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Tangible benefits or token gestures: does Bwindi impenetrable National Park's long established multiple use programme benefit the poor?

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Trade and use of Non-timber forest products (NTFPs) has often been suggested as a means through which forest dependent people can improve their livelihoods to overcome poverty. Many projects have indeed promoted trade and use of NTFPs as a means of achieving development and conservation goals. One of the earliest large-scale initiatives to explore this was the Bwindi's Multiple Use programme (MUP) in Southwest Uganda that began in 1994. The MUP allows limited park access by local people for medicine and basketry plants, and beekeeping. Here, we assess the development benefits obtained by local people through the MUP two decades after its introduction. Using data from 384 randomly sampled households and repeated market surveys over a 1-year period, we determined household preferences, dependency and incomes from NTFPs. The NTFPs that are most preferred by local people are those prohibited by park management. Furthermore, the highest income per household from NTFPs trade was estimated at 119 US \$ per annum (14% of total household income). Restrictive policies on NTFPs extraction curtail tangible benefits to the local people. Restrictions ensure that NTFPs use cannot be increased, thus, despite their significant contribution to welfare, Bwindi's NTFPs remain of negligible value for improving livelihoods.

Keywords: non-timber forest products (NTFPs), household income; tangible benefits

Introduction

Poverty among rural households living near protected areas (PAs) is an international concern. The Convention on Biological Diversity, the World Parks Congress held in Durban in 2003, the United Nations Millennium Development Goal (2014), and other International agreements explicitly connect conservation and poverty alleviation. This reflects acceptance that gaining local support is necessary for sustainable conservation, as well as concern that many of the costs of achieving conservation continue to be borne by the poor and vulnerable. Programmes for alleviating poverty in households near PAs have therefore been a major focus of most governments in the tropics. These programmes are focused on increasing household incomes to levels above the poverty line (1.25 US \$ per day) as recognized in the Millennium Development Goals (Goal Number 1).

Poverty has been defined in various ways by different authors (e.g., Alkire & Foster 2011; Hutto et al. 2011; Israeli & Weber 2014; Uganda Poverty Status report 2014; United Nations Millennium Development Goal 2014). Common to all these definitions are deprivation and limited access to basic resources. Here, we use the definitions given by Israeli and Weber (2014), the Uganda Poverty Status Report (2014), and that of the United Nations Millennium Development Goal (2014) that define households with chronic

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poverty as those that are deprived of access to commodities essential for their livelihoods and earn less than 1.25US \$ per day. While this definition is limited in scope, it facilitates assessment, comparison, and it ensures policy relevance as household income is one of the common measures of well-being. Here, we define household income as the sum of income, both in-cash and in-kind, that accrues from economic activities performed by households (Uganda Bureau of Statistics (UBOS) 2014). For rural households, these economic activities include agricultural production, Non-Timber Forest Products (NTFPs) trade and employment. Many of the rural poor households are living close to PAs in the tropics (Wunder et al. 2014) and most are dependent on NTFPs and other natural resources to a significant degree.

There is an increasing consensus that conservation should benefit the rural poor people (Angelsen et al. 2014; Wunder et al. 2014). Nonetheless, demonstrable synergies between conservation and poverty alleviation remain elusive (Adams & Hutton 2007). The post Rio 1990s period witnessed wide acceptance that the use and trade in local NTFPs is an incentive for local people to value and maintain forests leading to promotion of NTFPs as a means of achieving development without destroying the forest (Belcher & Schreckenberg 2007). This led to the view that, with suitable safeguards, extraction of NTFPs could and should be allowed, even within PAs. That was the start of a paradigm shift in the management of PAs that remains a focus of debate even today: instead of excluding local people, it is widely believed that they should be permitted to access some resources and thus share the benefits of conservation.

Over two-thirds of the one billion people in Africa rely on NTFPs for their livelihoods, welfare, or both (Timko et al. 2010). While this dependence is clear, the opportunities to improve welfare through use and trade in NTFPs are less certain. One school of thought is that NTFPs offer real development opportunities (Timko et al. 2010; Angelsen et al. 2014; Wunder et al. 2014) but another suggests that the benefits from NTFPs cannot reduce poverty (Belcher & Schreckenberg 2007). This view has recently been challenged by Angelsen et al. (2014) and Wunder et al. (2014), who note that millions of rural smallholders across the developing world may still derive as much income from foraging forests and wildlands as from cultivating crops. One explanation for the more pessimistic views on NTFPs and poverty reduction is that if the trade is sufficiently lucrative most of the benefits will be captured, not by the poor, but by more powerful elites (Arnold & Ruiz-Perez 2001; Belcher & Schreckenberg 2007). This pessimistic view further notes that trade in NTFPs aimed at improving rural livelihoods may instead lead to forest degradation and in the worst cases to deforestation (Babigumira et al. 2014). One way of ensuring that the rural poor people benefit from trade in NTFPs is to regulate access for the poor and ensure sustainable harvesting of the NTFPs (Cunningham 2001; Adams & Hutton 2007; Angelsen et al. 2014; Wunder et al. 2014).

Presently in Uganda, most government programmes are geared towards ‘prosperity for all’ and poverty alleviation particularly among the rural poor (Uganda Poverty Status Report 2014). These programmes aim at tapping the opportunities and resources available to improve livelihoods and incomes. In Southwest Uganda, a region of high population and low incomes, the Bwindi Impenetrable National Park (hereafter called ‘Bwindi’) was gazetted as a national park in 1991. Local people were first barred from accessing the gazetted forest and this was a major source of conflict with the park authorities. Views changed and in 1994, the Uganda Wildlife Authority (the Government entity that manages national parks) and a number of partner organizations introduced a programme allowing regulated harvests of NTFPs by local people to mitigate the conflict. This was coined the Multiple Use Programme (MUP) where selected local people referred to as ‘resource

users' (herbalists and basket makers) were permitted to access certain medicinal and basketry plants on certain dates in designated areas called Multiple Use Zones (MUZs). Local people were also allowed to locate and access their beehives placed in certain MUZs (Scott 1992; Wild and Mutebi 1996; Cunningham 2001). A range of other activities and interventions, including revenue sharing, tourism, crop improvement, and methods to deal with crop damage from wild animals, were introduced alongside the MUP to benefit those who lived close to the park (Baker 2004; Christensen 2009; Blomley et al. 2010).

When the MUP was introduced in Bwindi in 1994, forest resource access was restricted to only subsistence use, and the sale of NTFPs for cash was prohibited (Wild and Mutebi 1996; Cunningham 2001; Christensen 2009; Multiple Use MoUs 2011). The original aim of the programme was not to alleviate poverty but to sustain local people livelihood activities and maintain their cultural links to the forest. However, a few years after, local people abandoned these restrictions because of the need to improve their incomes through trade in NTFPs. Local people utilized opportunities offered by the tourism industry and local markets to sell the NTFPs (Cunningham 2001; Ndangalasi et al. 2007; Christensen 2009). With the present Uganda government programme of 'prosperity for all,' the local people look toward the MUP for providing opportunities to improve further their household incomes and livelihoods.

Understanding the socio-economic contribution that NTFPs make to rural livelihoods is crucial for crafting policies, laws, and appropriate interventions that benefit people and safeguard forest assets (Timko et al. 2010). Though it is now two decades since Bwindi's MUP was introduced, no studies have gauged the extent to which local people continue to obtain tangible benefits from the programme. This information is crucial for the MUP to remain a significant and relevant component of the regional conservation and development strategy. In this paper, we assess the tangible benefits the MUP is providing to local people, and we take a critical look at the Bwindi's MUP. Our specific research questions are: what is the major source of income for households around Bwindi? What NTFPs do local people prefer? How much income do households derive from NTFPs? And to what extent do NTFPs contribute to household income?

Methods

Study area

The study was carried out in eight parish administrative structures bordering Bwindi in Southwestern Uganda (Figure 1). Bwindi is an afro-montane forest located in Southwestern Uganda and is part of the Albertine Rift. The management staff of Bwindi National Park works with the parish structures through Memoranda of Understandings (MoUs) with the local people for NTFPs extraction. The smallest unit of administration in the Uganda local government structure is a 'village' and several villages (about 10) constitute a 'parish' (Uganda local government Act 1997). Two of the parishes were Non-MUZs and these were located where no NTFPs extraction is allowed (Bujengwe and Mushanje). Four parishes were plant harvest zone parishes (MUZs) and were located where NTFPs harvest is allowed (Buremba, Karangara, Rutugunda, and Southernward). The last two parishes (Kashasha and Kitojo) included the beekeeping zone (MUZs) where local people used to place beehives for honey collection (Figure 1). Households interviewed in all the parishes were those directly adjacent to Bwindi, within a 1–2 km radius, also called 'frontline households.' The major economic activities in those parishes are farming for food and cash crops.

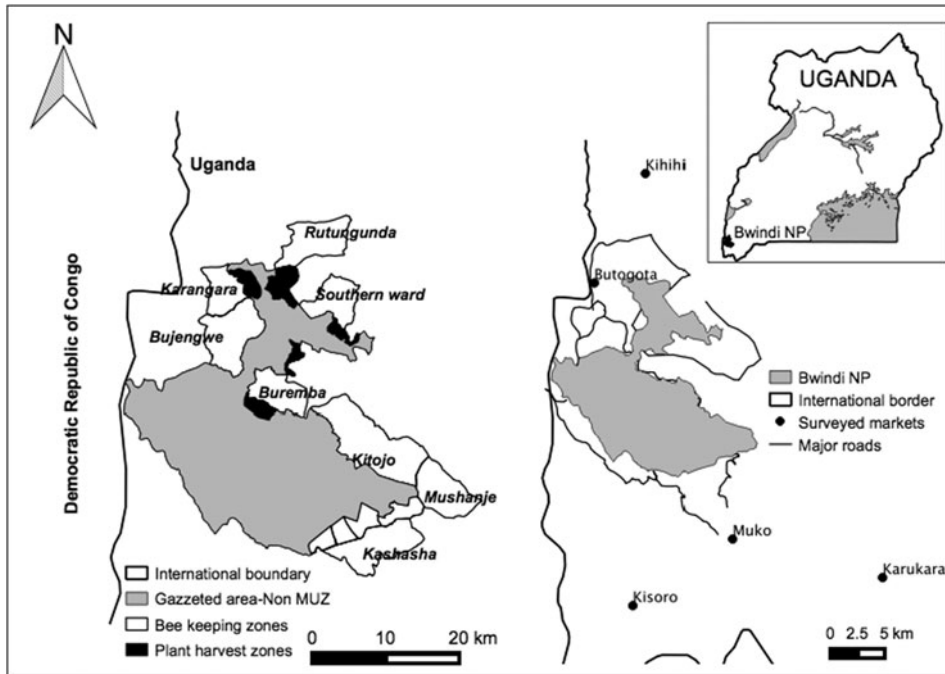


Figure 1. Maps showing the study parishes and the five markets surveyed around Bwindi

Household interviews

A total of 384 household heads were interviewed from the eight parishes using a semi-structured questionnaire with open-ended questions. The interviews were facilitated by a local guide and carried out in the local language of Rukiga by one of the authors who understands the language. Household census lists maintained by local council officials were used to select respondents for interviews following Eilu and Bukenya (2004). The household heads and their spouses were randomly issued with questionnaires. Household heads and/or their spouses interviewed were those found at or near their homes following Eilu and Bukenya (2004) and Eilu et al. (2007). If household heads were absent at the time of interviews, no interview would be carried out. Information sought from the respondents included; name of household head, age, and sources of livelihood following methods by Tuxill and Nabhan (1998). Out of the 384 interviewed respondents, 157 were from plant harvest parishes, 119 from beekeeping zone parishes and 108 from Non-MUZ parishes.

Forest resource user interviews

Households with specialist forest resource users, e.g., herbalists, basket makers, and beekeepers were identified during the village interviews and selected for resource user interviews. A total of 104 resource users were interviewed from all the parishes. One parish was randomly selected for resource user interviews from each of the three categories of parishes (making a subsample of three parishes). These comprised 34 households from a Non-MUZ parish (Bujengwe), 40 households from a beekeeping zone parish (Kashasha), and 30 households from a MUZ parish (Buremba). The interviews were

in form of semi-structured questionnaires focusing on: products made, number of products made per year, whether products were used for domestic use only or sold, and the cost of the products in markets (verified later during market surveys).

Market surveys

All the five major local markets bordering Bwindi were surveyed to identify the most important forest resources sold there. Methods recommended by Martin (1995) and Cunningham (2001) were used. The following markets were surveyed: Kihihi town council and Butogota town council (Kanungu district), Kisoro town council (Kisoro district), and Muko and Karukara in Kabale district (Figure 1). The five markets were selected with the help of local guides and experience of the first author. These are the only major markets around Bwindi that the local people use and are consistently open on specific days of the week. A semi-structured questionnaire with open-ended questions was administered to NTFPs vendors in the markets. Information sought from the vendors included: products sold, raw materials used for the products, source of raw materials, number of products for sale, and costs following recommendations of Martin (1995) and Cunningham (2001). Opportunistic purchases of NTFPs were carried out to determine the price ranges following Martin (1995). The market surveys were repeated every 6 months for 2 years in three major markets of Muko, Kisoro, and Butogota to assess seasonality of the NTFPs sold. The months were during March and July of the year.

Data analysis

Important forest resources for local people

A list of the six NTFPs most preferred by households was generated in order of preference using ANTHROPAC computer software for Smith's Saliency test. The test is a calculation that accounts for frequency of mention and is weighted for position in the list (Smith 1993). The Smith's saliency test for the six most preferred NTFPs was calculated separately for the MUZs, Non-MUZs, and beekeeping parishes. The values were then converted into percentages of the most frequently mentioned forest resources.

Other data from village interviews and market surveys

Data from the village and resource user interviews as well as the market surveys were analyzed using Systat version 10.2 (SYSTAT Software, Inc. 2002). A Chi-square goodness of fit test was used to test for differences in annual incomes of resource users and differences in the number of products sold in the five major markets for the different study seasons. The Chi-square goodness-of-fit test is appropriate and was used to test whether differences existed between the observed and the expected frequencies. Mean annual household incomes from NTFPs were calculated using the prevailing market prices of the NTFPs (verified in markets and primary vendors) multiplied by the maximum number of products (after \pm SD) made per household per year. To estimate the percentage contribution of NTFPs to household income, we used the figure provided by the most recent housing and population census (Uganda Bureau of Statistics (UBOS) 2014). According to this census, the average annual income per household in south west Uganda is estimated at 862US\$, including incomes from agriculture, wage employment, in-kind cash, and other non-agricultural activities such as NTFPs trade.

Results

Source of income for local people

Most interviewed households around Bwindi depended on trade in both agricultural products (food and cash crops) and NTFPs (Table 1). No household depended on the sale of only NTFPs or agricultural products alone. Only few household heads were employed and these ranged from 5% to 35% for all the three categories of parishes. Household heads were either employed formally (in the park as rangers or research assistants) or informally as shop attendants, owned kiosks or worked as casual laborers in the park or in tea estates. The employed household heads mainly resided near town centers (<10 km from town centers). The highest number of household heads that depended on sale of both agricultural and NTFPs were those from parishes far away from town centers.

Important and preferred NTFPs by the local people

The most preferred NTFPs by local people were those prohibited by park management (Table 2). These, in descending order were: firewood, timber, *Milletia dura* (Dunn) tool handles (e.g., hoe handles and walking sticks), and bush meat. Permitted NTFPs preferred by local people included vines of *Smilax anceps* Willd (for weaving baskets and winnowing trays) and tree bark from *Rytigyniakigeziensis* tree, (used for medicinal purposes). The preference for prohibited NTFPs cuts across the three categories of parishes (beekeeping, plant harvest zones, and Non-MUZs).

Annual household income from NTFPs

Annual household incomes from the sale of NTFPs differed significantly between the three categories of parishes (Goodness of fit, $\chi^2 = 94,598$, $df 6$, $p < 0.05$). Households in

Table 1. Primary source of income for local people around Bwindi.

Surveyed Parish category	Parish	Location from a town center	Formally/informally employed		Sells both agricultural and forest produce		Total households surveyed
			#	%	#	%	
Non-MUZs	Bujengwe	Near	13	19	56	81	69
	Mushanje	Far	2	5	37	95	39
Beekeeping zone	Kashasha	Far	5	7	64	93	69
	Kitojo	Far	8	16	42	84	50
Plant harvest zone	Rutugunda	Far	7	15	39	85	46
	Buremba	Near	12	27	32	73	44
	Karangara	Near	7	16	37	84	44
	Southernward	Near	8	35	15	65	23
Total	384						

Notes: Near = parishes that were closer to town centers (<10 km), Far = parishes far away from town centers (≥ 10 km). Formally employed, locally employed by the Bwindi park management as Rangers or Field assistants; informally employed, employed by self such as owns a kiosk/shop or works as a porter at a tea estate).

Table 2. Important and preferred NTFPs for local people around Bwindi (n = 384 respondents).

Parish category	Resources permitted for extraction by park management	% Frequency of mention	Resources prohibited for extraction by park management	% Frequency of mention
Plant use zones (n = 157 households)	<i>Smilax anceps</i>	87	Firewood (various species)	92
	<i>Ocotea usambarensis</i>	67	Timber (various species)	85
	<i>Dracaena laxissima</i>	59	<i>Milletia dura</i> tool handles	84
	<i>Piper guineense</i>	56	Bush meat (various)	80
	<i>Monanthonaxis littoralis</i>	35	<i>Loeseneriella apocynoides</i>	66
	<i>Rytigynia kigeziensis</i>	26	Fish	56
Beekeeping zones (n = 119 households)	<i>Smilax anceps</i>	100	Firewood (various species)	95
	<i>Rytigynia kigeziensis</i>	91	Timber (various species)	80
	<i>Ocotea usambarensis</i>	64	Bush meat (various)	74
	Bamboo rhizomes	52	<i>Milletia dura</i> tool handles	64
	<i>Salacia elegans</i>	43	<i>Loeseneriella apocynoides</i>	53
	<i>Dracaena laxissima</i>	38	Fish	47
Non-multiple use zones (n = 108 households)	Bamboo rhizomes	100	Firewood (various species)	100
	<i>Smilax anceps</i>	75	Timber (various species)	92
	<i>Dracaena laxissima</i>	57	Bush meat	75
	<i>Prunus africana</i>	55	<i>Milletia dura</i> tool handles	68
	<i>Ocotea usambarensis</i>	45	<i>Loeseneriella apocynoides</i>	65
	<i>Rytigynia kigeziensis</i>	40	<i>Milletia dura</i> tool handles	58

Note: Bamboo rhizomes are extracted from Bwindi and planted in gardens for home garden bamboo forest planting

the beekeeping zones generally earned the highest from the sale of honey with a mean annual income of 119 US\$ per household (Table 3). This contributed to 14% of total household income. Honey was sold at home, in kiosks, or to nearby honey packaging factories but not in markets. Households from the plant harvest zones that sold baskets made from *Marantochloa manii* plants followed with a mean annual income of 16US\$ per household (1.8% of total household income). Households from the Non-MUZs earned the least with some earning as little as 1.2US\$ from the sale of baskets contributing to only 0.1% of total household income. The major income generating activities were, therefore, the sale of honey and baskets. Because of park restrictions on quantities of forest resources extracted, the number of NTFP products made by resource users annually was low and depended on permitted plant harvest quantities. Income from medicinal plants was not determined in monetary terms because payment was in form of gifts or presents. The local people in need of the medicine paid resource users for the efforts used in searching for the medicinal herbs using other forms of payment such as local brew, foodstuffs, or other household items.

NTFPs sold in local markets and origin of raw materials

The major NTFPs sold in the local markets around Bwindi were: the large and small baskets (used for storing grains and meals, respectively), tea harvest baskets, winnowing trays, and hoe handles (Table 4). Honey was not sold in local markets but was bought

Table 3. Annual household incomes generated from trade in NTFPs around Bwindi.

Parish/ number of resource users	Species used	Products made	Number of products made per HH per year (\pm SD)	Price of product (US \$)	Mean annual income per product (US \$)	Percentage of total HH income
Buremba (30 resource users)	<i>Smilax anceps</i> , <i>Dracaena laxissima</i> , <i>Monanthonthaxis littoralis</i>	Winnowing trays	11.8 \pm 7.6	1	12	1.4
		Big baskets	9.4 \pm 3.4	1.2	11	1.3
		Small baskets	8.7 \pm 2.3	1.8	16	1.8
	<i>Marantochloa purpurea</i>	Small baskets	4.8 \pm 2.5	1.8	9	1
		Small baskets	5.8 \pm 0.4	1.4	8	0.9
	<i>Raphia farinifera</i>	Handfuls of bark	2.2 \pm 0	Gift	NA	NA
	<i>Rytigynia kigeziensis</i>	Handfuls of bark	1.8 \pm 0	Gift	NA	NA
	<i>Piper guineense</i>	Handfuls of root	1.9 \pm 0	Gift	NA	NA
	Kashasha (40 beekeepers)	Beekeeping	Kilograms of honey	59.6 \pm 23	2	119
Bujengwe (34 resource users)	Banana fibers	Small baskets	6.3 \pm 4.9	0.6	4	0.5
		Small baskets	7.1 \pm 3.1	0.8	6	0.7
	<i>Triumfetta macrophylla</i>	Winnowing trays	2 \pm 0	0.6	1.2	0.1
	<i>Eleusine indica</i>	Small baskets	7.1 \pm 3.1	0.8	6	0.7

Notes: Average annual household income in southwestern Uganda is estimated at 62US \$ per HH (Uganda Bureau of Statistics (UBOS) 2014). HH, Household; NA, not applicable; Iusds, 2900ushs, the prices of forest products mentioned during interviews were validated with market surveys for accuracy. Mean annual incomes quoted were calculated from the estimated maximum NTFPs price (after \pm SD) and the number of products made per household per year.

from homes by vendors and sold to nearby honey packing factories. The highest number of NTFPs from the national park sold in the local markets were the small baskets (678 baskets- made out of a mixture of forest plants) followed by winnowing trays made from *Smilax anceps* Willd (427 trays). Others were *Arundinaria alpina* (K. Schum.) C. S. Chao & Renvoize, large baskets (392 baskets). The lowest number of NTFPs sold was for the tea harvest baskets made from *Loeseneriella apocynoides* (Welw. ex Oliv.) N. Hallé ex J. Raynal (Table 4). Tree species such as *Albizia grandibracteata* Taub. and *Markhamia lutea* (Benth.) K. Schum. were also used to make NTFPs found in the markets (Table 4); however, these species were extracted from village woodlots and not from Bwindi forest.

Table 4. Forest products sold in local markets around Bwindi and origin of raw materials used.

Name of market	Forest products sold	Species used	Reported origin of raw materials	Number of vendors	Total NTFPs sold in two seasons
Kihihi	Big baskets	<i>Smilax anceps</i> , <i>Draceana laxissima</i> , <i>Monanthonthaxis littoralis</i>	Bwindi forest	1	14
	Big baskets	Bamboo, <i>Triumfetta macrophylla</i>	Echuya forest	1	37
	Winnowing trays	<i>Smilax anceps</i> , <i>Draceana laxissima</i> , <i>Monanthonthaxis littoralis</i>	Bwindi forest	1	16
	Hoe handles	<i>Albizia grandibracteata</i> , <i>Markhamia lutea</i>	Village woodlots	1	23
Kisoro	Big baskets	Bamboo, <i>Triumfetta macrophylla</i>	Echuya forest	6	185
	Winnowing trays	<i>Smilax anceps</i> , <i>Draceana laxissima</i> , <i>Monanthonthaxis littoralis</i>	Village woodlots	10	427
Butogota	Small baskets	<i>Marantochloa manii</i> , <i>Plantago palmata</i> , <i>Marantochloa purpurea</i>	Bwindi forest	10	678
	Big baskets	<i>Smilax anceps</i>	Bwindi forest	2	20
	Tea harvest baskets	<i>Phoenix reclinata</i>	Village woodlots	1	68
	Tea harvest baskets	<i>Loeseneriella apocynoides</i>	Bwindi forest	1	2
	Trays	<i>Smilax anceps</i> , <i>Draceana laxissima</i> , <i>Monanthonthaxis littoralis</i>	Bwindi forest	3	21
	Chicken trap basket	<i>Phoenix reclinata</i>	Village woodlots	1	2
Karukara	Big baskets	Bamboo, <i>Triumfetta macrophylla</i>	Echuya forest	6	223
	Winnowing trays	Bamboo, <i>Triumfetta macrophylla</i>	Echuya forest	2	9
	Hoe handles	<i>Markhamia lutea</i>	Village woodlots	5	203
Muko	Winnowing trays	<i>Smilax anceps</i> , <i>Draceana laxissima</i> , <i>Monanthonthaxis littoralis</i>	Bwindi forest	3	52
	Big baskets	Bamboo stems, <i>Triumfetta macrophylla</i>	Echuya forest	10	392

Notes: Honey from beekeepers was not sold in markets but to nearby packaging factories (2 around Bwindi) and was also sold from household to household for direct consumption. The most commonly used forest plants were: *Smilax anceps*, *Dracaena laxissima* Engl., *Phoenix reclinata* Jacq., *Arundinaria alpina*, *Monanthonthaxis littoralis* (Bagsh. & Baker f.) Verdc., *Marantochloa manii*, *Marantochloa purpurea* and, *Raphina farinifera* (all got from Bwindi forest).

Types of NTFPs vendors in local markets

The number and type of NTFPs including product vendors varied with markets (Table 5). We observed two types of vendors: primary vendors (forest resource users who made and

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Table 5. Number and type of forest products and vendors in local markets around Bwindi.

Forest product	Market								
	Butotogota			Kisoro			Muko		
	#	1 ^o vendor	Middlemen	#	1 ^o vendor	Middlemen	#	1 ^o vendor	Middlemen
Big baskets	35	8	2	69	50	8	1122	13	7
Winnowing trays	99	6	2	936	45	5	32	10	4
Small baskets	106	10	2	0	0	0	0	0	0
Tea baskets	119	2	0	0	0	0	0	0	0
Hoe handles	9	1	0	0	0	0	0	0	0
Serving spoons	10	1	0	0	0	0	0	0	0
Total	378	28	6	1005	95	13	1154	23	11
% vendors	—	82%	18%	—	88%	12%	—	68%	32%

sold the products themselves) and middlemen (those who bought and re-sold the NTFPs). The primary vendors constituted the highest percentage of forest product vendors in all the local markets, with more than 68%. Each market had different NTFPs sold but winnowing trays and large baskets were the most common in all the markets. The local markets that were far away from town (e.g., Butogota) had a variety of NTFPs sold by the vendors but primary vendors and secondary vendors did not differ much with markets that were far away or close to Bwindi.

Seasonality of NTFPs sold in local markets

The numbers of NTFPs sold in the major markets around Bwindi were significantly different between survey seasons (Goodness of fit, $\chi^2 = 36$, *df*, 10, *p*-value < 0.05 for Butogota market; Goodness of fit, $\chi^2 = 934.6$, *df* 10, *p* value < 0.05 for Kisoro market; and Goodness of fit, $\chi^2 = 117.7$, *df* 10, *p*-value < 0.05 for Muko market). Over all the survey seasons, Butogota market (which is far away from major town centers) had the highest variety of NTFPs sold (Table 6). Furthermore, NTFPs sold in the local markets were more abundant in July than in March. July coincided with the crop harvest season in the surveyed parishes, when baskets were highly demanded by local people.

Discussion

Major source of income for households

The major income generating activities for households around Bwindi are the subsistence trade in both agriculture and NTFPs. These results are consistent with findings elsewhere that show that many people in the tropics depend to some degree on wild forest resources even though they are farmers (Muhwezi et al. 2009; Debela et al. 2012; Wunder et al. 2014). Debela et al. (2012) recorded similar results, showing that over 65% of rural households in Uganda depended on forest resources as well as agricultural produce for income. Only few households have chances of formal employment in park related jobs, which require formal education. Most households around Bwindi therefore have few opportunities for diversifying incomes since they are limited to trade in agriculture and NTFPs.

Forest foraging is the most available alternative source of income to most rural poor people in the tropics even when they do not entirely depend on forests for their livelihoods (Debela et al. 2012; Wunder et al. 2014). Although this study did not investigate this, perhaps forest foraging in Bwindi is one way the local communities are insuring themselves against agricultural harvest shocks resulting from droughts and famines as was observed elsewhere (Arnold & Ruiz-Perez 2001; Ghazoul & Sheil 2010; Debela et al. 2012).

Important and preferred NTFPs for the local people

Our results are similar to studies elsewhere such as in Nepal and Kalimantan (Indonesia, Borneo) which have also shown that the forest resources most preferred by local people are: firewood, building poles, and timber (Ghazoul & Sheil 2010; Shova & Hubacek 2011). Previous studies around Bwindi (e.g., Scott 1992; Cunningham 2001; Davey et al. 2001; Bitariho et al. 2004; Namara 2006; Twinamatsiko et al. 2014) also found that park management prohibited the NTFPs most preferred by local people and these were: firewood, building poles, timber, and bush meat. Although we used direct face-to-face interviews and despite the method's limitations, there were slight differences between our

Table 6. Seasonality and numbers of forest products sold in local markets around Bwindi.

Forest products	Markets/seasons											
	Butogota				Kisoro				Muko			
	March 2009	July 2009	March 2010	March 2009	July 2009	March 2010	March 2009	July 2009	March 2010	March 2009	July 2009	March 2010
Big baskets	20	185	0	185	75	17	392	394	174			
Winnowing trays	40	427	12	427	969	98	0	16	6			
Small baskets	8	44	0	44	33	27	0	0	0			
Tea baskets	68	77	39	0	0	0	0	0	0			
Hoe handles	15	20	0	0	0	0	0	0	0			
Serving spoons	0	10	0	0	0	0	0	0	0			
Total forest products	151	763	51	656	1,077	142	392	410	180			

Note: The survey seasons of March 2009 and March 2010 (after 1 year) and July 2009 (after 5 months) show an increase in the number of NTFPs sold in the markets per season.

study and that of Twinamatsiko et al. (2014) who used an indirect method and ranked bush-meat as the most preferred followed by firewood and building poles.

Bitariho (2013) notes that of the potential types of NTFPs in Bwindi, only 23% of the products desired by local people are permitted for extraction. This is different from other PAs in Uganda, such as Mt. Elgon and Rwenzori National Parks that permit over 69% of the NTFPs. This indicates that while the MUP idea was innovative two decades ago, park management in Bwindi remains conservative with regards to NTFPs harvest. Despite these restrictions, local people continue to illegally harvest the resources disregarding the risks of arrests, imprisonments, and fines (Namara 2006; Olupot et al. 2009; Shova & Hubacek 2011; Twinamatsiko et al. 2014). The unauthorized NTFPs may contribute a significant amount of income to households in Bwindi (Angelsen et al. 2014), which may be the reason local people risk their harvests. Although we did not investigate this, it is also likely that the unauthorized NTFPs harvests are other ways households are supplementing their incomes. Indeed Bitariho (2013) observed tool handles for hoes and axes made from forest products being sold in the local markets around Bwindi (the vendors though claimed they got them from village woodlots).

Previous studies (Davey et al. 2001; Bitariho et al. 2004; Christensen 2009) observed that local people around Bwindi find the MUP restrictive on NTFPs access. Twinamatsiko et al. (2014) noted that although local people value the MUP, restrictions imposed on the harvest quotas and harvest seasons are negatively affecting their attitudes. Bwindi's MUP plays a major role in influencing local people attitudes toward the park (Muhwezi et al. 2009; Blomley et al. 2010). Combined with human-wildlife conflicts and poor revenue sharing policies (Twinamatsiko et al. 2014), the restrictions on the MUP mean that resentment due to the programme may increase. The Bwindi park management is cognizant of this and is revising revenue sharing and the human-wildlife conflict policies. However, in our view the MUP policies too need to be revised.

Does Bwindi's MUP offer tangible benefits to the local people?

Recent studies (Vedeld et al. 2004; Angelsen et al. 2014; Wunder et al. 2014) estimated that income from NTFPs could contribute to over 22% of all household incomes in the tropics. Wunder et al. (2014) further stated that rural households in the tropics might as well derive as much income from NTFPs as from cultivating crops. Vedeld et al. (2004) estimated that an average household in Southern Africa and Asia earned about 678 US \$ per year from NTFPs while Angelsen et al. (2014) gave an estimate of about 480 US \$. These household incomes are above the United Nations Millennium Development Goal (MDG) minimum of 1.25 US \$ per day and can be assumed to offer tangible benefits to local people. In comparison, around Bwindi, because of the restrictions on NTFPs access and considering only legal income, a small number of households get a maximum of 119 US \$ per year from sale of honey while most households derive only about 16 US \$ to 1.2 US \$ per year from sale of baskets. The maximum income from NTFPs for households around Bwindi contributes about 14% of total household income while the least contributes to only 0.1%. These sums contribute little to poverty reduction. Our observations, however, do indicate that the resource users (herbalists and basket makers) are among the poorest in Bwindi so the contribution from NTFPs should not be dismissed as irrelevant.

Whereas there is potential for households to earn more from NTFPs, certain factors curtail them. Wunder et al. (2014) noted that these factors include but are not limited to inflexible supplies of NTFPs, physical hardships to accessing the NTFPs, and low returns

from NTFPs sale. Indeed this is the situation in Bwindi, extraction of NTFPs was restricted to twice a year, and the annual off-takes were fixed at very low quotas. For example, in Buremba parish with a population of about 10,000 people, the annual off-take quotas are fixed at only 231 stems of *Dracaena laxissima* and 2316 stems of *Smilax anceps* for making baskets (Multiple use MoUs 2011). The plants can be used to make about 190 baskets that cost 1 US\$ each. Indeed, other researchers working around Bwindi have noted that the plant off-take quotas are too low for the local people to realize sound benefits (Wild & Mutebi 1996; Bitariho et al. 2004; Bitariho 2013). Indeed the forest resource users have complained to the park authorities about this and have recently written an appeal letter to park authorities to increase NTFPs off-takes and harvest frequency.

Policies and laws that tend to restrict NTFPs use should be revised in order for local households to get realistic benefits from the MUP and for NTFPs to make meaningful contributions to the rural economy. This is especially important for the most disadvantaged households, which are most often within 0.5 km of the Bwindi park boundary (Twinamatsiko et al. 2014).

It is now over two decades since Bwindi's MUP was introduced as a means to reduce conflict and benefit local people. The social, political, and economic landscapes have changed since then. The population has increased and so has demand for the NTFPs. Park management needs to be dynamic and respond to the changes. NTFP harvests could be increased in scale and frequency without undermining sustainability. Bitariho et al. (2006), Muhwezi et al. (2009), and Bitariho (2013) have concluded, based on a range of field and market data, that NTFP harvests in Bwindi remain too low to cause any detectable impacts. Bitariho (2013) shows that the harvests will almost certainly remain sustainable even when increased to 10% from the present harvest quotas of 1%. Other opportunities for increasing local benefits from other park programmes such as tourism and revenue sharing also need to be examined to identify options for the poorest households (Christensen 2009; Blomley et al. 2010; Twinamatsiko et al. 2014). These programmes need to be synergized with other government programmes of poverty alleviation and 'prosperity for all' to achieve holistic poverty alleviation.

Limitations for commercialization of NTFPs in Bwindi

We noted that most of the products sold in local markets were those intended for subsistence use only. The market surveys revealed no commercialization threat of the NTFPs. We observed that forest product vendors were generally few in all local markets and that resource user vendors were more common than the middlemen vendors. This is an indication of the low level of commercialization of the NTFPs as noted by Martin (1995) and Cunningham (2001). The only forest products normally seen transported in large quantities are the large *Arundinaria alpina* baskets, mostly based on products obtained from outside the park (Bitariho & McNeilage 2007; Muhwezi et al. 2009). There would have been many more middlemen than forest resource user vendors in the trade if the NTFPs had a high potential for commercialization (Martin 1995; Cunningham 2001).

NTFPs sold in local markets around Bwindi are therefore at a subsistence level that provides for only the basic necessities required by the households.

Conclusion

Bwindi's MUP has potential to contribute more to rural household incomes. Honey from beekeeping is the most lucrative type of NTFPs followed by baskets made from wild

plants. Despite the low income from NTFPs, the primary resource users (herbalists, basket makers, and beekeepers) are the direct beneficiaries from the trade, but are among the poorest in Bwindi. Two decades after the MUP introduction, Bwindi's landscape has changed, yet the original guidelines and policies remained static. As such, aside from beekeeping, the current MUP offers remarkably few tangible benefits to the rural poor. This reflects both the constraints placed on accessing any NTFPS and their relatively low market values. Whatever views are taken, there is a clear need to revise and update the MUP guidelines and policies to provide greater benefits to the poorest people while also ensuring sustainability.

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