The Socio-Economic Contribution of Non-Timber Forest Products to Rural Livelihoods in Sub-Saharan Africa: Knowledge Gaps and New Directions

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The socio-economic contribution of non-timber forest products to rural livelihoods in Sub-Saharan Africa: knowledge gaps and new directions

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SUMMARY

The majority of Sub-Saharan Africa's population relies on forest products for subsistence uses, cash income, or both. In the case of non-timber forest products (NTFPs), it is imperative to 1) clearly understand the socio-economic contributions that they make to rural livelihoods in order to 2) design policies, interventions, and business ventures that serve to safeguard forest assets for the poor in a targeted manner. Based on existing literature, this article highlights the quantitative contributions that NTFPs have made to rural household incomes in several forested, Sub-Saharan African countries. Reasons for a paucity of data on this front are discussed. The article then identifies five broad socio-economic factors (location, wealth status, gender, education, and seasonality) affecting levels of dependency on NTFPs by rural households, and calls for a better understanding of the linkages between these five factors in order for targeted policies on poverty alleviation in forest-dependent communities to be developed.

Keywords: NTFPs, poverty, livelihoods, socio-economic, forests, Africa

La contribution socio-économique des produits forestiers autres que le bois aux revenus des ruraux dans l'Afrique sub-saharienne: carences de la connaissance et nouvelles directions

J.A. TIMKO, P.O. WAEBER et R. A. KOZAK

La majorité de la population sub-saharienne dépend des produits forestiers pour sa subsistance directe, et ses revenus en liquide, ou les deux à la fois. Dans le cas des poduits forestiers autres que le bois (NTFPs), il est impératif de: 1), comprendre clairement les contributions socio-économiques qu'ils apportent aux revenus des ruraux pour, 2) brosser des politiques, interventions et initiatives commerciales à même de protéger les richesses forestières pour les plus démunis, d'une manière concertée. En se basant sur la littérature existante, cet article souligne les contributions quantitatives apportées par les NTFPs aux revenus des foyers ruraux dans pluiseurs pays boisés de l' Afrique sub-saharienne. Des raisons pour expliquer la maigreur des données sur ce sujet sont examinées. L'article identifie ensuite cinq facteurs socio-économiques larges (location, status financier, sexe, éducation et nature saisonnière) affectant les degrés de dépendance sur les NTPFs par les foyers ruraux, et appelle à une meilleure compréhension des liens entre ces cinq facteurs afin de pouvoir développer des politiques visant à la réduire la pauvreté chez les communautés dépendant de la forêt.

La contribución socioeconómica de los productos forestales no madereros en las comunidades rurales de África subsahariana: lagunas de conocimiento y nuevas posibilidades

J.A. TIMKO, P.O. WAEBER y R.A. KOZAK

La mayoría de la población de África subsahariana depende de productos forestales para ingresos al contado, para poder subsistir o para ambas cosas. En el caso de los productos forestales no madereros (PFNMs), resulta imprescindible: 1) entender claramente la contribución socioeconómica que proporcionan a las comunidades rurales, y 2) diseñar políticas, intervenciones y nuevas empresas que logren conservar los recursos forestales de forma planeada y en beneficio de los pobres. Basado en la literatura existente, este estudio destaca las contribuciones cuantitativas que los PFNMs han aportado a los ingresos de los hogares rurales en varios países aforestados de África subsahariana, y analiza posibles motivos por la escasez de datos en este campo. Luego el artículo identifica cinco factores socioeconómicos generales (la ubicación, la riqueza, el género, la educación, y los factores estacionales) que afectan el nivel de dependencia de los PFNMs en los hogares rurales, y

recalca la necesidad de comprender mejor las conexiones entre estos cinco factores en aras de desarrollar políticas dirigidas a la reducción de la pobreza en las comunidades que dependen de los bosques.

INTRODUCTION

Africa has the highest percentage of people anywhere in the world that live on less than a dollar a day (Anderson *et al*. 2006). It has been estimated that almost 60% of rural Africans live below the poverty line (Oksanen *et al*. 2003), and in Sub-Saharan Africa, where more than 90% of the poor are rural, poverty is especially acute (Oksanen *et al*. 2003). In Africa, it has been estimated that over two-thirds of the continent's 600 million people rely on forest products, either in the form of subsistence uses or as cash income derived from a wide range of timber and non-timber forest products (NTFPs) (Arnold 2001, CIFOR 2005, Kaimowitz 2003, Sunderlin *et al*. 2005). With forests linked to rural livelihoods, forests present both an opportunity and a challenge for achieving conservation and development goals. In the past decade, much in the way of peer-reviewed and unpublished literature has attempted to disentangle the link between poverty and forests in developing countries around the world (see, for example, Anderson *et al*. 2006, Angelsen and Wunder 2003, Bukula and Memani 2006, FAO 2006, PROFOR 2007, Raik and Decker 2007, Shackleton *et al*. 2006, Sunderlin *et al*. 2005).

Given such widespread reliance on forest products to meet livelihood and subsistence needs, it is imperative to 1) clearly understand the socio-economic contributions that non-timber forest products (NTFPs) can make to rural livelihoods in Africa because, only in doing so, is it then possible to 2) craft policies, develop appropriate interventions, and encourage business ventures that serve to safeguard forest assets for the poor in a targeted manner (Sjaastad *et al*. 2005). The purpose of this article is to contribute to the dialogue about the socio-economic contribution that NTFPs make in Sub-Saharan Africa by distilling from the existing literature the most salient factors appearing to influence dependence on forest resources and by summarizing studies which have sought to quantify these contributions. In so doing, our hope is to reveal gaps in knowledge on the roles that NTPFs play in poverty reduction of forest-dependent people in Sub-Saharan Africa and to initiate discourse on creating a typology as a means of developing a common language on this topic. The article then concludes with a call for a better understanding of the interrelationships between these and other factors in order for targeted poverty alleviation strategies in forest-dependent communities in Africa to be developed[1].

This article focuses on data and findings obtained through a structured search of both published and unpublished secondary sources. Time and language constraints did not allow a detailed literature search of the non-English literature to be conducted. The search for literature on this topic began in October 2008, and ended in March 2009. The on-line catalogues of *Social Sciences in Forestry*, *ISI Web of Knowledge,* and *CAB Direct* were used, using combinations of the search terms 'NFTPs', 'forest', 'livelihood', and 'Africa'. Grey-literature from organizations whose work focuses on forests and livelihoods, such as the *Centre for International Forestry Research* (CIFOR), the *United Nations Food and Agriculture Organization* (FAO), and the *International Union for the Conservation of Nature* (IUCN), were also searched. The literature search was kept deliberately wide, and included articles that, at first, may have only appeared peripherally related to the topic, while keeping the review manageable by restricting the search to articles published over the past two decades. The majority of the literature drew mainly from sources on forest products in Sub-Saharan Africa, but some of the more general discussions regarding the links between forests and poverty came from articles focused on forest products from around the world, including India and Asia. Only articles focused on forest resources from natural forests – not managed plantations – were included as monoculture plantations generally lack a wide diversity of species suitable for NTFP use.

This article consists of five sections. Section 2 defines the key concepts and terms used in this article. Section 3 clarifies the importance of NTFPs by describing the variety of forest products used as natural sources of economic contributions by rural, forest- households across Africa. It then quantifies the economic contribution of NTFPs to rural livelihoods in a number of Sub-Saharan African countries, including South Africa, Botswana, Malawi, Madagascar, Tanzania, Cameroon, Ghana, and Guinea. However, a paucity of data in this regard is acknowledged, and reasons for this are discussed. Section 4 broadly identifies five socio-economic factors (access to forests and markets, wealth status, gender, education, and seasonality) that directly affect the levels of dependency on NTFPs by rural people. Section 5 concludes the article with a call for the development of a typology as a means of better understanding of the interrelationships between the five factors and their implications for the socio-economic contribution of NFTPs, provides suggestions for parties considering enacting policies, poverty reduction interventions, and business ventures related to NTFP extraction, and offers a number of potential research questions to address known knowledge gaps within this realm.

KEY TERMS

This article repeatedly refers to the key terms 'NTFPs', 'poverty', 'income' (as it applies to forest resources),

[1] While the literature used in this article is focused on Sub-Saharan African countries, 'Africa' is used interchangeably with 'Sub-Saharan Africa' for the sake of brevity. Throughout, the discussion is always with regard to rural livelihoods and forest-dependent households in Africa.

and 'livelihood'. This section defines these terms, and distinguishes between poverty mitigation or avoidance and poverty elimination.

'NTFPs' broadly include all non-timber biological resource-derived products (animal, plant, or mushroom) harvested from forested lands (Mbuvi and Boon 2009) by rural households, and which are intended primarily for domestic consumption or small-scale trade, with no, or limited capital investment (Shackleton *et al*. 2007). NTFPs include roots, fruits, medicinal plants, resins and essential oils, and fibres such as bamboos, rattans, and other palms used for weaving and structural applications (Belcher 2005). While we exclude timber products that are derived from large-scale industrial forestry enterprises (e.g., concessions), we include small-scale value added products in this discussion (furnishings, carvings, etc.).

The World Bank defines 'poverty' as "…a pronounced deprivation of well-being related to lack of material income or consumption, low levels of education and health, vulnerability and exposure to risk, and voicelessness and powerlessness" (as cited in Dubois 2002: 1). Arnold (2002: 231) provides further clarification: "…having insufficient food, income, and other inputs to maintain an adequate standard of living, or assets to reach this standard; vulnerability to shocks to the livelihood systems, and inability to cope with and recover from them; and weaknesses in their position which prevent the poor exercising options that a resource endowment could make available".

The term 'income' is a difficult construct to disentangle. Multiple definitions and interpretations of income mean that it is fraught with complexity. Sjaastad *et al*. 2005 (40) provide a simple definition of environmental income as "income earned from wild or uncultivated natural resources". However, the authors also note – and we concur – that there is a lack of clear application of the concept of environmental incomes in general, and in regard to forests in particular. The disparate ways in which the concept has been applied by different researchers, in resource valuations, household economic surveys, and stakeholder analyses, makes comparisons difficult (Sjaastad *et al*. 2005). As such, we have purposefully retained the specific terms used by the authors cited in this paper in regard to forest resources, including forest income, household income, cash income, and NFTP-related income.

A 'livelihood' can be understood as that which "comprises the assets (natural, physical, human, financial, and social capital), the activities, and the access to these (mediated by institutional and social relations) that together determine the living gained by the individual or household" (Ellis 2000: 10).

Lastly, Sunderlin *et al*. (2005: 1386) distinguish between the use of forest resources in poverty mitigation or avoidance, and poverty elimination. Poverty mitigation or avoidance in the context of forestry means "the use of forest resources to meet household subsistence needs, to fulfil a safety net function in times of emergency, or to serve as 'gap filler' in seasonal periods of low income, in order to lessen the degree of poverty experienced or to avoid falling into poverty". Poverty elimination, then, means "the use of forest resources to help lift the household out of poverty by functioning as a source of savings, investment, accumulation, asset building, and lasting increases in income and well-being" (*ibid*). NTFPs rarely provide a means for poverty elimination because the same factors that make NTFPs important in the livelihoods of the poor (such as remote settings and poor market access) also limit the scope for NTFPs to lift them out of poverty (Neumann and Hirsch 2000, Sunderlin *et al*. 2005). This article focuses on poverty mitigation or avoidance, and examines the use of forest resources from this perspective. The underlying reason for doing so relate to so much of current forest use being borne out of the need for poor households to cope with, rather than escape, poverty (Angelsen and Wunder 2003, Arnold 2002, Ros-Tonen and Wiersum 2003).

THE IMPORTANCE OF NTFPs TO FOREST-BASED LIVELIHOODS IN AFRICA

The importance of many NTFPs to rural livelihoods cannot be overstated, as a wide variety of forest products are used as natural subsidies by rural households across Africa. These can entail products that are collected directly for subsistence, or those that are 'transformed' through processing (e.g., wood carving for sale) to earn an income. Some of those NTFPs listed below (e.g., fuelwood) are used for both subsistence and for sale in order to earn an income:

- medicinal plant collecting (Arnold 1994, Belcher *et al*. 2003, Ndam and Marcelin 2004, Novy 1997);
- animal food sources, including insects, molluscs, fish, crustaceans, amphibians, and bushmeat (Jenkins and Racey 2008, Jenkins *et al*. 2009, Shackleton and Shackleton 2004a, Van Dijk and Wiersum 1999);
- plant food sources, including mushrooms, seeds, edible fruits, vegetables, and root crops (Arnold 1994, Shackleton and Shackleton 2004a, Van Dijk and Wiersum 1999);
- gums and resins (Arnold 1994, Tadesse *et al*. 2007);
- grass or twigs for making hand brushes (Shackleton and Shackleton 2004a);
- wood for woodcarving and fuelwood (Belcher *et al*. 2003, Cunnigham *et al*. 2005, Horning 2003, Horning 2004, Shyamsundar and Kramer 1997);
- charcoal (Horning 2003, Horning 2004, Monela *et al*. 2000);
- honey (Arnold 1994, Monela *et al*. 2000, Paupert Razafierisera 2005); and
- canes, lianas, raffias, and twines for framing houses, and grass, bamboo, reeds, and leaves for roofing (Arnold 1995) and chewsticks (Arnold 1994, Horning 2003).

Several large-scale comparative studies on NTFPs (Angelsen and Wunder 2003; Shackleton and Shackleton 2004a; Shackleton *et al*. 2007; Sunderland *et al*. 2004) have sought to obtain quantitative information on individual

NTFPs in an effort to identify some generalisable truths or trends to help inform policy-making. We refer to these and other smaller studies in this section to provide an overview of the contribution that NTFP-related incomes make to local livelihoods in several African countries. We then explain the paucity of data on the quantification of rural incomes. NTFPs are important both for their direct subsistence value, and for their contribution to a household's cash income (Neumann and Hirsch 2000). While the contribution that household incomes garnered through the sale of forest products varies, in many African countries it appears to be substantial. Unfortunately, relatively few studies "have examined the use of forest resources from a livelihoods perspective, and even fewer have estimated or measured the proportion of total income streams of households that can be ascribed to forest goods and services" (Shackleton *et al*. 2007: 563). Kamanga (2009) notes that rural households' income and their degree of dependence on forest income could be determined by simply measuring the share of income derived from forest environmental sources relative to all other sources.

Across Cameroon, incomes based on NTFPs vary widely, but they remain a substantial proportion of total household incomes. The Bagyeli people in the south still depend on hunting and gathering with the former providing an average of 90% of their cash income; the sedentary Bantu farmers in the same area sell both game and vegetal NTFPs to generate only approximately 20% of their cash income (Ros-Tonen and Wiersum 2003). In the southeast of Cameroon, forests have been found to contribute more than 50% to village household incomes, while this figure is 30-40% in the Mt. Cameroon region (IUCN no date). Defo (2004) notes that NTFPs including hunting / rattan and small-scale wood exploitation accounted for 68% of total cash income of producer households in seven villages in the Yaounde region. Around Mt. Cameroon, *Prunus africana* is the major source of income and accounts for 70% of the average annual income from their various activities (Ndam and Marcelin 2004).

In eastern and southern Africa, figures for incomes based on forest-resources are equally compelling. In an analysis of countries in this region, Arnold *et al*. (1994) found that small forest products producers received more than 50% of their income from their enterprises, except in Botswana where it was lower. In Malawi, Fisher (2004) uncovered indications of high levels of dependence on forests for income, with sample households deriving approximately 30% of their incomes from forests, on average. In Tanzania, households derived more than 50% of their cash incomes from the sale of NTFPs such as charcoal, honey, wild fruits, and firewood, with the peri-urban households deriving almost 70% of their cash incomes from the woodlands (Monela *et al*. 2000). In Zimbabwe, income from NTFP sales made a notable contribution to total incomes, comprising 35.4% of average total income per person in 1993/94 and 36.9% in 1996/97 (Cavendish 2000). In several study communities in the same country, Campbell *et al*. (2002) found that woodland income largely comes from fuelwood, structural items, and wild foods, and that the common pool resources of the woodlands and grazing areas provide 30-40% of net income for all wealth quartiles, with this income being derived predominantly from grazing for the top wealth quartiles and forest products for the lowest quartile. Sola (2004) found that the basket industry contributed 20% of annual household income in Zimbabwe. In Madagascar, Shyamsundar and Kramer (1997) found that the villagers around the Mantadia National Park derive 31% of their subsistence-based economy from forest products, with each household collecting an average of 6,164 kilograms of fuelwood per year, valued at $US 39. In South Africa, the use of forest resources in study communities generally contributes between one-sixth and one-quarter of total livelihood income streams, and "the contribution of forest resources is keenly appreciated by rural communities, and the loss of these resources requires significant changes to livelihoods to cope and adapt" (Shackleton *et al*. 2007: 563).

Recent research in Guinea indicates that villagers derive up to 25-30% of their incomes from collecting and selling forest products (PROFOR 2007). In Ghana, it appears that reliance on NTFPs is lower than in some of the other countries discussed above. For example, Townson (1995) found that the majority of people in their study relied on NTFP-based activities for only part of their income and that only 10% relied solely on NTFP-activities. Asare (1999) found that NTFPs accounted for about 5.6% of incomes in their study region.

All that said, the paucity of data on the quantification of rural incomes in general, and in Africa more specifically, must be acknowledged. This dearth is due, in large part, to two factors. First, analyses of the importance and role of environmental income are hampered by the lack of a clear understanding and the ambiguity of the application of the concept of NTFPs (Belcher 2003, Sjaatad *et al*. 2005) to the point where there is not even an accepted typology of the different NTFPs that are available. Only recently has there been a necessity to acknowledge and collect these data given increased interest and interventions related to the role of NTFPs in poverty mitigation or avoidance in Africa. Dubey (2007) notes that many governments have included NTFPs in broad categories such as forestry, agriculture, and horticulture (and hence, statistics do not recognize the role of many of these products). Many NTFPs are also gathered or harvested outside 'forests' as normally defined, being produced in managed fallow or farm bush, or from trees managed as farm crops (Arnold 1995). This is a challenge because, for example, as Shackleton *et al*. (2007: 563) question, "should browse and fodder be included as a forest/ woodland product, or be assigned to the livestock income stream?"

Second, a large impediment to producing accurate rural income data in Africa is the challenge of defensibly quantifying the role of NTFPs in rural livelihoods. But "estimating the incomes of people whose livelihoods depend on forests is key to understanding their well being and use of the forest" (Wollenberg and Nawir 1998: 157) and "…is fundamental in shaping policies that safeguard and develop environmental assets for the poor in a targeted

manner" (Sjaastad *et al*. 2005: 38). While qualitative data on the safety-net role of forests exists, there are few studies on forest product incomes and none of these focuses on the dynamics (e.g., due to seasonality) and nuances of the economic contributions from non-wood forest products to individual households (Angelsen and Wunder 2003, Nielsen *et al*. 2005). This is hindered by the fact that producers (and users) of forest goods – many of whom are part of the informal economy – generally do not keep books or records, and income has proven to be a difficult variable to determine accurately (Shackleton and Shackleton 2004b). Likewise, many environmental goods are not traded in formal markets, which is why they have been excluded from household budgets (Cavendish 2000). Kamanga *et al*. (2009) found that published rural research from Malawi neglected forest incomes as the forest and environment still represent forgotten sources of rural income. Also, forest product activities usually constitute just one activity within an agricultural household, and thus, it is difficult to separate out the portion of household time, costs, returns, etc. attributable to just NTFPs (Arnold 1995). Many different approaches – resource valuations, household economic surveys, stakeholder analyses – have been brought to the study of income from natural resource inventories (Sjaastad *et al*. 2005). However, there is little agreement about which method to use and conventional income assessment methods are not easily applied to the estimation of forest incomes given the remoteness, diversity, and number of forest products (Oksanen *et al*. 2003, Wollenberg and Nawir 1998). A substantial variation in the actual estimations of forest-product incomes also constrains comparisons of case results (Vedeld *et al*. 2007).

FIVE SOCIO-ECONOMIC FACTORS AFFECTING LEVELS OF DEPENDENCY ON FOREST RESOURCES

It is imperative to clearly understand the socio-economic contributions that NFTPs can make to rural livelihoods in order to design poverty mitigation strategies, policies, interventions, and business ventures that will safeguard forest assets for the poor in a targeted manner (Sjaastad *et al*. 2005). While more data on the quantification of rural incomes in Africa is called for, the socio-economic contributions of NTFPs to forest-based livelihoods in Africa have been qualitatively assessed. This section briefly summarizes – from a vast body of literature – five of the most commonly recurring factors that affect levels of dependency on NTFPs for forest-dependent people in Africa. These five factors are: access to forests and markets, wealth status, gender, education, and seasonality.

Access to Forests and Markets

Rural people's dependence on forest resources is influenced by where they are physically situated in relation to forests (location), as well as by the governing institutions that restrict or enable their access to these forests. Where people are located in terms of proximity to transport routes, markets, and forested regions can influence the degree to which they depend on NTFPs. In Cameroon, for example, access to forests is largely responsible for the level of dependency of the population on incomes from forest products – the IUCN (no date) found that the more isolated or remote an area, the higher the dependence of communities on the forest. In Chiradzulu District, Malawi, Kamanga *et al*. (2009) found that poor households with access to forests had much higher forest incomes than those without access. In comparison, agricultural populations, farm households, and those processing and trading forest products tend to rely on nearby forests and trees on their own lands for some livelihood inputs (Arnold 2002). For these households, NTFPs contribute only a portion of household income; they must be considered in terms of systems as people most often use them in combination with other economic activities (Belcher *et al*. 2003). Therefore, according to Shackleton and Shackleton (2004a), it is necessary to distinguish between dependence on NTFPs for an 'emergency net' function (where NTFPs assist households to cope in times of shocks and adversity such as death, droughts, floods, frosts, or disease leading to crop failure or death of livestock) and a 'daily net' function (where rural households use several different NTFPs to meet their everyday needs).

We also acknowledge that access to forests is largely dictated by the institutions governing them, including the extent to which local residents have legal standing, enforceable property rights, authority for resource management, and protection against arbitrary land-use decisions by state agencies (Balint 2006). In particular, Indigenous peoples' rights to the use, ownership, management, and control of their traditional lands and forests have been enshrined in international law by the International Labour Organization Convention 169 (Colchester 2000). In spite of this, many Indigenous forest people continue to have restrictions placed on their access to the lands that they claim as their own.

Wealth Status

Angelsen and Wunder (2003) note there is solid empirical evidence regarding the positive link between rural poverty and NTFP dependence. The poor are more resource-dependent than the rich and usually derive a greater share of their overall needs from forest products and activities (Arnold and Townson 1998, Cavendish 2000, Sander and Zeller 2007). As a proportion of all income streams, incomes derived from NTFPs have been shown to make a greater contribution to the overall livelihoods of poor households (Arnold 2001, Shackleton and Shackleton 2006). In the Marovay region of northwestern Madagascar, Sander and Zeller (2007) categorized 477 households into three poverty classes: 'poorest', 'less poor', and 'better-off'. The latter generated about 50% more cash-income than the poorest and 90% of the poorest households collected firewood, compared to only 80.2% and 76.8% of the less poor and better-off households, respectively (Sander and Zeller 2007). In the

Kat River area of the Eastern Cape, South Africa, a greater proportion of poor households (>30%) were found to engage in selling NTFPs as a means of cash generation than more wealthy households (Shackleton and Shackleton 2004a). Ease of access to NTFPs, combined with the low skill and capital needed for most small-scale forest-based enterprises, mean that these products can be important in the coping strategies of the very poor (Arnold 1994, 2001). Where forest resources are easily accessible, income derived from their sale is often particularly important for poorer groups (e.g. Sander and Zeller 2007) and may reduce income inequality across households (Arnold and Townson 1998; Fisher 2004). This is germane to the discussion of rural incomes as the income distribution Gini coefficient (a common measure of economic inequality) of Africa is higher than the aggregate world Gini coefficient of 67.0, equalling 72.2 for sub-Saharan Africa (Anderson *et al*. 2006).

Gender

Gender plays a key role in the degree to which rural Africans depend on NTFPs as women's and men's rights, responsibilities, and expectations within the milieu of natural resources tend to be culturally specific (Rico 1998). In general, the importance of gender issues "depends on the extent to which differences between men and women influence resource use and control patterns, decision-making power, and livelihood strategies in the area in question" (Meinzen-Dick and Zwarteween (2001: 66). In Africa, fairly substantial differences in the ways in which men and women depend on and control NTFPs have been observed. For example, women collecting NTFPs in the Banyang-mbo wildlife sanctuary in Cameroon receive less income, but incur higher costs, than men. This sort of male dominance in earnings is not an uncommon occurrence in Africa, pointing to the need for more equitable benefit sharing mechanisms to be put in place in the forestry (and other agricultural) sectors (Nkembi 2003).

Ease of access and low entry thresholds also mean that women may depend on forest gathering activities for income generation more than men (Arnold 1994). Both women and children, often from the poorest households, can obtain a major source of their subsistence from a diverse set of forest products, including many of the same products sold for cash income (Oksanen *et al*., 2003). NTFP activities can be particularly important for women because they can be combined with regular family and household tasks, often at or near home, thereby allowing women to combine these income earning activities with other household chores such as child care (Arnold 1994, 2001, Arnold and Townson 1998).

It is imperative to acknowledge that women and men in different countries, much less in different regions of the same country, will rely on different NTFPs. For instance, in Benin, shea nuts (*Vitellaria paradoxa* C.F. Gaertner) are particularly important for those with few other income-generating options, including the elderly (often widows and those without the physical strength necessary to engage in other activities) and young newly-married women without capital (Schreckenberg 2004). While there is overlap between the forest-based activities of women and men, women generally tend to be more involved in gathering and trading of non-wood forest products (Arnold 1994, Shackleton and Shackleton 2004a) and rely more frequently than men on forest products activities for the generation of income (Arnold 1995). Their dependence on more labour-intensive, low-return household-based activities means that women tend to be concentrated in the enterprise areas that are most exposed to shifts in markets, prices, or costs, and are therefore likely to be more adversely affected by changes that occur over time (Arnold 1994). In general, women in rural Africa:

- produce and trade brushes and marula beer (Shackleton and Shackleton 2004a);
- are involved in pottery-making (Cavendish 2000);
- tend to be more involved than men in the collection of palm-related products (Sola 2004);
- sell wild vegetables, fruits, and wine (Cavendish 2000);
- collect and/or sell thatching grass, fuelwood, and leaf litter (Cavendish 2000);
- collect snails, mushrooms, seeds, pestle, plant medicines, and resins (Arnold 1995);
- process chewsponge and sponge (Arnold 1995, Townson 1995), smoked snails, plant medicines, chewsticks, palm oil, and charcoal (Arnold 1995); and
- engage in the trade of mortars, pestles, sleeping mats, akpteshie spirit, cane baskets, bushmeat, and spices (Arnold 1995).

Comparatively, almost all activities associated with wood (e.g. sales of wood, carpentry) are carried out by men (Cavendish 2000). For instance, the literature shows that men in rural Africa generally:

- dominate woodworking (Arnold 1994, Shackleton and Shackleton 2004a);
- hunt and sell wild animals and are overwhelmingly responsible for collecting termitaria (Cavendish 2000);
- are involved in basketry and mat-making (Townson 1995), and processing activities, including charcoal, akpeteshie spirit distilling, roof tiles, cane furniture, fish traps, and canoes/paddles (Arnold 1995, Townson 1995); and
- gather and produce honey, chewstick logs, building poles, roofing materials, and palm wine (Arnold 1995).

Some joint activities do exist. For example, the Tanalaha men and women of the Ranomafana in Madagascar have similar rights regarding the use and control of environmental resources in contrast to many other regions (Jaervilehto 2005). As such, either gender can basically do any kind of resource-related work, although men tend to engage in the more labour-intensive activities like collecting firewood

(Jaervilehto 2005). In Zimbabwe, both men and women can make and/or sell certain mats (Cavendish 2000). In addition, traditional healers can be either male or female, meaning that the sales of wild medicines can be done by either gender (Cavendish 2000). In Ghana, both men and women are proprietors of a number of NTFPs (mushrooms and medicines) (Townson 1995). There also appears to be some sharing of processing activities. Blay (2004) found two categories of chewstick processors: first order processors are males who make cut stems and branches into round logs, while second order processors are mostly females who split the logs into small shards for consumption. Regardless of gender, small-scale production and trading activities in forest products constitute one of the largest parts of rural non-farm enterprise employment in Africa (Arnold and Townson 1998).

Education

The education level of rural Africans can influence their reliance on NTFP trading or producing. Kamanga *et al*. (2009) found that households in Africa with higher education levels generally have more reliable sources of income opportunities and generally wider asset bases. In a more specific survey of African NTFP producers, Arnold *et al*. (1994) found that half of the respondents involved in grass, cane, and bamboo enterprises had no education, while most of the rest had only primary education and those owning forest products trade enterprises were only slightly better educated. "In contrast, very few woodworking proprietors had no education and more than a third had qualifications beyond the primary level" (Arnold *et al*. 1994: 15). Given that it is men who are generally the woodworkers (see above), Townson (1995) found that male proprietors typically (75%) had been educated to primary levels or sometimes higher, while female proprietors were likely to have not received any education (60%) or were only educated to primary level (27%). Within the same product categories, Townson (1995) found that male dominated activities, such as bushmeat hunting, carving, and carpentry, showed little difference in the level of the proprietor's education, but that amongst female dominated activities, chewsponge and sponge processors showed markedly lower educational levels than the average for all female proprietors. More recently, in their survey of marula beer traders, Shackleton and Shackleton (2004a) found that more than half of the traders had some secondary education; of those, 18% had a school-leaving certificate, and only one had a tertiary diploma. Of note, the authors suggest that a lack of employment opportunities, rather than poor education and skills, has forced the women, as the primary producers and traders of marula beer, into selling NTFPs for income (Shackleton and Shackleton 2004a).

Seasonality

The reliance on NTFPs in general, and forest-based incomes in particular, varies depending on the season and accompanying household needs. Some activities are seasonal because the crop or material can only be gathered at certain times of the year and/or is directed by the seasonality of other activities (e.g., agricultural production), or because of seasonally induced cash needs (e.g., school fees) (Arnold 1994). For instance, Schreckenberg (2004) found that income from the sale of shea (*V. paradoxa* C.F. Gaertner) kernels was particularly important in bridging the shortfall at the start of the agricultural season. Likewise, Arnold (1994) noted that fuelwood collection for a market in Sierra Leone was concentrated during the off-peak agriculture period, providing cash income in periods when food supplies were generally at their lowest. Shackleton and Shackleton (2004a) found that income from the sale of Marula beer was crucial following the Christmas season as there was a high demand for cash for school fees, books, and uniforms, at a time when cash reserves were particularly low. In fact, the timing and seasonality of rural incomes could be considered even more important than their magnitude (Angelsen and Wunder 2003, Arnold and Townson 1998). Some of the most pressing needs that can be met by collecting and selling forest products include:

- the payment of school fees (Adebisi 2004, Campbell *et al*. 2002, Sunderlin *et al*. 2005);
- funding investments in consumptive activities (such as new clothes, school uniforms, gifts, pots, and pans) (Campbell *et al*. 2002, Schreckenberg 2004);
- dealing with medical emergencies as they arise (Sunderland *et al*. 2004, Sunderlin *et al*. 2005) or meeting medicinal needs (Arnold and Perez 2001);
- the provision of low-cost energy as wood remains the main source of energy for the vast majority of rural Africans (Oksanen *et al*. 2003);
- supplementing diets during particular seasons in the year or during shortfalls (Angelsen and Wunder 2003, Arnold and Perez 2001);
- using profits for participating in family ceremonies (Adebisi 2004); and
- using incomes in productive activities (such as building a storage hut, purchasing a new goat or agricultural stocks for later resale (Schreckenberg 2004) or purchasing agricultural inputs (Sunderlin *et al*. 2005).

THE SOCIO-ECONOMIC CONTRIBUTIONS OF NTFPs: A PATH FORWARD FOR INTERVENTIONS, POLICIES, AND RESEARCH

Through a detailed literature review, this paper sought to provide a better understanding of the socio-economic contribution that NTFPs can make to the livelihoods of forest-dependent people in Sub-Saharan Africa. Clearly, NTFP collection – either for subsistence or as an income-generating activity – is an important means by which poverty conditions for rural households can be improved. However, a clearer understanding of dependence on NTFPs and the relative contributions that these products make to household

incomes and rural livelihoods in Africa is complicated by a current dearth of quantitative data. A logical starting point should be the provision of socio-economic data that goes beyond aggregated statistics, to take into account the many nuances and variables associated with the role of forests in poverty mitigation. This would serve to provide a richer baseline for understanding the contributions that NTFPs can and do make to the livelihoods of rural Africans. However, the socio-economic contributions of NTFPs to rural livelihoods are also affected by a complex array of interacting factors, including access to forests and markets, wealth status, gender, education, and seasonality. Policies, interventions, and poverty mitigation strategies should be vastly different for a poorer, less-educated single mother living with her children in a remote forested region of Africa, for instance, than for an educated man from a less-poor or better off family located along a major transport route. Likewise, for each of these types of individuals, the proportion of their incomes that arise from the sale of NTFPs – and thus their dependence on NTFPs – can be expected to be different.

This speaks to the necessity for a new way of thinking about the role of NFTPs in poverty mitigation. Specifically, there is a pressing need for parties responsible for enacting policies, strategies, and business ventures within this domain to have a better understanding of the consequences of their interventions. *What are the potential contributions that NTFPs can make to rural livelihoods within specific contexts? What sorts of factors should be taken into account in devising and implementing poverty reduction strategies involving the extraction of NTFPs?* Answering questions like this should begin the development, refinement, and incorporation of a typology of NTFP dependence wherein interrelationships between socio-economic factors (identified in this article and elsewhere in the literature) and NTFPs are contextualised by defensible and quantitative data on rural incomes. Given that women, for example, tend to be more involved in the gathering and trading of NTFPs (Arnold 1994, Shackleton and Shackleton 2004a), and that the poor are more dependent on NTFPs than the rich (Arnold and Townson 1998, Cavendish 2000, Sander and Zeller 2007), one could expect the less-educated single mother described above to benefit more from targeted tools, programs, or policy interventions which increase access to supplies of NTFPs, provide training on reducing exposure to shifts in markets, prices, or costs, assist with access to markets, and offer seasonal support during times when household expenditures might be particularly high (such as the start of the new school year). Comparatively, the wealthier, educated man described above would more likely benefit from a different combination of policies or interventions, such as micro-finance support, business support training, and assistance with securing forest tenures and other supplies.

In addition, there is a salient need for further research into enabling locally-appropriate business ventures and developing policies to safeguard forest assets for the poor in a targeted and strategic manner. Rural peoples' access to, sustainable use of, and tenure over these resources are often determined by factors well beyond local control. Business and policy factors can impede the use of forest products in rural households' livelihood strategies in Africa in complex ways, and stimulate more questions than answers in regard to rural households' livelihood strategies in Africa. For instance, *how do access to forest resources, micro-credit, and markets affect the use of income from forest products? What business interventions can mitigate the affects of seasonal dependence on forest resources? How does a lower education level affect the occupations open to forest-dependent people? How do policies on access or proximity to, and tenure over, forest resources affect the sustainability of use of forest resources? What enabling mechanisms can be recommended to overcome the barriers presented by business and policy impediments?* If we wish to effectively engage in dialogue with policy makers, put forward effective poverty reduction interventions, and catalyse appropriate business opportunities for improving local livelihoods, it is imperative that we begin with the answers to these key questions.

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