp.*)*	Southwest	Wholesaler	447	14
	Littoral	Wholesaler	223	15
Pygeum (*Prunus africana)*	Northwest, Southwest	Trader	1,964	6
Bush mango (*Irvingia* spp.)	Southwest	Exporter	108	24
	Centre, South, Littoral	Wholesaler	125	33

Social and economic aspects of the NTFP value chains

This section introduces each forest product and briefly describes how the chain is structured and who is involved.

Gnetum spp., called eru (in Cameroon) and fumbwa (in DRC*),* comprises two species of climbing vines found across West and Central Africa, in fallows secondary and primary forests. Its leaves are used as a medicine and a popular protein-rich vegetable, available year-round and therefore important for food security. Approximately 200 tons from Mbandaka, Equateur and Bandundu provinces in DRC and 4,180 tons from the Southwest, Littoral and Centre regions of Cameroon are harvested annually, with between 50 and 2000 tons exported to Europe. This involves at least 1885 and 1744

people directly respectively in Cameroon and DRC. This is a very valuable trade, with the markets in the regions studied in Cameroon worth 13.8 million US$ and in DRC 1.2 US$ annually. The commerce contributes up to 22% (DRC) and 58% (Cameroon) of harvester's annual incomes, 75% of a retailer's and 58% of an exporter's income. Unlike Kisangani in Oriental province where it is hardly eaten, in Equateur Province fumbwa comprises 6% of NTFPs consumed in producer households and in Kinshasa consumers indicated it is eaten once a week. A dish of fumbwa in Kinshasa costs on average US$ 0.76 and of eru in Cameroon around $1, making it an affordable and staple food source. Mainly women (79%) are involved in all stages of the chain in Cameroon, whereas 50 and 60% of wholesalers and retailers in DRC are male. Cultural differences concerning who collects and trades forest products and the focus on more valuable cash crops such as cocoa and coffee in Cameroon may explain the gender difference. Despite the presence of Gnetum for millennia in these forests, it appears that in Gabon, DRC and Cameroon the species is in decline. This is linked to three factors. Unsustainable harvesting techniques are primarily responsible, with 50% of harvesters using unsustainable techniques. 97% have observed that available Gnetum has decreased, with 68% attributing this to forest clearance for farmlands, plantations (25%) and logging (7%). This matches experiences in other areas of Cameroon (Awono et al. 2002; Bell 2004; Fondoun and Manga 2000) with resource scarcity increasing as the rate of harvesting exceeds the slow natural regeneration. In both countries it is an open access resource, with no, or very few, traditional or legal controls on harvest. Even domesticated *Gnetum* is often stolen as the common perception is that this is a forest and not a farmed resource. Secondly, high demand is a major factor, with between 78 and 83% of the harvest sold. The actors closest to consumers, supplying markets in Kinshasa (DRC), Cameroon cities, Nigeria and Europe, are highly and efficiently organized – particularly in Nigeria where strong unions govern the trade - creating a strong incentive to harvest all available resources. Harvest losses of between 4 to 26% result from poor storage, long transport times and delays due to negotiating bribes with officials along transport routes, amount to 14% of wholesale costs. In Cameroon transport is mainly by trucks on very poor roads and or by sea, and in DRC via charter planes from Kisangani to Kinshasa. These unreliable routes result in major losses as the maximum lifespan is up to a week and the product is often bought on credit. Such transit risks and costs create a large gap between the producer's selling price and the consumer's buying price, with the producer receiving less than 10% of the price paid by the consumer. Still, on average, an additional 30 to 80% increase in value above the wholesale price is added by finely slicing leaves for retail. Such losses exacerbate over-exploitation, compensating for losses to satisfy demand. Thirdly, the non-existent or low level of domestication makes wild harvest the norm, despite its profitability and demonstration trials in Cameroon for over 15 years (Shiembo et al. 1996). In Cameroon 16% of harvesters in the Southwest farm eru, but less than 5% sold is from planted sources, and none in DRC. This is a market-based network chain.

Safou *(Dacryodes edulis)* produces a purple skinned, green fleshed fruit, eaten baked or boiled. In DRC, it has multiple medicinal uses, especially for dental pain. Annual production in Bas Congo province came mainly from agro-domestic forests (42%) and secondary forests (22%) due to increasing deforestation and increasing product value.

In 2007 an estimated 790 tons came from the province, with an individual collectors selling on average 1,718 kg. The total producer value was around US$ 228,808 in 2007. The main production area comprises 11 villages in the Boma, Lukaya and Cataractes area, each with about 500 households. Safou contributed to 31% of household income for collectors and over half of a household's NTFP derived revenues. The average annual income in villages was US$ 310, three times the salary of a primary school teacher (about US$ 100). About half of the collectors are members of agriculture groups, of which 67% of these sell safou locally. Safou is also traded in 28 Kinshasa markets, with 1,100 traders active, 66% of whom are retailers and 75% of whom are female. Profit margins increase in Kinshasa markets up to 30%, with the Kinshasa market estimated at US$ 2,424,175. The overall average profit in the main Kinshasa markets was US$ 6,763 for retailers and US$ 5,770 for wholesalers. During the 2007 harvest season, the generalist Bas Congo retailers earned an annual average profit of US$ 3205, while traders in Bas Congo and Kinshasa earned almost 50% more profit than producers. Another market-type chain, high profits are possible when these highly perishable fruits can be quickly and efficiently transported from forest to market, as there is no technology for conservation. The largest source of safou is domesticated with 77% of harvest from fields and fallow and trees planted around households, and 22% from secondary forest. It is used extensively to mark field boundaries, for shade and as a complementary species for intercropping, as such it is the most highly prioritised NTFP for domestication, by 40% of harvesters interviewed. The species is not regulated specifically, either for harvest or sale, in practice.

Bush mango *(Irvingia gabonensis)*, has fragrant, juicy flesh and sweet juice, and *Irvingia wombulu* 'dry season mango' has smaller, bitter fruit. Both are popular in Cameroon being used in the same way and have multiple uses: with ground kernels used as a condiment and sauce thickener, often preserved dried in a 'cake'. Cooking oil is extracted from the seed, the fruit juice is used in cooking and wine, and the pulp is used as a black dye. The bark and kernels have multiple medicinal uses and provide timber for construction and fuel. In 2007, over 533 tons valued at US$ 7 338,905 were produced from five areas in the Centre, South and Littoral regions, with 3 tons exported to Nigeria, Equatorial Guinea and Gabon. In the Southwest *wombulu* is highly sought after for export to Nigeria. Price setting cartels of buyers have been opened up with the 'market information system' in 2008 enabling new market entrants, especially to remote locations to access actual forest-edge prices. A small enterprises' average annual revenue from bush mango in 2007 was US$ 193 and for individual harvesters US$ 419. Consistently higher margins were earned by individual dealers, although average production per person is higher when in a group. 30% of production is auto-consumed; the remaining sales contribute on average to 25% of household incomes, used mainly for basic needs. Value per kilogram varies from US$ 0.9 to 1.8 (producer) and US$ 2.5 to 4.6 (consumer). Near the borders, price is a function of demand in Nigeria and regional supply. The market value of 5,000 tons total production in 2007 was around US$ 7,855,537. Two of the largest markets have respectively 71% and 19% of the Southern Cameroonian trade, and in the South West, five main markets have a flourishing border trade to Nigeria, where Nigerian agents commonly store and distribute from the border and set buying prices. Producers receive between 30 to 50%

of the consumer buying price, with prices increasing with transformation into balls and sachets. Over 90% of actors belong to 64 groups and six unions. Over 14 cooperatives, NGOs and international support organizations were active in the zone from 2007 to 2009, focusing on marketing and processing. In the South West about 50% of traders and exporters are Nigerians, arriving only for the season and travelling around remote villagers buying. The circuit is less organised with one active NGO, although support organisations are helping domesticate *wombulu*. Sustainable exploitation is not yet a concern as it is extensively domesticated in forest/farm areas, however forest clearance means that demand does not keep up with supply, particularly as fruiting is highly variable. Conservation is an issue, despite storage methods being known, pesticides are used to increase shelf life which may have long term health risks. Transport routes are critical, with river and road access restricted during rainy periods. The directed network nature of the chain and the legality gap between the permit for commercial use and its absence in practice, plus increasingly demand from neighbouring countries, present challenges for long term sustainability.

Raffia (*Raphia* spp.) and Cola (*Cola acuminata, C. Nitida and C. anomala)* are well known forest plants with a long history of use as a number of products: Raphia species produce palm wine, for poles, in furniture, matting and roofing, housing, tools and cola nuts mainly as a stimulant, across in Western and Central Africa. The value chains, predate colonial times and continue to be structured in largely the same way. These products are neither regulated as NTFPs or as crops. The regional trade from the Cameroon highlands was traditionally based on male owned and controlled products, dominated by three NTFPs: cola, honey and palm wine (Goheen 1996). As clan lineage heads own all tree crops, they controlled, and continue to control, the trade, supporting a system of male wealth and power, which ultimately, in combination with surpluses from women's farm labour and material capital, is transferred to 'symbolic power'. While the chains are no longer as lucrative as 30 years ago, they remains long distance and high value, employing over an estimated 1000 people (mainly men), full time in harvest and production of palm wine, with children also participating in harvesting fallen cola nuts during the season. These species are both well domesticated and integrated into farming systems with approximately 90 % of harvest in the northwest and west originating from cultivated specimens in the wild, managed or governed forest patches or agro forests. Harvesting techniques are largely sustainable. In contrast, in the East, where the cultural importance and traditions linked to palm wine are less significant, an open access forest regime dominates and most raffia is not 'owned'. Increasing demand linked to its being a highly elastic substitute for beer, frequently leads to over exploitation, creating an inferior quality product both in terms of quantity and taste, which ultimately commands a lower price.

Cameroon has been one the world's largest exporters of dried pygeum *(Prunus africana)* bark from its montane forests to Europe and the US for the last 15 years, exporting on average 1700 tons of bark annually. The international pharmaceutical industry uses this in drugs to treat Prostatic Hyperplasia and Prostate gland Hypertrophy (enlarged prostate gland). Over 45 traditional uses have been recorded in Cameroon including anti-inflammatory, analgesic , stomach ache, genito-urinary,

allergies, malaria treatment and for veterinary use, as well as the wood favoured for hoe handles, carving and previously fuel (Stewart 2003). The increase in value from US$ 0.35per/kg for raw bark at harvest to US$ 350 per/kg packaged medication is all added by the pharmaceutical industry outside of Cameroon. International demand has grown by over 600% the last 40 years resulting in an increased number of un-organised harvesters and traders exporting an estimated 98% of annual production. Listing *Prunus africana* as a 'vulnerable' and CITES listed species led to more transparent trade figures, but also complicated regulations, governance and equity problems. The inventory demonstrated a previously unknown level of domestication, partially mitigating unsustainable harvesting from natural forests: 52% of trees inventoried had been harvested at least once, of which 60% of trees unsustainably. However, an EU trade suspension in 2007 collapsed the US$ 540,000 producer market and estimated US$ 2,010,000 export market, consistently dominated by one company with a 50% market share. In the main production areas in the Southwest and Northwest it had contributed up to 80% household incomes in peak harvest years, sustaining a market chain over around 60,000 people: 21 community forests, over 500 small holder tree owners, around 500 harvesters, some 11 traders and five exporting enterprises. This chain moved from a hierarchical network to a directed network when the buying monopoly was liberalised in 2005. It is characterised by few information flows between buyers and sellers but substantial technical assistance, until platforms brought actors together, especially the remote harvesting communities, who exchanged data on techniques, problems and prices which differed up to 100% between regions. Customary rights have been gradually degraded, exacerbated by changing tenure, with the introduction of 21 community forests and a Plantlife Sanctuary in the Northwest and a new national park on Mt Cameroon which have created new local institutions and relocated rights out of traditional control, but without corresponding powers and responsibilities. Agreements between the government and CITES to develop a sustainable management plans in 2006 were not maintained, which combined with the overlapping rights governing access, cultural and land use practices were insufficient to counteract the high value of Prunus for export. When the most sacred of traditional forests, subject to strong taboos, was extensively harvested by a traditional ruler in 2005, this signalled the end of customary regulations and lead to a free for all of over-exploitation, encouraged by the government and exporters. This stock flooded the market, decreasing prices and eventually leading to a suspension on exports by the European Union, due to fears (at the time unsubstantiated) of unsustainable harvesting.

The bamboo chain in Cameroon is small with an estimated 500 actors, catering for local rural and urban markets. It is largely based on introduced 'Chinese bamboo' although two African indigenous species in the Northwest and in the savannah are also used extensively in their localities. The chain consists of largely individual or micro and small enterprises of owners, collectors and harvesters; craftspersons, traders and retailers: only 13% belonged to a bamboo related association. Regulatory, support and control actors, such as local and central government ministries and development or support organisations are absent; although some traditional councils and chiefs are regulate use locally. Across the country bamboo is harvested for own use by 77% of harvesters, typically middle-aged, married family men from the collection area. A few high volume

'professional' producers collect up to 6000 stems a year (earning up to US$ 4,000) but most are small scale, collecting around 500 stems a year, earning on average US$ 364. Access and control differs across regions, with the Northwest and West regions more traditionally regulated. Most bamboo, however, is freely available with open access: 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%) harvested is naturally regenerating; only 6% has been planted and 27% is a combination of natural generation and planting. Resource availability is not generally seen as an issue except in Adamaoua where concerns of decreasing resources were expressed. Craftspersons are typically married, middle-aged men, a third of who have their major occupation. Prices reflect demand, quantity of raw material used and product quality. Their average annual revenue from bamboo in 2009 was US$ 1390, ranging from US$ to US$ 2357. Bamboo is consumed both unprocessed and after a series of basic primary and secondary processing activities, resulting in 14 major product types with over 43 different products, majority used in construction (50%), furniture (30%), agriculture (22%), tools and utensils (21%) and fuel (12%). It is largely perceived as affordable 'local' material but producing high quality goods.

Cameroon's apiculture production areas in the Adamaoua savannah and montane forests support over 250,000, predominately (80%) male, harvesters, 75% of which are in some 70 groups. Beekeeping contributes up to 50% of household incomes, usually second to agriculture. The Anglophone circuit has well organised, decades old cooperatives, who's individuals own on average 20 traditional and top bar hives (with significant deviations from two to hundreds), and at least 45 groups who process and market filtered honey mainly locally (average price US$ 3 a litre) and a wide variety of by-products such as honey wine, soaps, cosmetics, candles and medicinal products with an annual value of at least US$ 800,000. The Adamaoua circuit tends to be an individual or family activity, using a larger number (average 100 per person) of low cost local grass hives. This results in a high regional production of an estimated 2 million litres annually but lower quality. There are more intermediaries, also involved in the production of around 300 of tons of wax annually for export to three neighbouring countries, and in the last two years a growing European market. Increases in wax production have lead to a realisation that the major fuelwood source is also the prime source of bee forage, initiating one of the largest intermediaries to search for more fuel efficient and low impact wax processing alternatives. Equally, up-scaling production using either traditional or modern hives, has placed more demands on local NTFP materials with limited availability in the Adamaoua savannah, such as rattan, bamboo and certain *Rubiaceae* sp. leaves, leading to the nurseries and regeneration schemes and source areas to be locally protected in agreement with grazers. In the Northwest, declining production and increased colony absconding may be linked to high levels (0.37% pa) of forest degradation and deforestation (Solefack 2009)– also leading to emerging forest protection schemes under a "zone of origin" certification scheme. Intermediary led organic certification has raised beekeeper incomes by 50%, to on average US$ 0.2 a litre, and up to US$ 5 a litre for premium white honey in the major cities. The long history of support from conservation and development organisations focussing on production is changing to a market focus. Quality and export standards and a responsible ministry have been introduced. Producers and traders are organising

into unions. The total retail market for honey, wax, propolis and other apiculture-based products is around US$ 5 million a year. In contrast to Cameroon, the honey production zones of Bas Fleuve and Plateau de Batéké in Equateur Province, DRC are small scale with about 60 producers, mainly individuals and males, with on average 7 hives per person (22% of the harvest is from wild colonies, the rest is from hives), producing 8 to 10 litres a hive respectively. Total production is around 500 litres annually, 83% of which is sold and retailed in local towns at an average of US$ 2.6/litre, the price varying largely with location and actor. Consumers use honey for medicinal use (65%) and food (35%). About 18 producer organisations sell on average 30 litres annually each. There is little or no processing or use of hive by-products. At least five support organisations have been active in the sector, some for 15 years. In 2007, income generated from honey by traders, wholesalers and the retailers in Kinshasa was estimated at US$ 236,867 and US$ 66,828 respectively and average revenue of individual producers was estimated at US$ 3,340. The large price and income differences in the chain reflect the low level of organization.

DISCUSSION

Implications for sustainable livelihoods

The implications for the livelihoods of actors involved in NTFP chains from the Congo Basin forests differ according to the type of chain. For NTFPs entering local value chains and for subsistence use, the products fulfil a range of important and often multiple functions for consumers often close to their source. All the NTFPs studies provide either important food, medicines, materials and energy. Whilst none are staple food stuffs, they are important in diversifying food sources, for example gnetum, and providing seasonal alternatives, such as safou and honey. Several of the products have high cultural values, often co-jointly, such as cola and palm wine, or higher perceived joint medical efficacy, such honey and prunus bark, bush mango bark and raffia palm wine. Bamboo, prunus and raffia are also important providing versatile materials. This small scale, mainly geographically local trade or barter has a low impact on the forest ecosystems, as the volumes harvested and do not appear to exceed natural regeneration capacity. The products are also valuable in providing a source of cash or have an exchange value, with on average up to 6% of harvest used for barter. However when NTFPs become higher value and are traded in greater volumes, the implications for livelihoods change. The gnetum, prunus and honey chains show how larger numbers of people can earn significant incomes, with the cash gained from such commerce being a significant means to diversify household incomes and purchase essential goods and services. However, when the value chains are characterised by market based or directed networks, they appear ultimately more prone to unsustainability. The win-loose combination, to use the game theory term used to indicate the play off often occurring in common pool resources, is due the lack of communication flows between actors in the chain about the impacts of the trade on the resource; weak governance arrangements regulating access, harvest techniques or volumes, particularly when customary regulations are ineffective in the absence or lack of enforcement of formal regulations; and inherently destructive harvest techniques. This leads to over–exploitation as a livelihood strategy to gain maximum short term economic benefits, but introducing a major risk that ultimately threatens the livelihoods of those dependent upon these products. Prunus africana and gnetum form the most

striking examples of this, illustrating how the high demand for very valuable products outstrips supply with a direct impact on species availability. Whilst initially these chains generate a very positive livelihood impact, after a sustained period of harvesting (40 years in the case of Prunus), the value attracts more actors to a free-for-all resource common, leading to a negative impact. This was dramatically highlighted by the suspension of the *Prunus* trade in 2007, having an immediate and direct negative impact (a 'loose') on the livelihoods of all actors involved – but also providing a positive (a 'win') respite for the species. Cumulative, knock on positive and negative impacts are predicted to occur, although not yet visible, for other species in the montane forests. As local communities search for alternative cash sources than Prunus, they may increase exploitation of other species, such as bamboo and increase conversion of forest to farm or grazing land. Equally, bee farmers seeking to protect their forage sources, which include Prunus as one of the key species giving the white mountain honey its distinctive characteristics, have subsequently started to lobby for increase forest protection, seeing the impact of the change in governance that lead to the unregulated harvests and post-harvest Prunus tree mortalities.

For many species, it is impossible to quantify when and what is the sustainable balance between supply and demand without full resource inventories of the major harvest zones. This has only occurred only for Prunus to date, in response to fears from conservation focused organisations in countries where aware and concerned consumers are located. In this case, inventories (Ingram, Awono, Schure et al. 2009) confirmed that Prunus harvesting practices have been highly unsustainable, which combined with anthropogenic factors, threatens both the forests in general and Prunus regeneration in particular. Continued harvesting may be possible given a vastly improved and changed governance system, with a much reduced quantity of around a third of previous annual harvest possible.

The *Gnetum* chain, with very few formal or informal governance controls in practice to assure a sustainable supply in DRC or Cameroon, may follow a similar route as Prunus in the longer term, If current harvest volumes continue and exceed supply. Such a critical balance point appears to be reached now in some of the harvest zones of southwest and central Cameroon now, according to reports of availability by harvesters. Over harvesting is exacerbated by the high additional costs of poor governance, requiring high volumes to make a stable profit margin. Belying classical demand and supply theory, market prices are not a good indicator of scarcity. These signals arrive too late in the market based networks typical of NTFP chains in the Congo Basin for actors at all the many stages of the chain to become aware of declining product availability and the implications of harvesting practices. This is unlike the Prunus case, where informed regulating agencies were able to enforce and pressure for a re-regulation of the playing field. If lessons are learnt from the extreme example of *Prunus*, waiting until a crisis hits and then responding to external governance' agents (the European Union and CITES) pressure upon direct agents (national Governments and NGOs) to take action, is the worst case scenario for livelihoods. It has taken two intense years to participatively reach a point where governance arrangements in the form of a national management plan (Republic of Cameroon 2009), appear to be acceptable to all

parties have been reached, and are now in the process of adoption. The new rules however may have negative implications for equity of access and control, as the smaller, weaker, and until recently, unorganised actors struggle to make their voice heard against the larger, dominant traders and exporters.

For Gnetum, domestication attempts are yet insignificant but promising, and may provide the best alternative to wild harvest by ensuring more measurable, manageable and sustainable supply. The safou, cola and raffia chains highlight how extensive domestication can take the pressure off wild resources as well as lowering costs and increasing control over a species by moving it into a more governable regime where land tenure and rights are securer. The low impact harvest techniques for these products are also less threatening to species regeneration. For *Prunus*, domestication while more widespread than realised, happening, but given the average of 15 years for the species to reach maturity and harvestable size, came too late to avoid the ban on international trade. The remnant domestic trade, much as the bamboo trade, is off sufficiently small scale and impact to have an impact on species sustainability, but equally provides only more limited income for a much smaller number of actors.

Influence of governance on trade and livelihoods

The governance, political and regulatory contexts encompassing NTFP chain have an enormous influence on trade and livelihoods. In both countries, the regulatory framework is largely ineffective and seldom applied. Where it is enforced, for the Cameroon Special Forestry Products for example, it is so inconsistent and unclear, that the products fall all too easily prey to corruption, whether during permit issuance or during transport. With the value of such products apparently low compared to timber, little government attention is focussed on enforcement, leading to a negative spiral of perceived low value, over-exploitation and formally un-governed resources.

Customary regulations, well illustrated by the cola, raffia and bamboo chains, fill some of the institutional voids and can ensure, for those lower value chains, for a low key but sustainable trade over decades. By setting the ground rules for access and control over resources, the resilience of ecosystem and the product to continue harvested is more assured. Traditional systems however often favour certain groups or elites, giving them access to products such as raffia which are difficult to change. Also entrenched is the exclusion of other groups, notably women, from all or part of the chains, notably harvest and production. However, technological or market changes have show how they traditional regulations can be circumvented or altered. Women are now increasingly involved in bee farming, placing hives closer to their farms and houses, which while changing the composition of the honey, gives them control and easier access and management of the product and its value, as well as eliminating the often hard physical work that can effectively exclude women. The introduction of mobile phone based market information systems has also empowered actors, such as the baka pygmies in the southern forest zone of Cameroon. Access to information on prices and buyers has meant that their profit margins can improve by 50% also resulting in cash sales instead of barter, making a dramatic difference in their livelihood options. The influence of the explanatory variables highlighted by Agrawal (2007) remains valid. Particularly the characteristics of the NTFPs (ie. perishability, ease of transformation and parts and

uses), have a strong influence on how the chain evolves. Equally the spatial location and physical infrastructure have a very practical influence on the nature of the chain and hence how its is governed. Communities in places such as Adamaoua and the Kilum Ijum forest of the Cameroon highlands content with different governance due largely to their remoteness and lack of infrastructure, making the role of traditional structure more prominent.

Decentralisation of forest management, notably through community forests in Cameroon, has however had a notable impact on control over resources. By introducing alternative networks of power, along largely democratic models, although some elite capture was inevitable, community forests in the northwest and southwest have been able to counter some of the negative practices and lobby for regeneration. They have also been engaged increasingly to develop new governance solutions, being regarded as legitimate actors. This has also had an effect of improving communication, changing the chain towards a more balanced network. Communication has also enabled new alliances. For example, the role of intermediaries or middlemen, traditionally seen in both countries as 'the baddies who take too much profit', has been more valued when harvesters realise the risks and difficulties faced and how critical and costly the functions of transport, bulking and storage are in getting a product to market. In the honey sector, innovations in diversifying products and pushing for quality as a marketing niche, and a pragmatic regulatory framework to fill the complete lack of one for apiculture in Cameroon, has made such intermediaries more valued actors in the chain.

The influence of collective action on governance, particularly control and access to markets, price setting and profit margins is highlighted by the Gnetum and Safou chains. All the chains have largely unorganised harvesters and producers, but where these actors are organised, notably in the Safou, apiculture and gnetum chains, selling prices and profits almost always increase as negotiating power and information augments. Raffia and cola provide contrasting examples: most harvesters being individuals and competing strongly with each other to sell their largely undifferentiated products in local markets, creating a buyers market and driving down selling prices. The Gnetum retail markets, particularly in Nigeria, are strongly well controlled by exclusive unions, which both protect and aid traders, helping to assure more stable traders profit margins by providing the rapid logistics and rules necessary for the sale of this perishable product. Collective action by producers in the honey sector in both countries also aims to ensure that producers can enter new markets and diversify products, creating new chains such as for wax, organic and fair trade products. Working collectively has been essential to meet the substantial market entry conditions as well as educate consumers about both new products and quality standards, raising profit margins.

CONCLUSIONS

The value chain analysis of NTFPs from Congo Basin forests has shown that these products have multiple and increasing values as the nature of the assets changes. Starting as natural and sometimes social capital in the forest, harvest and processing change and add largely economic value, but also a new social (cultural) value. For some products, particularly those where multiple parts are used and species who have

multiple uses, values multiply and not just transform. Different consumers place values on what may be essentially the same product i.e. a man with prostate disorder in Europe has a different economic and social value for Prunus africana bark in its processed tablet form, than a Cameroonian for the dried bark made into a tea. Each actor also places a different value, depending upon where they are positioned in the value chain: a harvester gains a significant portion of his (cash) income from stripping the bark from the tree and head portering it to a buyer on the road some kilometres through the forest below; compared to an exporter of the bark, who also trades in a number of other products. The value of an NTFP is also acutely physical when it is (also), along side trade, for subsistence use. These diverse and increasing values highlight the importance of NTFPs as it moves from its rural, forest source to largely urban consumer populations.

The social, regulatory and political contexts govern these trade chains and determine how value is added. The chains are dynamic over time and space. They are subject to shocks and changes, determined both by governing structures and processes, both cultural, institutional and policy. Equally, the interplays between forest, legal, cultural and market institutions create windows for interactions that can enable the creation of alternative forms of governance, such as the system of organic certification placed by Adamaoua beekeepers, as well as new governance systems being introduced, such as community forests, and accommodate shifting forms of self-governance, such as the management plan devised by the Prunus chain actors.

The implications for the Congo Basin forests however are not promising. Despite nominally being largely under the governance of the state, in practice the state fails to govern. If customary regulations or new forms of management do not fill these voids, the effect is unsustainable exploitation. If NTFPs such as Gnetum and Prunus continue to be governed in this way, the impact on livelihoods, while initially positive, can eventually be unfavourable, particularly when chains collapse. Where species are already vulnerable, especially if they are located in ecological niches, this can also be a major threat for their continued existence.

The social and economic aspects of these value chains are impressive and diverse and highlight that the values of these forest products and their chains remain hidden and underestimated. With over 500,000 people involved along the chains, many small and medium enterprises, a host of support and indirect actors, plus innumerable local and international consumers, with economic market values over the 50million US$ annually for the nine chains.

The governance, political and regulatory contexts strongly influence the outcomes of the trade on the sustainability of the products and the livelihoods of those dependent upon them. Main challenges and lessons learnt include:

- A declining resource base of NTFPs with a naturally low abundance or specialized ecosystem niches, combined with largely unsustainable harvest practices and low levels of domestication is an indicator of an unsustainable chain. The time scale for the balance to tip from a ‘win’ to a ‘loose’ for both the species and chain depends

upon the characteristics of the resource as well, of course intervening institutional structures, actors and regulatory processes.

- A lack of political will to combat or change the culture of corruption – especially in the permitting, transport and trade of NTFPs, ultimately increases costs and uncertainty in the chain and adds to unsustainable chains;
- The regulatory and policy framework focus on timber and agroforestry cash crops undervalues NTFPs and creates a highly disenabling environment for sustainable exploitation and enterprises.
- The absence of effective or efficient formal institutions combined with multiple, overlapping customary and confused by devolved or decentralised institutions, rights and responsibilities governing forest access, exploitation and trade does not favour enduring and sustainable NTFP value chains.
- Governance issues are critical in value chains: The combination of absent regulatory and weakening customary controls on access and harvest techniques results in over-exploitation and long term degradation of the resource.
- Large volume and high value, well organized trade, significant consumer demand, and high levels of corruption (particularly in permitting and transport), combine together with the governance issues and low level of domestication, to make livelihood enhancing chains potentially short lived.
- More secure and increased chains however may possible through domestication – but appears successful only given intensive support and training at village level, and realization of the long term threat, combined with access to markets, technical support and cultural change agents.
- Processing and diversifying products obtained from a species frequently adds value and increases incomes, often creating new chains and opportunities – but requires equipment, expertise and entrepreneurial skills often lacking without external intervention at the harvester or village level.

ACKNOWLEDGEMENTS

The time, information and interactions with all the actors in the chains interviewed are highly appreciated. Thanks to the interviewers, internship students and colleagues at CIFOR, particularly Abdon Awono, Henri Owono and Jolien Schure; SNV colleagues especially Julius Niba Fon; Ousseynou Ndoye and Julius Chupezi Tieguhong of the FAO for their ongoing support and Mirjam-Ros Tonen of the University of Amsterdam who made valuable comments to previous versions of this paper. Financial and logistical support was provided by CIFOR; as part of the EU funded project 'GCP/RAF/408/EC *Mobilisation et renforcement des capacités des petites et moyennes entreprises impliquées dans les filières des produits forestiers non ligneux en Afrique Centrale';* and by INBAR as part of a Common Fund for Commodities project '*Enhancing Opportunities for Market–Led Bamboo and Rattan-based Development in West and Central Africa'* for the bamboo chain.

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