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The Forest-Agriculture interface: a zone for  
enhanced productivity?

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## Forest to farm to market interfaces for Non-Timber Forest Products in Central Africa

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### Summary

*Non-timber forest products provide multiple livelihood benefits. They are mainly harvested from the wild until their value increases and over-harvesting incentivises cultivation. Markets have driven cultivation, but are also frequently negatively associated with maintaining populations of wild species. A forest-to-farm transition can maintain and enhance sustainable livelihoods as well as help maintain genetic resources aided by species specific regulation, customary traditions and support from research and development initiatives.*

Introduction: Forest products in  
Cameroon and Democratic Republic of  
Congo (DRC)

Central Africa has high forest cover, extraordinary biodiversity and persistently high levels of poverty (de Wasseige et al. 2012). Forests provide Non Timber Forest Products (NTFPs<sup>2</sup>) for food, medicine, fibre, tool, shelter, energy and cultural use, and act as a genetic reserve for the future. Many have long histories of consumption and trade, providing incomes for forest-dwelling, rural and urban based-people involved in their value chains<sup>3</sup>.

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<sup>2</sup> Products of biological origin from natural  
modified and managed forested landscapes.

<sup>3</sup> Processes involved in bringing a product from  
the forest, through processing and production, to  
delivery to consumers.

Despite their common use, comprehensive knowledge on their origins and socio-economic value is lacking for many products, hindering their management<sup>4</sup> and governance<sup>5</sup>. Forest to farm to market chains are mainly informal and un-captured in statistics and policy for such products in these countries. This makes their contribution to livelihoods and economies difficult to evaluate. Policies for sustainable development based on their production, use and trade are consequently largely absent. This study aims to inform policy makers and practitioners by presenting the values and interfaces between wild and farmed products and markets, and implications for the sustainable management and governance of NTFPs.

### Methodology

From 2007 to 2010 high-value NTFP chains were tracked from harvesters in major production areas to consumers. Interviews were conducted in Cameroon and DRC with 4,108 people, representing 25% of actors at each stage of the chains, concerning use, trade, values, governance, livelihood and sustainability. Literature, regulatory and trade data were also collected and analysed.

<sup>4</sup> Management is the act or art of managing, conducting or supervising something and judicious allocation of resources to achieve specific objectives and outputs. It involves decision-making processes related to resources and is carried out within boundaries by specific people (i.e. Farmers managing their land and crops), and can be planned and implemented.

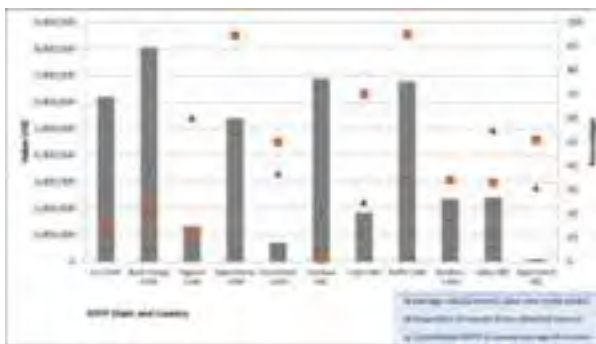
<sup>5</sup> Governance sets the framework in which management can thrive. Forest governance refers to the process of implementing and monitoring the allocation of forest land and resources and relevant policy. It encompasses decisions on how and to what ends forests are managed, who is involved, and how laws and policies are enforced. It includes the regulatory and institutional frameworks for the conservation, use and trade of forest resources and principles guiding interactions between those involved in the design and implementation of arrangements. It includes governments, private and civic actors such as communities and non-governmental organisations (Ros-Tonen and Kusters 2011).

Table 1: Characteristics of NTFPs studied

Product names	Species	Production Location	Consumption locations	Life form	Parts used	Uses
Gum arabic	<i>Acacia senegal</i> , <i>A. polyacantha</i> , <i>A. seyal</i>	Cameroon	Local, Europe, USA	Tree	Resin, bark, leaves, timber	Cosmetic, food, ink, medicine, forage, timber
Eru, okok, koko	<i>Gnetum africanum</i> <i>G.buchholzianum</i>	Cameroon	Local, national, Nigeria, Europe	Vine	Leaves	Food, medicine
Fumbwa		DRC	Local & urban			
Apiproducts (honey, wax, propolis)	<i>Apis mellifera adansonii</i>	Cameroon	Local & urban Central African Republic, Nigeria, Europe, USA	Insect	By-products	Food, medicine, cosmetics, candles,, soaps, sealing agent
		DRC	Local & urban			
Pygeum	<i>Prunus africana</i>	Cameroon	Local & urban Europe, USA, China	tree	Bark, seeds, leaves, timber	Medicine, wood carving, timber, fuel
Cola nuts, abel, goro	<i>Cola acuminata</i> , <i>C. nitida</i> , <i>C. anomala</i>	Cameroon	Local & urban Chad, Nigeria	Tree	Seeds, bark	Stimulant, medicine, cultural
Bush mango, ndo'o, andok	<i>Irvingia gabonensis</i> , <i>I. wombulu</i>	Cameroon	Local & urban Equatorial Guinea, Nigeria, CAR, Gabon	tree	Fruit, seed, bark, timber	Food, medicine, dye, construction, fuel
Raffia, cane, Indian bamboo, mimbo	<i>Raphia farinifera</i> , <i>R. vinifera</i> , <i>R. hookeri</i> , <i>R. negalis</i>	Cameroon	Local & urban	Palm	Stems, sap, leaves, seeds	Weaving, construction, tools, crafts, wine, food
Bamboo, (Alpine, kok-ko, Chinese)	<i>Yushania alpina</i> , <i>Oxytenanthera abyssinica</i> <i>Bambusa vulgaris</i>	Cameroon	Local & urban	Grass	Stems	Construction, tools, crafts, musical instrument, timber, paper, fuel
Safou, plum	<i>Dacryodes edulis</i>	DRC	Local and urban	Tree	Fruits, leaves	Food, medicine

## Results and discussion

In Cameroon an estimated 25,000 harvesters and 4,700 in DRC are engaged in the chains of the 11 NTFPs reviewed. They have diversified livelihoods, having on average of six (standard deviation 2) sources of household income. The majority (98%) are also farmers, with farming ranked as the primary source of livelihoods by 44% and harvesting of NTFPs as the main income source by 39%. On average 12 other NTFPs<sup>1</sup> were also collected by harvesters in the DRC and six in Cameroon. Trade is a major driver of harvesting: on average 78% (standard deviation 15) of all NTFPs were sold, 12% consumed and the remainder bartered, given as gifts or perished. The NTFPs contribute on average to 37% (standard deviation 14) of a harvester's average annual household revenue (Figure 1).



*Figure 1: Average annual market value, livelihood contribution and cultivation levels in NTFP chains in DRC and Cameroon 2007-2009 hh= household income*

The majority of NTFPs were gathered from primary and open-access forest (49%) where no governance is exercised and 30% from farms and fallows, 18% from

customarily-controlled forest areas and 3% from community forests, with rates differing greatly by product and country (Figure 1). Over the three year period studied, a trend of increasing quantities harvested was noted for all products. Also in the longer term volumes sold increased for eru/fumbwa, safou, pygeum, honey, wax and bush mango. For example pygeum exports increased from 1995 to 2007 from 310 to 1,863 tons and in the last 25 years the fumbwa market in the DRC grew from an estimated 600 to 2,456 tons.

Diverse harvesting strategies have evolved for the different NTFPs. Unlike trees used for timber which are felled in fallows and preserved on cocoa farms (Robiglio et al. 2012), trees and plants producing NTFPs are often conserved on subsistence and cash-crop farms and in fallows. Medicinal, condiment and spice producing species are often planted around households. Other non-tree NTFPs are not extensively planted and few wild animals are domesticated. Strategies for harvesting and use vary according to species characteristics, commercial and cultural values, with the highest economic value products primarily sourced from the wild. Apiculture is an anomaly: although bees are domesticated, 78% of hives are located in forests. The NTFPs currently farmed generally have long trade histories. Harvesting and use of culturally-prized products such as cola and raffia are strongly customarily regulated, bamboo and honey less so. Eru, pygeum and gum arabic are customarily and formally regulated: these plural systems are largely incompatible and uncoordinated.

<sup>1</sup> Not reported on in this study.

**Table 2: Harvester-farmer NTFP strategies**

Strategy	NTFP	Features	Ownership and governance regimes
Domestication	Apiproducts	High economic and cultural value, multiple products, advanced domestication techniques	Individual harvester , unregulated or customary
	Safou	Easily domesticated, cultivation produces larger fruits	Family, customary
Small scale cultivation/farmed production	Eru	Cultivated since the 1990s in Cameroon, initially difficult to cultivate. Not farmed in DRC.	Household, trade regulated
Active planting	Gum arabic	High economic value. Around 30-40% sourced from small and large scale plantations	Community, government , trade regulated, customary harvesting rules
	Cola	High economic and cultural value	Household, customary regulation
	Pygeum	High economic value, multiple uses, grown on farm and in small scale plantations	Community, household, customary, national and international trade regulations
Historical planting	(Chinese)Bamboo	Planted during colonial period.	Individual harvester, household and community
Active management	Bamboo (Alpine & kok-ko)	Wild sources appropriated and managed, multiple uses	Individual harvester, household and open access, customary regulation
	Raffia	Wild sources ‘‘owned’ and managed by individuals, high cultural value, multiple uses	Individual harvester, customary regulation
Preserved	Bush mango	Left during field clearance and in fallows	Household, customary regulation
	Cola	Left during field clearance, in fallows and cocoa and coffee farms	
	Safou	Left during field clearance and fallows, planted around compounds	
Spontaneous	Bush mango	Wild, left in fallows, spontaneous growth along paths to villages	Open access
	Chinese bamboo	Considered invasive species, widespread in clumps and groves	Open access
Wild harvest	Gum arabic	High value export trade, 60-70% harvested from wild	Open access, trade regulated, customary harvest rules
	Eru/Fumbwa	Own use and cash crop	Open access
	Apiproducts	Honey mainly hunted in humid forest areas Cameroon and DRC	

Shifts to planting and farmed production have been largely market driven. Increasing demand and scarcity has increased the prices of pygeum and eru, leading to further increases in harvesting. These shortages have stimulated farmed production. The pygeum trade and prices peaked in 2007, when international trade was suspended due to fears of unsustainable levels of harvest, a disincentive for some farmers. The growing fumbwa trade mirrors, with a three-decade time lag, the eru trade. Increasing scarcity started to really stimulate wider scale cultivation and government support in 2008, with decreasing abundance reported in all the traditional harvest areas (Ingram, Ndumbe et al. 2012).

The unsustainability of high volume trade in wild-sourced species has been increasingly realised (Ingram, Ndoye, et al. 2012). This has led to recommendations for their integration into perennial, biologically diverse cultivation systems (Leakey and Simons 1997). Guided by conservation or

poverty-alleviating strategies, donor, research, civil society and government initiatives in the last two decades have supported bee domestication, safou, eru and pygeum cultivation. For the latter two, the study shows that scale of farmed production however is insufficient to keep pace with demand.

Formal regulation, forest and agricultural policy do not distinguish between wild and cultivated products for the species studied. With the exception of pygeum – they have hardly affected harvesting techniques or farmed production strategies. Incentives to reward cultivated, sustainable production or balance high market demand by stimulating farmed production are absent. This is despite sustainable harvesting<sup>1</sup> being critical to conserving the wild populations of

<sup>1</sup> Where the parts or whole of a species can be harvested indefinitely from a defined area without detrimental impact on the structure and dynamics of harvested populations.

species from which products are harvested (Schipmann et al. 2006). The relationship between the life form (i.e. perennial liana and tree) of a species and the parts of a species used was shown to be important to its vulnerability to harvesting. Eru and pygeum have limited resilience as significant proportions of their leaves and bark respectively are harvested, compared to safou fruit and bush mango nuts, which present a much lower threat to long-term survival at individual and population level. Lacunas in regulations in Cameroon and especially DRC exacerbate this vulnerability. Even when vulnerable species are regulated, harvesting techniques have not been specified, harvest quotas have been demand-led, instead of conservation led, quotas are largely exceeded and compliance unenforced. Although a conservation strategy has recently been developed for pygeum, none exists for eru, despite signs of its increasing vulnerability. Other threats to the forests within which these species grow (reported by the harvesters) were agricultural expansion and increasing timber concessions. Studies of land use changes in the Congo Basin confirm these major drivers of degradation and deforestation (de Wasseige et al. 2012)

#### Conclusions

Farmed production and conservation of wild populations of the species producing NTFPs discussed in this article are both essential **for people active in their value chains**. However sustainably managing and governing wild populations is extremely challenging given high market demand, fuelled by growing populations, urbanisation, the increasing ease of export, and threats of agricultural expansion and intensification of timber harvesting. Sourcing of products solely from natural forests risks their depletion, particularly given species-specific vulnerabilities. Tenure and access rights to forests, trees and their products can determine who benefits and how, with secure land ownership closely linked to better resource management and pro-poor outcomes (Alden Wily 2002). As nearly half of the NTFPs studied were

harvested from open-access forest, this creates a "tragedy of the commons" situation. Farmed production of the species which produce NTFPs can play a critical role in creating sufficient supply to maintain a balance between short-term livelihood gains and long-term livelihood and environmental concerns.

The factors discussed above have direct consequences for NTFP supply and the livelihoods they sustain. Forest and agricultural policy, clear tenure, support to farmers and harvesters and regulation adapted to changing needs are needed to encourage the integration of NTFPs in agricultural systems and ensure their sustainable management and governance. The diversity of forest-farm interfaces highlights that species specific measures - conservation, management, planting and cultivation or a combination of these - are needed. Given the low level of state governance in Cameroonian and Congolese forests, recognising, using and maintaining sustainability-orientated customary and voluntary arrangements which support statutory frameworks is essential. If combined with well-designed demand-side incentives (Belcher and Schreckenberg 2007), this may help to fine tune management, increase the sustainability of production and contribute to poverty alleviation.

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