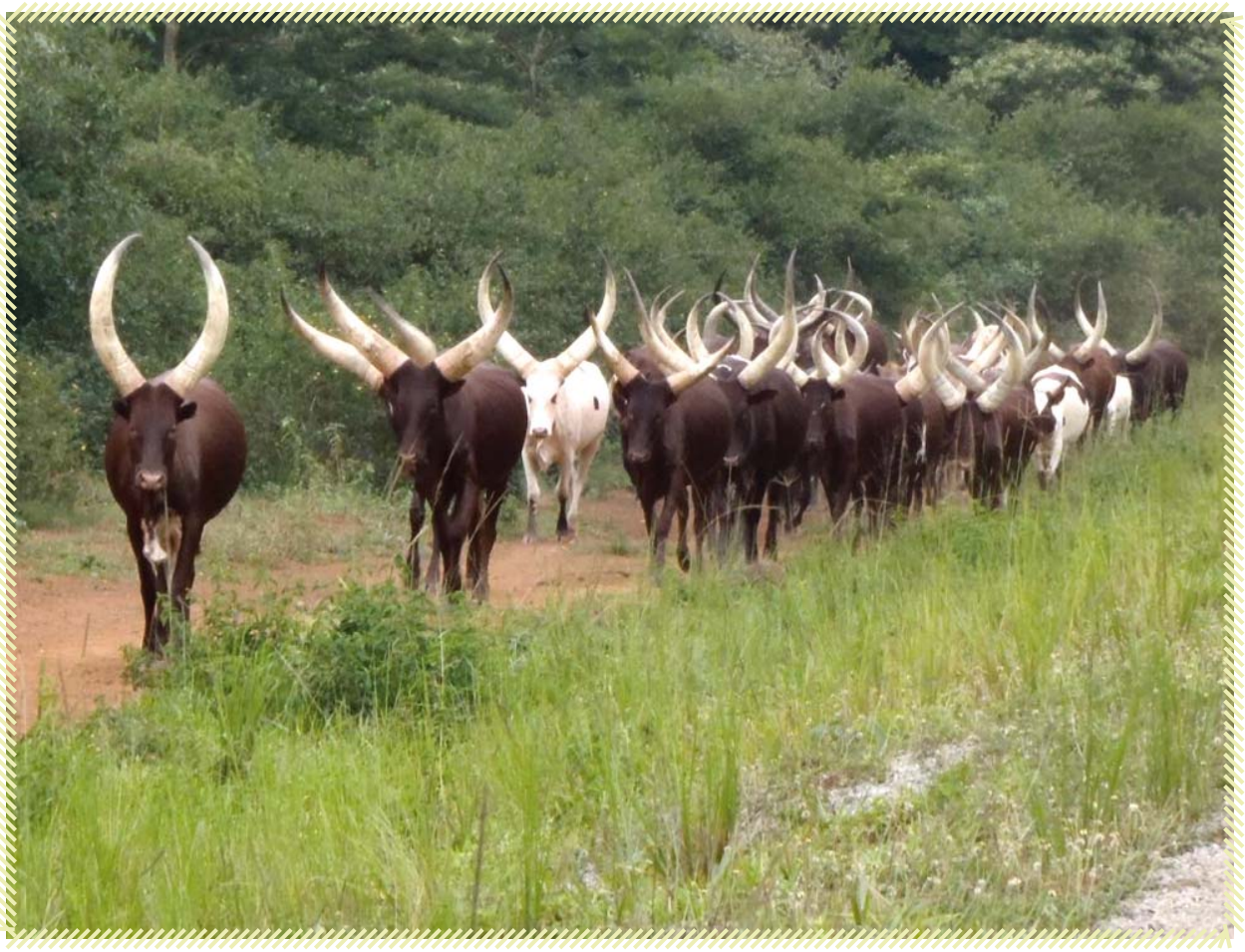
Forests, livelihoods and poverty alleviation: the case of Uganda



Forests, livelihoods and poverty alleviation: the case of Uganda

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with D. Mueller

Food and Agriculture Organization of the United Nations
Rome, 2013

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For quotation:

FAO.2013. ***Forests, Livelihoods and Poverty alleviation: the case of Uganda***, **by, G. Shepherd, C. Kazoora and D. Mueller. Forestry Policy and Institutions Working Paper No. 32. Rome.**

Cover photo:
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ACKNOWLEDGEMENTS

At FAO, grateful acknowledgement is made to Fred Kafeero, Mette Loyche-Wilkie, Eva Mueller, Ken MacDicken, Ewald Rametsteiner, Sophie Grouwels and Adam Gerrand.

The Sustainable Development Centre in Kampala would like to thank the following people for their contributions to the study: Zainab Birungi, Frank Kizza, Agnes Twebaze, Cornelia Asiimwe, Prisca Kisembo, Robert Esimu, Sarah Akello, Lilian Wanican, Mercy Alungat, Emmanuel Okalang, John Robert Elatum and Abok Openytho.

The authors would also like to acknowledge the essential analytical work and assistance of Cornelius Senf, who worked with Daniel Mueller at Humboldt University in Berlin.

EXECUTIVE SUMMARY

INTRODUCTION

The value of forests to the livelihoods of poor people has been under discussion for about 15 years. There is growing interest in the roles that forests play in supporting the poor, reducing their vulnerability to economic and environmental shocks, and reducing poverty itself.

However, these debates have gone on largely among forestry researchers, while policy-makers in key non-natural resource ministries – such as those of finance, planning or local government and others responsible for poverty reduction – are often unaware of forests' contribution towards poverty reduction. At the same time, forestry ministries are only beginning to face the challenge of demonstrating the ways in which forests contribute to poverty reduction.

In most countries, very few data are available to illustrate how forests contribute to the livelihoods of poor households. Poverty reports tend to underestimate the contribution of forests – and off-farm natural resources in general – to livelihoods, while forestry reporting is typically in terms of the physical resource and its status and extent. Such reporting sheds no light on the contributions made by forests to the lives of the poor.

It is therefore very significant that FAO is seeking to stimulate the collection of data about local people's reliance on forests in the context of their national forest monitoring systems , and many developing countries have asked FAO for assistance in these efforts. Including these aspects in the Global Forest Resources Assessment (FRA) will further encourage governments to start collecting them, which will result in more official recognition of forests' value at the national level and fuller assessment of that value internationally.

Data gathering on forests and poverty will in due course need to be built into or at least strongly linked to other government data collection processes such as living standards surveys, household budget surveys and censuses. One process would be to:

i. undertake a few country studies to investigate the ways in which forests support local livelihoods, and the overall importance of these forest contributions at the national level;

ii. work with national bureaux of statistics and the World Bank to develop forest-oriented modules for incorporation in data collection instruments;

iii. institutionalize this data collection in the long term, also facilitating the collection of data for FRA in the future.

This report is part of the first step in this process.

METHODOLOGY OVERVIEW

This report represents one approach to the problem of generating deeper insight into the relationship between forests and the livelihoods of rural people, while presenting a picture of the situation at the national level – in this case of Uganda. It does so by combining three types of data.

First, a desk analysis for the whole of Uganda was conducted[1], to set out the broad relationships between forests and poverty. Forest data from Moderate Resolution Imaging Spectroradiometer (MODIS) vegetation continuous fields (VCF) in 2000/2001 were overlaid with Government of Uganda poverty data (Uganda Welfare Map 2002). Using the data from the desk analysis, the team selected four districts that represented examples of the different types of poverty–forest relationship identified.

Second, a short intensive field data gathering exercise was conducted in each of the eight villages selected, using the Poverty-Forests Toolkit.

Third, the results from these earlier steps were combined with the Government of Uganda's latest district-level population data to generate an assessment of rural forest dependence countrywide. This dependence was then converted into cash values to calculate the value of forests to livelihoods.

The report finishes with some overall conclusions, suggests the implications for FAO, and shows how the work conducted in Uganda can be used in the development of affordable data collation methods for the FAO FRA process.

DESK ANALYSIS

Poverty

The latest available poverty data for Uganda are from the Uganda Welfare Map 2002, which makes small-area estimations (SAEs) at the sub-county level by combining census, survey and sector data. The SAEs combine the Uganda National Household Survey 2002/2003 (UBOS, 2006) and the 2002 Uganda Population and Housing Census (UBOS, 2007).

Tree cover

Tree cover data is used from the MODerate-resolution Imaging Spectro-radiometer (MODIS) Vegetation Continuous Fields. The VCF provides a significant improvement in terms of spatial resolution and temporal match compared with earlier tree cover data from 1992-1993. For the subsequent calculations the researcher used the FAO definition for closed and open forest from the FRA 2000 (FAO, 2001).

Selecting field sites

In Uganda, open forest is far more common than closed forest (as defined by FAO). When poverty and forest maps were overlaid, the best patterning was found with a threshold of 20 percent forest cover to distinguish between high and low forest cover. At this level, it was

[1] This work was commissioned from Daniel Müller of Humboldt University, Berlin.

possible to divide most of the country into one of four patterns: high forest–high poverty; high forest–low poverty; low forest–high poverty; and low forest–low poverty.

Much of the country falls into the high forest–low poverty and low forest–high poverty clusters; only a few areas were found in the high forest–high poverty category, and low poverty–low forest areas were predominantly around the capital, Kampala, and in the southern part of the country. Large areas in the north had faced great difficulties during the years of warfare and the Lord's Resistance Army, and the population had only recently started to leave the camps for internally displaced persons (IDPs) and return home.

It was decided to conduct fieldwork in one district with a high forest–high poverty pattern, one with a high forest–low poverty pattern, one with a low forest–high poverty pattern, and one in the north where the forest–poverty pattern needed to be explored. The researchers did not sample a low forest–low poverty periurban area because of the limited interest and resources available.

In each of the four districts, two villages were selected – one near to a market/urban centre (less than 4 km away) and one further from such a centre (at least 10 km away). Such spatial relationships are proving increasingly important in identifying variations in forest use and forest dependence.

The districts selected were Masindi – high forest–high poverty; Lamwo – high forest–high poverty in a former conflict area; Kibaale – high forest–low poverty; and Kumi – low forest–high poverty.

FIELDWORK RESULTS

In each of the eight villages, a team worked for four to five days applying the six tools in the Poverty-Forests Toolkit. Working with four focus groups in each village, this process generated data on:

- forests' contribution to the livelihoods and incomes of men and women, and of richer and poorer villagers;
- the drivers of deforestation and other changes over the past 20 to 30 years, as recalled by local people;
- current forest problems and potential solutions, as perceived by local people;
- differences in forest use and dependence between villages near roads and markets, and villages far from them.

The second and third types of data can also be used to improve understanding of governance challenges in the area.

Differences in the use of natural resources across the four districts

Results from the eight villages showed some distinctive patterns. Masindi sells more forest products and agricultural produce than Kibaale, but otherwise the Masindi and Kibaale data are remarkably similar. Both areas lie in the better forested west of Uganda, but Masindi is classed as an area of high forest and high poverty, while Kibaale is classed as high forest and low poverty. Income sources are as follows:

- Masindi household livelihood income: 23 percent forest; 60 percent agriculture; 14 percent livestock; and 3 percent off-farm employment.
- Kibaale household livelihood income: 22 percent forest; 59 percent agriculture; 14 percent livestock; and 5 percent off-farm employment.

In Kumi (low forest–high poverty), poverty levels are about the same as in Masindi, with about 50 to 60 percent of the population below the poverty line. However, although Kumi's forest cover is low-density scattered woodland, its forest dependence is by far the highest of the four districts, at 38 percent. This is partly because little off-farm employment is available, and partly because the area is undergoing reoccupation following the insurgency. Kumi is typical of large areas of eastern Uganda.

In Lamwo (Kitgum), people are returning home after spending years in IDP camps. Poverty levels are high, with about 80 percent of the population living below the Uganda poverty line, and population density is low. Forest has greatly regenerated in areas distant from the camps. Agricultural lands are fairly ample and farmers are currently investing far more in agriculture than in forestry. The picture derived from the two villages in Lamwo is typical of many areas in northern Uganda.

Land and forest use have reached a fairly stable balance in Masindi and Kibaale, but are in rapid transition in Kumi and Lamwo. The final picture of land use in Kumi and Lamwo is likely to resemble that of Masindi and Kibaale, as population densities increase and cattle are brought back into the mix of income sources.

Important types of forest product in the villages

Tables were compiled of the most important types of forest product gathered for sale and for home use and consumption.

In order of importance, the forest products gathered for generating cash are:

- fuelwood and charcoal, which are by far the most important, accounting for 36 percent of all cash sales, with fuelwood being about four times as important as charcoal;
- building materials, with 30 percent of sales, including poles, thatching materials, brick clay for firing (often in the forest) and fired bricks;
- a vast array of forest foods, which complement on-farm carbohydrates and include bushmeat, white ants and fish (protein) wild fruits and berries (vitamins A, C and E) forest leaves and vegetables (vitamins A, C, D and E and various amino acids), cooking oils such as shea butter, and treats and flavourings such as honey and mushrooms – together these account for 21 percent of sales;
- fibre and cordage for tying poles together in house construction, laying thatch, and making mats, baskets, rope and string;
- herbal medicines;
- timber.

The same range of products, in exactly the same order, is also of major importance for domestic use and consumption. To local people, the non-cash values of forest products are two to four times higher than their cash values.

Category of forest products	Mentions for cash uses		Mentions for non-cash uses		Total	Non-cash importance compared with cash importance
	(No.)	(%)	(No.)	(%)	(%)	
Fuel	324	10.1	951	29.5	39.6	3 times as important
Building materials	276	8.6	526	16.3	24.9	Twice as important
Forest Foods	192	6.0	409	12.7	18.7	Twice as important
Fibre (for ropes, baskets etc)	56	1.7	205	6.4	8.1	4 times as important
Herbal medicine	36	1.1	116	3.6	4.7	> 3 times as important
Timber	27	0.8	103	3.2	4	4 times as important
Total mentions	**911**		**2 310**		**3 221**	
Percentage split between cash and non-cash		28.3		71.7	100%	

Ability to collect and use or sell forest products, by remoteness and by gender

In each district a more remote and a less remote village was selected. (A village 4km or less from a market centre was defined as 'close' while a village 10 or more km from a market centre was defined as remote). We could thus compare more remote and less remote villages across all four districts for common characteristics.

Results show that location makes a difference to the extent to which forests are used, and by whom.

- Overall, use is slightly higher in a more accessible village closer to a market, mainly because more forest produce is sold. In remoter areas, a higher proportion of what is collected is consumed rather than sold.
- Of the 30% of forest products sold in market centres (as against 70% consumed) poorer villagers sell a higher percentage (24%) than wealthier villagers (8%), a difference more marked in accessible villages than in remote villages. They also rely more on forest for home consumption than do wealthier villagers, in both types of location.
- Men sell a higher percentage of forest products than women do, in both less remote and more remote villages.
- Contrary to popular myth, men collected a good deal of the products needed for home use as well as women in both villages near to markets and villages further away.

Region	Income as % of national average (%)	Calculated income (US$)
Rural Central	111	594
Rural Western	91	487
Rural Eastern	79	423
Rural Northern	46	246

Per capita income is calculated on the basis of cash from wages, trade, sales of agricultural, forest and livestock products, and direct consumption of farm products. It therefore excludes forest products that are consumed/used at home, although these are a very important component of livelihoods. This is a major cause of the great undervaluing of forest products worldwide. The corrected figures for the study districts are shown in the following table.

District	UBOS-calculated per capita income (US$)	Share of consumed forest products calculated from fieldwork (%)	Corrected per capita income (US$)
Kibaale, Western Region	487	19	580
Masindi, Western Region	487	17	570
Kumi, Eastern Region	423	25	503
Lamwo (Kitgum), Northern Region	246	16	293

Income by Region and by source

Data generated by Humboldt University's analysis were used in conjunction with data derived from the fieldwork to calculate the proportions of rural income derived from forest, agriculture, etc. in each of the areas studied. The results are summarized in the following table.

Rural populations' main income sources, by region						
Region	**Total rural population**	**Total income* (US$)**	**Agriculture cash and consumption (US$)**	**Livestock cash and consumption (US$)**	**Employment and petty trade (US$)**	**Forest products cash and consumption (US$)**
Central	4 374 713	3 099 011 911	1 825 722 267	420 204 910	146 683 359	706 401 376
Percentage		**100**	**59**	**13**	**5**	**23**
Northern	6 913 139	2 086 361 441	1 285 836 166	83 517 708	1 031 438	715 976 130
Percentage		**100**	**61.5**	**4**	**0.5**	**34**
Eastern	8 985 417	4 709 933 309	2 700 967 338	308 870 751	40 763 381	1 659 331 839
Percentage		**100**	**57**	**7**	**1**	**35**
Western	7 330 612	4 240 883 553	2 506 465 518	593 723 697	203 355 735	937 338 603
Percentage		**100**	**59**	**14**	**5**	**22**
Total	**27 603 881**	**14 136 190 614**	**8 318 991 289**	**1 406 317 066**	**391 833 913**	**4 019 047 948**

* Includes non-cash forest income calculated from fieldwork.

- The inhabitants of the two regions that have suffered from war and conflict – Northern and Eastern – rely very heavily on forests to help them rebuild their livelihoods. The incomes that people in the other two regions derive from other sources such as livestock and employment/trade are not yet readily available to the inhabitants of post-conflict regions. Forests make up about 35 percent of their incomes – at least 12 percent more than in the more settled and wealthier regions.
- All regions draw about 60 percent of their incomes from agriculture. However, even in the wealthier and more settled areas, income from forest products is more important than income from livestock and employment/trade combined.

Forest income at the national level

The total value of forests to rural people in Uganda (across the great majority of the country covered in this analysis) comes to more than US$4 billion per year, almost US$146 for each man, woman and child, or about US$730 a year for each household. Of this value, 72 percent is used domestically, and 29 percent is cash derived from sales. For an average household, the value of forest products breaks down into US$290 from fuel, US$180 from building materials, US$135 from forest foods, US$60 from fibre, US$35 from herbal medicines and US$30 from timber.

In money terms, the value of forests to Uganda's rural people – and to the nation itself – is best demonstrated by comparisons:

- ***Energy*:** Uganda's energy budget in 2011 was expected to rise to US$514 million. The energy from the forest used by rural people is worth almost US$1.6 billion – three times as much.
- ***Housing*:** Fifty-one percent of houses in Uganda are made of wood-fired bricks, 46 percent of mud and poles, and only 3 percent of "modern" building materials; 42 percent have thatched roofs (UBOS, 2010b). Most of these materials are taken from the forest, to a value of more than US$1 billion a year. Other vital domestic materials for making rope, string, mats, baskets, etc. come to US$325 million.
- ***Health and food security*:** Uganda spends US$10.4 per head per year on health, focusing this expenditure on HIV/AIDS, tuberculosis and malaria. The Ministry of Health suggests that to treat other diseases, such as respiratory tract infections, malnutrition, child and maternal mortality, it would need to spend an additional US$28 per head. Meanwhile every rural Ugandan collects at least US$27 worth of forest foods a year (forest foods are of particular value in supplying the protein, vitamins and minerals that are lacking in farm-based diets) and another US$7 worth of herbal medicines. The forest is vital for supplementing government health budgets and contributing to food security.
- ***Post-conflict reconstruction*:** The report calculates that forests in Northern and Eastern regions contribute an additional US$870 million dollars per annum over and above "normal" forest use, helping people to rebuild their household economies and settle back into post-war life.

CONCLUSIONS

The data collected in this report demonstrate how firmly forests underpin livelihoods, providing fuel, health, food and building materials. Forests are essential to the daily lives of everyone. They are not just for hard times, although they have played a key role in Uganda's post-conflict reconstruction. They support both men and women, both richer and poorer people, and both people living near to markets and those in remoter areas, who are somewhat more reliant on forests.

In many parts of Uganda the livelihood needs drawn from forests are far more important than forest timber values, and forests' contribution to national gross domestic product (GDP) is much greater than current assessments indicate. The commonly cited figure for forests' contribution to Uganda's GDP is 6.1 percent, but this figure does not factor in the major role of forest products consumed domestically, which are worth an additional US$2.9 billion. Forests' actual contribution to the Ugandan economy may be as high as 15 percent of GDP. The implications for FAO's FRA are profound, especially in poorer countries.

The aim of this report is to alert policy-makers at a stage when it is useful to make the case for forests' importance to livelihoods. However, it is not recommended that FRA use the methodology described in this report. Instead, the report proposes the development of a forestry module for use in household and living standards surveys and censuses. Capturing all the income derived from forests, including the non-cash income that accounts for such a large part of forest use by local people, will provide FRA with affordable livelihood data on which to draw over the next decade.

World Bank support and FAO collaboration will be needed for the design of such forest data gathering instruments and their preliminary testing in a handful of countries.

ACRONYMS

AVHRR	Advanced Very High Resolution Radiometer
CIFOR	Center for International Forestry Research
DFID	Department for International Development
EFI	European Forest Institute
FRA	Global Forest Resources Assessment (FAO)
GDP	gross domestic product
GIS	Geographic Information System
IDP	internally displaced person
ILRI	International Livestock Research Institute
IMF	International Monetary Fund
ITTO	International Tropical Timber Organization
IUCN	International Union for Conservation of Nature
LC	Local Council
LISA	Local Indicators of Spatial Association
LRA	Lord's Resistance Army
MODIS	Moderate Resolution Imaging Spectroradiometer
NAADS	National Agricultural Advisory Services
NASA	National Aeronautics and Space Administration
NFA	National Forestry Authority
NWFP	non-wood forest product
PEN	Poverty Environment Network (CIFOR)
PROFOR	Programme on Forests (UNDP and World Bank)
SAE	small-area estimation
UNDP	United Nations Development Programme
UNFF	United Nations Forum on Forests
VCF	vegetation continuous fields
WWF	World Wide Fund for Nature

1. INTRODUCTION

The value of forests to the livelihoods of poor people has been under discussion for more than 15 years, partly driven by earlier work on community forestry. There is growing interest in the role of forests in supporting the poor, increasing their resilience, reducing their vulnerability to economic and environmental shocks and widening their options, as well as in reducing poverty itself.

Over the last ten to 15 years, excellent research has been undertaken on the link between forests and poverty. Arnold has published widely on this subject (e.g., Byron and Arnold 1997; Arnold 2001; 2002), and Angelson and Wunder contributed an important paper in 2003. Major workshops and conferences on forests and poverty were held by FAO in 2001 in Cortevecchia, Italy; by the European Forest Institute (EFI) in 2002 in Tuusula, Finland; and by FAO, the International Tropical Timber Organization (ITTO) and others in 2006 in Ho Chi Minh City, Viet Nam. In 2004, the World Bank conducted a meta-analysis of 54 primary studies of rural livelihoods in and near forests, which suggested that forest income represents at least 20 percent of the total annual income of households in these areas, counting both cash and non-cash incomes (Vedeld et al., 2004). None of these earlier papers looked at the relationship between forests and poverty in spatial terms, but this aspect is now being examined more frequently (e.g., Sunderlin et al., 2008). Most recently, the Center for International Forestry Research (CIFOR) conducted a large study through its Poverty Environment Network (PEN) field research. Initial findings were presented in 2011.

However, these debates have gone on largely among forestry researchers, while policy-makers in key non-natural resource ministries – such as those of finance, planning and local government, and others responsible for poverty reduction – are often unaware of forests' contribution towards poverty reduction. At the same time, forestry ministries are only beginning to face the challenge of demonstrating the ways in which forests contribute to poverty reduction, and are not well-placed to collect such data.

In most countries, few data are available to illustrate how forests contribute to the livelihoods of poor households. Research into poverty tends to underestimate the contribution of forests – and off-farm natural resources in general – to livelihoods. Forestry reporting is typically limited to physical resources, their status and extent; reporting on forest income tends to be limited to income from timber; and reporting on the employment generated by forests does not usually go beyond numbers of government or company employees. Such reporting sheds little or no light on forests' contributions to the lives of the poor.

It is therefore extremely significant that FAO has considered to promote the collection of data on the value of forests, for inclusion in its five-yearly Global Forest Resources Assessment (FRA). FRA's demand for these data will encourage governments to collect them, resulting in more official recognition of forests' value at the national level and fuller assessment of that value internationally. The FRA process depends heavily on the good will and voluntary contributions of national focal points, who can collate data but not collect it. Data on forests and poverty will therefore need to be generated from other government data collection processes, such as living standards and household budget surveys and censuses.

FAO is undertaking an ambitious remote sensing survey to form the basis for a long-term global forest monitoring system. The survey will generate a new global tree cover map at 250 m resolution, and will gather and analyse the best existing global imagery (Landsat images at 30 m resolution) from 1975, 1990, 2000 and 2005 for improved estimates of forest area and forest area changes. Archival Landsat satellite images are being selected from more than 10 000 locations across the globe, each sample tile covering a square 10 by 10 km at the junction of each degree of latitude and longitude (approximately 100 km apart). The result will be online availability of remote sensing imagery and image processing software, which can be used for other studies and monitoring purposes and which will enhance countries' capacity for monitoring, assessing and reporting on forests and land-use changes.[2] It is essential that monitoring of the physical forest is harmonized spatially with data on poverty and livelihood dependence to generate a picture of how these two aspects relate. Any method selected for the analysis of forests and poverty must take this requirement into account.

[2] www.fao.org/forestry/fra2010-remotesensing.

2. METHODOLOGY

This report outlines one approach to the challenge of generating deeper insights into the relationship between forests and the livelihoods of rural people, while presenting a national-level picture – in this case of Uganda. It combines three types of data.

First, a desk analysis of the whole of Uganda was conducted[3] to identify broad forest–poverty relationships. Forest data from Moderate Resolution Imaging Spectroradiometer (MODIS) vegetation continuous fields (VCF) from 2000/2001 was overlaid with Government of Uganda poverty data (Uganda Welfare Map 2002). The methodology for this is described in chapter 3.

Using data from the desk analysis, the team selected four districts that represent examples of the different relationships between poverty and forest identified in the desk analysis. In each of these districts, two villages were selected –one close to a market/urban centre[4] (within 4 km) and one further from such a centre (at least 10 km away). Such differences in remoteness from urban centres are proving increasingly important in identifying variations in forest dependence.

In the second step, a short, intensive field data gathering exercise was conducted in each of the eight villages selected, using the Poverty-Forests Toolkit[5]. This instrument makes it possible to identify differences in the types and levels of forest dependence of wealthier and poorer villagers and of men and women; generate insights on trends in forest cover and the reasons for change; and investigate the forest and natural resource problems perceived by local people. The second and third of these types of data can also be used to improve understanding of governance challenges in the area. Results from this stage of the process are outlined in chapters 4 and 5.

Third, the data presented in chapters 3, 4 and 5 were combined with the Government of Uganda's latest district-level population data to assess rural forest dependence countrywide. This dependence was then converted into cash values to calculate the overall value of forests to rural livelihoods. This analysis is presented in chapter 6.

Chapter 7 draws overall conclusions and shows how the work conducted in Uganda can be used as a stepping-stone towards new and affordable methods of collating data for the FAO FRA process, which enhance the ability to calculate forests' true value.

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[3] This section is based on work by Daniel Müller of Humboldt University, Berlin.

[4] In Uganda, such centres are designated as "urban centres", "peri-urban centres", "town councils" or "town boards" depending on the population size. Urban centres may have some permanent shops and a daily or weekly market.

[5] The toolkit was created for the United Kingdom Department for International Development (DFID)-Indonesia in 2003–2004 and tested by the World Bank/United Nations Development Programme (UNDP) Programme on Forests (PROFOR) in 2005–2006. It was developed further and used by the International Union for Conservation of Nature (IUCN) in its Livelihoods and Landscapes programme from 2007 to 2011.

3. DESK ANALYSIS: DATA AND METHODS

POVERTY

The latest available poverty data for Uganda are from the Uganda Welfare Map 2002, which uses small-area estimations (SAEs) combining census, survey and sectoral data. The Uganda Welfare Map generates poverty estimates at the sub-county level. Uganda poverty data were downloaded from the Geographic Information System (GIS) Web site of the International Livestock Research Institute (ILRI).

The SAEs combine data from the Uganda National Household Survey 2002/2003[6] (UBOS, 2006) and the Uganda Population and Housing Census 2002 (UBOS, 2007). The estimates comprise observations on 938 out of 958 sub-counties in Uganda; 20 sub-counties are missing because data for Kotido district in northeastern Uganda appear to have been falsified.[7]

The Uganda Welfare Map produces poverty measures following Foster, Greer and Thorbecke (1984) whose classes of poverty define the *incidence of poverty* (the percentage of people below the poverty line) as p0, and the *depth of poverty* (the average distance of the poor below the poverty line) as p1. Estimates of *severity of poverty* (p2) are not available from the Uganda Welfare Map, although the data do include the Gini coefficient at the sub-county level.[8] The Uganda Welfare Map also contains data on total numbers of individuals in sub-counties and dummy variables for locations in urban areas.

TREE COVER

The tree cover data used come from MODIS VCF,[9] which contain proportional estimates of the vegetative cover types "tree cover", "herbaceous ground cover" and "bare ground cover" (Hansen *et al.*, 2003). The product is derived at 500-m spatial resolution from all seven bands of the MODIS sensor on the National Aeronautics and Space Administration's (NASA's) Terra satellite. In this study, the only tree cover product used is the annual percentage of tree cover for the period from November 2000 to November 2001.[10] The continuous classification scheme of the VCF product depicts areas of heterogeneous land cover better than traditional discrete classification schemes. While traditional classification schemes indicate where certain land cover types are concentrated, the VCF product is more apt at showing how much of a specific land cover, such as forest or grassland, exists anywhere on a land surface (Hansen *et al.*, 2003; 2002). The VCF provides significantly better spatial resolution and temporal match than do the tree cover data for 1992–1993 derived from the Advanced Very High Resolution Radiometer (AVHRR) images used by Sunderlin *et al.* (2008). The percentage of the area of each sub-county with tree cover above a specified percentage threshold has been calculated. Thresholds vary from

[6] This was the eighth in a series of household surveys that started in 1988.
[7] www.ubos.org.
[8] The Gini coefficient measures the gap between the richest and the poorest quintile in a population. Changes in the Gini coefficient show increasing or decreasing inequality.
[9] http://glcf.umiacs.umd.edu/data/vcf/
[10] This provides a neat temporal match with the welfare data for 2002.

10 to 90 percent in steps of 10 percent. Before tree cover percentages in each sub-county were calculated, water pixels and missing data were excluded, to avoid area bias.

For subsequent calculations the researcher used FAO's definitions of closed and open forest from FRA 2000 (FAO, 2001). Closed forests are forest formations with tree cover of more than 40 percent; open forests are formations with discontinuous tree cover of between 10 and 40 percent. Decisions regarding what constitutes forest and the cut-off between open and closed forest are widely debated in the literature (e.g., Sasaki and Putz, 2009). For current research purposes, and using the open and closed forest categories from FAO (2001), VCF data were used for thresholds of 10, 20, 30 and 40 percent tree cover.

ANALYSIS METHOD

Local Indicators of Spatial Association (LISA) were used to identify the spatial relationship between variations in closed and open forest cover and poverty rates (Anselin, 1995). The approach followed was largely that of Müller, Epprecht and Sunderlin (2006), used by Sunderlin *et al.* (2008). Calculating LISA necessitates the *a priori* definition of a spatial neighbourhood structure. This report presents results only for first-order contiguity matrices, considering only immediate neighbours that share a boundary with the observation of interest.[11] The multivariate LISA (Anselin, 1995) indicates how one variable (e.g., poverty) is spatially related to neighbouring observations. The method results in maps that depict the spatial correlations of one variable with its own values in neighbouring locations (such as the univariate LISA of poverty with poverty) or the spatial correlations of one variable with surrounding values of another variable (such as the bivariate LISA of poverty with forest cover).

RESULTS

Poverty

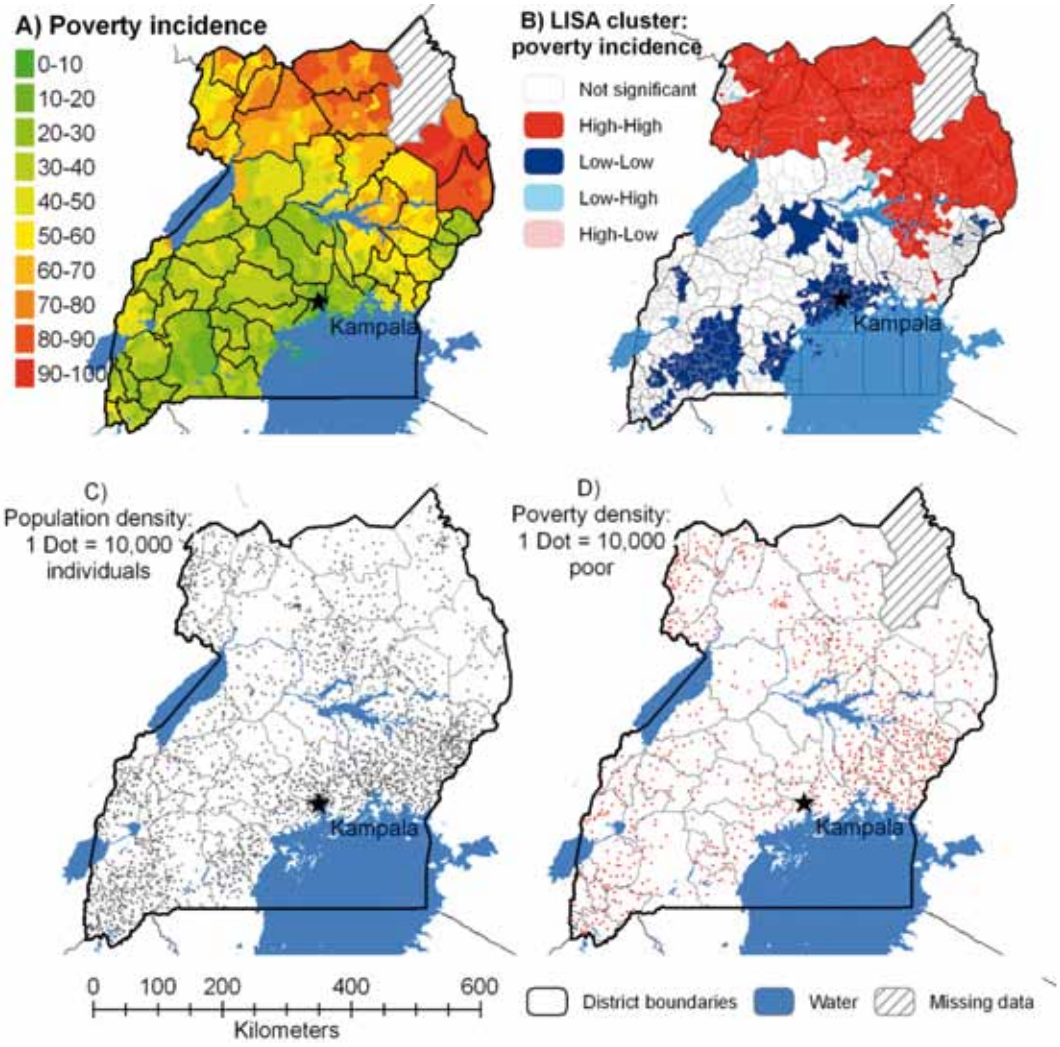
Poverty incidence and depth of poverty are strong and positively correlated ($p = 0.97$). Thus, a high poverty rate tends to go hand in hand with a high depth of poverty, and results that apply for the poverty rate also apply for the depth of poverty.

In Map 1, poverty is strongly and positively autocorrelated in space (global Moran's $I = 0.79$). In Map 1A, areas with high poverty *incidence* cluster together, as do areas with low poverty incidence. The *local spatial associations* are visualized in Map 1B, which shows that clusters with high poverty incidences are found across most of northern Uganda and in eastern Uganda. Low incidences of poverty concentrate in southern Uganda and central Uganda around Kampala and in the vicinity of Lake Victoria.

[11] The spatial weight matrix defines the neighbouring observations considered in calculation of the global Moran's I and in the production of the maps of the univariate and bivariate LISA indicators. Univariate global Moran's I measures the linear association of a variable with itself in space, and was used to test the strength of global spatial autocorrelations of poverty and forest at the country level. Moran's I ranges between -1 and +1. A positive Moran's I indicates spatial clustering of either high or low values, whereas a Moran's I near zero implies no spatial autocorrelation, or spatial randomness (Anselin, 1988). Local Moran's I measures LISA.

According to the Uganda Welfare Map, there were 24.4 million individuals in Uganda in 2002. Of these, 9 million lived below the poverty line, amounting to a countrywide poverty rate of 37 percent. *Population density* (Map 1C) is relatively evenly spread across the country, with clusters in southern Uganda and along Lake Victoria. Poverty density is highest in eastern Uganda along the border with Kenya (Map 1D). *Population density* and poverty density show a positive correlation with a correlation coefficient of 0.75.

MAP 1: **Poverty incidence and density in Uganda**



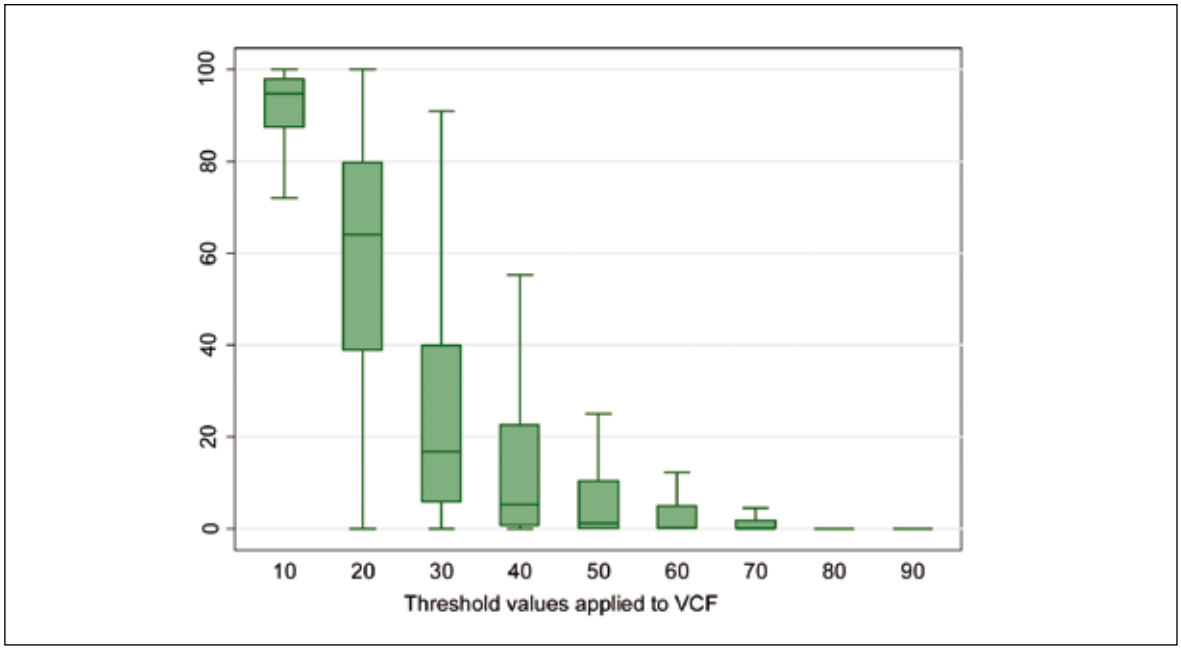
A – poverty incidence; B – LISA cluster map of poverty incidence; C – population density; D – poverty density.

Source: Humboldt University visualization; all data from Uganda Welfare Map 2002.

Tree cover

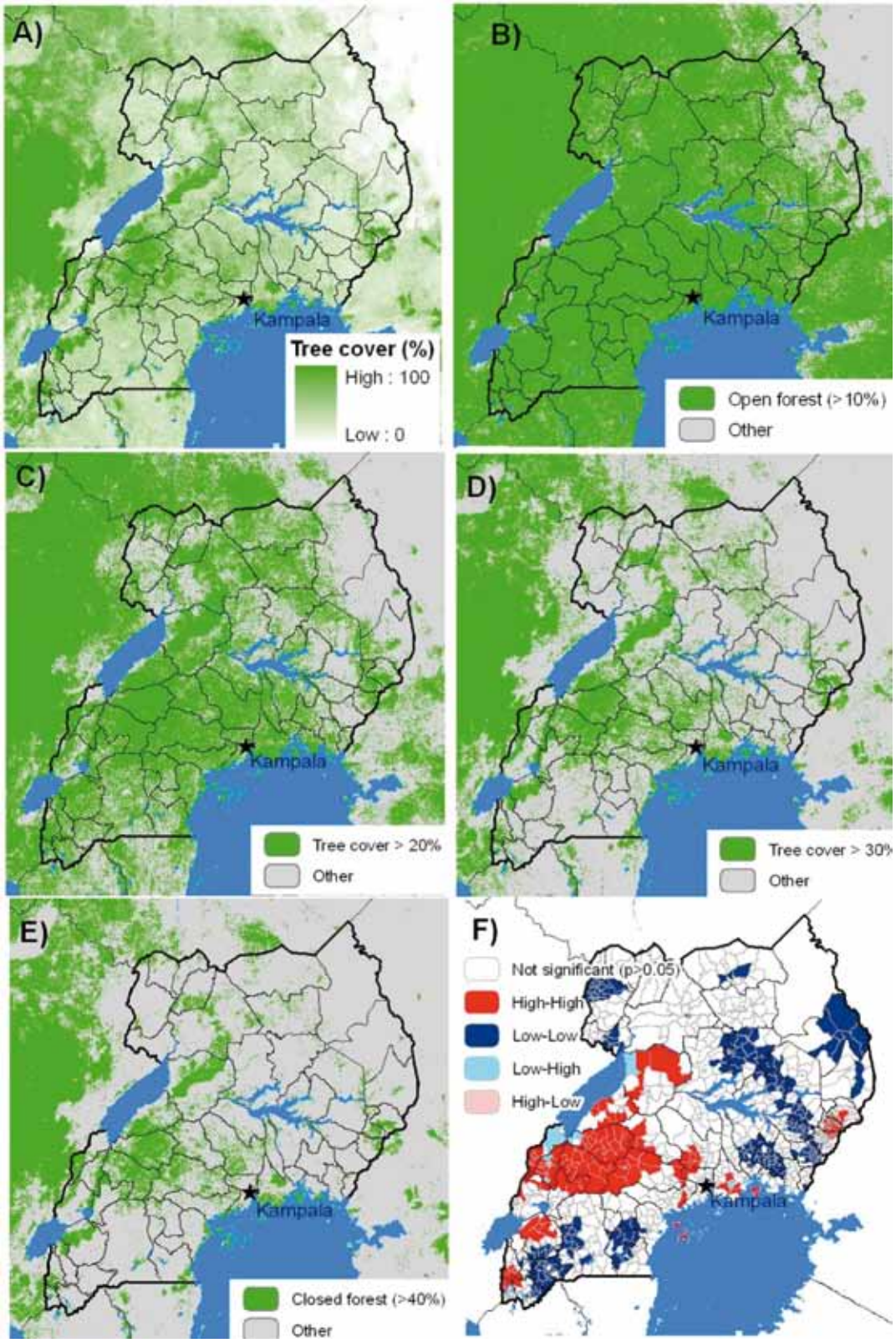
VCF analysis gives a closed forest canopy cover for Uganda of 18 percent of total land area in 2001 (Map 2C) and an open forest cover of 88 percent (Map 2B). Figure 1 visualizes this sharp decline at varying thresholds. The change is particularly high in the range between 10 and 30 percent tree cover. Few sub-counties are more than 80 percent closed forest.

FIGURE 1: **Tree cover percentages along varying threshold values**



In Map 2, open forest cover is found across most of the country, with small exceptions in the northeast (2A, 2C and 2D). Closed forest cover shows spatial autocorrelation with a Moran's I of 0.71. Most closed forests are concentrated in central and western Uganda, particularly along the southern shores of Lake Albert and, to a lesser extent, close to Lake Edward (2E). 2F visualizes the spatial clusters in areas where a sub-county with high closed forest cover is likely to be surrounded by sub-counties with similarly high closed forest cover (dark red). Low closed canopy forests are spatially concentrated in eastern and northern Uganda (dark blue in 2F).

MAP 2: **Tree cover in Uganda at various density levels**



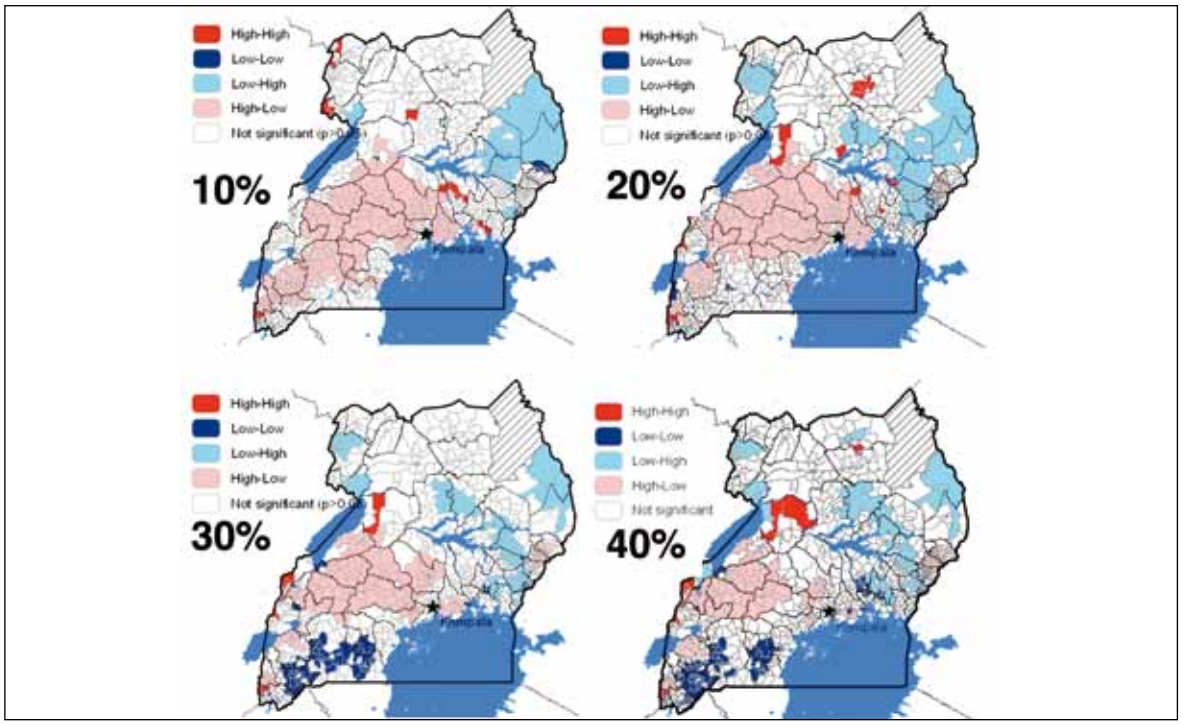
A – tree cover; B – open forest (> 10 percent tree cover); C – open forest (> 20 percent tree cover); D – open forest (> 30 percent tree cover); E closed forest (> 40 percent tree cover); F – LISA cluster map of closed forest

Source: Humboldt University visualization; all data from VCF http://glcf.umiacs.umd.edu/data/vcf/.

Spatial association of closed forest cover and poverty

Müller calculated the LISA between various levels of forest cover and the poverty rate. Map 3 visualizes the spatial clusters and shows that positive clusters (high–high and low–low) are quite rare. Sub-counties with high closed forest cover are surrounded by sub-counties with high poverty rates only inland of the northern shore of Lake Albert and along the southern border with the Democratic Republic of the Congo. Sub-counties where low forest and low poverty are spatially associated are found in the southern part of the country. Although quite large areas fall into the high forest–low poverty and low forest–high poverty clusters, Uganda has more spatial outliers (shown in white) than most other countries investigated by Sunderlin et al. (2008).

MAP 3: **Comparison of LISA maps of tree cover (10, 20, 30 and 40 percent) and poverty rate**



Selection of locations for fieldwork

Based on the information shown in Figure 1 and Maps 2 and 3, the authors selected a level of 20 percent cover as the threshold between open and closed forest. This was because open forest is far more common than closed forest in Uganda, and it was felt that a cut-off of 40 percent cover (Map 2E) resulted in too large an area in the open forest category. On the other hand, choosing a forest cover level of only 10 percent (Map 2B) resulted in virtually all the country being categorized as forested. The choice was therefore between a 20 and a 30 percent level.

The authors were guided in their final choice by Map 3, in which the forest threshold levels were set against the available poverty data. The largest number of districts where significant correlations between forest cover and poverty could be observed occurred at the 20 percent level, so this was the level chosen.

Five kinds of relationship between forests and poverty emerge from the Humboldt University maps: i) high forest cover and high poverty levels (red); ii) low forest cover and low poverty levels (dark blue); iii) low forest cover and high poverty levels (turquoise); iv) high forest cover and low poverty

levels (pink); and v) an assorted category where clear LISA patterns do not occur (white). Maps 1A, 1B and 2C gave some sense of the forest–poverty relationships in the districts in these areas.

With the resources available, the team was able to undertake field surveys in only eight villages – two per district. It was essential to have samples from:

- high forest cover–high poverty level areas;
- low forest cover–high poverty level areas;
- high forest cover–low poverty level areas.

The fourth pair of villages was not from a low forest–low poverty district (as this pattern is found mainly in urban and periurban areas) but from one of the northern areas where poverty incidence is high.

For each district, the authors commissioned a custom-made map from the National Forestry Authority, at 1: 100 000 scale showing district boundaries, towns, villages, roads and forested areas. These maps made it possible to select two villages that were not far from one another and that used the same or similar forest resources. In each district, one of the selected villages was not far from an urban centre, or was itself a small trading centre, and the other was somewhat further away from such urban opportunities.

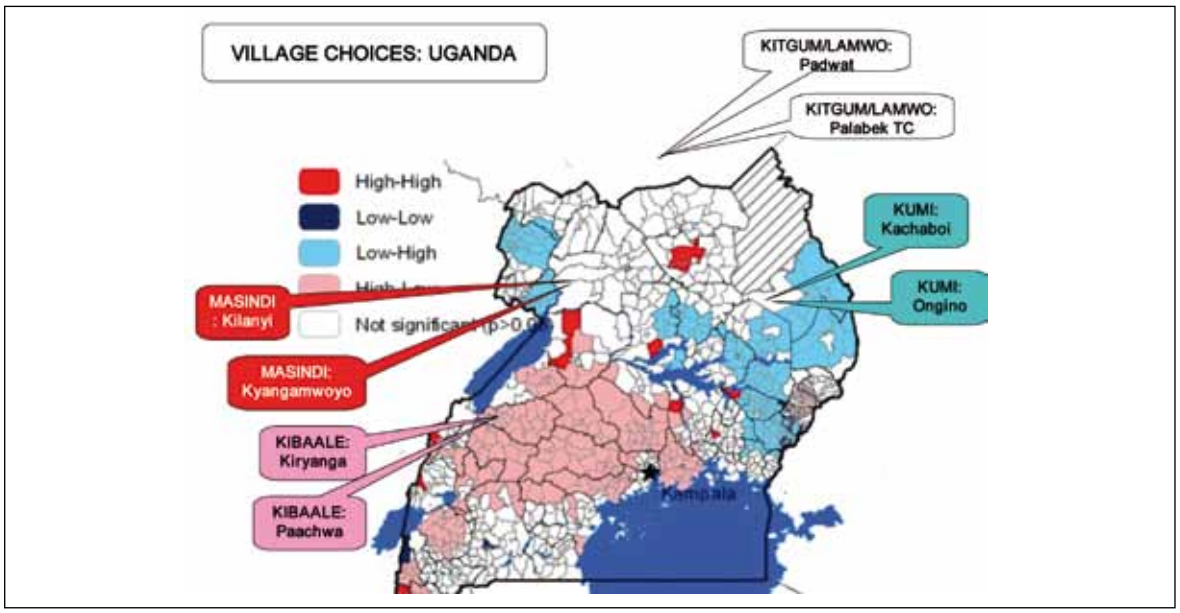
The final choices are shown in Table 1 and Map 4.

TABLE 1: **Selected districts and villages**

District	Village close to an urban centre/main road	Village distant from an urban centre/main road
Masindi (high forest–high poverty)	Kyangamwoyo	Kilanyi
Kibaale (high forest–low poverty)	Paachwa	Kiryanga
Kumi (low forest–high poverty)	Ongino Trading Centre	Kachaboi
Lamwo*	Palabek Ogil Trading Centre	Padwat

* Formerly part of Kitgum District.

MAP 4: **Selected districts and villages**



Fieldwork was conducted in October and November 2010, before campaigning for general elections began. Preliminary analysis of field data took place in December 2010 and January 2011, ready for presentation at the United Nations Forum on Forests (UNFF) ninth session in New York in January and February 2011.

4. COLLECTION OF FIELD DATA ON CONTEXTS, POVERTY AND FOREST USES IN THE DISTRICTS

TOOLS USED

In each of the eight villages selected, a team worked for about three days to apply the six tools of the Poverty-Forests Toolkit:

- *Tool 1 – wealth ranking* – uses local but comparable criteria for distinguishing wealth and poverty. It is used to select a sample of 40 individuals of both genders and from across wealth levels to participate in four focus groups for subsequent tools.
- *Tool 2 – forest and agricultural landscape use* – involves visits to the main forest and agriculture areas used by the community and questions about the distance from other use areas. For agriculture areas, the tool includes questions about land use and ownership, the fallow cycle, and the crops grown. For forest areas, questions concern ownership, use rights, hunting and gathering, timber, and the impact of investors from outside the area, such as logging companies where these are present. Villagers are also asked how long it takes them to get to areas where they can gather forest products or hunt.
- *Tool 3 – timeline and trends* – identifies time blocks over the last 30 years or so that everyone recognizes. These time blocks may simply be decades, or they may be remembered because of presidential periods in office, revolutions, disease outbreaks, etc. A series of topics are then considered, and villagers recall how each topic evolved over the time periods identified. In the eight study villages the topics chosen were:
  - *forestry*: ownership; abundance; access for men; access for women; forestry extension services; market, trade and prices for forest products; main challenges in obtaining access to forest products;
  - *agriculture/crops*: landownership; area of land for crops; types of crops grown; productivity; crop extension services; markets, trade and prices for crops; main challenges in crop production;
  - *agriculture/livestock*: ownership by men and women; types of animals; fodder and pasture; livestock extension services; markets, trade and prices for livestock products; main challenges in livestock production;
  - *agriculture/fisheries*: abundance and types of fish; fisheries extension services; markets, trade and prices for fish; main challenges facing fisheries;
  - *transport and roads*: types of vehicles; quality of roads; costs of transport;
  - *social services*: education; health.
- *Tool 4 – sources of cash and non-cash income* (from forests, agriculture, livestock, fish, other) – captures households' dependence on forests as a proportion of their dependence on all other sources of income. The tool captures the relative weighting that household members give to cash and non-cash income flows over the year. The data are generated from four focus groups, distinguishing between genders and wealth categories.
- *Tool 5 – the relative importance of different forest products* – focuses on the main product categories that people rely on the forest to provide. These data too are generated from four focus groups, so gender and wealth differences are clearly distinguished.

❖ *Tool 6 – main forest, agriculture and other problems experienced in the village, and possible solutions* – these data too are generated from four focus groups, so gender and wealth differences are clearly distinguished.

WEALTH RANKING

Wealth ranking was conducted using the same categories of criteria for differentiating among wealth levels in all villages, but setting the details of what constituted each wealth level through consultation with village leaders. Table 2 shows an example of wealth ranking.

TABLE 2: **Example of wealth ranking (Kachaboi village, Kumi District)**

Variable	Very poor households	Poor households	Average households	Wealthy households
Landownership and area	< 1 acre*	1–3 acres	3–4 acres	5 acres
Livestock ownership	No livestock	No cattle; 1–2 goats; 1–2 chickens; 1–2 pigs	≤ 5 cows; 3–10 goats; 3–20 chickens; 2–5 pigs	> 5 cows; > 10 goats; > 20 chickens; 5 pigs
Ownership of physical assetsp	No bicycles; no radio, no telephones; no mattresses and beds; no chairs; poor utensils	Small radio; poor-quality bicycles; cotton mattresses	Bicycles; mobile phones; radio, mattresses and beds; wooden chairs; metal and melamine utensils	Motorcycle and other vehicles; TVs; sofa sets and chairs; home music systems; cameras; glass and high-quality utensils; high-quality bedding
Other sources of income and livelihood	Casual labour; begging; collecting mushrooms and white ants; hook fishing	Subsistence farming; brewing local beer; selling fuelwood; making ropes, mats, pottery, bricks and charcoal	Petty trade; waged employment; do commercial farming; rental fees; small-scale property rentals	Large-scale trade; large-scale commercial farming; well-remunerated employment; rental fees; large-scale property rentals from high-quality premises
Quality of housing	Poor-quality grass-thatched huts; poor ventilation; temporary housing; untidy; may leak; poor doors and windows/shutters; multipurpose huts	Small grass-thatched huts (1–2) of mud and wattle; poor ventilation; uneven floors smeared with cow dung	Brick-walled houses; cemented floors; moderate size; well-ventilated; good wooden shutters	Plastered brick walls, painted; iron roof tops; metal and glass doors; cemented floors; kitchens; and high-quality latrines
Level of education	Usually to primary three	Usually to primary seven	Usually to senior four	Usually to diploma and university level

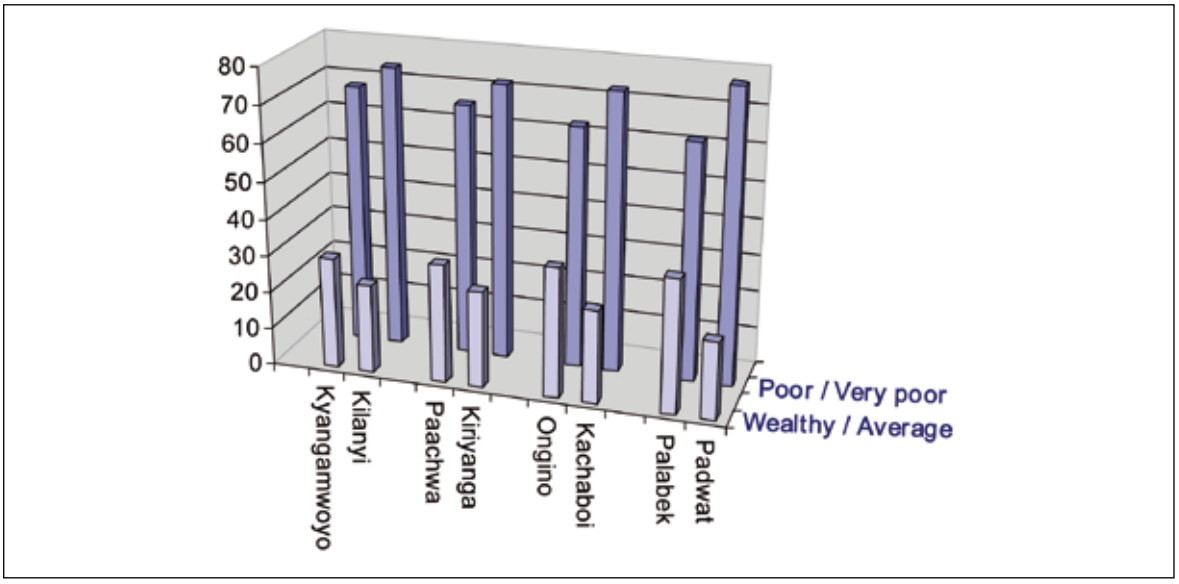
* 1 acre = 0.405 ha.

TABLE 3: **Households ranked by local wealth and poverty criteria in the eight villages**

Village	Wealthy		Average		Poor		Very poor		Total households	
	(No.)	(%)	(No.)	(%)	(No.)	(%)	(No.)	(%)	(No.)	(%)
Masindi										
Kyangamwoyo	7	11	13	19	24	36	23	34	67	100
Kilanyi	8	9	13	15	32	36	35	40	88	100
Kibaale										
Paachwa	13	17	12	15	22	28	31	40	78	100
Kiryanga	10	11	14	15	35	38	33	36	92	100
Kumi										
Ongino TC	10	14	15	21	28	39	19	26	72	100
Kachaboi	6	9	11	16	21	30	31	45	69	100
Lamwo (Kitgum)										
Palabek Ogil TC	8	13	14	23	20	32	20	32	62	100
Padwat Village	4	5	13	16	34	42	30	37	81	100

The names of all the village household heads in each village were put on to separate cards, ranked according to wealth – using the criteria set in consultation with local leaders – and sorted into wealth/poverty categories. Participants for the four focus groups were then drawn randomly from within each category. The resulting balance of wealth levels across all eight villages is shown in Table 3. The main interest in Table 3 is in the contrasts between the two villages in each district, which are shown more simply in Figure 2. In each case, as might be expected, poverty levels are higher and wealth levels lower in the remoter villages.

FIGURE 2: **Relative wealth and poverty levels, by local criteria, in the eight villages (percentages)**



The following four sections set out key data for each of the sampled districts, on landscape and population, governance, changes over time – including drivers of deforestation – and the characteristics of livelihood dependence on forest.

MASINDI DISTRICT

Of the two villages selected in Masindi (a high forest–high poverty area), Kyangamwoyo is very close to Budongo National Park and Kilanyi is 4 to 5 km from the park. The Budongo Forest Reserve is managed by the National Forestry Authority (NFA) on behalf of the central Government. This section describes the results of applying tools 2, 3 and 6 in Masindi.

TABLE 4: **Masindi District – basic data**

Area	9 326 km²	
Population (2011 estimate, UBOS)	635 200	
Population density	68.11/km²	
Urban–rural split	7.7% urban; 92.3% rural	
Human development index	0.524	
Rural population below the poverty line: 1999 2011	66.2%	
50–60%		
Gini coefficient	0.37	
Rainfall	1 061 mm/year long-term average	
Located in a comparatively dry part of Uganda; sufficiently fertile to support a mainly agricultural population		
Vegetation: Moist medium-altitude forest on hills; dry and humid savannah with elephant grass and permanent swamps in the valleys.		

Sources: www.foodnet.cgiar.org/scrip/docs&databases/; Masindi Government Web site http://www.masindi.go.ug; UBOS and ILRI, 2003/2004; UBOS, 2010a; UNDP, 2007.

Administrative structure and governance

In both village areas, management of forest, which was originally owned by the Bunyoro Kingdom, was passed to the central Government when the kingdoms were abolished in 1964. Over time, forest administration has split, and today there are central government forest reserves, local government forest reserves and areas under the Uganda Wildlife Authority, all ultimately under NFA. As in many other parts of Uganda, there are also private forests in Masindi, which are supervised by district forest authorities.

In Budongo, restrictions and arrests became more common in the 1980s, and in the 1990s, park staff in both the reserves and private forest applied laws strictly. The collection of forest products is restricted in reserves and the park, and the products' availability has diminished on private land.

In remoter Kilanyi, forest use started to be heavily restricted in the 1980s. Game guards were issued with guns, and more active patrolling and management reduced access for many people. However, resources continued to be depleted throughout the 1990s, and in the last decade large areas of forest have been privatized in an attempt to retain access to some resources.

Drivers of deforestation and forest degradation

In the 1960s and 1970s, forest was full of large trees, and animals such as lions, leopards, elephants and buffaloes. Forest degradation began in earnest in the 1980s, with influxes of immigrants and the introduction of pit-sawing, charcoal production and more extensive mechanized farming and ranching. At this time, there was a lot of hunting, using guns left over from the war. The bushmeat trade was important in the 1970s and 1980s, but bushmeat had become scarce and expensive by the 1990s. Guns were withdrawn in the 1990s, and hunting has now been stopped completely. Animal numbers seem to have grown greatly as a result, as the most significant forest problem in both villages is crop destruction by monkeys, baboons and wild pigs.

Reforestation

There have been forest extension services in the area since the 1960s, promoting tree planting, including of eucalyptus and various fruit trees. Services are offered through NFA, the Uganda Wildlife Authority and the District Forestry Service. In Kyangamwoyo, close to the park, forestry extension has been very limited, and few seedlings have been planted. In more deforested Kilanyi, more extensive efforts to rehabilitate forest and replant trees have been made. In both villages, however, there is a high and unmet demand for better-quality and cheaper seedlings and more extension assistance for on-farm trees.

Other important changes

Livestock were originally kept mainly for family ceremonies, bride price, etc., until the 1970s, when many cattle were stolen and eaten by Idi Amin's soldiers during the bush war, and little effort was made to replace them. From the 1990s onwards, rapid commercialization led to growing numbers of animals and scarcities of pasture and water. Today all animals – including cats and dogs – may be sold for meat.

Roads have greatly improved over the last 20 years, although recent heavy usage is causing deterioration. Public transport costs have become very high.

Schooling: In both villages, almost 100 percent of children attend primary school.

Health: By the 2001–2010 decade, 100 percent of the population of Kyangamwoyo (near the market) had access to clean drinking-water, and 70 percent had decent pit latrines. In the remoter village of Kilanyi, only half of villagers had access to clean water, and only 45 percent had pit latrines. Health centres exist, but are still poorly supplied with drugs.

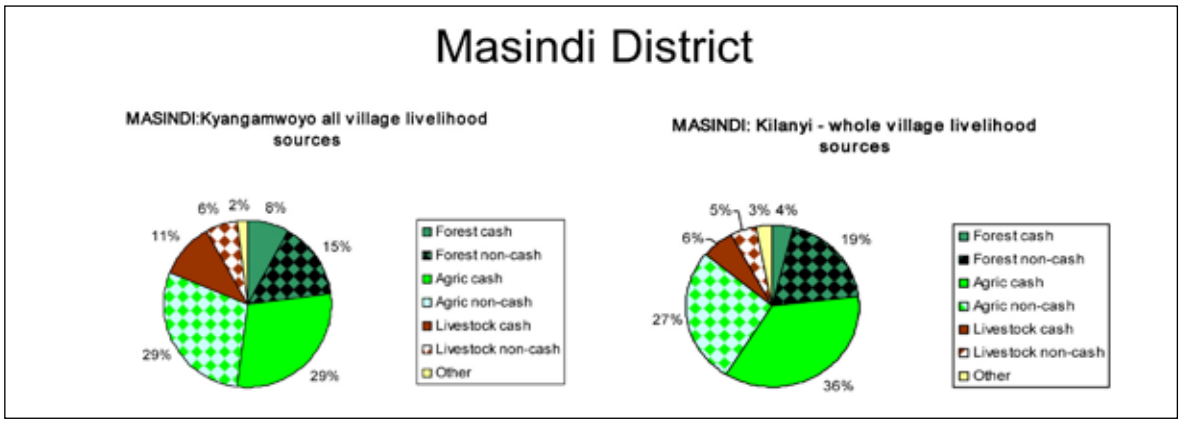
Land and farming: Both villages mentioned low and unstable market prices, difficult access to markets, and crop pests and diseases as their main problems. In Kyangamwoyo, villagers also complained of land shortage, lack of capital for agriculture (poor borrowing facilities) and high costs of agricultural inputs. In Kilanyi, farmers listed high costs of inputs, dwindling soil fertility and unpredictable climate variability, which depresses yields, as their main problems. This demonstrates that land shortages and land-use intensification have proceeded further in the village close to the market, as might be expected. Agricultural extension is not easing the transition.

Conclusions: The survey findings suggest that Budongo forest is heavily protected, and the effects of this protection on local people are not being addressed. Agricultural intensification – including the intensified raising of livestock for sale and consumption – is occurring without government assistance. Prices are high and the means of raising cash to purchase inputs, such as by selling more crops, are hampered by low food crop prices and poor market access. Farmers have no redress for crop damage caused by wild animals from the park. There is also considerable unsatisfied demand for specialized tree seedlings to plant on farms and around homesteads. Evidence suggests that the most desired tree species are substitutes for the resources that were once drawn from the forest, such as high-quality timber – *Markhamia lutea* (*musambya*), *Maesopsis eminii* (*musizi*) and *Milicia excelsa* (Iroko or *mvule*), poles and fruit.

Livelihood dependence on forest and other income sources

According to Humboldt University's analysis, Masindi District has high forest cover (40 percent or more) and high (50 to 60 percent) incidence of poverty. This profile is relatively uncommon in Uganda (marked in red on Map 4).

FIGURE 3: **The two villages selected in Masindi District**



Differences in market access between the two villages

Kyangamwoyo is located conveniently on a road that leads to Masindi, the district capital, and villagers can sell their main cash crop – tobacco – to passing traders. There is also a small trading centre nearby on the road. By local standards, 30 percent of households are of wealthy or average status, and 70 percent are poor or very poor (Table 3). Villagers generate an average of 50 percent of their incomes from cash sources, and 50 percent from non-cash sources. The forest contributes an average of 23 percent of all livelihood income, 8 percent from cash sales of forest products and 15 percent from products collected and consumed at home (Figure 3).

The poorest villagers are squatters with an average of 0.25 acres (0.1 ha) of land each; average-wealth households may have 0.5 to 5 acres (0.2 to 2 ha); and some of the wealthy have accumulated large areas of land through inheritance and purchase, so they can have anything from 10 acres (4 ha) upwards. Those with sufficient land, farm their plots for three years and then rest them for a year on rotation. All the forest in this area is privately owned or lies within Budongo Forest Reserve. Land is used by its owners or by others on request.

The Uganda Wildlife Authority prevents people from hunting, gathering or collecting honey, and some of the land that previously belonged to individuals has been incorporated into the park. Pigeon is the only game species that can be legally hunted. The park has squeezed people on to very small plots of land. Forests are only half an hour away, but as hunting and gathering are forbidden there is no reason to go to them.

Kilanyi is poorer than Kyangamwoyo, with only 24 percent of households ranked as wealthy or average by local standards, and 76 percent ranked as poor or very poor (Table 3). Villagers generate 49 percent of their incomes from cash sources and 51 percent from non-cash sources. The forest contributes 23 percent to livelihood income – the same proportion as in Kyangamwoyo, but the cash component is smaller at 4 percent, and the non-cash component (collection and consumption) is larger at 19 percent (Figure 3).

Villagers live in worse conditions than in Kyangamwoyo. The very poorest are landless, the poor are squatters, and average and wealthy households own between 3 and 10 acres (1.2 and

4 ha). The poor cannot leave their land fallow, but farmers with more resources do, using their plots for three to four years and then leaving them fallow for two. There is tremendous pressure to convert previously private forest to farmland because many people are coming into the area, and commercial agriculture is an option through sugar cane outgrower schemes. Land insecurity resulting from land grabbing is a feature of the area.

Some Kilanyi villagers plant woodlots, and there are small natural forests, but the large forest (Budongo) is too far away (4 km) to be used, even illegally. People living in villages closer to the park gather NWFPs, but it is not worth the journey for most inhabitants of Kilanyi.

Both villages rely on cattle for part of their income: cattle contribute 17 percent of income in Kyangamwoyo and 11 percent in Kilanyi. With fewer cattle, Kilanyi inhabitants rely more heavily on sales of agricultural produce to make up the income they need. Cattle are increasingly owned by women. As grazing land has become scarcer over the last 20 years, its ownership has been privatized, and grazing areas have been fenced and sometimes even padlocked.

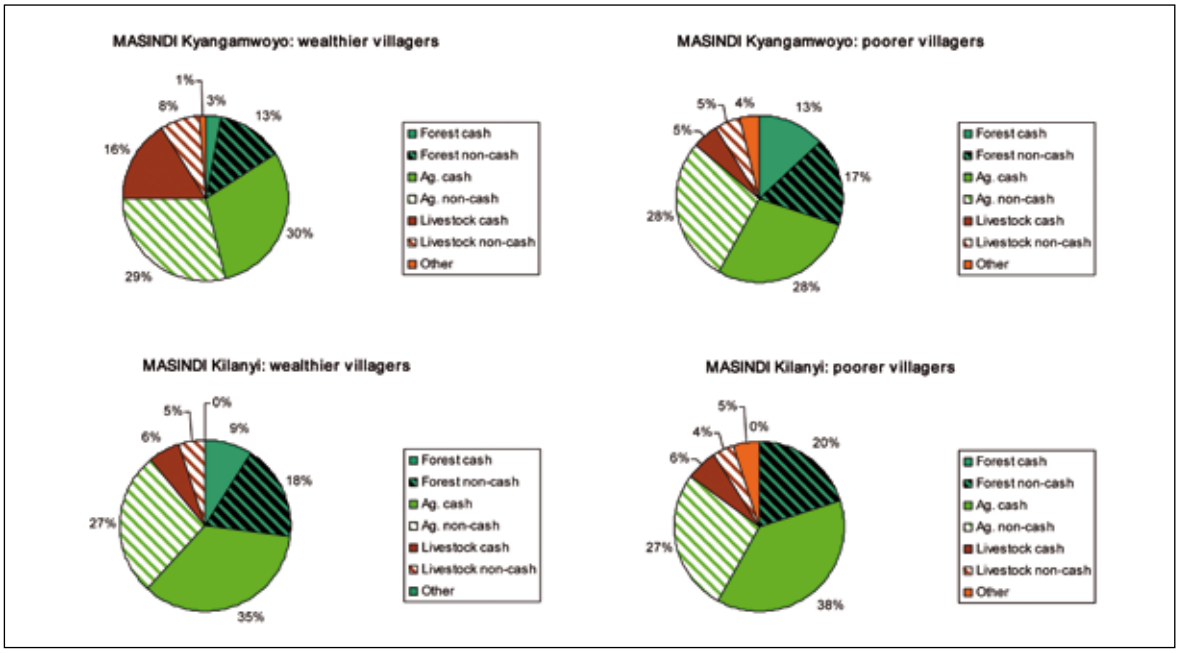
Wealth differences in the two villages

Figure 4 presents the results of livelihood analysis.

The results for Kyangamwoyo show that wealthier villagers derive far more than twice as much benefit from cattle than poorer villagers do; poorer villagers rely more on the forest for generating cash from sales of forest products and for consumption, and on off-farm employment. Dependence on agriculture is similar in both categories.

In poorer Kilanyi, the two wealth categories rely on income from cattle to almost the same extent. In this village, it is the wealthier villagers who derive more cash benefit from forests, probably because these forests are privately owned. The poor sell a slightly higher proportion of their crops than wealthier villagers do, and are far more likely to seek off-farm employment. Both categories generate similar proportions of their incomes from forest products for non-cash purposes.

FIGURE 4: **Comparisons of wealthier and poorer villagers in Kyangamwoyo and Kilanyi**



Gender differences in cash and consumption reliance on forests in Kyangamwoyo

Figures 5 and 6 show the cash and consumption values generated by forest products, and how these vary by gender. For sales, the top three items for men are forest fruits, charcoal and fuelwood, and the top three for women are fuelwood, medicinal herbs, and poles and grass for thatch. For home consumption, fuelwood, bushmeat and poles are the most important for men, while for women the top three products are fuelwood and poles, with forest fruits, medicinal herbs and grass tying in third place.

FIGURE 5: **Cash income from forests in Kyangamwoyo**

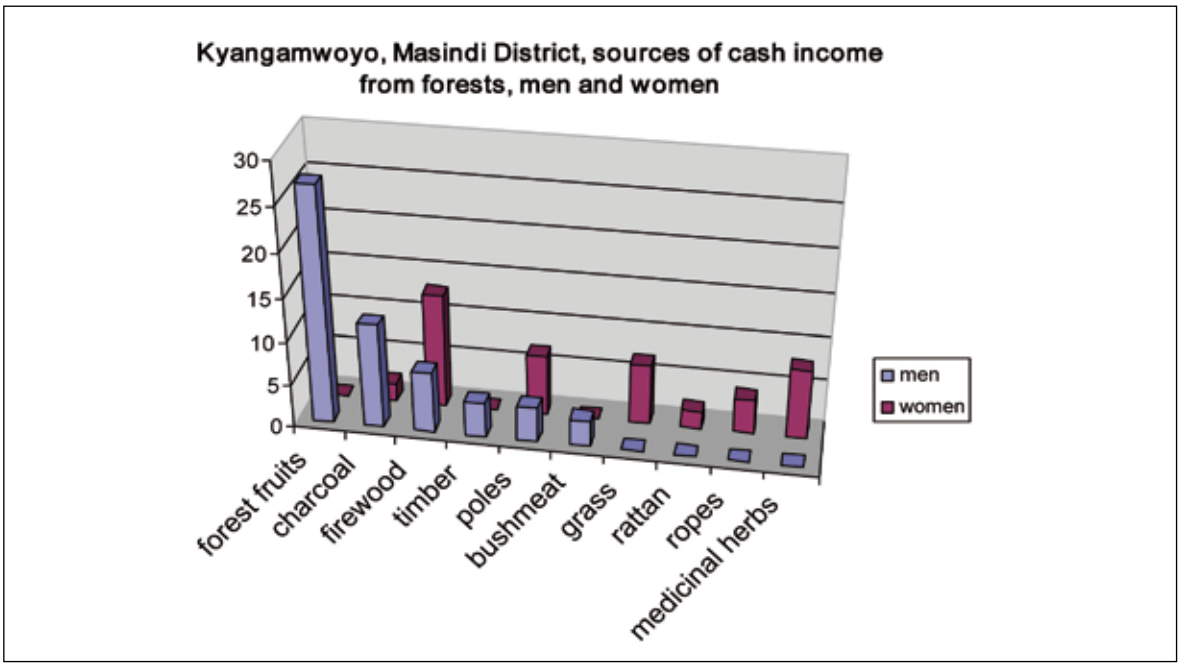
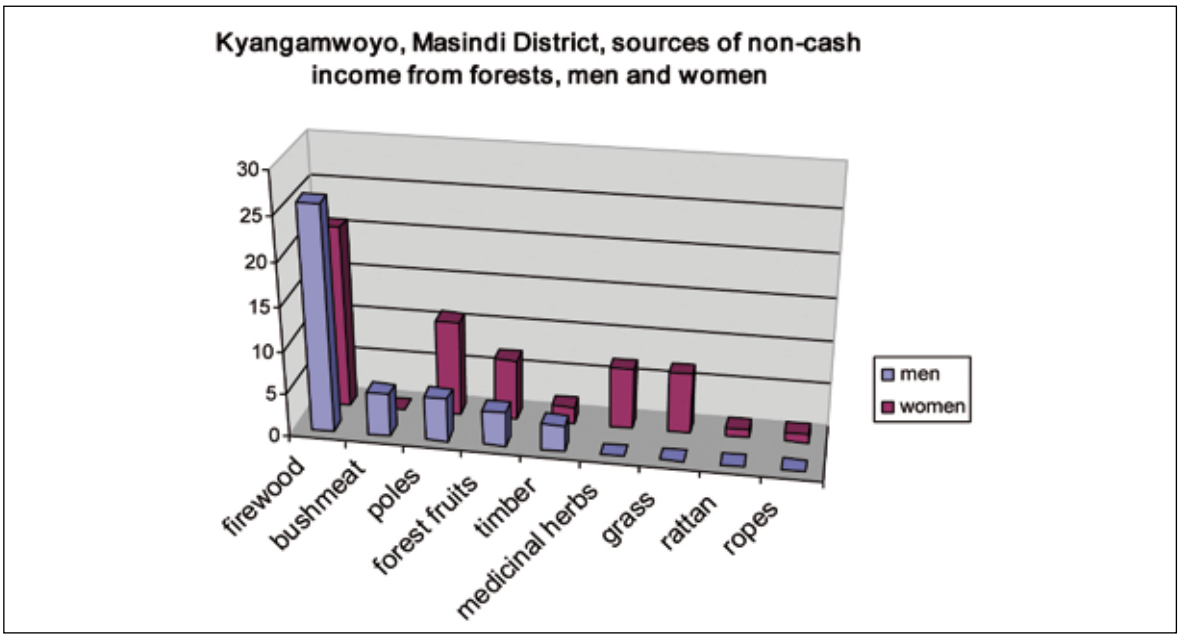


FIGURE 6: **Non-cash income from forests in Kyangamwoyo**



Although fuelwood is very important for both sales and consumption and for both sexes, the gender division of labour makes women prioritize the collection of medicinal herbs for sale and

home use, building materials and fibre, while men focus on forest fruits for sale, and bushmeat for sale and consumption.

Gender differences in cash and consumption reliance on forests in Kilanyi

FIGURE 7: **Cash income from forests in Kilanyi**

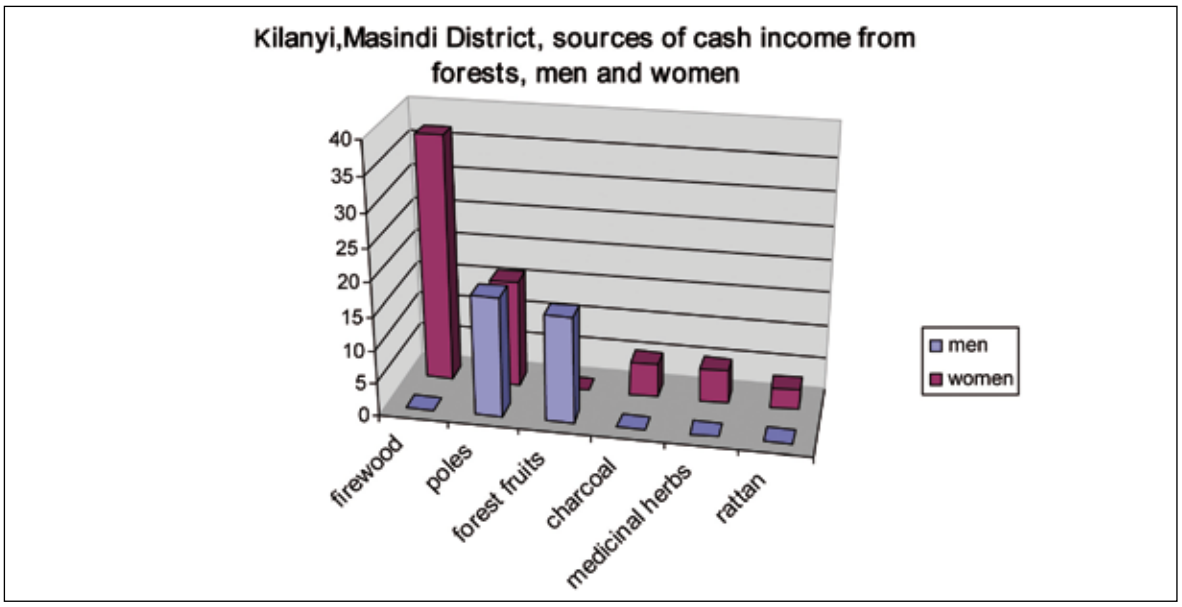
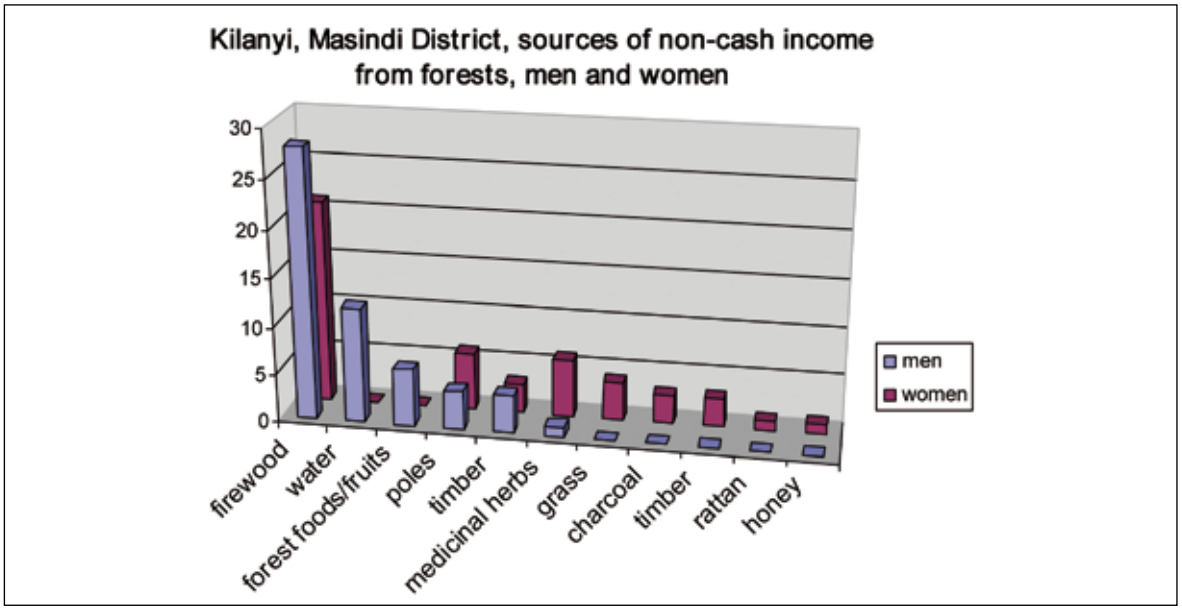


FIGURE 8: **Non-cash income from forests in Kilanyi**



Figures 7 and 8 show the results for Kilanyi, some of which are similar to those for Kyangamwoyo. In Kilani too, men focus more on gathering forest fruits for sale and consumption, and are far less interested than women in medicinal herbs for sale or home use, or in building materials such as poles, rattan and grass. In both villages, women are more involved in fuelwood sales than men are, although men play a major part in ensuring domestic supplies of fuelwood.

Women are interested in a wider spread of forest products than men are, particularly in Kilanyi and particularly of products for home use or consumption.

KIBAALE DISTRICT

Of the two villages selected in Kibaale (a high forest–low poverty area), Paachwa contains a market, while Kiriyanga is several kilometres away from the nearest market. This section provides the results from tools 2, 3 and 6.

TABLE 5: **Kibaale District – basic data**

Area	4 400 km²
Population (2011 estimate, UBOS)	646 500
Population density	146.9/km²
Urban–rural split	7.7% urban; 92.3% rural
Human development index	0.524
Rural population the below poverty line: 1999	66.2%
2011	65.6%
30–40%	0.37
Gini coefficient	0.40
Rainfall	1 000–1 500/year
Favourable climate with bi-modal rainfall peaking in March to May and September to December. The western part of the district bordering the Rift Valley is generally drier. Temperatures range from 15 and 30° C.	
Vegetation: Modified equatorial, wooded savannah mosaic and savannah grassland. Human activity-modified equatorial vegetation in Bwamiramira, Kyebando, Kiryanga, Kakindo and parts of Nalweyo. Wooded savannah mosaic forms a transitional zone from modified equatorial vegetation to open savannah grassland. Open grassland and thicket promote livestock farming.	

Sources: www.foodnet.cgiar.org/scrp/docs&databases/; Kibaale Government Web site www.kibaale.go.ug; UBOS and ILRI, 2003/2004; UBOS, 2010a; UNDP, 2007.

Administrative structure and governance

The Kasato Central Forest Reserve near Kiryanga is owned by the government and managed through NFA. In both villages, forest is divided between government-owned central forest reserves, which now come under NFA, and privately owned local forests (*bibanja*).[12]

There was little contact with forestry officials until the 1990s, when forest reserves began to be more actively protected and extensionists began conservation training with local people. Both villages listed oppressive forest laws, limited access to forest resources and overactive forest guards as major forest problems. In Paachwa, villagers are also troubled by rebels and thieves who hide in the forest and steal crops and animals.

Drivers of deforestation and forest degradation

In the 1960s and 1970s, forest was intact and rich in biodiversity; forest began to disappear earlier in Kiryanga than in Paachwa. As settlements and the harvesting of forest products continued to expand, forests around both villages were first degraded and then converted for agriculture. Migrants, and from 2000 former soldiers, were given tracts of public forest land to farm.

Men in both villages had access to forest for food, craft materials, poles, etc. until about 1990, when access to public forests became illegal (although individuals entered forests "at their own risk" until recently). Access to private forests to gather most products could be obtained with

[12] *Bibanja* are private forests on such long-term leases that they are regarded as owned by those who hold the leases. In some land-short areas, the original landowners are demanding the return of their forests, and are forcibly evicting leaseholders. The term *bibanja* is sometimes used to refer to the landowners themselves.

the owner's permission. Women's access to forests was mainly to gather fuelwood, palm leaves and wild yams. In Kiryanga, land-short women began illegal farming in the forest in 1990, but this did not occur in Paachwa, where forest products continued to be gathered, although more from private forests (with permission) than public forests.

Kiryanga has had a market for forest products – especially mats, baskets and pots – since the 1960s, although lions, leopards and snakes made the forest dangerous until recently. Paachwa has no market for craft products, but individuals began to sell timber in the 1980s, increasing in intensity and prices since then. Forest animals, such as baboons and wild pigs, are still a threat to crops, and are regarded as the main forest problem by local people, along with the disease-bearing flies that live in the forest (mosquitoes, tsetse flies and the black flies that carry river blindness).

Reforestation

NFA has established tree nurseries in Paachwa. Although there was no mention of similar initiatives in Kiryanga, local people plant fruit trees such as citrus, guava, jackfruit and pawpaw, and *Erythrina abyssinica* in private forests for bark sales to medicinal export companies. Farmers in Paachwa plant the same range of fruit trees and eucalyptus around their houses. People with private forests may also plant major local timber species such as *mugavu*, *mulongo* (*Albizia* spp,), *muvule* (*Milicia excelsa*), *musizi* (*Maesopsis eminii*) and *nkoba* (*Lovea swynnertonii*). The World Wide Fund for Nature (WWF) and NFA are undertaking reforestation activities in the district.

Other important changes

Land and farming: Land was originally allocated by village leaders, until land purchases started in the 1980s. Farms in Kiryanga are about 2 to 4 acres (0.8 to 1.6 ha); those in Paachwa are tiny – a third of an acre to an acre (0.1 to 0.4 ha). Some people are landless and rent from others. In both areas, soils started to lose their fertility in the 1990s; in Paachwa this was mainly because of the introduction of cash crops such as coffee, cotton and tobacco. Soils in both villages are now depleted and fertilizer is required. Extension has been available for cash crops from the government and British American Tobacco for the last 30 years, and has recently expanded to support the improvement of local crops. The market for products such as alcohol, groundnuts and millet has been strong for the last 20 years.

Livestock: Men, women and children own their own small stock in both villages (goats, sheep, rabbits, turkeys, chickens, pigs). Cattle numbers are increasing because of high market prices for meat. There is a very good market for all forms of livestock, resulting in a high risk of livestock theft. Grazing land is becoming scarce in Kiriyanga and is completely unavailable in densely settled Paachwa, where fodder has to be purchased.

Fisheries: Originally fishing was not part of the local economy, and no-one had fishing equipment. Net and basket-trap technology was brought into the area about 15 years ago, and fish such as tilapia, cat fish and mud fish are now caught for sale and home consumption. People from outside the area also come to fish, so supplies are dwindling.

Roads: Both private transport (bicycles, motorbikes) and buses were first available in the 1970s, and there are now high numbers of them. Maintenance of access roads to the main road is poor and surfaces are still murram. Public transport costs are about U$1 for 10 miles (16 km).

Schooling: Almost 100 percent of children attend primary schools in both villages. Kiryanga also has a secondary school and private schools.

Health: By the decade 2001–2010, Kiryanga had a well-equipped health clinic and several private clinics, while Paachwa inhabitants still had to travel 7 miles (11.2 km) to reach the nearest clinic. Local herbal medicines from the forest are still important in both villages.

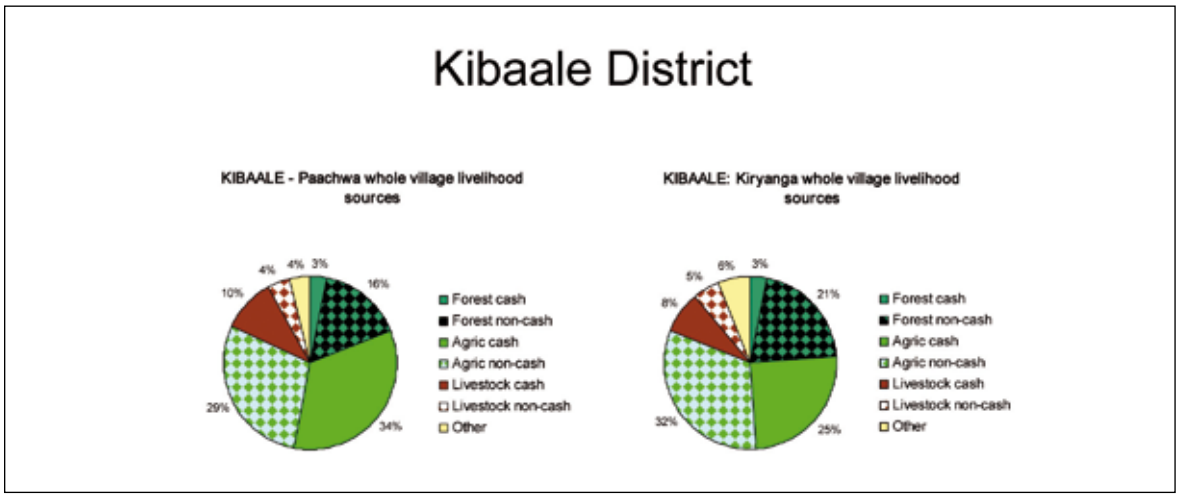
Conclusions: Forests in the vicinity of these two villages have become depleted over the years but are still yielding plentiful supplies of the products most desired by local people, and still contain enough wild animals for these animals to be regarded as a threat, albeit one that has diminished over the decades. It is unclear what proportion of the products gathered come from forest reserves and what proportion from private forests, but many products can be collected from private forests on request, while they have to be gathered illegally from State forest reserves "at the gatherer's own risk".

Inhabitants of both villages view crop pests and diseases as their second most important agricultural problem, after the depredations of forest animals eating farm produce while it grows. Farmers would like better access to improved seeds and extension help. Low yields from dried-out, overworked lands, and a rapidly developing land shortage characterize Paachwa in particular.

Livelihood dependence on forest and other income sources

According to Humboldt University's analysis, Kibaale has good forest cover (with at least 20 percent of land cover) and a relatively low poverty incidence of about 30 to 40 percent. This profile is typical of large parts of southern Uganda.

FIGURE 9: **The two villages selected in Kibaale District**



Differences in market access between the two villages

Paachwa has a weekly market. As Figure 9 shows, villagers generate 51 percent of their incomes from cash sources (agriculture and livestock sales, employment and sales of forest products) and 49 percent from non-cash sources. The forest contributes 19 percent of total livelihood income – 3 percent from cash sales and 16 percent from products collected and consumed at home.

Land is very scarce: farm areas are only a third to 1 acre (0.1 to 0.4 ha). There are very few private forest owners and most remaining forest is government forest reserve under fairly strict control, which individuals can enter only illegally at their own risk.

Kiryanga is about 9 km from Paachwa market, and registers a smaller proportion of income from cash sources (42 percent) than from non-cash sources (58 percent (Figure 9). The forest contributes an average of 24 percent of total livelihood income – 3 percent from cash sales and an important 21 percent from products collected and consumed at home.

There is still sufficient land for agriculture, with many households having access to 8 to 9 acres (3.2 to 3.6 ha), some of which can be left fallow while about 2 acres (0.8 ha) is cultivated. Government forest reserves and private forests are sufficiently abundant (although they are somewhat degraded) for forest products to generate almost a quarter of all income. Government forest may be used for gathering all products except timber. Agricultural lands are nearby, forests for timber and NWFPs are about 2 km away, and forests for hunting are 7 km away.

Both villages have similar reliance on livestock, which accounts for about 13 to 14 percent of total income. Kiryanga has slightly higher reliance on off-farm activity (wage labour or small business), at 6 percent, than Paachwa does, at 4 percent (tools 1, 2, 3 and 4). Figure 11 shows that men sell a far wider range of forest products than normal, while women sell only one – charcoal.

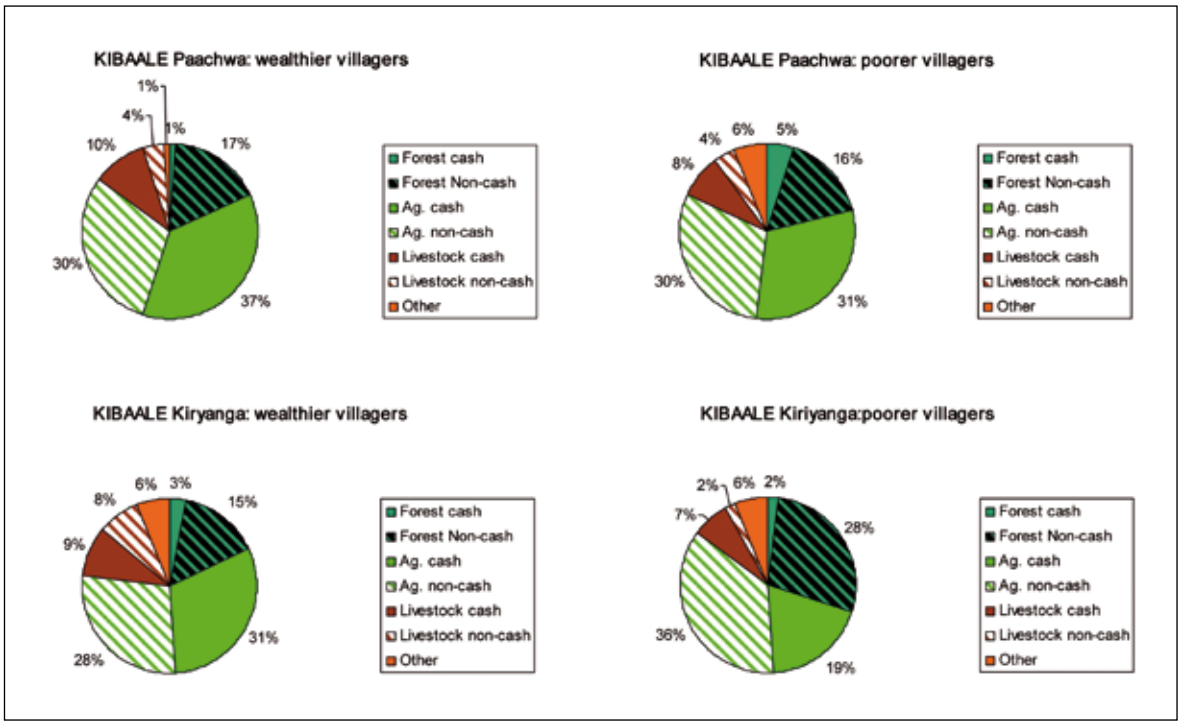
Wealth differences in the two villages

Figure 10 presents livelihood analysis results from Tool 4.

In Paachwa, the poor are slightly more dependent on forests than their wealthier counterparts (with 21 percent compared with 18 percent), derive slightly less of their incomes from cattle (12 percent compared with 14 percent), and sell a smaller proportion of their agricultural produce (31 percent compared with 37 percent). The main difference seems to be that the poor make up income shortfalls with wage labour to a greater extent than the wealthy do (6 percent compared with 1 percent).

In Kiriyanga, the differences between poor and wealthy villagers are more extreme. Forest dependence is considerably higher for poorer than wealthier villagers (30 percent of total annual livelihood income compared with 18 percent). Poorer villagers derive lower proportions of their income from cattle (9 percent compared with 17 percent) and from crop sales (19 percent compared with 31 percent). Income from forest – which is predominantly non-cash income – therefore partially substitutes for lack of income from other sources. Consumption rather than sale of agricultural produce is also higher among poorer villagers. Wage labour is equally important for both groups (at 6 percent).

FIGURE 10: **Comparisons of wealthier and poorer villagers in Paachwa and Kiryanga**



Gender differences in cash and consumption reliance on forests in Paachwa

FIGURE 11: **Cash income from forests in Paachwa**

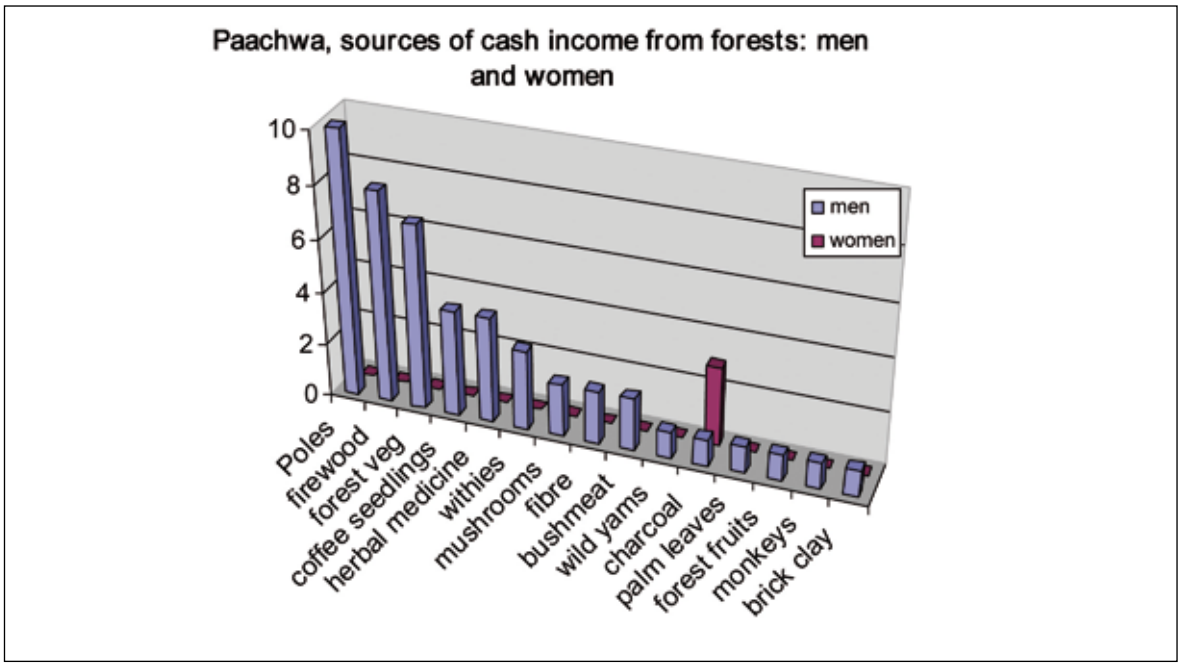


FIGURE 12: **Non-cash income from forests in Paachwa**

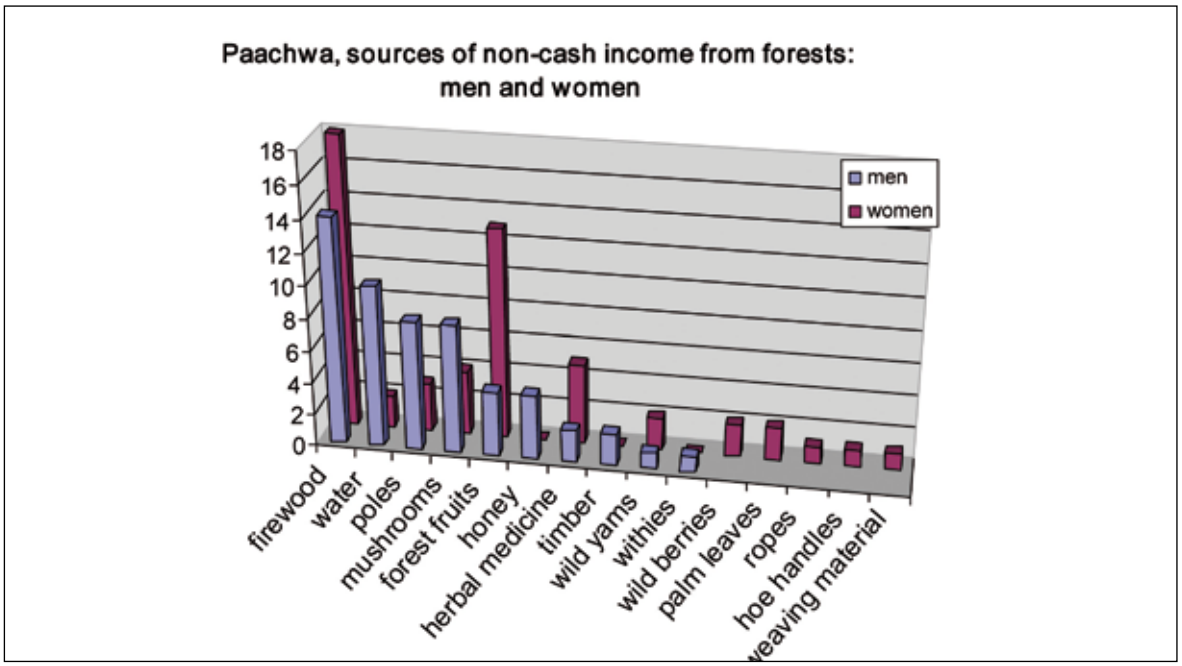


Figure 11 shows an unusually wide range of products sold by men (15 as opposed to the usual six or so), and the unusually narrow range sold by women (only charcoal). Men are also heavily involved in the collection of items for home use and consumption (Figure 12), although – as is usually the case – they sell a wider range of products than they collect for home use. Women on the other hand collect the normal wide range of products – fuelwood, forest foods, medicinal herbs and building and handicraft materials – but do not sell them.

Gender differences in cash and consumption reliance on forests in Kiryanga

FIGURE 13: **Cash income from forests in Kiryanga**

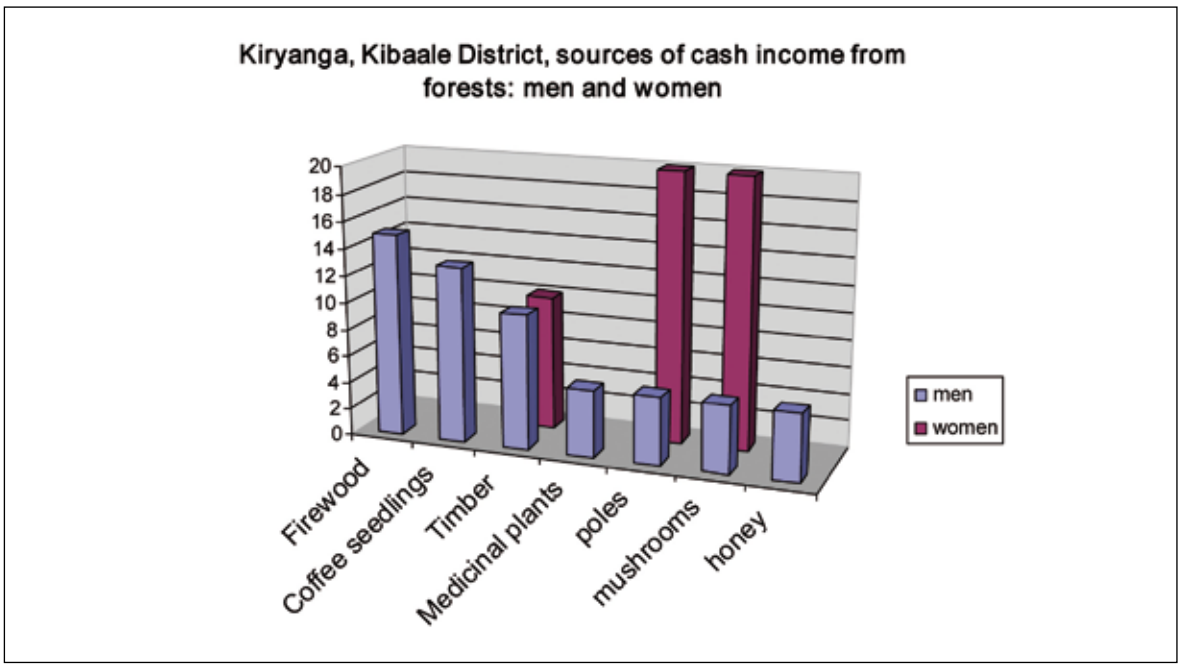
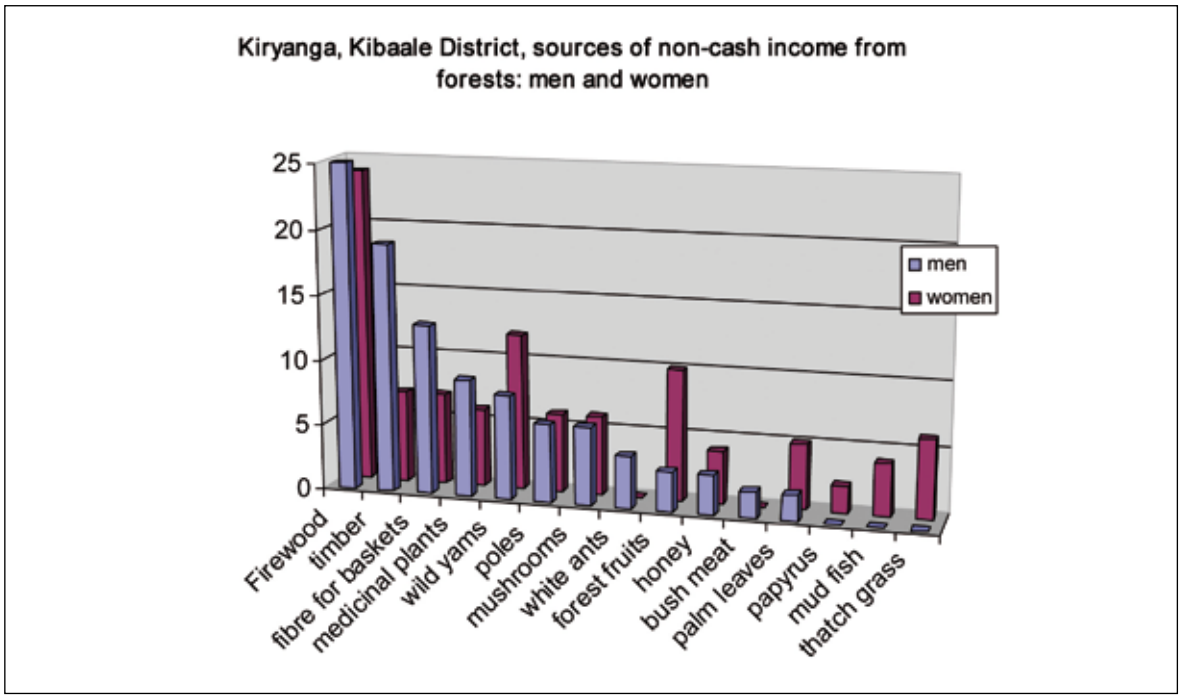


FIGURE 14: **Non-cash income from forests in Kiryanga**



Among the most striking contrasts in Figures 13 and 14 are the far wider spread of products gathered for home use and consumption than for sale, and the far broader involvement of women in gathering products for home use than for sale. The timber and poles sold by women probably come from Kiryanga's private forests.

Women play a significant role in the gathering of fuelwood, a wide range of forest foods (including fish), medicinal plants and building materials. Men are heavily involved in the gathering of fuelwood, timber and fibre for baskets. They collect (and sell) more medicinal plants than women do, but contribute less to the gathering of all foodstuffs except bushmeat.

KUMI DISTRICT

Of the two villages selected in Kumi (a low forest–high poverty area), Ongino Trading Centre is close to a market, and Kachaboi is several kilometres away from the nearest market. This section provides the results of using tools 2, 3 and 6.

TABLE 6: **Kumi District – basic data**

Area	2 848 km²
Population (2011 estimate, UBOS)	395 100
Population density	138.7/km²
Urban–rural split	7.9% urban; 92.1% rural
Human development index	0.581
Rural population below the poverty line: 1999 2011	82.2%
50–60%	65.6%
Gini coefficient	0.30
Rainfall	Two seasons averaging 216 mm each
1 100 m above sea level. Generally flat terrain with few undulations and isolated inselbergs. Moderate climate with temperatures averaging 24° C.	
Vegetation: Savannah species and some dry and moist bushlands. Woodlands, dry thickets and swamps.	

Sources: www.foodnet.cgiar.org/scrip/docs&databases/; Kumi Government Web site http://www.kumi.go.ug ; UBOS and ILRI, 2003/2004; UBOS, 2010s; UNDP, 2007.

Administrative structure and governance

Kumi District has faced a series of catastrophic events over the last 40 years. During Idi Amin's rule from 1971 to 1979, Nubians and Somalis took over Ongino Trading Centre; they were replaced by the Iteso (related to the Karamojong) when Obote deposed Idi Amin. Power structures changed again in 1985, when Obote was overthrown by Yoweri Museveni. From 1986 to the early 1990s, northern rebels loyal to Obote fought Museveni's National Resistance Army through various insurgent organizations, provoking a major government offensive in Kumi district in 1990. Internally displaced persons (IDPs) from adjacent districts such as Seroti lived in Kumi District until about 2005.

Until the 1980s, forest was communally owned and looked after, with the exception of planted trees on farmland. The ownership of individual planted trees in Ongino passed first to Nubians and Somalis and then back to the Iteso. In remoter Kachaboi, fewer outsiders arrived, and trees were communally and individually owned with more continuity. Institutions such as schools and government offices also owned trees. In the 1990s, by-laws were passed to conserve the environment and penalties were introduced for illicit use.

The decentralized administrative structures that regulate access to resources were known as Resistance Councils from 1986, and Local Councils (LCs) from 1995. In Ongino, clan and individual ownership of forest and farmland have been asserted more and more strongly, with some cases being taken to court. The LC III[13] level of administration has taken over the management of trees in Ongino's central trading area. People in Kachaboi complained of district officials imposing fines or community labour for illicit forest exploitation.

[13] Local councils are administered through various levels. LC I is the village level, LC III the sub-district level and LC V the district level.

Drivers of deforestation and forest degradation

Until the 1980s, the landscape around both villages was savannah woodland with large individual trees set in extensive shrub. Trees were valued for shade, as boundary markers and way markers, and meetings and ceremonies were held under them. The main species were a wide variety of Acacias and *Milicia excelsa*. Wild mangoes were also found. There was individual ownership of *Cassia* spp, *Melia azedrach* and other trees.

In the 1970s, a few people in Ongino began to make charcoal to sell to Nubian and Somali immigrants. Thorny shrubs were cut to sell to make livestock kraals as protection from predators. Charcoal production increased in the 1980s, and trees were also cut for brick firing, house building and, in due course, fuelwood and construction materials for IDPs. To some extent this increased off-take was mitigated by the slaughter and non-replacement of cattle during the insurgency period. During the 1990s, sales of forest products for fuelwood, charcoal and brick making increased as a way of making a living in the absence of livestock to sell.

In the last decade, with returning peace, households have been restocking, clearing land for farming and continuing to generate cash from sales of forest products. The pressures on forest near both villages have become extreme. Access to government-managed local forest reserves has been strictly limited and all forest products have to be purchased from either local government or private tree owners.

The selling of forest products in Ongino began in the Idi Amin period and slumped for a while after the Nubians and Somalis left. In the 1990s, the Teso started to buy fuelwood and charcoal, and gradually forest products became marketable throughout the area. Since 2000, every conceivable forest product has been sold, including white ants, birds and a wide range of construction materials, from reeds and poles to hard-core and murram. Small wild animals such as squirrels and hedgehogs are caught, and the forest provides honey, mushrooms and important fruits and vegetables. Intra-household conflict has erupted over who can sell forest products and keep the proceeds. Local forest reserves are all government-owned. In remoter Kachaboi, forest product sales seem to be limited to fuelwood and charcoal, although forest fruits and vegetables, honey, mushrooms and wild animals can also be found.

Reforestation

In Kachaboi, some woodland restoration has been attempted, in addition to the planting of trees on individual farms and homesteads. The village-level LC I Committee has organized extension assistance. In Ongino, there is little interest in afforestation, although farmers are interested in planting citrus, mango, other fruit tree seedlings and timber and pole species, such as Eucalypts, *Gmelina arborea*, *Grevillea robusta* and *Melia azedrach* (*elira*).

Other important changes

Land and farming: Land is owned customarily through clans and their constituent households, except in the case of land originally donated by clans for creation of the Ongino Trading Centre, or land now owned by schools or other institutions. In Ongino, residents estimated that in 1980, about two-thirds of available land was allocated to crops, and a third was kept for livestock. Today, permanent houses cover so much of the land that only 40 percent is available for crops and almost nothing for grazing. Plots have to be cultivated every year and there is no space for agricultural expansion. Some farmers have to rent plots from the trading centre.

In remoter Kachaboi, land was widely available for all purposes until the 1980s, when population increases (mainly from immigration) changed the situation. Today, farm plots are smaller and more fragmented, but it is still possible to rotate plots and leave them fallow for a year between plantings. The agricultural area continues to expand as bush is cleared.

Until about 1992, despite occasional severe famines, soils were good, particularly when the land was rested during the insurgency period. Starting in the second half of the 1990s, land has been more and more intensively used, as oxen, tractors and good-quality agricultural extension become available and market opportunities improve.

Livestock: Small stock have been owned for the last 40 years, but cattle disappeared rapidly during periods of insurgency or raiding and are only slowly being replaced. In recent years, pigs have become more common, as they are not stolen and do not require pasture, which is increasingly being converted to farmland. Good veterinary services have become available over the last 20 years, and all livestock are easy to sell. Fish can be caught near Ongino and there is a ready market for them.

Roads: Both public (lorries and buses) and private (motor-cycles and cars) transport are now common, although public transport costs are extremely high. Roads that were once well-surfaced are becoming degraded, and community road maintenance has decreased. The Kachaboi area has a very limited road network.

Schooling: School fees became very high in the 1990s and girls began to be withdrawn from school. Compulsory universal primary education – offered free to all children – was introduced at the end of the 1990s, and enrolment increased. However pupil-to-teacher ratios are very high.

Health: Ongino Trading Centre offers free clinic services for HIV/AIDS and other diseases, but drugs are periodically lacking. Sanitation has also improved. In Kachaboi, drugs can be bought in shops, but there is no clinic.

Conclusions: Ongino Trading Centre has benefited greatly from its market and adequate roads. Opportunities for marketing are more limited in Kachaboi, and the main forest products sold are fuelwood and charcoal. In both villages unregulated timber and fuelwood cutting and forest product sales are the main forest problems. Bush burning and clearance for agriculture are a major threat, especially in Kachaboi where the agricultural frontier is still expanding. Excessive grazing of forest by livestock is rated a serious problem in Ongino.

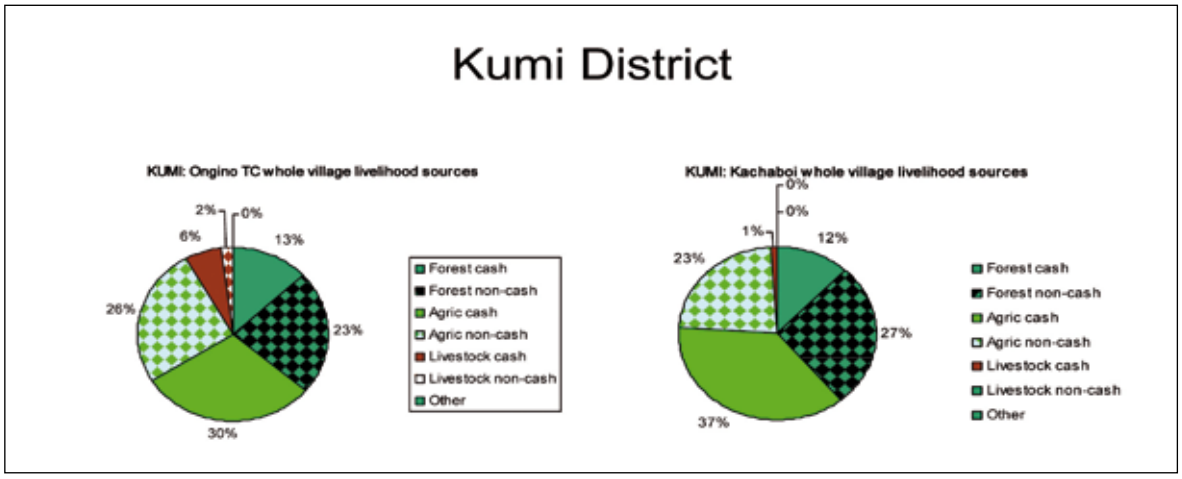
Both villages reported droughts as the chief challenge to agriculture, together with reduced soil fertility resulting from far more intensive use of land as population density increases. Crop diseases are on the rise, especially in intensely cultivated Ongino. Kachaboi inhabitants mentioned marketing difficulties as their third most important agricultural problem.

Overall, Kumi District seems to have moved on from the intensely unsettled period of the past 30 years. However, with the return of peace, both the farming system and the forest are under severe pressure. Efforts are being made to plant trees to replace the disappearing forest, especially in urbanized Ongino, but there are insufficient tree seedlings to satisfy the demand. Around Kachaboi, tree and bush clearing to create more farmland continues to be a major activity. Traditional governance structures and local government are unlikely to be able to control this clearance until the resettlement process is complete.

Livelihood dependence on forest and other income sources

According to the Humboldt University analysis, Kumi District has low forest cover (of 10 percent or less of the total area) and a medium-to-high incidence of poverty at 50 to 60 percent. This profile is typical of large parts of eastern Uganda.

FIGURE 15: **The two villages selected in Kumi District**



Differences in market access between the two villages

Ongino Trading Centre is near an urban centre. Villagers generate 49 percent of their incomes from cash sources and 51 percent from non-cash sources. The forest makes a major contribution to livelihoods, accounting for 36 percent of all income – 13 percent from cash sales and 23 percent from products collected and consumed at home.

Even the poorest households still own some land, but landholdings are small and under pressure. The poorest households now have to farm the same plot every year, with no spare land to allow fallow periods, so some farmers are likely to become landless in the near future.

Local forest reserves and a few individually owned forests provide small game animals and birds, wild fruits (including Balanites and tamarind), mushrooms and honey. There is also a wide range of important non-food products. During and after the insurgency, cattle were raided and cattle ownership declined to almost zero. The forest provided incomes from charcoal and brick making (bricks are fired with fuelwood from the forest). Although cattle are becoming important again, fuelwood, charcoal and bricks continue to provide income to many people. Nearby forests can be reached in half an hour.

Kachaboi is further from a market. Villagers generate 50 percent of their incomes from cash sources and 50 percent from non-cash sources. The forest contributes a significant 39 percent of all livelihood income – 12 percent from cash sales and 27 percent from household use and consumption.

Landholdings are small, of between one and five plots totalling less than 5 acres (2 ha). There is still sufficient land to leave plots fallow for a year. The cultivated area is expanding as people clear the bush and make charcoal. There is enough forest to allow hunting of a few small animals and birds and gathering of forest fruits, honey and mushrooms, but the forest is under heavy threat, not least because of the good prices that charcoal and fuelwood command.

Both areas rely on cattle to some extent, with Ongino generating 8 percent of total household income from this source, and Kachaboi a far smaller 1 percent. The expansion of agriculture in Kachaboi has reduced the areas available for fodder and pasture, resulting in greater reliance on sales of agricultural crops, which account for 37 percent of all income, compared with 30 percent in Ongino. Both villages also generate a high proportion of their incomes from forest product sales, at 12 to 13 percent.

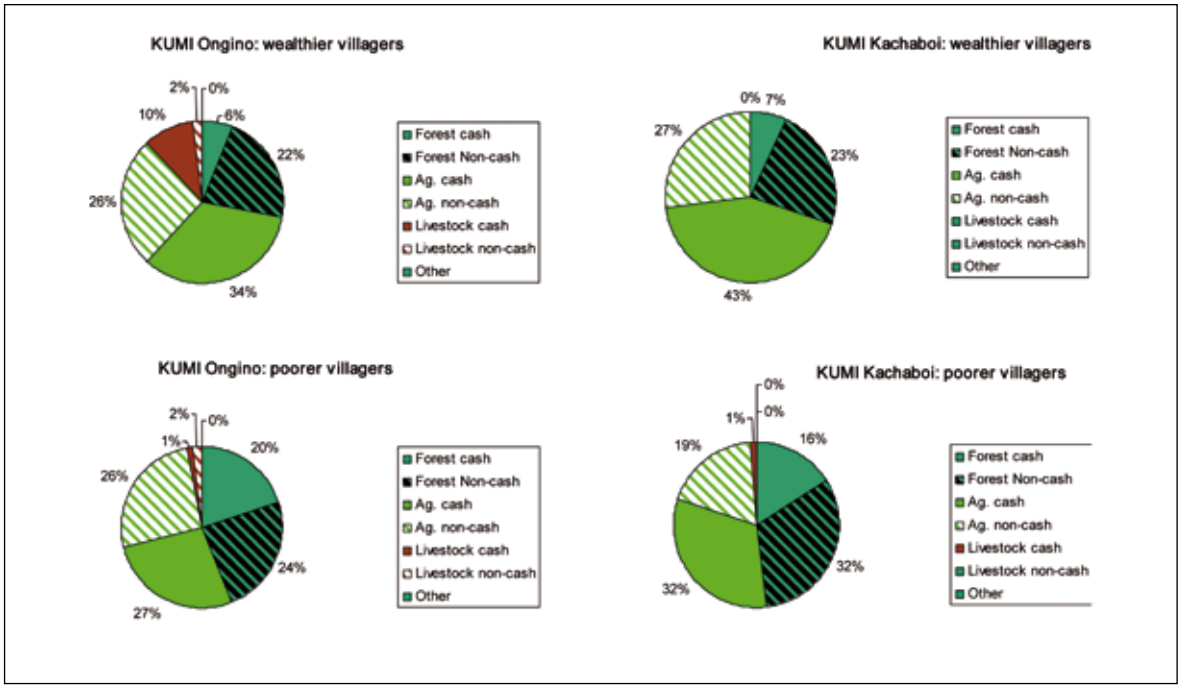
Wealth differences in the two villages

In Ongino Trading Centre, wealthier villages generate 28 percent of their total annual income from forests, while poorer villagers generate a very high 44 percent. Wealthier villagers have invested in cattle, which provide 12 percent of their income. It is not clear why there were no cattle owners among the sample of wealthier villagers in Kachaboi. Poorer villagers keep a few cattle, although they generate a smaller proportion of their income from cattle than do Ongino's poorer villagers.

In remoter Kachaboi, the proportion of income from forests is higher for both wealth categories. Wealthier villagers derive 30 percent of their income from forest (against Ongino's 28 percent), and poorer villagers 38 percent (against 44 percent).

Opportunities for off-farm employment seem non-existent in both villages, and so the proportion of total income derived from agriculture is very high. All groups sell more agricultural produce than they consume.

FIGURE 16: **Comparisons of wealthier and poorer villagers in Ongino Trading Centre and Kachaboi**



Gender differences in cash and consumption reliance on forests in Ongino Trading Centre

FIGURE 17: **Cash income from forests in Ongino Trading Centre**

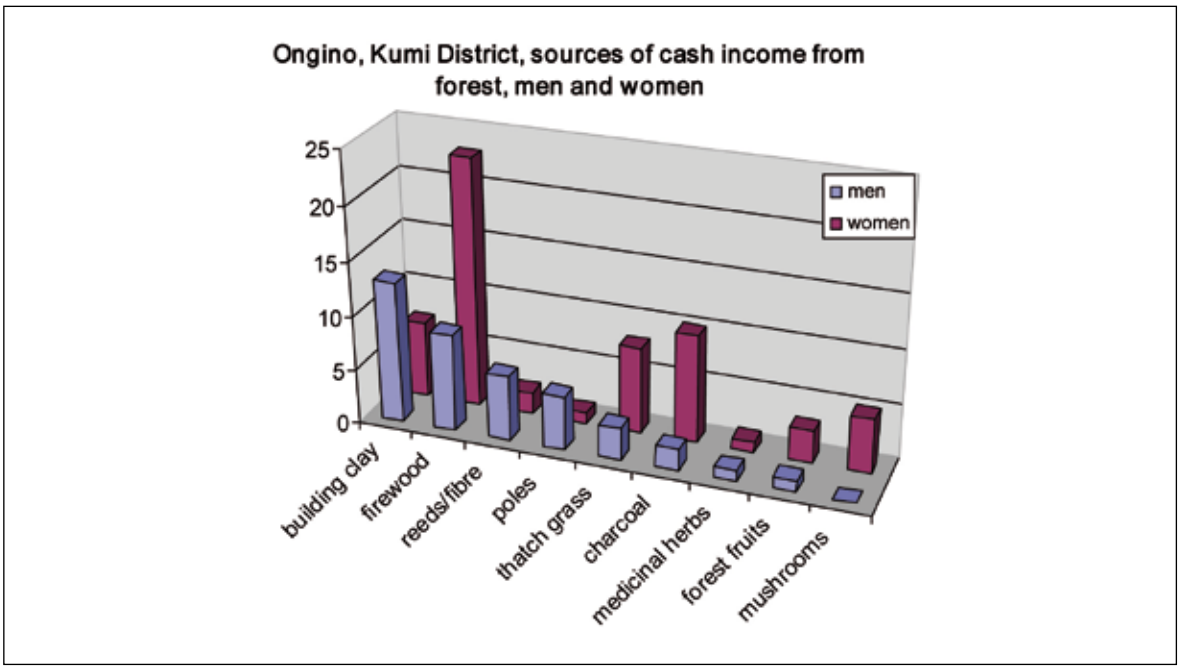
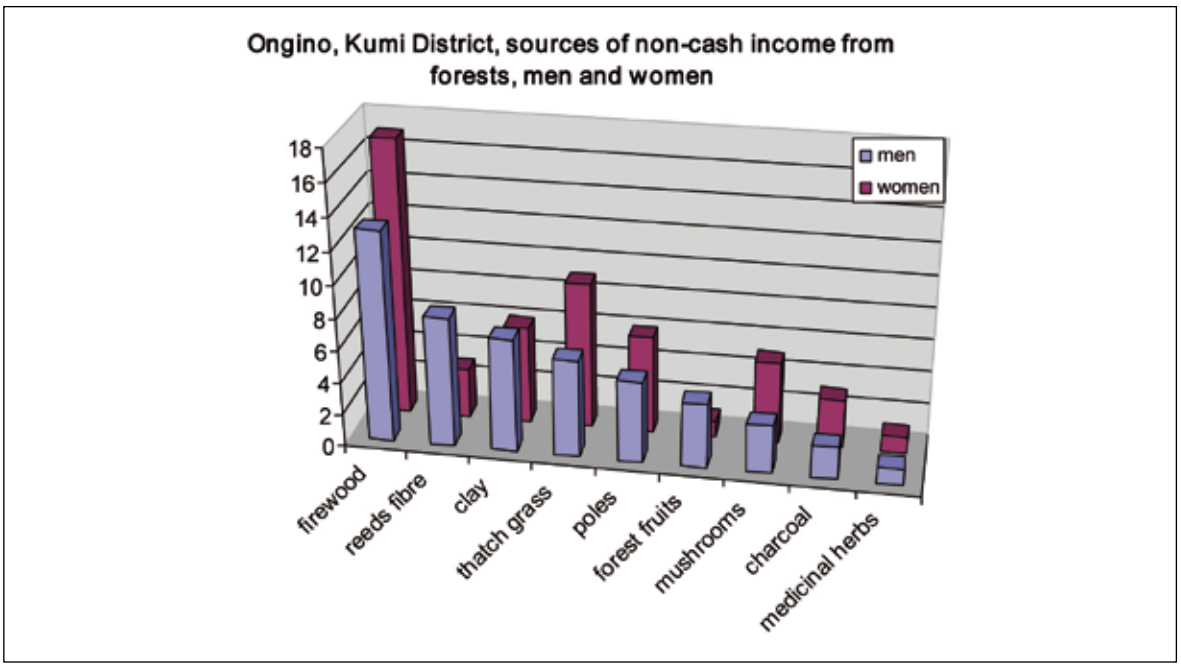


FIGURE 18: **Non-cash income from forests in Ongino Trading Centre**



Fuelwood, charcoal and grass for thatching are the main products sold by women, followed by brick clay and small quantities of forest foods such as mushrooms and wild fruit. Men sell mainly brick clay, fuelwood and building materials. Medicinal herbs are of only minor interest for either cash or home consumption, and forest foods are generally less important than in some higher-rainfall parts of Uganda, such as Masindi and Kibaale.

For home use, the products are similar: fuelwood, thatching grass and building materials for both women and men. Both sexes also collect mushrooms and wild fruits/berries.

Gender differences in cash and consumption reliance on forests in Kachaboi

FIGURE 19: **Cash income from forests in Kachaboi**

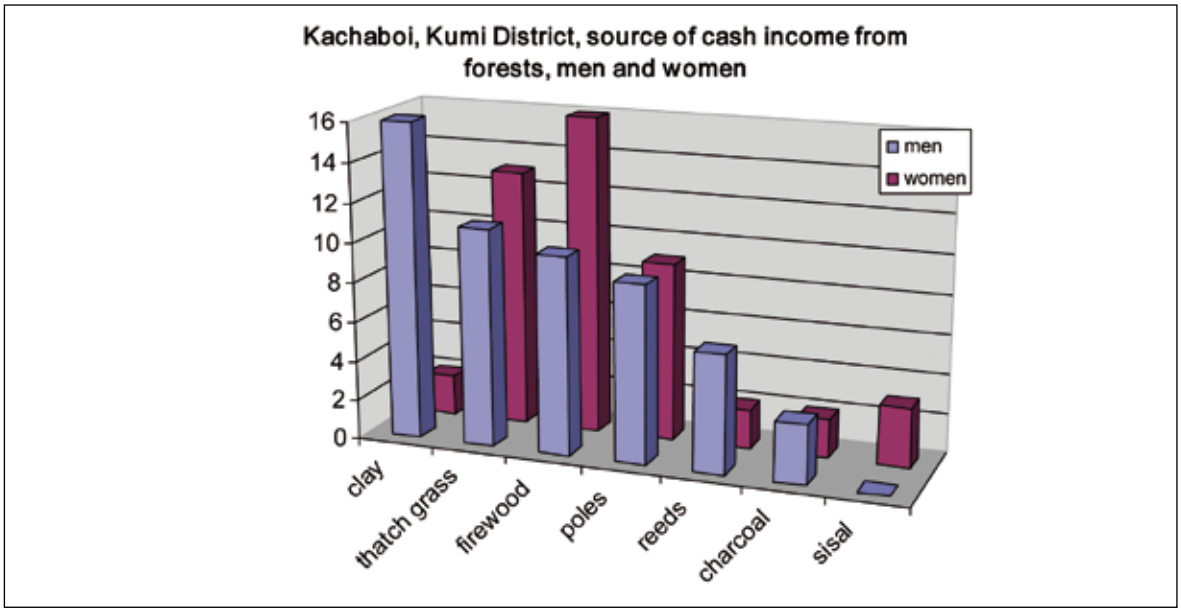
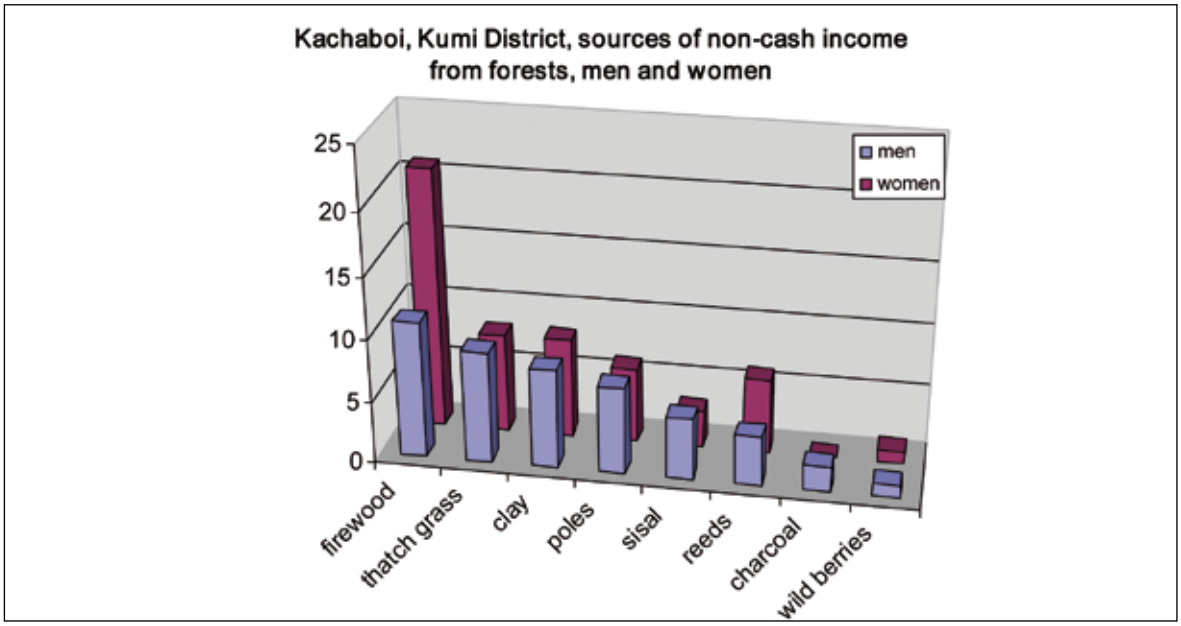


FIGURE 20: **Non-cash income from forests in Kachaboi**



Cash income from forests in Kachaboi is based almost entirely on fuelwood, charcoal and building materials, including clay for firing bricks. Women also sell sisal for rope/handicrafts. Given the important contribution to livelihood incomes that forests make in these villages (Figure 19), it is interesting to observe the very narrow range of products used.

The pattern of forest products gathered for non-cash use is almost the same, although the order of importance varies a little.

LAMWO (KITGUM) DISTRICT[14]

Of the two villages selected in Lamwo (a low forest–high poverty area), Palabek Trading Centre is close to a market, and Padwat is several kilometres away from the nearest market. This section presents data collated from tools 2, 3 and 6.

TABLE 7: **Lamwo (Kitgum) District – basic data**

Area	4 400 km²
Population (2011 estimate, UBOS)	646 500
Population density	146.9/km²
Urban–rural split	7.7% urban; 92.3% rural
Human development index	0.524
Rural population the below poverty line: 1999	66.2%
2011	65.6%
30–40%	0.37
Gini coefficient	0.40
Rainfall	1 000–1 500/year
Favourable climate with bi-modal rainfall peaking in March to May and September to December. The western part of the district bordering the Rift Valley is generally drier. Temperatures range from 15 and 30° C.	
Vegetation: Savannah woodland characterized by woody cover and grass layers.	

Sources: www.foodnet.cgiar.org/scrip/docs&databases/; Kitgum Government Web site www.kitgum.go.ug; UBOS and ILRI, 2003/2004); UBOS, 2010s; UNDP, 2007.

Administrative structure and governance

The people of Lamwo have lived through terrifying times over the last 25 years. The main victims of the Lord's Resistance Army (LRA), which has operated since 1987, have been the Acholi people of northern Uganda in Kitgum, Gulu and Pader districts.

In 2003, the United Nations regarded the humanitarian crisis in northern Uganda as among the worst in the world, and the International Criminal Court, based in the Hague, announced arrest warrants for Joseph Kony and other senior LRA leaders in 2005.

In the late 1980s, more than 1 million Acholi people were moved to IDP camps, which they have been able to leave only since 2005. Others fled into the Sudan. Those in camps and semi-settled villages in Kitgum District spent years coping with armed attacks, insecurity, loss of agrarian livelihood systems, limited food aid, and inadequate health and sanitation conditions. As hostilities between the armed forces of the Government of Uganda and the rebel LRA came to an end (with the LRA moving first to the Congo and then to the Central African Republic), the government started to exert pressure on IDPs to return home, and most were very willing to leave the crowded conditions in the camps.

Many IDPs chose to return to their homes in stages, initially moving in and out of the camps daily or seasonally, because it was very risky to abandon the safety of the camps altogether (Stites, Mazurana and Carlson, 2006).

Forests have been nominally owned by the community since the 1960s, under the leadership of chiefs and clan heads. The Palabek Local Forest Reserve is also communially owned.

[14] Kitgum District was recently split into two – Lamwo and Chua. All the available data refer to Kitgum.

Planted trees are individually owned, the most desired species being *Milicia excelsa*, *Afzelia africana*, *Ficus glumosa*, *Khaya* sp., *Albizzia* sp. and *Diospyros mespiliformis*. The decentralized administrative structures that regulate access to resources were known as Resistance Councils from 1986, and Local Councils from 1995.

Drivers of deforestation and forest degradation

There was ample forest from the 1960s until the 1980s, and men and women had free access to gather the products they needed. From the 1980s onwards forest started to decline around Palabek as a result of charcoal making and timber felling. In remoter Padwat, forest cover was maintained because the rural population had all been moved to IDP camps. Throughout the 1990s, forest cover disappeared from the areas close to IDP camps, because camp residents had to rely entirely on the forest for poles to build houses and for fuel for cooking. After 2000, IDPs slowly began resettling outside the camps, and the forest picture changed again. Deforestation spread outwards from the areas around camps as families cleared forest for agriculture, house building and fuelwood.

During the insurgency period, rules controlling the gathering of forest products were not applied, while insecurity limited forest access to some extent. In the 1980–2000 period, women in Palabek gathered essential thatching grass and fuelwood, despite the dangers, while in Padwat men and women used only the forest closest to IDP camps. In spite of this dangerous background, trade in basic forest products was maintained throughout the insurgency period, with sales of fuelwood, thatching grass, charcoal and fruits such as mangoes. Prices rose steeply over the decades, and continue to rise as products become more difficult to find. Today, access to forest near Palabek can be obtained only with local authority permission, while in Padwat the forest is open for the collection of NWFPs, but permission must be sought for timber felling.

Local people in both villages reported that bush fires became more common in the 1970s, limiting their access to forest. In the early years, these fires may have been part of the tactics of insurgents, but they still occur and both villages listed them as their top forest problem. More recently, fires seem to be the result of careless bush clearing – the second most mentioned problem was indiscriminate forest clearance. In Palabek, excessive exploitation of the forest for timber and other forest products was highlighted; people in Padwat complained of oppressive forest laws and excessive restrictions on access to forest resources, while their crops are raided by baboons and monkeys.

Reforestation

Before the insurgency period, there was some forestry extension and tree planting in Palabek, but not in Padwat. All such activity was put on hold throughout the 20-year insurgency. Since 2000, village-level forestry extension services have been established in both villages, under the National Agricultural Advisory Services (NAADS) programme. Species offered include fruit trees, pine, neem, *moringa*, teak, acacia and eucalyptus, but problems with domestic animals have not been resolved and tree survival rates are low. In both villages, wealthier men and women mentioned the limited forestry extension available for tree planting and the lack of good-quality seedlings.

Other important changes

Land and farming: Each family has from 3 to 10 acres (1.2 to 4 ha) in Palabek, but only about 2 acres (0.8 ha) in Padwat. Ideally, plots are used for two years and rested for three. Land is fertile because it was not used during the insurgency period, but the area under cultivation is rapidly expanding as the population increases and cultivation with ploughs and oxen becomes more common. In Palabek, farming areas may be between half an hour and four hours away. In Padwat, they are more distant, taking from two to six hours to reach. Since 2000, markets for agricultural crops have sprung up, offering incentives for the production of surpluses, and trade with neighbouring villages. Crop extension and improved seeds are available, but the seeds are expensive and sometimes of inadequate quantity.

Livestock and fisheries: Since 2000, a major restocking exercise has been ongoing to replace the animals that were rustled or killed for food during the insurgency period. Land disputes may arise as agriculture and livestock compete for land, and areas for grazing become increasingly scarce. There are few livestock extension services. NAADS has promoted fish farms over the last decade, and prices for fish are high. However, fish farms are sometimes badly located, causing damage to dams or stream banks.

Roads: Both public (trucks and buses) and private (motor cycles, bicycles and cars) transport are common. Road quality is good in Palabek, but less so in remoter Padwat, although feeder roads are being extended. Public transport costs are high.

Schooling: Palabek has eight primary schools and a secondary school. Padwat has fewer schools, but is still expected to implement the government's policy of universal primary and secondary education. The pupil-to-teacher ratio has been problematic in primary schools since universal primary education was introduced, and inhabitants of both villages complained about this. Padwat has some private primary schools, which charge very high fees.

Health: Palabek has a government health centre. Padwat has health units constructed by non-governmental organizations and the government.

Conclusions: Lamwo has undergone major changes and upheaval over the last three decades, as has much of northern Uganda. Forest has been instrumental in supporting the population through this long period of insecurity, supplying essentials such as fuelwood and building materials for the residents of IDP camps, as well as fruit to supplement and diversify their diets when farming is all but impossible.

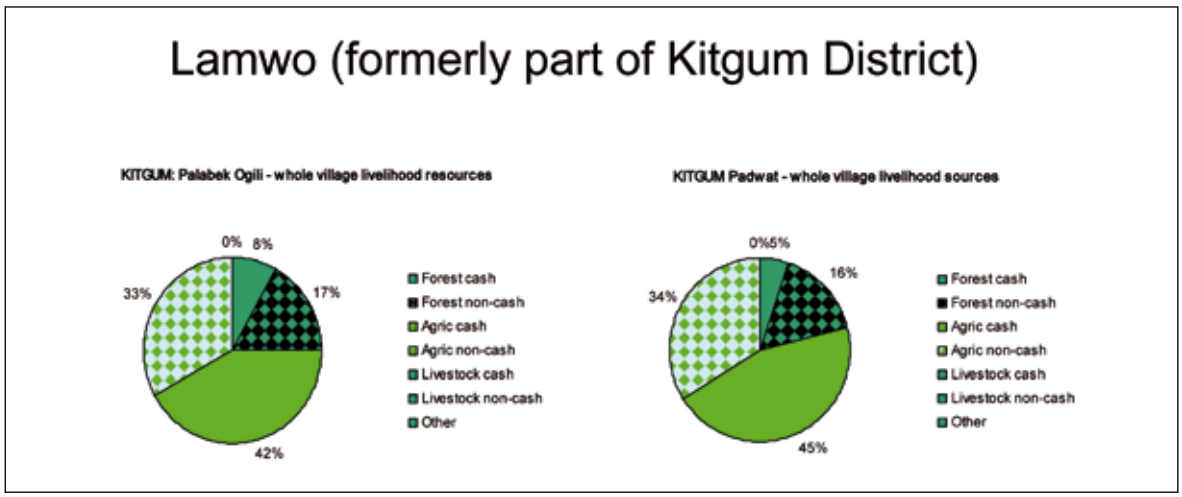
As often happens during wars, while forest was much depleted in densely settled areas containing IDP camps, it was left to grow undisturbed in areas that were temporarily emptied of their human populations. Not only was this absence of human inhabitants beneficial to forest and wildlife, but it also resulted in soils becoming more fertile after years of resting unfarmed.

The emptying of IDP camps over the last decade has changed the picture, resulting in much deforestation as rural people resettle the land. This situation will stabilize as the landscape evolves and the movements of people cease, but currently conflicts arise as agriculture, livestock and planted trees vie with each other for space. Many farm plots are several hours away from villages, which hinders the evolution of more sustainable farming systems. The agricultural frontier is still expanding at the expense of forest and bush, and traditional governance structures and local government are unlikely to be able to control this expansion until the resettlement process is complete.

Livelihood dependence on forest and other income sources

Humboldt University's maps show that Lamwo has 10 to 19 percent forest cover and 70 to 80 percent incidence of poverty.

FIGURE 21: **The two villages selected in Lamwo District**



Differences in market access between the two villages

Palabek Ogili Trading Centre is adjacent to an urban centre. Villagers derive 50 percent of their incomes from cash sources and 50 percent from non-cash sources. The forest contributes 25 percent of total income – 8 percent from cash sales and 17 percent from non-cash collection and consumption.

Padwat is further away from an urban centre. Villagers obtain 50 percent of their incomes from cash sources and 50 percent from non-cash sources. The forest contributes 21 percent of total income – 5 percent from cash sales and 16 percent from non-cash use and consumption.

Landholdings are smaller than in Palabek Ogili, but cultivated land can be fallowed for three years. This situation suggests that land is less scarce than the labour and other resources that are needed to bring it back into cultivation after a long period of insecurity. Farmland is distant from the village (up to six hours away), which limits the amount of time/labour available for cultivation itself. Poverty levels are very high, and the long periods spent in IDP camps have made it difficult for people to invest, acquire assets and move out of poverty.

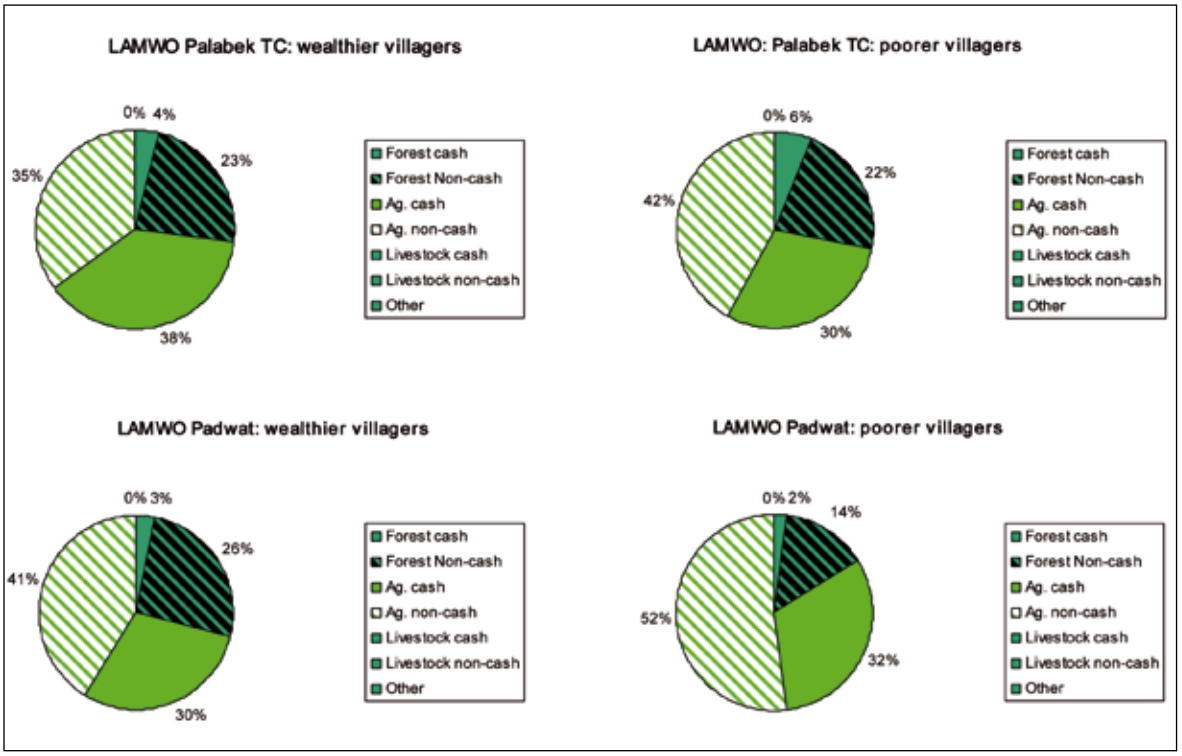
The forest is used for hunting and for gathering a wide range of wild fruit and timber products. Timber felling is regulated, but extensive felling occurs without permission, as people returning from IDP camps clear fields and build houses. The felling rate will slow as people resettle. Livestock lost during the period of insecurity are being restocked, and fodder and pasture supplies are still ample. Unfortunately, the sample drawn for the toolkit exercises contained no cattle owners.

Wealth differences in the two villages

In Palabek Ogil Trading Centre, wealthier villagers generate 27 percent of their livelihood income from forest, and poorer villagers 28 percent (Figure 22).

In remoter Padwat, forests generate 29 percent of total income among wealthier villagers, but only 16 percent among poorer villagers. Tool 2 results show that both agricultural lands and forests are two to six hours away from the village, so an inability to spread labour across both agricultural and forest lands is the likely explanation for this low figure. Poorer villagers are short of everything, especially farm tools (tool 6 results). Agriculture provides the bulk of income for both villages and both wealth categories. Only wealthier villagers in Palabek sell more produce than they consume; poorer Palabek inhabitants and all Padwat inhabitants consume more than they sell. In the sample, no villager derived income from off-farm, non-natural resource sources.

FIGURE 22: **Comparisons of wealthier and poorer villagers in Palabek Ogil Trading Centre and Padwat**



Gender differences in cash and consumption reliance on forests in Palabek Ogil Trading Centre

Although – as in all the survey villages – fuelwood is an important source of cash in Palabek, with both men and women collecting and selling it, it is interesting to note how important forest foods are as sale items. The most important products sold by men are honey, followed by shea butter, bushmeat and medicinal herbs. The most important products sold by women are shea butter, followed by honey.

FIGURE 23: **Cash income from forests in Palabek Ogil Trading Centre**

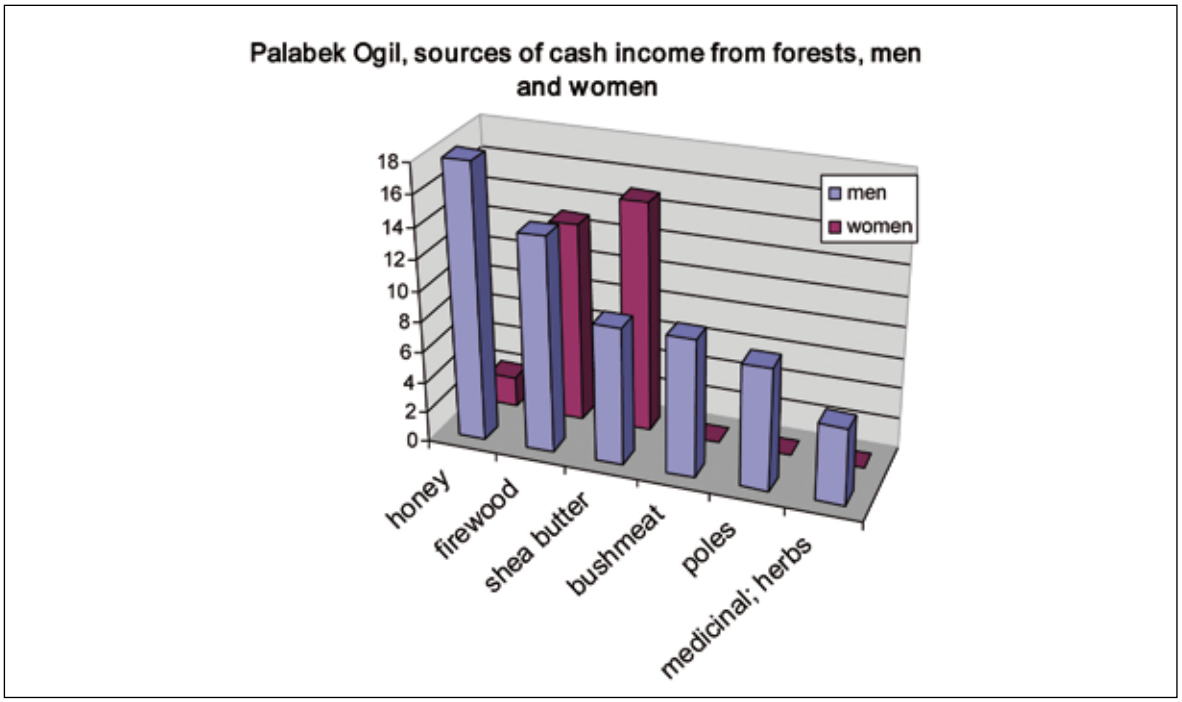
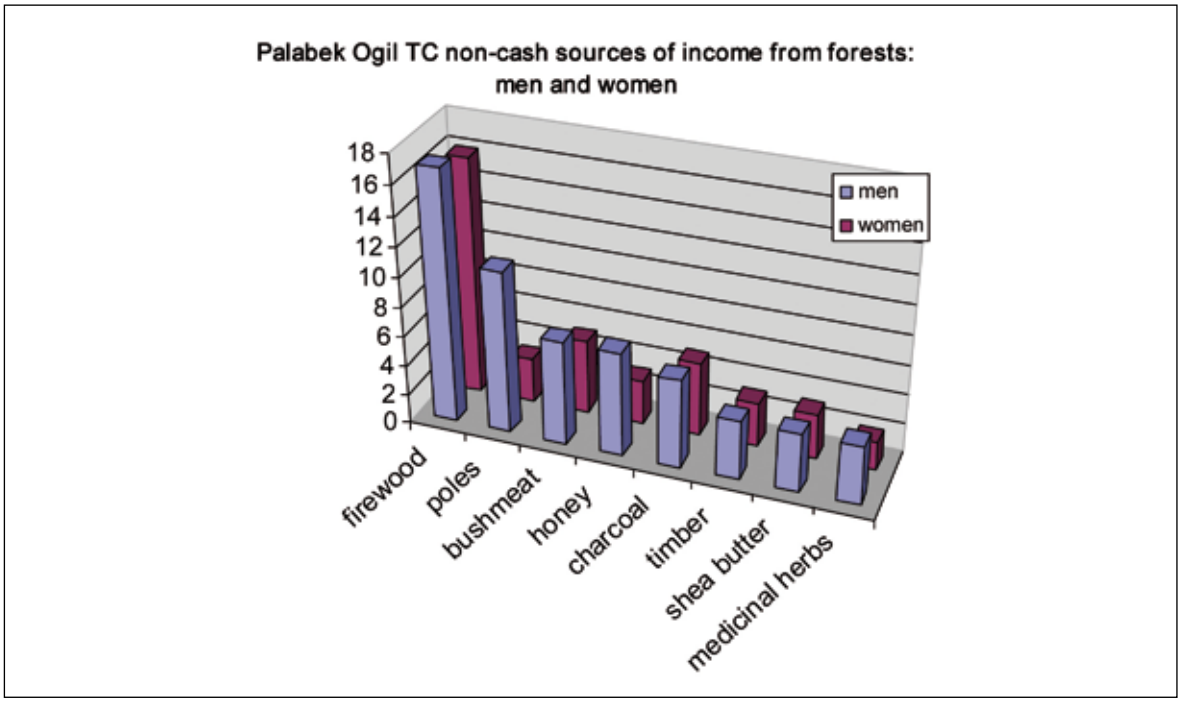


FIGURE 24: **Non-cash income from forests in Palabek Ogil Trading Centre**



For home consumption, as well as fuelwood and charcoal, bushmeat, honey, shea butter and medicinal herbs are important items collected by both men and women. Building materials are also collected by both genders, but more by men.

Gender differences in cash and consumption reliance on forests in Padwat

FIGURE 25: **Cash income from forests in Padwat**

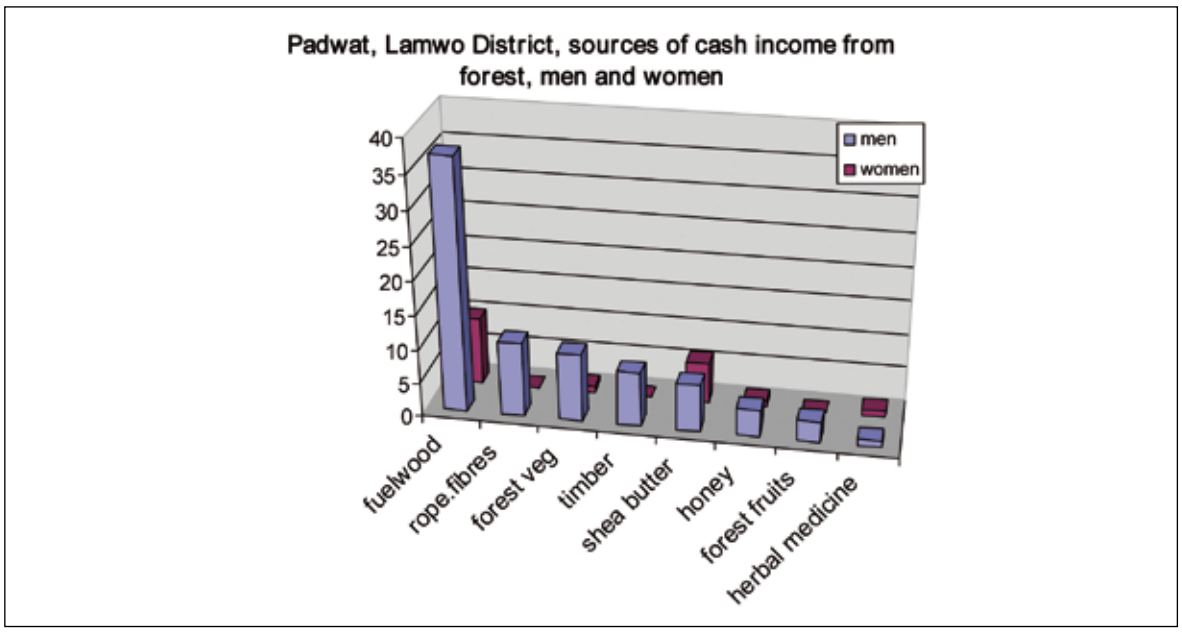
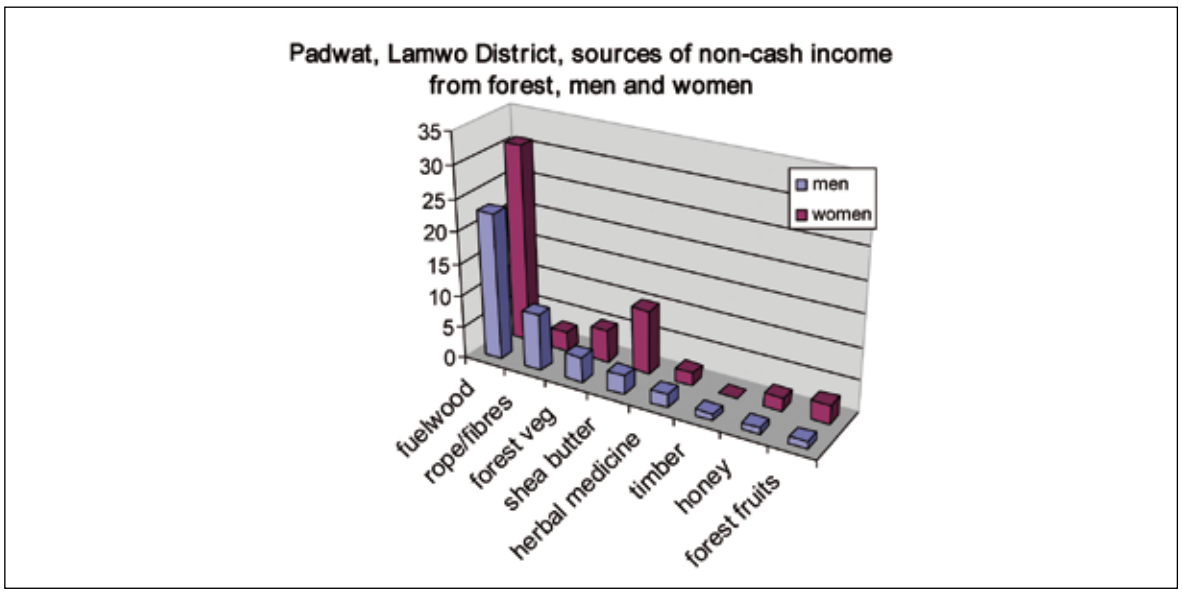


FIGURE 26: **Non-cash income from forests in Padwat**



The list of forest products sold and consumed in Padwat is similar to that for Palabek Ogil. Remoteness from the forest reduces villagers' access to forest products, which they gather for only essential needs and in small quantities.

Fuelwood is an important sale item for both men and women, although women sell far smaller quantities. Men also sell small quantities of forest foods, fibre for rope making, timber and medicinal herbs, while women sell a little shea butter and honey.

Women are the main collectors of fuelwood for home use. They also collect shea butter, small quantities of other forest foods, and fibre for rope and handicrafts. Men collect smaller quantities than women of all products except fibre.

5. FIELD DATA – SUMMARY OVERVIEW

This chapter summarizes the major results that emerge from the data presented in chapter 4, showing broad patterns of forest use and forests' main contributions to livelihoods across the four districts and the eight villages.

CONTRASTS AMONG THE FOUR DISTRICTS' USE OF NATURAL RESOURCES

Figure 27 is compiled from eight intradistrict pie charts. The data in each chart were derived from toolkit exercises involving four focus groups (with wealthier men, wealthier women, poorer men and poorer women) in each of two villages.

Masindi sells more forest products and agricultural produce than Kibaale, but otherwise the Masindi and Kibaale pie charts are remarkably similar. Both areas lie in the better forested west of Uganda, but Masindi is classed as forest–high poverty, while Kibaale is classed as high forest–low poverty:

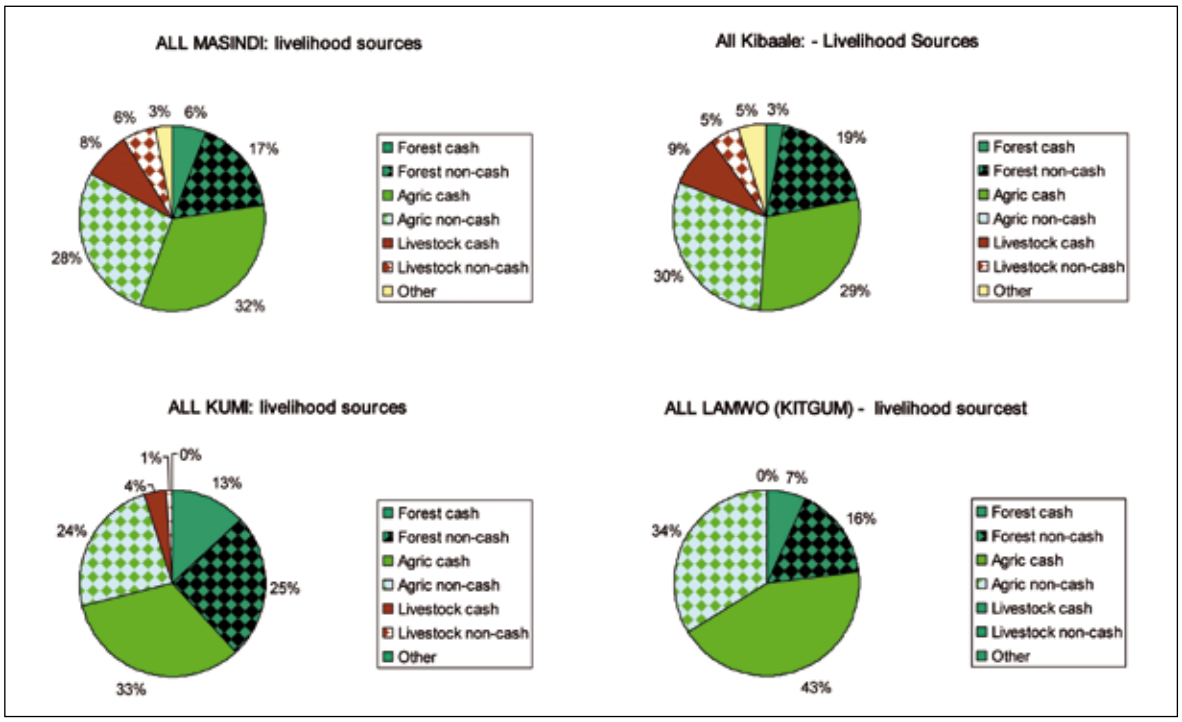
- Masindi household livelihood income: 23 percent forest; 60 percent agriculture; 14 percent livestock; and 3 percent off-farm employment;
- Kibaale household livelihood employment: 22 percent forest; 59 percent agriculture; 14 percent livestock; and 5 percent off-farm employment.

The other two pie charts are very different from these two. In Kumi (low forest–high poverty), poverty levels are about the same is in Masindi, with about 50 to 60 percent of the population below the poverty line. However, although Kumi's forest cover is low-density scattered woodland, forest dependence is by far the highest in the four districts, at 38 percent. This is partly because there is very little off-farm employment available, and partly because the area is being resettled as people return after the insurgency. After fuelwood, the highest sales of forest products are almost all building materials: poles, brick clay, fibre, and reeds and grass for thatch. Few people yet have the financial means to restock their cattle, and the lack of livestock leaves people more dependent on cash from the forest, and on some forest foods. Kumi is typical of large areas of eastern Uganda.

In Lamwo (Kitgum), people are returning home after years spent in IDP camps. Poverty levels are high, with about 80 percent below the Uganda poverty line, and population density is low. Forest has greatly regenerated in areas far from the camps, but some of these areas are too distant for forest use to be very high. Agricultural lands are fairly ample, and farmers currently seem to be investing far more in agriculture than in forest. Cattle restocking has just begun, but is not reflected in the samples from the two Lamwo villages. The situation in these two villages is typical of many areas in northern Uganda.

Land and forest use seems to be in rapid transition in Kumi and Lamwo, but has become relatively stable in Masindi and Kibaale. The final picture for the first two villages will probably resemble the balance of land uses already seen in Masindi and Kibaale, as population densities increase and cattle are brought back into the mix of income sources.

FIGURE 27: **Livelihood sources in all four districts**



IMPORTANT FOREST PRODUCTS IN THE SAMPLE VILLAGES

Summary tables of the most important types of forest product gathered for sale and for home use and consumption were compiled from focus groups in the eight villages (generating 32 datasets in all). All the scores were added to create a broader picture across the four districts, as opposed to the individual results for each village presented in Chapter 4. The results are presented in Tables 8 to 10.

The following forest products are used to generate cash:

- Fuelwood and charcoal are by far the most important (36 percent of all cash sales), with fuelwood about four times as important as charcoal.
- The second largest category is building materials (30 percent of sales), including poles, thatching materials, brick clay for firing (often in the forest) or fired bricks.
- Third in importance is the vast array of forest foods (21 percent of sales), which complement on-farm carbohydrates and include bushmeat, white ants and fish (protein), wild fruits and berries (vitamins A, C and E), forest leaves and vegetables (vitamins A, C, D and E and various amino-acids), cooking oils such as shea butter, and treats and flavouring such as honey and mushrooms.
- Fourth come fibre and cordage for tying poles together in house construction, laying thatch, and making mats, baskets, rope and string.
- Herbal medicines are the fifth most important category in cash terms.
- The least important category is timber.

The same products, in the same order, are of major importance for domestic use and consumption, with an even higher emphasis on fuelwood.

Table 10 shows the cash and non-cash importance of forest products weighted by the number of times that each was mentioned on the cash or non-cash charts used in tool 4. Individual forest products were mentioned a total of 3 221 times: 911 times for cash sales and 2 310 times for non-cash use and consumption. Cash and non-cash values were therefore weighted proportionally, with 3 221 set as 100 percent.

The results show that the non-cash value of each category of forest product is considerably higher than its cash value. Households use products that they gather in the forest to construct their homes, make ropes and baskets, cook their food and heat their homes, diversify their diets, and cure themselves when sick. As shown in Figure 28, to local people, the non-cash values of forest products are two to four times higher than the cash values.

TABLE 8: **Important forest products for cash income, aggregated (numbers of mentions)**

Forest product	Masindi District		Kibaale District		Kumi District		Lamwo District		Totals	Totals	Per cent
	Kyanga mwoyo	Kilanyi	Paachwa	Kiriyanga	Ongino TC	Kachaboi	Palabek TC	Padwat			
Fuel										**324**	**36**
Fuelwood	26	26	8	6	68	53	34	39	260		
Charcoal	18	4	4	0	26	10	2	0	64		
Subtotal									324	**324**	
Timber	6	0	0	8	0	0	6	7	27	**27**	**3.0**
Building materials (and tools)										**276**	**30.0**
Poles	15	24	10	8	13	32	10	0	112		
Thatch grass	10	0	0	0	23	49	0	0	82		
Withies			3						3		
Clay for bricks	0	0	1	0	41	37	0	0	79		
Subtotal									276	**276**	
Fibre for basket weaving, rope making etc.: rattan, palm leaves, papyrus, sisal, reeds, etc.	5	0	3	0	16	23	0	9	56	**56**	**6.0**
Herbal medicines	11	4	4	2	6	0	7	2	36	**36**	**4.0**
Forest foods										**192**	**21.0**
Forest fruits, berries, wild yams, vegetables	37	11	9	0	7	0	0	11	75		
Protein – bushmeat	4	0	3	0	0	0	11	0	18		
Protein – other (white ants, mudfish)	0	0	0	0	0	0	0	0	0		
Mushrooms	0	0	2	9	11	0	0	0	22		
Honey	0	0	0	1	0	0	26	4	31		
Shea butter	0	0	0	0	0	0	30	11	41		
Coffee seedlings		5							5		
Subtotal									192	**192**	
									911	**911**	**100.0**

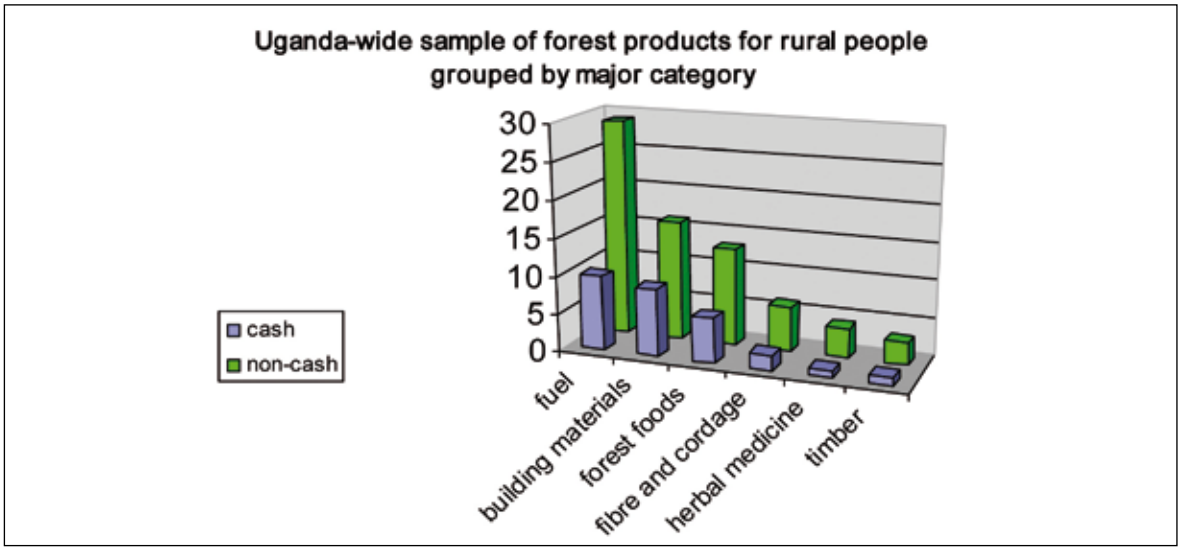
TABLE 9: **Important forest products for home use/consumption, aggregated (numbers of mentions)**

Forest product	Masindi District		Kibaale District		Kumi District		Lamwo District		Totals	Totals	Per cent
	Kyanga mwoyo	Kilanyi	Paachwa	Kiriyanga	Ongino TC	Kachaboi	Palabek TC	Padwat			
Fuel										**951**	**41**
Fuelwood	113	142	78	74	110	133	93	142	885		
Charcoal	0	8	0	0	21	7	30	0	66		
Subtotal									951	**951**	
Timber	10	20	6	44	0	0	19	4	103	**103**	**4.0**
Building materials (and tools)										**526**	**23**
Poles	37	27	29	19	42	53	40	0	247		
Thatch grass	17	10	0	7	57	70	0	0	161		
Withies			3						3		
Clay for bricks	0	2	0	0	47	63	0	0	112		
Hoe handles			3						3		
Subtotal									526	**526**	
Fibre for basket weaving, rope making etc.: rattan, palm leaves, papyrus, sisal, reeds, etc.	4	3	8	43	39	76	0	32	205	**205**	**9.0**
Herbal medicines	18	20	19	23	8	0	17	11	116	**116**	**5.0**
Forest foods										**409**	**18**
Forest fruits, berries, wild yams, vegetables	28	16	33	28	14	12	0	33	164		
Protein – bushmeat	12	0	1	3	0	0	33	0	49		
Protein – other (white ants, mudfish)	0	0	0	11	0	0	0	0	11		
Mushrooms	0	0	28	19	29	0	0	0	76		
Honey	0	2	9	11	0	0	27	6	55		
Shea butter	0	0	0	0	0	0	20	33	53		
Coffee seedlings				1					1		
Subtotal									409	**409**	
										2310	**100.0**

TABLE 10: **Relative importance of categories of forest product for cash and non-cash income**

Forest product category	Cash value		Non-cash value		Total	Non-cash importance compared with cash importance
	(No.)	(%)	(No.)	(%)	(%)	
Fuel	324	10.1	951	29.5	39.6	3 times as important
Building materials	276	8.6	526	16.3	24.9	Twice as important
Forest foods	192	6.0	409	12.7	18.7	Twice as important
Fibre (for ropes, baskets, etc.)	56	1.7	205	6.4	8.1	4 times as important
Herbal medicine	36	1.1	116	3.6	4.7	More than 3 times as important
Timber	27	0.8	103	3.2	4	4 times as important
Total number of times products mentioned	**911**		**2 310**		**3 221**	
Cash and non-cash percentages		**28.3**		**71.7**	**100%**	

FIGURE 28: **Relative importance of categories of forest product for cash and non-cash income**



CASH AND NON-CASH FOREST INCOME ACROSS ALL FIELD SITES

This section and Tables 11 and 12 examine the factors that shape cash and non-cash forest use.

Remoteness

The bottom lines of Tables 11 and 12 show the overall balances of cash and non-cash uses of forest resources across the two types of village – close to and distant from an urban centre/ market. Both types use similar proportions of forest products but, unsurprisingly, the villages nearer to urban centres sell higher percentages of these resources: 16 percent compared with 12 percent in the remoter villages.

In villages near to urban centres (line number 6 in the tables) villagers sell 32 percent of the resources they take from the forest, and use 68 percent of them for home consumption. In villages further from urban centres, villagers sell only 24 percent of the forest resources they collect, and use or consume 76 percent at home.

Wealthier and poorer villagers

Table 11 shows that although the forest dependence of all villagers is conditioned by their location relative to urban centres, the dependence levels of wealthier and poorer villagers in less remote villages differ quite sharply from one another: of the 32 percent of forest products sold by villagers in or near an urban centre, wealthier villagers sell only 8 percent while poorer villagers sell 24 percent. In remoter (often poorer) villages, the wealth distinction disappears in the case of cash sales, with both wealthier and poorer villagers selling 12 percent each of the 24 percent of all products sold.

In villages near urban centres, wealthier and poorer villagers collect equal shares of the 68 percent of forest products used and consumed at home, at 34 percent each. In remoter villages, the overall figure for gathered products – 76 percent – is divided into 34 percent for wealthier villagers and 42 percent for poorer villagers.

Men and women

Table 12 (line number 6) shows that men sell higher percentages of forest products than women in villages nearer to urban centres (18 percent for men, 14 percent for women) and those further away (14 percent for men, 10 percent for women). Men in both categories of village are also more heavily involved than women in gathering products for home consumption, although there is some variability among villages.

Main results

Tables 11 and 12 show that location makes a difference to how forests are used, and by whom:

- While the overall volume of use is similar in accessible and remote villages, inhabitants of accessible villages sell a higher proportion of what they gather (Table 11).
- In accessible villages, poorer villagers make a significantly higher percentage of forest produce sales than do wealthier villagers, while there is no difference between the two wealth categories in remote villages. In remote villages, the wealthier inhabitants rely more on forest for home consumption than do the wealthier inhabitants of accessible villages, while poorer villagers rely more heavily on home consumption than do wealthier villagers (Table 11).
- Men sell more forest produce than women do in both accessible and remote villages (Table 12).
- On average, men also gather somewhat more for home consumption than women do in both types of village (Table 12), but the situation varies among villages. This is an unusual finding, and may be linked to the high levels of insecurity that many areas of Uganda have experienced over the last two decades.
- Over the entire sample, only 28 percent of all forest products are collected for sale, while 72 percent are for home consumption, a ratio of 1: 2.5.

TABLE 11: **Cash and non-cash forest income, by village location and household wealth category (numbers of mentions)**

	Villages near to urban centres							Villages further from urban centres						
	Cash			Non-cash			All	Cash			Non-cash			All
	Wealthier	Poorer	Total	Wealthier	Poorer	Total		Wealthier	Poorer	Total	Wealthier	Poorer	Total	
1. Kibaale	Paachwa							Kiriyanga						
	12	39	51	131	116	247	298	20	20	40	120	181	301	341
2. Masindi	Kyamgamwoyo							Kilanyi						
	34	102	136	105	134	239	375	71	n/d	71	131	154	285	356
3. Kumi	Ongino Trading Centre							Kachaboi						
	47	164	211	175	192	367	578	77	127	204	161	253	414	618
4. Lamwo Kitgum	Palabek Trading Centre							Padwat						
	33	93	126	160	119	279	405	31	52	83	156	105	261	344
5. Total (no.)	**126**	**398**	**524**	**571**	**561**	**1 132**	**1 656**	**199**	**199**	**398**	**568**	**693**	**1 261**	**1 659**
6. Total (%)	**8%**	**24%**	**32%**	**34%**	**34%**	**68%**	**100%**	**12%**	**12%**	**24%**	**34%**	**42%**	**76%**	**100%**
Contribution to total income			**524**			**1 132**				**398**			**1 261**	**3 315**
			16%			**34%**				**12%**			**38%**	**100%**

TABLE 12: **Cash and non-cash forest income, by village location and gender (numbers of mentions)**

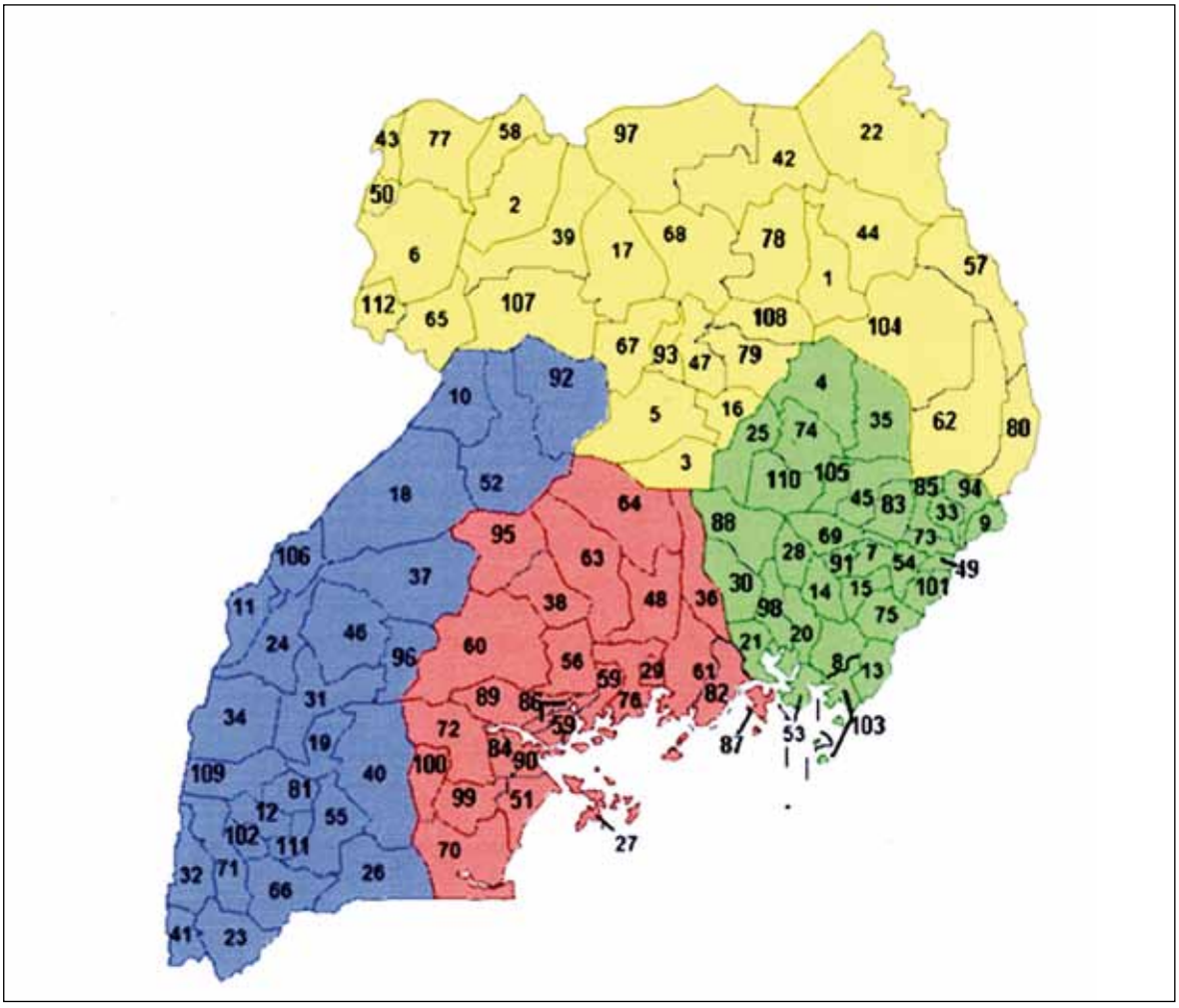
	Villages near to urban centres							Villages further from urban centres						
	Cash			Non-cash			All	Cash			Non-cash			All
	Men	Women	Total	Men	Women	Total		Men	Women	Total	Men	Women	Total	
1. Kibaale	Paachwa							Kiriyanga						
	48	3	51	135	112	247	298	20	20	40	186	115	301	341
2. Masindi	Kyamgamwoyo							Kilanyi						
	78	58	136	103	136	239	375	24	47	71	157	128	285	356
3. Kumi	Ongino Trading Centre							Kachaboi						
	85	126	211	181	186	367	578	113	91	204	196	218	414	618
4. Lamwo Kitgum	Palabek Trading Centre							Padwat						
	86	40	126	166	113	279	405	67	16	83	116	145	261	344
5. Total (no.)	**297**	**227**	**524**	**585**	**537**	**1 132**	**1 656**	**224**	**174**	**398**	**655**	**606**	**1 261**	**1 659**
6. Total (%)	**18%**	**14%**	**32%**	**35%**	**32%**	**68%**	**100%**	**14%**	**10%**	**24%**	**40%**	**36%**	**76%**	**100%**
Contribution to total income			**524**			**1 132**				**398**			**1 261**	**3 315**
			16%			**34%**				**12%**			**38%**	**100%**

6. COMBINING FIELD DATA, HUMBOLDT UNIVERSITY'S CATEGORIES AND NATIONAL-LEVEL DATA

INTRODUCTION

Uganda has 110 districts, grouped into four regions (Map 5): Northern (yellow), Western (blue), Eastern (green) and Central (red).

MAP 5: **Uganda's 110 districts**

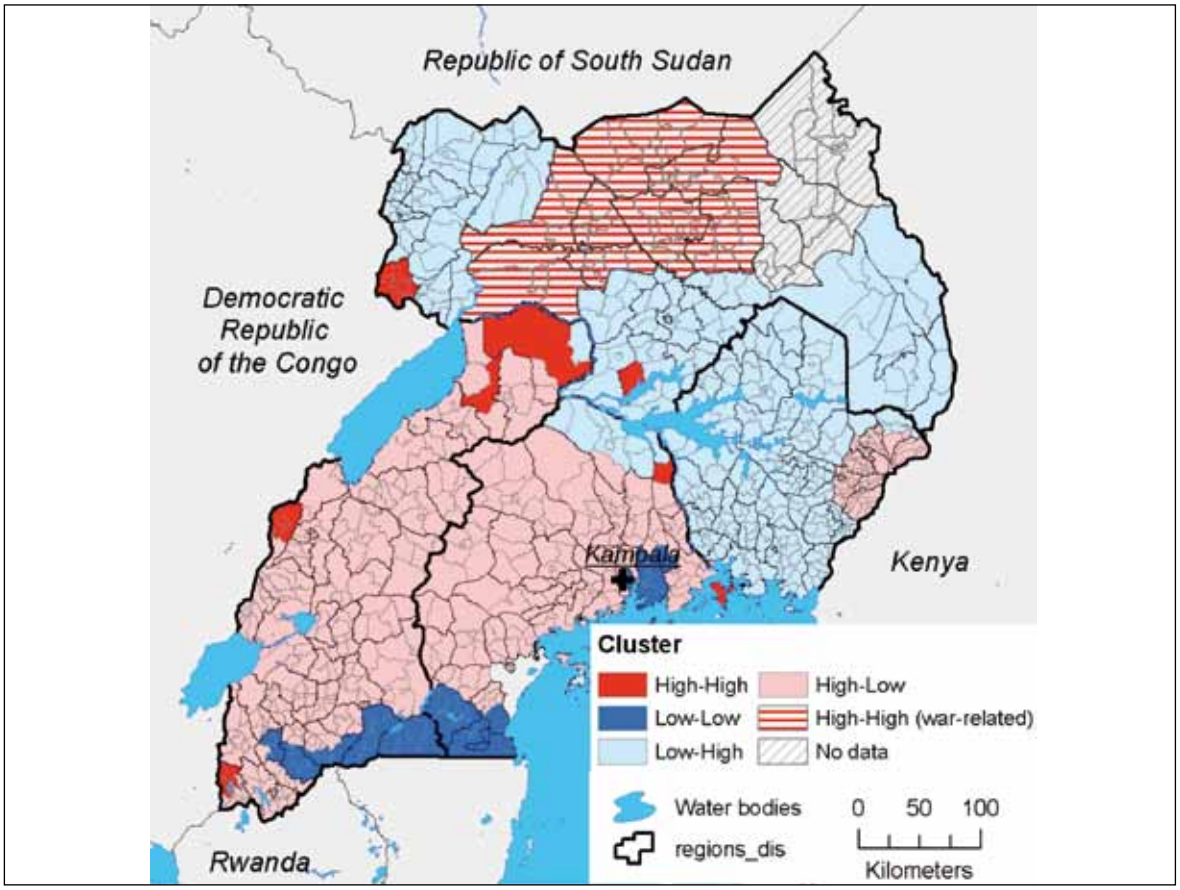


The preliminary Humboldt analysis (chapter 3) offered a way of classifying Uganda's districts according to the relationship between tree cover and poverty level. This categorization made it possible to select sample sites for field work in four districts that are representative of many other districts in Uganda. (Results are reported in chapter 4.):

- Masindi (52 on Map 5): high forest–high poverty in Western Region;
- Lamwo (97 on Map 5): high forest–high poverty in an ex-war area in Northern Region;
- Kibaale (37 on Map 5): high forest–low poverty in Western Region;
- Kumi (45 on Map 5): low forest–high poverty in Eastern Region.

Subsequent analysis of the Humboldt data facilitated countrywide estimates of rural forest dependence based on the detailed data collected. This analysis was based on the maps of poverty incidence and density and forest cover in chapter 3. Field material from the northernmost district sampled (Lamwo) was discussed with Ugandan colleagues, and it was agreed that a further category based on forest cover and poverty incidence existed in the north of the country, where war and insecurity had kept the population confined to IDP camps outside the area, resulting in considerable forest regeneration. The final classifications are shown in Map 6.

MAP 6: **Final classification by forests and poverty relationship**



In Map 6, districts with similar forests and poverty relationships to Masindi's are shown in red; those similar to Lamwo are in red and white stripes; those similar to Kibaale are in pink; and those similar to Kumi are in turquoise.

The dark-blue areas have low forest and low poverty and were not sampled for fieldwork (only four districts could be covered with the available resources) or included in the following calculations. In the black-striped area, poor security during the years of conflict made it impossible to collect poverty data, so this area was also excluded from the calculations. Bright blue areas are water bodies.

THE URBAN–RURAL SPLIT IN THE FOUR REGIONS

The urban–rural split in the four regions was not available from the latest population estimates in the 2010 UBOS Statistical Abstract (UBOS 2010a), but percentages could be calculated from 2006 data and applied to the 2010 estimates.

TABLE 13: **Proportions of urban and rural population, by region, 2006**

Countrywide						Within region				
Region	**Urban**		**Rural**		**Total**	**Urban**		**Rural**		
Central	55.9	8.6	24.4	20.6	29.2	29.5	29	70.5	71	100.0
Eastern	12.8	2.0	27.4	23.2	25.2	7.9	8	92.1	92	100.0
Northern	18.4	2.8	20.0	16.9	19.7	14.4	14	85.6	86	100.0
Western	12.9	2.0	28.2	23.9	25.9	7.7	8	92.3	92	100.0
	100		100		**100**					
All Uganda		**15.4**		**84.6**	**100**					

These urban–rural percentages were then applied to the current populations of all the districts in Uganda, region by region, and each district was allocated to one or more of the forests and poverty categories (see Annex 1, Table 1 for results).

RURAL PER CAPITA INCOME IN THE REGIONS

Table 14 uses figures from the most recent year for which data are available (2005/2006) showing Uganda's average national household expenditure and how urban and rural averages vary by region. The fifth column shows that Central Region's rural household expenditure is 111 percent of the national average; Eastern Region's is 79 percent; Northern Region's is 46 percent; and Western Region's is 91 percent.

TABLE 14: **Household consumption expenditure, 2005/2006**

Region	Rural U Sh/month	US$/ month**	US$/year	Regional as % of national average	Urban U Sh/month	US$/ month	US$/year	Regional as % of national average
Kampala					333 704	187.4	2 248.4	219.00
Central*	168 688	94.7	1 136.6	111.00	276 635.0	155.3	1 863.9	182.00
Eastern	120 176	67.5	809.7	79.00	212 255.0	119.2	1 430.1	140.00
Northern	70 173	39.4	472.8	46.00	150 692.0	84.6	1 015.3	99.00
Western	138 201	77.6	931.2	91.00	246 462.0	138.4	1 660.6	162.00
National average	152 068	85.4	1 024.6					

* Excluding Kampala. ** U sh 1 781 = US$1 in 2005.

Source: UBOS, 2010: 122.

According to the International Monetary Fund (IMF), Uganda's average per capita income in 2008/2009 was US$506 and the figure is projected to rise to US$850 by 2014/2015 (Government of Uganda, 2010). It is thus reasonable to use a per capita figure of US$535 for 2010.

Using the differentiations in rural percentages shown in Table 14 regional per capita income figures can be derived: US$594 in Central District (111 percent of US$535); US$423 in Eastern District (79 percent); US$246 in Northern District (46 percent); and US$497 in Western District (91 percent).

TOTAL RURAL INCOME BY REGION AND FORESTS AND POVERTY CATEGORY

Annex 1, Table 2 shows the total rural population for each region, grouped by forests and poverty categories, together with the per capita income calculated for the region.

These figures were used in conjunction with those from the fieldwork (Figure 27 in chapter 5) to calculate the proportions of rural income derived from forest, agriculture and so on. The data also permitted income from non-cash forest consumption to be factored in. This income is not normally counted in per capita income calculations in Uganda or elsewhere.[15] The results are set out in full in Annex 1, Tables 3 to 10, and summarized in Tables 15 and 16.

The regional figures in Table 15 show how in the "stable" Uganda pattern represented by Central and Western regions, the rural livelihood portfolio is made up of agriculture, with about 60 percent, forest products, with 22 to 23 percent, livestock with 13 to 14 percent, and employment and small-scale trade, with 5 percent. In the more disrupted Northern and Eastern regions, which have had to deal with many years of war and are just beginning to settle back into normality, agriculture contributes a similar proportion of the portfolio, but forests are far more important, substituting for income from cattle herds, which will take time to build up, and the still very weak employment/trading sector. Forests are also important in the rebuilding of homes, of course.

In Table 16, analysis by forests and poverty category shows similar patterns for the high forest–high poverty and high forest–low poverty parts of the country, where forests contribute between a fifth and a quarter of livelihoods. Despite their scattered nature, forests are very highly valued in low forest–high poverty areas, which have been much affected by insecurity. In the northern ex-war areas, with high poverty and much forest regrowth, households value agriculture above all.

Numbers in the two tables are overprecise because of the types of data that have been combined. Rounded figures and percentages make the main points (last two lines of each table).

[15] Per capita income is normally derived from cash income from employment and trade, from sales of agricultural, forest and other environmental products, and from home consumption of food produced on the farm. It excludes home consumption of forest products, which is included in this study.

TABLE 15: **Main income sources for the rural population, by region (Annex 1, Tables 3, 4, 5 and 6)**

Region	Total rural population	Total rural income (US$)	Agriculture cash and consumption (US$)	Livestock cash and consumption (US$)	Employment and trade (US$)	Forest income cash and consumption (US$)
Central	4 374 713	3 099 011 912	1 825 722 267	420 204 910	146 683 359	706 401 376
Percentage		100	59	13	5	23
Northern	6 913 139	2 086 361 442	1 285 836 166	83 517 708	1 031 438	715 976 130
Percentage		100	61.5	4	0.5	34
Eastern	8 985 417	4 709 933 309	2 700 967 338	308 870 751	40 763 381	1 659 331 839
Percentage		100	57	7	1	35
Western	7 330 612	4 240 883 553	2 506 465 518	593 723 697	203 355 735	937 338 603
Percentage		100	59	14	5	22
Total	**27 603 881**	**14 136 190 216**	**8 318 991 289**	**1 406 317 066**	**391 833 913**	**4 019 047 948**
Percentage		**100**	**59**	**10**	**3**	**28**
Rounded		**14.1 billion**	**8.3 billion**	**1.4 billion**	**392 million**	**4.01 billion**

TABLE 16: **Main income sources for the rural population, by forests and poverty category (Annex 1, Tables 7, 8, 9 and 10)**

Forests and poverty category	Total rural population	Total income (US$)	Agriculture cash and consumption (US$)	Livestock cash and consumption (US$)	Employment and trade (US$)	Forest income cash and consumption (US$)
HH Masindi-type	930 812	502 810 848	301 686 508	70 393 519	15 084 326	115 646 495
Percentage		100%	60	14	3	23
HL Kibaale-type	12 309 220	7 534 991 729	4 445 645 119	1 054 898 842	376 749 587	1 657 698 181
Percentage		100%	59	14	4	22
LH Kumi-type	12 689 145	5 620 494 106	3 203 681 640	281 024 706	0	2 135 787 760
Percentage		100%	57	5	0	38
HH northern war-affected	1 674 704	477 893 533	367 978 021	0	0	109 915 512
Percentage		100%	77	0	0	23
All	**27 603 881**	**14 136 190 216**	**8 318 991 289**	**1 406 317 066**	**391 833 913**	**4 019 047 948**
Percentage		**100**	**59**	**10**	**3**	**28**
Rounded		**14.1 billion**	**8.3 billion**	**1.4 billion**	**392 million**	**4.01 billion**

HH = high forest–high poverty.

HL = high forest–low poverty.

LH = low forest–high poverty

FOREST INCOME AT THE NATIONAL LEVEL

The total value of forests to rural people in Uganda comes to about US$4.01 billion. Of this, 28 percent comes through sales of forest products such as fuelwood, building materials, forest foods, fibre, medicines and timber, with a total annual value of US$1.137 billion; 72 percent – US$2.882 billion – is contributed by the forest products that are used and consumed at home.

TABLE 17: **Total annual value of forest products to rural people**

Forest product category	Cash value		Non-cash value		Total value of forest products	
	(US$ million)	(%)	(US$ million)	(%)	(US$ million)	(%)
Fuel	406	10.1	1 186	29.5	1 592	39.6
Building materials	346	8.6	655	16.3	1 001	24.9
Forest foods	241	6.0	510	12.7	752	18.7
Fibre (for ropes, baskets, matting, etc.)	68	1.7	257	6.4	326	8.1
Herbal medicines	44	1.1	145	3.6	189	4.7
Timber	32	0.8	129	3.2	161	4
Total	**1 137**	**28.3**	**2 882**	**71.7**	**4 019**	**100**

At the household level, the forest provides US$730 a year, which for an average household of five members is US$146 for every man, woman and child. This household forest income is made up of US$290 from fuel, US$180 from building materials, US$135 from forest foods, US$60 from fibre, US$35 from herbal medicines and US$30 from timber.

Forests' direct value to Uganda's rural people is best seen through comparisons. Forest products often substitute for goods that the Ugandan government cannot afford to provide itself.

Energy

Uganda's energy budget for 2011/2012 was expected to reach US$514 million.[16] Energy from the forest, which rural people use for cooking, lighting and heating, is worth almost US$1.6 billion – three times as much.

Housing

Ninety-seven percent of houses in Uganda are constructed from forest products or wood-fired bricks – 46 percent are made of mud and poles, and 52 percent of wood-fired bricks; 42 percent have thatched roofs; and only 3 percent are made of concrete or other "modern" materials (UBOS, 2010b).

Building materials from the forest are worth more that US$1 billion a year. Forest fibres (for making rope, string, ties for poles and thatch, mats, baskets, etc.) are used to complete and furnish the home, and also provide households with farming and foraging equipment. Their annual value is US$325 million.

[16] www.casepolicy.org/p208.

Health and food security

In 2009/2010, Uganda's health budget was US$319 million, or US$10.4 per member of the population. Most of this money comes from foreign donors and is spent on three diseases – HIV/AIDS, tuberculosis and malaria. The Chief Planner of the Ministry of Health reported that in 2010 US$28 per capita would be required to provide the Uganda National Minimum Health Care Package, which also addresses diseases and health care matters such as respiratory tract infections, malnutrition, and child and maternal mortality (Lirri, 2010).[17]

Data collected by this report suggest that every year, every rural Ugandan can collect at least US$27-worth of health-giving foods from the forest (forest foods are particularly valuable as sources of protein, vitamins and minerals that are lacking in farm diets) and another US$7-worth of herbal medicines. Herbal medicines alone are worth US$189 million a year to rural Ugandans – nearly 60 percent of the national health budget.

The forest is therefore vital in supplementing shortfalls in government health budgets and promoting food security. Forest food accounts for 19 percent of forest income (Table 17) and 8 percent of all the food consumed and sold, including that from agricultural production (Tables 15 and 17). Forest food's nutritional quality is probably even more important than its quantity (FAO, 1990; 1991). It is now well recognized in the agriculture and food policy sectors that nutrition security is not the same as food security (Heidhues et al., 2004; ODI, 2002).

Post-conflict reconstruction

Calculations from the study data give a figure of US$4.01 billion for the value of forest products to rural people in Uganda. At present, as shown in Table 15, two of the study regions – Central and Western – are relatively stable while Eastern and Northern regions are still recovering from civil war and conflict. Table 18 shows what the total value of forest products would be if all four regions were as stable as Central and Western.

Table 18: Hypothetical total rural income once stability has been established in all four regions

Per capita income	Total population	Recorded total income	Unrecorded income from forest consumption	Total income	Agriculture cash and consumption	Livestock cash and consumption	Employment and trade	Forest sales	All forest income (sales + home consumption)
Central Region (actual)									
US$ 594			19%		59%	13%	5%	4%	23%
	4 374 713	US$ 2 598 579 522	US$ 597 236 619	US$ 3 099 011 911	US$ 1 825 722 267	US$ 420 204 910	US$ 146 683 359	US$ 109 164 757	US$ 706 401 376
Northern Region (hypothetical)									
US$ 246			19%		59%	13%	5%	4%	23%
	6 913 139	US$ 1 700 632 194	US$ 384 512 939	US$ 2 023 752 311	US$ 1 194 013 863	US$ 263 087 800	US$ 101 187 616	US$ 80 950 092	US$ 465 463 031
Eastern Region (hypothetical)									
US$ 423			19%		59%	13%	5%	4%	23%
		US$ 3 800 831 391	US$ 859 367 978	US$ 4 522 989 355	US$ 2 668 563 720	US$ 587 988 616	US$ 226 149 468	US$ 180 919 574	US$ 1 040 287 552
Western Region (actual)									
US$ 423			19%		59%	14%	5%	3%	22%
	US$ 7 330 612	3 570 008 044	US$ 797 079 432	US$ 4 240 883 553	US$ 2 506 465 518	US$ 593 723 697	US$ 203 355 735	US$ 140 259 171	US$ 937 338 603
All									US$ 3 149 490 562
ROUNDED									**US$$ 3.1 billion**

[17] The author of this article also points out that an excessive proportion of the notional US$10.4 per person is spent on central administration rather than the delivery of health services.

In Table 18, under "stable" conditions in Uganda, on average, rural people generate:

- 59–60 percent of livelihood income (cash and consumption) from agriculture;
- 13–14 percent from livestock (cash and consumption);
- 22–23 percent from forest (cash and consumption);
- 4–5 percent from employment and/or trade.

When this pattern is applied to the two "unstable" regions (using the same per capita income figures), reliance on forest drops considerably, with overall forest income falling to about US$3.1 billion (Table 18). This drop of US$870 million in products gathered from forests in Northern and Eastern regions is likely to occur when post-conflict reconstruction has been completed.

Forests help in the transition from war to peace in three vital ways:

- They provide materials for building new homes as families return to their lands and villages.
- One of their best-known roles is in bridging gaps in the flow of other resources, by helping families to survive until employment and trading opportunities resume in ravaged areas.
- With agriculture, they support households' slow rebuilding of livestock assets, ¬which are a relatively exchangeable store of investment wealth vital for coping with shocks and regular or occasional expenses such as school fees, marriages and funerals.

When life returns to normal in the two unstable regions, forest dependence will drop to the levels seen in other parts of Uganda, but until then the forest is a crucial resource for reconstruction.

7. CONCLUSIONS

PREVIOUS VALUATIONS OF FOREST IN UGANDA

As the draft National Forest Plan for Uganda (2011) notes, "the estimation of the contribution of forests to the national economy in Uganda still presents both conceptual and methodological challenges. In general, it is believed that the contribution of forests is routinely underestimated". The following are some of the reasons for this underestimation:

- Forests produce multiple products, and methodologies for applying values to these products are largely missing.
- Forests provide many products that scarcely enter the market.
- Many forest products play a minor part in forest sales, but a very major part in home consumption.
- Many forest products are important to the livelihoods of the rural poor, but are not well recognized in commodity markets.

Falkenberg and Sepp (1999, quoted in Bush et al., 2004) calculated that the value of *timber*, together with the associated processing and other value-added activities, amounted to about 6.1 percent of Uganda's GDP.

Bush *et al.* (2004) noted that forest's contribution to global GDP is estimated at 6 percent (excluding forest environmental services). However, they estimated from their own field surveys that the direct value of forests in Uganda was only about US$190 million in 2004 (3.5 percent of total GDP of US$6.2 billion).[18]

For unclear reasons, given the conclusions arrived at in earlier work, UBOS follows Bush *et al.* in estimating the livelihood value of Uganda's forests at only 3.5 percent of GDP – US$506 million[19] in 2009 (when GDP was $15.8 billion).

A Forest Department estimate quoted in Bush *et al.* at the time of their survey in 2004 calculated that about 70 percent of Uganda's wood consumption was in the informal sector; this quantity was not factored into Falkenberg and Sepp's 6.1 percent figure. As no attempt has been made to calculate the value of other forest products such as NWFPs, the true value of forests to the national economy[20] is likely to be very much higher than 6.1 percent, although this remains the commonly quoted figure (e.g., UNDP/NEMA/UNEP Poverty Environment Initiative, 2009).

At 6.1 percent of GDP in 2009, the value of forests would actually have stood at US$963 million rather than US$506 million. However, if ¬– as seems likely ¬¬– this figure excludes 70 percent (itself a very conservative estimate) of timber and NWFP extraction, then the real figure for forest value would have been closer to US$3.2 billion in 2009.

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[18] Bush *et al.* suggest that forest environmental services contribute an additional US$110 million, bringing the total value of Uganda's forests to US$300 million or 5–6 percent of GDP.
[19] Final draft of Uganda National Forest Plan, 2011.
[20] Excluding environmental services.

THIS REPORT'S VALUATION OF FOREST

The fieldwork for this report (data were collected in 2010) used different methods from those employed by Bush et al. in 2004. Its sample districts (and villages) were selected on the basis of criteria using forests and poverty categories for the whole country; data were gathered from sample villages using intensive short surveys that were fine-tuned by gender and wealth level, and results from sample districts were applied to all the other districts in Uganda with similar forest cover and poverty classifications (Maps 4 and 6).

The results suggest that forest is currently worth US$4.01 billion to rural people, at a time of intensive readjustment and post-conflict reconstruction (Table 15), and that this figure will decline to US$3.1 billion once reconstruction is complete (Table 18). These figures are high by the standards of Bush et al. (2004) and UNDP/NEMA/UNEP Poverty Environment Initiative (2009), but they are very similar to the hypothesized true valuation of forest of US$3.2 billion in 2009.

This report has frequently noted that the values of forest products consumed at home are completely unrecorded, even though they are huge and outweigh the value of marketed forest products by two to three times. The figure of US$4 billion for the value of forests calculated in this report is made up of US$2.9 billion from forest product consumption and US$1.1 billion from forest sales (Table 17). The cash figure (US$1.1 billion) is about 6 percent of GDP.

As the consumption value of forests is not currently counted when calculating GDP, US$2.9 billion is missing from the GDP figure of US$17.01 billion. However, the consumption components of livestock, fishing and even agriculture are not fully reflected in this figure either, so it would be incorrect to add only forest consumption.

Uganda's forests clearly play a major role in the lives of rural people (87 percent of all Ugandans) and a more minor role in the lives of urban people who use fuelwood or charcoal for cooking or whose houses are constructed using poles, thatch or wood-fired bricks. The forest's overall contribution to the Ugandan economy is probably closer to 15 percent than 6 percent, and may be even higher.

Better recognition of the value of forest could lead to changes in some of the poor land-use decisions currently being made by a government that assumes forests have virtually no value. For instance, in August 2011,[21] the President decided to convert a quarter of a major natural forest into a sugar plantation to enable the Uganda Sugar Corporation to double its output. The assumption seemed to be that the land was lying idle and could be put to economic use, while this report has shown that instead forests are of significant value to Uganda's economy.

[21] *Guardian Weekly*, 2 September 2011, p. 8. London.

PATHWAYS OUT OF POVERTY

Above all, the data collected for this study show how firmly forests underpin local livelihoods, providing fuel, building materials, food and medicines. Forests are essential to the daily lives of everyone.

Forests are not just for hard times (although they have a key role in post-conflict reconstruction in Uganda). They are for men and women, for richer and poorer people (although they supply a somewhat larger percentage of the needs of the poor), and for people living near markets as well as people living in remoter areas, whose reliance on forest is somewhat higher.

For all rural women and most rural men, apart from the very wealthiest, the livelihood needs collected from forests are far more important than the forests' timber values. This situation helps to explain why the contribution of forests to national GDP has been so invisible.

Earlier discussions of forests' role in poverty alleviation tended to look for direct income-generating activities, such as forest products to sell, which would lift people out of poverty. However, these efforts have tended to fail, except where timber sales are possible or where it is economic to grow trees to sell for poles. (The NFA Web site is currently encouraging the planting of pine and eucalypt plantations for telegraph poles by people with cash to invest and a few spare hectares of land.)[22] A few of the world's forest areas produce high-value commercial products such as Brazil nuts and nutmeg, but these forest and products are very much the exception.

In Uganda, forest-based cash is raised mainly from the sale of fuelwood and charcoal (36 percent of all sales), followed by building materials (30 percent) and forest foods (21 percent). The remaining 13 percent of sales are split among fibre, herbal medicines and timber (chapter 5). The money raised is invested in livestock (a rapid multiplier of wealth if droughts and wars do not intervene) and school fees, which help to enhance shorter- and longer-term resilience to shocks.

However a far greater proportion of forest income goes to support the household through direct consumption rather than cash sales. Cash sales account for only 28 percent of forest income, while direct consumption accounts for 72 percent (Table 10).

The chief role of forests for rural households is therefore to provide energy and to contribute to providing a home and furnishings, food and nutrition security and health, through both better nutrition and forest medicines. All of these aspects of forest income reduce households' vulnerability.

Forest products increase livelihood resilience and help to provide a household with a secure basis from which its members can take some risk as they seek income-generating opportunities from agriculture, employment, investment in livestock or tree planting.

[22] www.nfa.org.ug/

As the section on post-conflict reconstruction in chapter 6 makes clear, forests have helped households as they settle back into their pre-conflict lives and begin to look for ways to invest for the future. Over and above the support provided by forests in "stable" regions, households in Northern and Eastern regions have derived an additional US$275 a year from forest products, which are helping them through the early resettlement period.

NEXT STEPS

This report has the simple goal of attracting policy-makers' attention to the importance of forests to livelihoods; national-level as well as local data are needed to achieve this objective. However, the methodology described in the report was designed to make the best use of limited resources, and the data generated are not as effective as those from a nationwide survey would be.

The report therefore does not recommend that FAO's FRA use the methodology described, although the reported results emphasize the urgent need to collect data that highlight forests' livelihood values, especially in poorer countries with high percentages of their populations living in rural areas.

Instead, the report recommends that further work be directed towards developing a forestry module to be used in household and living standards surveys and censuses. This module should capture all the income from forests – including the non-cash income that is such a large part of forests' contribution to the livelihoods of local people – to provide FRA with affordable livelihood data over the next decade.

The design of instruments for gathering forest data will require World Bank support and FAO collaboration. The World Bank advises developing countries that are interested in improving the quality of their livelihood data on forests to request such assistance. Central statistics offices in three or four countries can then work with FAO and the World Bank to initiate and test the process at the country level.

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ANNEX 1

BACKGROUND TABLES: DETAILED CALCULATION OF RURAL INCOME

Table 1: Urban–rural population split, by district and Humboldt University forests and poverty category.

Table 2: Total rural area income, by district, Humboldt forests and poverty category and per capita income.

Tables 3 to 10: Total rural income for each region and each Humboldt forests and poverty category.

TABLE 1: **Districts of Uganda: populations in 2010, Humboldt University forests and poverty categories and rural–urban splits**

Western Region					Rural		Urban
Map	District	Pop. 2002	Pop. 2010		100	92	8
81	Buhweju	82 881	109 403	W	HL	100 650.8	8 752.2
10	Buliisa	63 363	77 000	W	HL	70 840.0	6 160.0
12	Bushenyi	205 671	858 700	W	HL	790 004.0	68 696.0
18	Hoima	343 618	499 100	W	HL	459 172.0	39 928.0
19	Ibanda	198 635	242 800	W	HL	223 376.0	19 424.0
23	Kabale	458 318	490 200	W	HL	450 984.0	39 216.0
24	Kabarole	356 914	403 100	W	HL	370 852.0	32 248.0
31	Kamwenge	263 730	317 000	W	HL	291 640.0	25 360.0
32	Kanungu	204 732	241 800	W	HL	222 456.0	19 344.0
34	Kasese	523 033	695 600	W	HL	639 952.0	55 648.0
37	Kibaale	405 882	613 300	W	HL	564 236.0	49 064.0
40	Kiruhura	212 219	280 200	W	HL	257 784.0	22 416.0
96	Kyegegwa	110 925	146 421	W	HL	134 707.3	11 713.7
46	Kyenjojo	266 246	504 600	W	HL	464 232.0	40 368.0
55	Mbarara	361 477	427 200	W	HL	393 024.0	34 176.0
102	Mitooma	160 802	212 259	W	HL	195 278.3	16 980.7
106	Ntoroko	51 069	67 411	W	HL	62 018.1	5 392.9
109	Rubirizi	101 804	134 381	W	HL	123 630.5	10 750.5
111	Sheema	180 234	237 909	W	HL	218 876.3	19 032.7
11	Bundibugyo	158 909	312 600	W	HL	143 796.0	12 504.0
11	Bundibugyo	158 909	312 600	W	HH	143 796.0	12 504.0
41	Kisoro	220 312	247 200	W	HL	113 712.0	9 888.0
41	Kisoro	220 312	247 200	W	HH	113 712.0	9 888.0
52	Masindi	208 420	602 100	W	HL	276 966.0	24 084.0
52	Masindi	208 420	602 100	W	HH	276 966.0	24 084.0
92	Kiryandongo	187 707	247 773	W	HH	227 951.2	19 821.8
26	Isingiro	316 025	396 700	W	LL	364 964.0	31 736.0
66	Ntungamo	379 987	458 000	W	LL	421 360.0	36 640.0
71	Rukungiri	275 162	311 500	W	LL	286 580.0	24 920.0

2010 value of new districts marked in deep yellow computed using Western Region growth rate for 2002 of 3.2 percent (UBOS, 2010a: 20, Table 2.4.4).

HH = high forest–high poverty. HL = high forest–low poverty. LH = low forest–high poverty. LL = low forest–low poverty.
Stripe = ex-war zone.

TABLE 2: **Total rural area income, by Humboldt University forests and poverty category, 2010**

Central Region – rural only				Rural 71%		Per capita income (US$)
Map	District	Pop. 2010				
82	Buikwe	412 322	C	HL	292 749	594.0
84	Bukomansimbi	174 445	C	HL	123 856	594.0
86	Butambala	108 443	C	HL	76 995	594.0
87	Buvuma	53 104	C	HL	37 704	594.0
89	Gomba	166 580	C	HL	118 272	594.0
27	Kalangala	58 000	C	HL	41 180	594.0
90	Kalungu	200 855	C	HL	142 607	594.0
38	Kiboga	319 600	C	HL	226 916	594.0
95	Kyankwanzi	150 719	C	HL	107 010	594.0
48	Luweero	418 000	C	HL	296 780	594.0
100	Lyantonde	77 100	C	HL	54 741	594.0
51	Masaka	833 500	C	HL	591 785	594.0
56	Mityana	301 700	C	HL	214 207	594.0
59	Mpigi	454 900	C	HL	322 979	594.0
60	Mubende	566 600	C	HL	402 286	594.0
61	Mukono	981 600	C	HL	696 936	594.0
63	Nakaseke	178 600	C	HL	126 806	594.0
72	Sembabule	210 900	C	HL	149 739	594.0
36	Kayunga	344 600	C	HL (40)	97 866	594.0
					4 121 414	
64	Nakasongola	150 000	C	LH	106 500	594.0
36	Kayunga	344 600	C	LH (40)	97 866	594.0
					204 366	
36	Kayunga	344 600	C	HH (20)	48 933	594.0
70	Rakai	466 900	C	LL	331 499	
99	Lwengo	302 815	C	LL	214 999	
76	Wakiso	1 260 900	C	LL	895 239	
29	Kampala	1 597 900	C	LL	1 134 509	
					2 576 246	

2010 value of districts marked in deep yellow computed using Central Region growth rate for 2002 of 2.6 percent (UBOS, 2010a: 97–98, Table 2.1 C).

TABLE 2: **Total rural area income, by Humboldt University forests and poverty category, 2010**

Eastern Region – rural only				Rural 92%		Per capita income (US-$)
Map	District	Pop. 2010				
4	Amuria	344 200	E	LH	316 664	423.0
7	Budaka	169 300	E	LH	155 756	423.0
8	Bugiri	599 000	E	LH	551 080	423.0
83	Bukedea	171 100	E	LH	157 412	423.0
13	Busia	281 200	E	LH	258 704	423.0
15	Butaleja	206 300	E	LH	189 796	423.0
88	Buyende	256 296	E	LH	235 792	423.0
20	Iganga	709 600	E	LH	652 832	423.0
21	Jinja	475 700	E	LH	437 644	423.0
25	Kaberamaido	183 100	E	LH	168 452	423.0
28	Kaliro	202 200	E	LH	186 024	423.0
30	Kamuli	716 700	E	LH	659 364	423.0
35	Katakwi	163 100	E	LH	150 052	423.0
91	Kibuku	171 813	E	LH	158 068	423.0
45	Kumi	377 900	E	LH	347 668	423.0
98	Luuka	248 605	E	LH	228 717	423.0
53	Mayuge	429 400	E	LH	395 048	423.0
103	Namayingo	194 904	E	LH	179 312	423.0
14	Namutumba	207 300	E	LH	190 716	423.0
105	Ngora	136 502	E	LH	125 582	423.0
69	Pallisa	506 900	E	LH	466 348	423.0
110	Serere	236 482	E	LH	217 563	423.0
74	Soroti	555 100	E	LH	510 692	423.0
75	Tororo	463 600	E	LH	426 512	423.0
					7 365 798	
49	Bududa	167 000	E	HL	153 640	423.0
9	Bukwa	67 500	E	HL	62 100	423.0
85	Bulambuli	130 346	E	HL	119 918	423.0
33	Kapchorwa	199 200	E	HL	183 264	423.0
94	Kween	90 009	E	HL	82 808	423.0
101	Manafwa	343 200	E	HL	315 744	423.0
54	Mbale	416 600	E	HL	383 272	423.0
73	Sironko	346 600	E	HL	318 872	423.0
					1 619 619	

2010 value of districts marked in deep yellow computed using Eastern Region growth rate for 2002 of 3.5 percent (UBOS, 2010a: 97–98, Table 2.1 C).

TABLE 2: **Total rural area income, by Humboldt University forests and poverty category, 2010**

Northern Region – rural only				Rural 86%		Per capita income (US$)
Map	District	Pop. 2010				
1	Abim	54 800	N	out	0	0
44	Kotido	204 600	N	out	0	0
22	Kaabong	345 200	N	out	0	0
78	Agago	261 306	N	stripe	224 723	246.0
39	Amuru	220 400	N	stripe	189 544	246.0
17	Gulu	374 700	N	stripe	322 242	246.0
42	Kitgum	387 100	N	stripe	332 906	246.0
97	Lamwo	163 790	N	stripe	140 859	246.0
107	Nwoya	58 234	N	stripe	50 081	246.0
68	Pader	481 800	N	stripe	414 348	246.0
					1 674 704	
2	Adjumani	331 600	N	LH	285 176	246.0
79	Alebtong	231 526	N	LH	199 112	246.0
3	Amolatar	120 500	N	LH	103 630	246.0
80	Amudat	90 272	N	LH	77 634	246.0
6	Arua	526 400	N	LH	452 704	246.0
16	Dokolo	171 000	N	LH	147 060	246.0
43	Koboko	209 600	N	LH	180 256	246.0
93	Kole	235 609	N	LH	202 624	246.0
47	Lira	669 900	N	LH	576 114	246.0
50	Maracha	388 200	N	LH	333 852	246.0
57	Moroto	297 700	N	LH	256 022	246.0
58	Moyo	354 300	N	LH	304 698	246.0
62	Nakapiripirit	244 900	N	LH	210 614	246.0
104	Napak	160 030	N	LH	137 626	246.0
65	Nebbi	537 300	N	LH	462 078	246.0
108	Otuke	88 066	N	LH	75 737	246.0
67	Oyam	353 700	N	LH	304 182	246.0
77	Yumbe	466 400	N	LH	401 104	246.0
5	Apac	543 200	N	LH (87.5)	408 758	246.0
					5 118 981	
5	Apac	543200	N	HH (12.5)	58 394	246.0
112	Zombo	71 000	N	HH	61 060	246.0
					119 454	

2010 value of districts marked in deep yellow computed using Northern Region growth rate for 2002 of 4.2 percent (UBOS, 2010a: 97–98, Table 2.1 C).

TABLE 2: **Total rural area income, by Humboldt University forests and poverty category, 2010**

Western Region – rural only				Rural 92%		Per capita income (US$)
Map	District	Pop. 2010		1		
81	Buhweju	109 403	W	HL	100 651	487
10	Buliisa	77 000	W	HL	70 840	487
12	Bushenyi	858 700	W	HL	790 004	487
18	Hoima	499 100	W	HL	459 172	487
19	Ibanda	242 800	W	HL	223 376	487
23	Kabale	490 200	W	HL	450 984	487
24	Kabarole	403 100	W	HL	370 852	487
31	Kamwenge	317 000	W	HL	291 640	487
32	Kanungu	241 800	W	HL	222 456	487
34	Kasese	695 600	W	HL	639 952	487
37	Kibaale	613 300	W	HL	564 236	487
40	Kiruhura	280 200	W	HL	257 784	487
96	Kyegegwa	146 421	W	HL	134 707	487
46	Kyenjojo	504 600	W	HL	464 232	487
55	Mbarara	427 200	W	HL	393 024	487
102	Mitooma	212 259	W	HL	195 278	487
106	Ntoroko	67 411	W	HL	62 018	487
109	Rubirizi	134 381	W	HL	123 631	487
111	Sheema	237 909	W	HL	218 876	487
52	Masindi	602 100	W	HL (50%)	276 966	487
41	Kisoro	247 200	W	HL(50%)	113 712	487
11	Bundibugyo	312 600	W	HL (50%)	143 796	487
					6 568 187	
41	Kisoro	247 200	W	HH (50%)	113 712	487
52	Masindi	602 100	W	HH (50%)	276 966	487
11	Bundibugyo	312 600	W	HH (50%)	143 796	487
92	Kiryandongo	247 773	W	HH	227 951	487
					762 425	
26	Isingiro	396 700	W	LL	364 964	
66	Ntungamo	458 000	W	LL	421 360	
71	Rukungiri	311 500	W	LL	286 580	
					1 072 904	

2010 value of districts marked in deep yellow computed using Northern Region growth rate for 2002 of 4.2 percent (UBOS, 2010a: 97–98, Table 2.1 C).

TABLE 3: **Total rural income Central Region**

Forests and poverty category	Total population	Total official income (US$)	Unrecorded income from forest consumption 19%	Full total income (US$)	Agriculture cash and consumption 59%	Livestock cash and consumption 13%	Employment and trade 5%	Income from forest sales 4%	All forest income (cash sales + home consumption) 23%
High–high p.c. income US$594	48 933	29 066 202	5 781 268	34 007 456	20 404 474	4 761 044	1 020 224	2 040 447	7 821 715
High–low p.c. income US$594	4 121 414	2 448 119 916	553 519 913	2 913 262 700	1 718 824 993	407 856 778	145 663 135	87 397 881	640 917 794
Low–high p.c. income US$594	204 366	121 393 404	37 935 439	151 741 755	86 492 800	7 587 088	0	19 726 428	57 661 867
	4 374 713		597 236 619	3 099 011 912	1 825 722 267	420 204 910	146 683 359	109 164 757	706 401 376

TABLE 4: **Total rural income Northern Region**

Forests and poverty category	Total population	Total official income (US$)	Unrecorded income from forest consumption 23%	Full total income (US$)	Agriculture cash and consumption 61.5%	Livestock cash and consumption 4%	Employment and trade 0.5%	Income from forest sales 11%	All forest income (cash sales + home consumption) 34%
High–high p.c. income US$246	119 454	29 385 684	5 844 813	34 381 250	20 628 750	4 813 375	1 031 438	2 062 875	7 907 688
Low–high p.c. income US$246	5 118 981	1 259 269 326	393 521 664	1 574 086 658	897 229 395	78 704 333	0	204 631 265	598 152 930
High–high striped p.c. income US$246	1 674 704	411 977 184	76 462 965	477 893 533	367 978 021	0	0	33 452 547	109 915 513
	6 913 139		475 829 442	2 086 361 442	1 285 836 166	83 517 708	1 031 438	240 146 688	715 976 130

TABLE 5: **Total rural income Eastern Region**

Forests and poverty category	Total population	Total official income (US$)	Unrecorded income from forest consumption 24%	Full total income (US$)	Agriculture cash and consumption 57%	Livestock cash and consumption 7%	Employment and trade 1%	Income from forest sales 11%	All forest income (cash sales + home consumption) 35%
High–low p.c. income US$423	1 619 619	685 098 837	154 900 847	815 267 616	481 007 893	114 137 466	40 763 381	24 458 028	179 358 876
Low–high p.c. income US$423	7 365 798	3 115 732 554	973 666 423	3 894 665 693	2 219 959 445	194 733 285	0	506 306 540	1 479 972 963
	8 985 417		1 128 567 270	4 709 933 309	2 700 967 338	308 870 751	40 763 381	530 764 569	1 659 331 839

TABLE 6: **Total rural income Western Region**

Forests and poverty category	Total population	Total official income (US$)	Unrecorded income from forest consumption 19%	Full total income (US$)	Agriculture cash and consumption 59%	Livestock cash and consumption 14%	Employment and trade 5%	Income from forest sales 3%	All forest income (cash sales + home consumption) 22%
High–high p.c. income US$487	762 425	371 300 975	73 851 764	434 422 141	260 653 284	60 819 100	13 032 664	26 065 328	99 917 092
High–low p.c. income US$487	6 568 187	3 198 707 069	723 227 668	3 806 461 412	2 245 812 233	532 904 598	190 323 071	114 193 842	837 421 511
	7 330 612		797 079 432	4 240 883 553	2 506 465 518	593 723 697	203 355 735	140 259 171	937 338 603

TABLE 6: **Total rural income Western Region**

Forests and poverty category	Total population	Total official income (US$)	Unrecorded income from forest consumption 19%	Full total income (US$)	Agriculture cash and consumption 59%	Livestock cash and consumption 14%	Employment and trade 5%	Income from forest sales 3%	All forest income (cash sales + home consumption) 22%
High–high p.c. income US$487	762 425	371 300 975	73 851 764	434 422 141	260 653 284	60 819 100	13 032 664	26 065 328	99 917 092
High–low p.c. income US$487	6 568 187	3 198 707 069	723 227 668	3 806 461 412	2 245 812 233	532 904 598	190 323 071	114 193 842	837 421 511
	7 330 612		797 079 432	4 240 883 553	2 506 465 518	593 723 697	203 355 735	140 259 171	937 338 603

TABLE 7: **Total rural income high forest–high poverty category, Masindi-type**

Region	Total population	Total official income (US$)	Unrecorded income from forest consumption 17%	Full total income (US$)	Agriculture cash and consumption 60%	Livestock cash and consumption 14%	Employment and trade 3%	Income from forest sales 6%	All forest income (cash sales + home consumption) 23%
Central p.c. income US$594	48 933	29 066 202	5 781 268	34 007 456	20 404 474	4 761 044	1 020 224	2 040 447	7 821 715
Northern p.c income US$246	119 454	29 385 684	5 844 813	34 381 250	20 628 750	4 813 375	1 031 438	2 062 875	7 907 688
Western p.c. income US$487	762 425	371 300 975	73 851 764	434 422 141	260 653 284	60 819 100	13 032 664	26 065 328	99 917 092
	930 812		85 477 844	502 810 848	301 686 508	70 393 519	15 084 326	30 168 650	115 646 495

TABLE 8: **Total rural income high forest–low poverty category, Kibaale-type**

Region	Total population	Total official income (US$)	Unrecorded income from forest consumption 19%	Full total income (US$)	Agriculture cash and consumption 59%	Livestock cash and consumption 14%	Employment and trade 5%	Income from forest sales 3%	All forest income (cash sales + home consumption) 22%
Central p.c. income US$594	4 121 414	2 448 119 916	553 519 913	2 913 262 700	1 718 824 993	407 856 778	145 663 135	87 397 881	640 917 794
Eastern p.c. income US$423	1 619 619	685 098 837	154 900 847	815 267 616	481 007 893	114 137 466	40 763 381	24 458 028	179 358 876
Western p.c. income US$487	6 568 187	3 198 707 069	723 227 668	3 806 461 412	2 245 812 233	532 904 598	190 323 071	114 193 842	837 421 511
	12 309 220		1 431 648 428	7 534 991 729	4 445 645 119	1 054 898 842	376 749 587	226 049 752	1 657 698 181

TABLE 9: **Total rural income low forest–high poverty category, Kumi-type**

Region	Total population	Total official income (US$)	Unrecorded income from forest consumption 25%	Full total income (US$)	Agriculture cash and consumption 57%	Livestock cash and consumption 5%	Employment and trade 0%	Income from forest sales 13%	All forest income (cash sales + home consumption) 38%
Central p.c. income US$594	204 366	121 393 404	37 935 439	151 741 755	86 492 800	7 587 088	0	19 726 428	57 661 867
Northern p.c income US$246	5 118 981	1 259 269 326	393 521 664	1 574 086 658	897 229 395	78 704 333	0	204 631 265	598 152 930
Eastern p.c. income US$423	7 365 798	3 115 732 554	973 666 423	3 894 665 693	2 219 959 445	194 733 285	0	506 306 540	1 479 972 963
	12 689 145		1 405 123 526	5 620 494 106	3 203 681 640	281 024 706	0	730 664 233	2 135 787 760

TABLE 10: **Total rural income high forest–high poverty category (Northern version), -Lamwo-type**

Region	Total population	Total official income (US$)	Unrecorded income from forest consumption 16%	Full total income (US$)	Agriculture cash and consumption 77%	Livestock cash and consumption 0%%	Employment and trade 0%	Income from forest sales 7%	All forest income (cash sales + home consumption) 23%%
Northern p.c. income US$246	1 674 704	411 977 184	76 462 965	477 893 533	367 978 021	0	0	33 452 547	109 915 512

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