

**Albertine Rift  
Technical Reports  
Volume 4**

# **THE SOCIO-ECONOMIC STATUS OF PEOPLE LIVING NEAR PROTECTED AREAS IN THE CENTRAL ALBERTINE RIFT**



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### **WCS's Albertine Rift Programme**

The WCS Albertine Rift Programme is working to conserve some of Africa's most biodiverse sites for the future generations of Africans and the global community. The Albertine rift stretches from the northern end of lake Albert down to the southern end of lake Tanganyika and encompasses the forests, savannahs, wetlands and mountains to be found in the rift and on the adjacent escarpment in Uganda, Rwanda, Burundi, Tanzania and Democratic Republic of Congo (DRC). This area of Africa contains 52% of all bird species and 39% of all mammal species on the African continent. Many species are endemic to this part of the world and it has been identified as being of global conservation importance by several global priority-setting exercises (it is an endemic bird area, ecoregion and a hotspot).

To learn more about the programme visit: [www.albertinerift.org](http://www.albertinerift.org)

### **The International Gorilla Conservation Programme**

The International Gorilla Conservation Programme (IGCP) is a coalition of three international conservation organisations that have been operating in the Great Lakes Region since 1979. The African Wildlife Foundation (AWF), Fauna and Flora International (FFI) and Worldwide Fund for Nature (WWF) formed the IGCP in 1991; with the mission to empower people to jointly manage a network of transboundary protected areas so that they contribute significantly to sustainable development and protecting the mountain gorilla and its afro-montane habitat. IGCP works on four overall strategic objectives to achieve its mission: i) building capacity of the national authorities to manage and protect the habitat and its wildlife; ii) enhancing regional collaboration for the conservation of the forests and their wildlife; iii) increasing support among interest groups for conservation and sustainable management of natural resources and iv) improving the relevance of and respect for policy and legislation for conservation and effective natural resource management.

To learn more about IGCP, please visit: [www.awf.org](http://www.awf.org), [www.fauna-flora.org](http://www.fauna-flora.org), [www.wwf.org](http://www.wwf.org), [www.mountaingorillas.org](http://www.mountaingorillas.org)

### **CARE Uganda**

CARE International's office in Uganda was established in 1979. Our goal in Uganda is to help ensure the fulfilment of the basic rights of poor and marginalized people through:

- Fulfilling and protecting the **economic rights** of poor and marginalized people
- Increased **accountability and effectiveness of services** to the poor and marginalized people
- Strengthening civil society, to provide an **effective voice for the concerns and rights** of poor and marginalized people.

Currently we are active in rural areas of South-Western, Western and Northern Uganda as well as in the West Nile and the districts surrounding Lake Kyoga. Much of our work is also at national level, and includes advocacy for improved policies, strategies and practices on the part of government and other key development actors. We work closely with partners in various coalitions, alliances and networks, especially with Civil Society Organisations.

**Cover Photo** : School children at window of school building, Uganda. A.J.Plumptre.

### **Suggested Citation:**

Plumptre, A.J., Kayitare, A., Rainer, H., Gray, M., Munanura, I., Barakabuye, N., Asuma, S., Sivha, M., and Namara, A. (2004) The Socio-economic Status of People Living Near Protected Areas in the Central Albertine Rift. *Albertine Rift Technical Reports*, 4. 127pp.

**ISSN: 1543-4109**

# CONTENTS

<b>Executive Summary</b>	3
Financial Support	4
Acknowledgements	5
<b>Section 1: Communities Adjacent to Protected areas in the Central Albertine Rift</b>	7
1.1 Afromontane Forests and the Albertine Rift	7
1.2 Aims of the Study	8
1.3 Geographical Setting and History of Conservation of the Protected Areas in the Central Albertine Rift	9
1.4 Challenges for the Conservation of the Protected Areas	14
1.5 Management and Use of Land	18
1.6 Poverty	26
1.7 The Batwa	25
1.8 Conservation Activities in the Central Albertine Rift working with Local Communities	27
1.9 Report Outline	30
<b>Section 2: Survey Methods</b>	32
2.1 Planning the Surveys	32
2.2 Developments and Questionnaire	35
2.3 Training Process	36
2.4 Supervision in the field	37
2.5 Methods used in the Field to Sample Households	38
2.6 Data Entry and Treatment	38
2.7 Data Analysis	39
<b>Section 3: Socio-Economic Situation of Local Communities</b>	40
3.1 Household Structures	42
3.2 Property and Assets	45
3.3 Crops and Cooking Fuel	53
3.4 Education, Employment and Health	58
3.5 Discussions	65

## **Section 4: The Local Economy and Income-Generation**

		67
4.1	Indicators/Measures of Wealth	67
4.2	Revenue Generating Activities	72
4.3	Markets	74
4.4	Access and Use of Credit Across the Region	77
4.5	Using the Forest to Make Money Legally	80
4.6	Discussions	84

## **Section 5: Relationship Between the Local Community and Protected Areas**

		85
5.1	Afromontane Forests and the Albertine Rift	
5.2	Crop Raiding and Hunting	98
5.3	Use of the Forest to Supply Livelihood Needs	106
5.4	Buffer Zones and Multiple-Use Zones	117
5.5	Discussions	119

## **Section 6: Lessons Learned and Policy Recommendations**

		121
	Socio-economic Sitation of Communities around the Forests	121
	The Local Economy	123
	Community-Forest Interactions	124
	Policy Recommendations	127
	Conclusions	130

## **Section 7: Reference**



## **SECTION 1: EXECUTIVE SUMMARY**



*Tea and eucalyptus plantations near Nyungwe Park, Rwanda. A.Plumptre*

This report summarises the results of a baseline survey of people living within 10 km of six protected areas in the central Albertine Rift region of Africa. This region has some of the highest densities of people on the continent, as well as high biodiversity and conservation values. As a result, there are major challenges to the conservation of protected areas in the region, many of which have become islands of natural habitat in a sea of agriculture. This region has been piloting mechanisms to integrate local communities in conservation and this survey partly compares and contrasts communities where pilot projects have been implemented and where they have not.

A total of 3,907 households, representing 22, 813 people were sampled from all the parishes and districts surrounding the six protected areas. As a result, the findings of the survey can be mapped in a GIS to visually assess patterns of socio-economic status and attitudes towards conservation. The data set is very large and this report presents a summary, but does not attempt to undertake all possible analyses. Following the production of this report, the data will be made available on the web so that others can continue to analyse the data further.

The results are summarised in three sections: a socio-economic status of local communities in the central Albertine rift (Chapter 3); an assessment of the economic situation and income generation (Chapter 4); and, finally, the relationship between the local community and protected areas (Chapter 5).

The aim of this report is to provide a baseline from which future monitoring can take place. Many projects in the region are aiming to alleviate poverty and yet this lofty goal is rarely measured and the progress of projects towards achieving it are rarely assessed. Similarly, projects in the region are aiming to improve protected area-community relationships and yet there has not been much attempt to measure or assess how well this is working. The data presented here will allow development and conservation practitioners to monitor the effectiveness of their activities and to establish whether people are really improving their livelihood security around the protected areas in the central Albertine Rift region.

# **FINANCIAL SUPPORT**

The Following Institutions and Foundations provided the funding that enabled these surveys to take place. IGCP, WCS and CARE are very grateful for their support.

**Dan Thorne Foundation**

**John D. and Catherine T. MacArthur Foundation**

**US Fish and Wildlife Great Ape Conservation Fund**

**United States Agency for International Development  
(USAID)**

**International Gorilla Conservation Programme  
(AWF, FFI and WWF)**

**Wildlife Conservation Society**

# ACKNOWLEDGEMENTS

The process of collecting data from 3,907 households involved many people; there were people who interviewed the households, people who supervised and met regularly with the interviewers, and those who were responsible for entering data into the computers. We are grateful to the following people for all their hard work:

## Uganda

### **Bwindi, Echuya and Mgahinga**

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*Data Entry/Translators:*

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*Logistics:*

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**DRC**

**Virunga**

*Supervisors:*

Ntayomba Bararuha, Mugabukomeye Benjamin

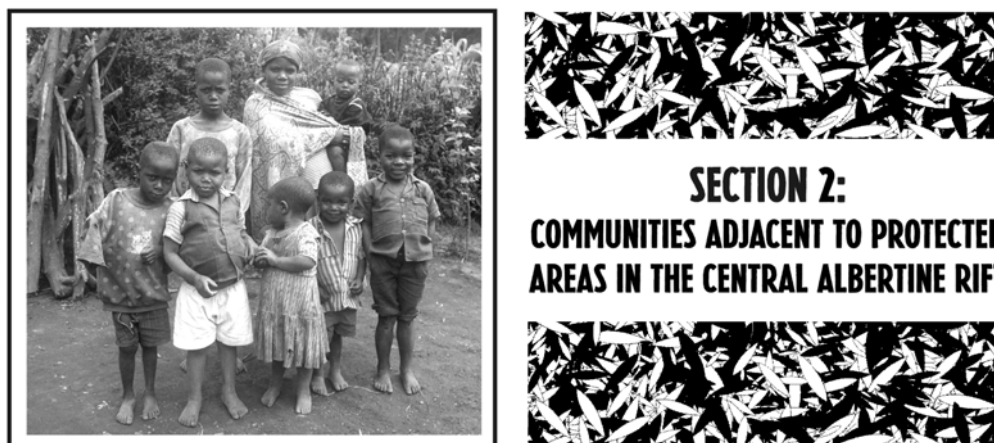
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Bahati Misenge, Habineza, Muombamungu, Rudatinya, Rukara, Sebiguri

*Data Entry/Translators:*

Deo Kujirakwinja, Budogire Emmanuel

Several people made comments on the various chapters in this report. We are very grateful to Annette Lanjouw, Bill Weber, Jose Kalpers, Michel Masozera and Jo Spyropoulos for the efforts they put into commenting and correcting initial drafts.



*Family living near Volcanoes National Park, Rwanda A.Plumptre*

## 1.1 Afromontane Forests and the Albertine Rift

The high biological diversity and endemism of the plants and animals of Africa's montane forests means that this habitat is globally important for conservation. The forests of the Albertine Rift are particularly rich in both endemic and threatened species (Plumptre et al, 2003) and have been recognised as a priority for conservation in Africa. Birdlife International recognises this region as an 'endemic bird area,' the World Wide Fund for Nature as an 'eco-region' and it will soon be recognised as a biodiversity hotspot by Conservation International. These forests contain more endemic species than anywhere else on the continent and also a high number of threatened species such as the mountain gorilla (*Gorilla beringei beringei*). The Albertine Rift encompasses the natural habitats from the northern tip of Lake Albert to the southern tip of Lake Tanganyika and stretches to about 100 km on either side of the international border of the Democratic Republic of Congo (DRC). The high altitude forests in the Albertine Rift contain most of the threatened and endemic species but the lakes and wetlands are also important for certain species.

These forests are also important for their watershed functions, soaking up rainfall and providing a regular flow of water to the people living around the forests. For instance, the Parc National des Volcans (PNV) and Parc National de Nyungwe (Nyungwe) in Rwanda contribute 10% and 74% respectively of the dry season river flow rainfall in the country's principal river system (Weber 1987). These forests also generate rainfall in the region through high evapotranspiration.

The Albertine Rift contains some of the highest human population densities in Africa, with up to 6-700 people per km<sup>2</sup> in the central part of the region (south west Uganda, Rwanda and Burundi and the adjacent areas of DRC). This juxtaposition of important areas for conservation and high human population densities pose challenges to long-term conservation management and species survival. This is particularly so, as the people living in this region are also some of the poorest in Africa and over 95% rely on subsistence farming for their livelihoods.

Due to high levels of poverty and the intensity of farming in the region, the people living near protected areas in the central Albertine Rift make use of these forests to supplement their incomes from farming. They harvest fuel-wood, timber, non-timber forest products, water and bush-meat where they can, and often break the law in areas in which it is banned. As a result, there has been friction between the people living adjacent to protected areas and the protected area authorities. Attempts have been made to work more closely with these local communities, in particular in Uganda, to minimise this friction and to also look for ways to improve their livelihoods and possibilities for income generation. These attempts have included:

1. supporting inputs to farming and improving farming practices;
2. establishing a community conservation department within the protected area authorities which meets regularly with the communities;
3. providing a trust-fund that supports the development of schools, clinics and other community projects in the vicinity of protected areas;
4. providing credit schemes to help people start new income-generating activities and
5. allowing restricted access and use of certain forest products which is monitored closely.

Despite these efforts and the large amounts of financial support that have been given to them, there has never been an extensive baseline study of the socio-economic situation of the people in the central Albertine Rift or what their views are regarding the conservation of the forests beside which they live. During 2002, the International Gorilla Conservation Programme (a consortium of the African Wildlife Foundation, Fauna and Flora International and World Wide Fund for Nature), the Wildlife Conservation Society (WCS) and CARE Uganda came together to start to plan the first such survey and this report summarises the results.

## **1.2 Aims of the Study**

This survey, therefore, presented an opportunity to better understand the problems encountered by local populations living around the parks that rely almost exclusively on natural resources for their survival. As previously mentioned, local populations in this region rely on agricultural activities for their subsistence needs and rely on the forests for a number of natural products to improve their livelihoods. To date, there are few data available which quantify this for the region and yet this information is important for both protected area managers and development agencies trying to work alongside these people.

The aims of the study were the following:

- To develop a framework of reference or a baseline survey in order to follow/assess conservation and development activities in the region. In Uganda, where several studies had taken place, thanks to the CARE Development through Conservation (DTC) project, comparisons were made with previous research.
- To identify the threats from the local populations living around the protected areas and to assess their impact in various regions.
- To provide conservation and development agencies working in the region with additional information to contribute to guiding the planning of their activities.

The need to undertake this research throughout the central Albertine Rift Region was necessary in order to contribute to the long-term conservation of the biological diversity in the region. This region has protected areas that straddle international borders and the impacts of local communities are felt over the international borders. The International Gorilla Conservation Programme (IGCP) has been working regionally, in the Virunga Volcanoes and Bwindi Impenetrable National Park (Bwindi), and was interested in obtaining a socio-economic baseline for communities surrounding these areas. WCS has been working in Nyungwe National Park (Nyungwe), Virunga Volcanoes, Bwindi and, to a lesser extent, in Echuya Forest Reserve (Echuya) and, likewise, was interested in obtaining a baseline for these areas. CARE had been working for many years with communities around Bwindi and Mgahinga Gorilla National Parks (Mgahinga) and was interested in information to compare with previous surveys they had made.

### **1.3. Geographical Setting and History of Conservation of the Protected Areas in the Central Albertine Rift.**

The region defined as the central Albertine Rift for this survey included the following protected areas (Figure 1.1):

#### *Uganda*

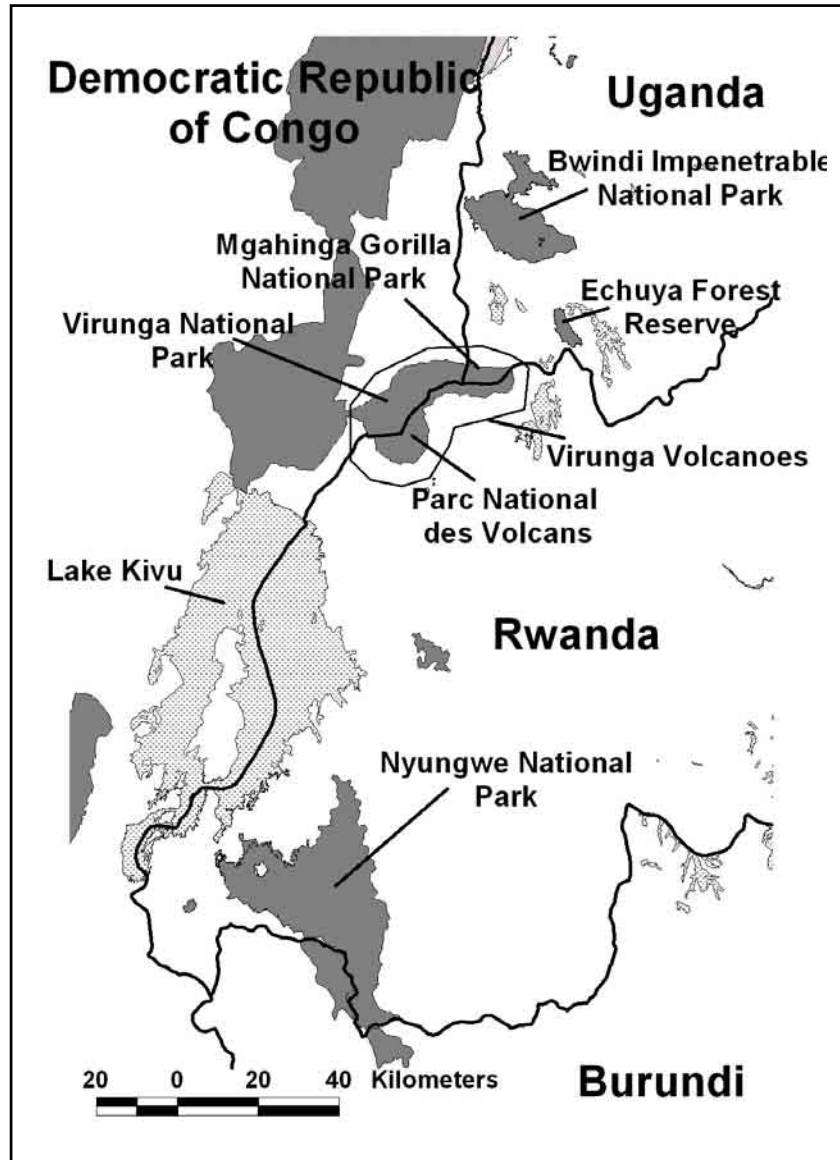
1. Bwindi Impenetrable National Park (Bwindi)
2. Echuya Forest Reserve (Echuya)
3. Mgahinga Gorilla National Park (Mgahinga)

#### *Rwanda*

4. Parc National des Volcans (PNV)
5. Nyungwe National Park (Nyungwe)

#### *DRC*

6. Virunga National Park - Mikeno sector (Virunga)



**Figure 1.1.** The location of the protected areas in the Central Albertine Rift

### 1.3.1 Bwindi Impenetrable National Park

Bwindi Impenetrable National Park (Bwindi) is located in south-western Uganda between latitude 0°53'S to 1°8'S and longitude 29°35 to 29°50'E. It is situated on the edge of the Western Rift Valley, occupying the highest blocks of the Kigezi Highlands. The park lies along the border of the Democratic Republic of Congo, at about 29 km by road to the north-west of Kabale town and 30 km north of Kisoro town. Bwindi is located in Rubanda County of Kabale District, Kinkizi County of the new Kanungu District, and Mutanda County of Kisoro District. Bwindi is separated from Mgahinga by a stretch of cultivated land. Adjacent to the park are 21 parishes. The park boundary coincides with the Uganda-DRC border in the west. The Park has a total area of 330.8 km<sup>2</sup>. Bwindi hosts about 300 of the world's population of 700 mountain gorillas (*Gorilla beringei beringei*).

This conservation value was the main reason the forest was upgraded to National Park status in 1991, to strengthen the protection of this species and its habitat. Other reasons included the need to conserve ecological resources of high biodiversity value in the forested area and to protect the forest as an important economic resource (Bwindi & Mgahinga General Management Plan, 2002-2012). Bwindi has been managed as a protected area since 1932. The colonial government gazetted it as a forest reserve in 1932 and then as a game sanctuary in 1961, under general notice 854 of 1961. From that time up to 1992, it was managed as both a forest reserve and a game sanctuary, under the joint management of the forest and game departments. In 1992, it was gazetted as Bwindi Impenetrable National Park in statutory instrument 3 of 1992. The gazettement of the park was based on the fact that the forest represented a vital refuge for some of Uganda's most rare and unique flora and fauna. The park was declared a World Heritage Site in 1994.

Historically, local communities used Bwindi forest as a source of timber, minerals, non-timber forest resources, game meat and agricultural land. These activities led to significant losses of forest over a period up to the late 1980s. Since 1991, the forest's tourism potential (mainly gorilla tourism) has been demonstrated as an additional direct economic value.

### 1.3.2. Echuya Forest Reserve

Echuya Forest Reserve (Echuya) is located between latitude 1°14' -1°21' south and longitude 29°47'-29°47' east. It covers an area of 34 km<sup>2</sup> at an altitudinal range of 2270-2570m. Approximately 20% of its area is situated in Bufumbira County of Kisoro District, and 80% is in Rubanda County of Kabale District. The southern boundary of the reserve runs along the north-eastern border of Rwanda. The Forest Reserve is located in one of the most densely populated areas in Uganda. Echuya hosts 10% (127 species) of Uganda's known tree and shrub species. Five of the species recorded in Echuya are unique to the forest (Echuya and Mafuga Forest Reserves Biodiversity Report, Report No. 22, 1996). Among its conservation values is Muchuya Swamp, which is of high conservation value because it is one of the few remaining high-altitude wetlands in the Albertine Rift. The swamp, surrounded by bamboo and natural forest, is rich in amphibians and vertebrates. Echuya hosts 12 species of Uganda's Albertine Rift endemics and 40 bird species in the forest are restricted-range species (Echuya and Mafuga Forest Reserves Biodiversity Report, Report No. 22, 1996; WCS unpublished). Echuya is surrounded by seven parishes and the forest is located 15 km west of Kabale town and 11 km east of Kisoro town.

### 1.3.3. Mgahinga Gorilla National Park

Mgahinga Gorilla National Park (Mgahinga) is situated in the south-western corner of Uganda in Kisoro District, 10 kms south of Kisoro town, bordered by the Republic of Rwanda to the south and the Democratic Republic of Congo to the west. It lies at latitude 1° 23' south and longitude 29° 39' east. Mgahinga is contiguous with Parc National des Virunga in the Democratic Republic of Congo and Parc National des Volcans in Rwanda, with the three protected areas forming a tri-country region, known as the Virunga Volcanoes (434 km<sup>2</sup>). The park includes three of the Virunga Volcanoes; Mt Muhabura at an altitude of 4,127 m, Mt Gahinga at 3,474 m, from which the park derives its name, and Mt Sabyinyo at 3,645 m. The park lies in Bufumbira County, Nyarusiza and Muramba Sub-counties and is adjacent to the three parishes of Gisozi, Rukongi and Gitenderi. The park was gazetted with the main purpose to protect the mountain gorillas and to conserve the ecological

resources in the park, particularly the vulnerable populations of plants and animals endemic to the area.

The area covered by Mgahinga has fallen under various protected area categories since 1930. Originally it was managed by the colonial government as a Gorilla Sanctuary from 1930 to 1941, and later as, both a game and forest reserve, from 1941 to 1991, under the joint authority of the Game and Forest Departments. Mgahinga was formally gazetted in 1991 under statutory instrument 27, which was later amended by statutory instrument 3 of 1992. The total area of the park is 33.7 sq. km, with boundaries corresponding with those of the 1930 Gorilla Sanctuary. The park area had been heavily encroached and settled, and its creation led to the eviction of over 2,400 people in 1992.

#### *1.3.4. Volcanoes National Park*

The Volcanoes National Park (PNV) is located in north-western Rwanda between 1° 21' parallels and 1°35' southern latitude and between meridian lines 29°22' and 29°44' longitude east. The creation of the Virunga National Park in 1925 was initiated by Carl Akeley, from the American Museum of Natural History. Its main goal was the protection of the last mountain gorillas. It was created in 1925 as the first national park in Africa, under the name of "Park National Albert."

In 1927, an order of the Governor of Rwanda-Urundi, approved by the decree of August 18, 1927, ensured the protection of the fauna and the flora of the slopes in the south-eastern part of the Albert Park, the Visoke and Karisimbi Volcanoes, located in the Rwandan territory, and increased the area of the park. During independence in 1960, the park was divided between two countries; the Volcanoes National Park (PNV) in Rwanda and the Parc National des Virunga (PNVi), or Virunga park, in Congo.

Since 1962, the Directorate of Water and Forests in the Ministry of Agriculture managed the PNV. In 1974, the management of this park was entrusted to the Rwandan Office of Tourism and National Parks (ORTPN), which was created with the aim to ensure nature conservation in general, to promote scientific research and to promote tourism, in so far as these last two activities are compatible with nature conservation.

Faced with chronic economic and population pressures, earlier Rwandan governments approved the significant clearing of the PNV to grow pyrethrum and to settle a portion of its population. In 1959, 7000 ha were cleared. Between 1969 and 1973, an additional 10,000 ha were converted for agricultural purposes, particularly to grow pyrethrum. Since its creation, the area of the park has been reduced by nearly 50%, shifting from 328 km<sup>2</sup> to 165 km<sup>2</sup>.

#### *1.3.5. Virunga National Park*

Parc National des Virunga (PNVi) in eastern DRC, formerly called Parc National Albert (PNA), was created on April 21, 1925, by a King's decree (Delvingt, Joly, J and Mankoto, 1990). This first reserve of 20,000 ha, with tourist sites such as Mounts Karisimbi, Mikeno, and Visoke, was created with the aim to protect the mountain gorillas and to protect the flora and fauna for tourism and scientific purposes.

The decree of 14, 1925 urged the extension of the park towards the north and south. This new area included Rwindi Hunting Reserve and was created on February 24<sup>th</sup>, 1925, with large farms belonging to the people of that region. All these scattered reserves were connected by the extension established by the decree of July 9<sup>th</sup>, 1929, totalling 350,000 ha. A decree on January 6<sup>th</sup> 1939 increased the area of the park to total more than 800,000 ha, (created by the decree of January 6<sup>th</sup> and November 12<sup>th</sup>, 1932). PNVi is sub-divided into four parts: the northern, central, eastern and southern sectors.

The altitude of the southern sector varies between 1,100 m, at its lowest point near Kibuga and Ondo lakes, and 4,500 m on the summit of Mount Karisimbi, the highest of the Virunga Volcanoes.

Local people living near PNVi primarily grow food crops for family consumption, the excess being sold in the neighbouring towns (Goma, Gisenyi, Bunagana, Kiwandja, Ishasha and even Bukavu). The main crops found at Kibumba, Jomba and Kanombe are maize, sorghum, Irish potatoes, cassava, beans, taro, banana trees, cabbages, onions, leeks, carrots, some rare condiments (garlic, sweet peppers, celeries), spinach, peas and sweet potatoes. At Kibumba, arable lands are very small because of the growing population. Local people at Kibumba also lack qualified agronomists who can ensure the monitoring and follow-up of suggested improvements. As a consequence, the local population resorts to using the natural resources in the park.

In the south, cattle and other livestock breeding flourished. However, all the livestock was destroyed during the recent civil wars and now new attempts to restart breeding have been initiated, although insecurity problems still persist. The pastures are empty; others have become arable farms. This situation may be encouraging poaching in the park.

### *1.3.6. Nyungwe National Park*

Nyungwe National Park is located in south-western Rwanda. In the south, it has a common border with the Republic of Burundi. In the east, it borders the Gikongoro province; from south to north it shares a common border with Nshili, Mushubi, Kivu and Mudusomwa districts. In the north it touches the Rusenyi and Itabire districts of Kibuye province and in the west, it borders the Gatara, Nyamasheke, Bukunzi and Bugarama districts of Cyangugu province.

This park is located between 2°15' and 2°55' latitude south and between 29°00' and 29°30' longitude east. It has an area of 1,102 km<sup>2</sup>. Nyungwe is one of the most significant rain forests in Africa because it is one of the few large extant forests remaining between the altitudes of 1,600-2,900 m (Weber, 1989). The forest is rich in species and is the most bio-diverse of the protected areas in this report (Plumptre et al. 2002).

Nyungwe was designated a forest reserve in 1933. However, this privilege did not prevent the local population from using the natural resources of the forest. (Fimbel and Kristensen, 1994). Gold miners exploited the forest for many years, damming streams and causing serious erosion. Poachers, beekeepers, farmers and pit-sawyers also exploited the forest resources (Bahigiki and Vedder, 1987). Between 1958 and 1979, the local population living near Nyungwe Forest Reserve took a large portion of it for farming and the area of the forest was reduced from 1,141 km<sup>2</sup> (Weber, 1989).

To attempt to stem the decrease in the size of the forest, several projects were established in the mid-1980s to manage the forest for timber and other products, as well as to conserve a core area of the forest. These projects established buffer-zones of Cyprus and pine trees around much of the forest (Weber 1989). These zones now have trees, which can be harvested and, in fact, there is a need to thin the stands. There is also a need to work with local political authorities to decide how these buffer-zones should continue to be managed. Should more pines be planted or should other crops that might benefit the local communities more directly be planted? The local population is complaining because it contributed to planting the exotic and local species in the buffer-zones around the park and yet the same population now has no access to these trees, which have reached the stage of being exploited (GAPUSI, 1998). Illegal timber sawing is very common in Bweyeye (Bugarama), Muzimu (Gatare) and Mwumba (Mudasomwa). A survey of attitudes about the use of the buffer-zones suggested that tea might be an alternative crop (Masozera, 2002).

Many tree species of Nyungwe forest are precious for timber and charcoal. These are local species such as: *Entandrophragma excelsum* (Umuyove), *Faurea saligna* (umutiti), *Symphonia globulifera* (Umushishi), *Parinari excelsa* (Umunazi), *Ocotea* sp. (Umutake). The craft industry values *Polyscias fulva* (Umwungo) to make harps and mortars, *Markhamia lutea* (Umusave) to make boxes, *Sinarundinaria alpina* (imigano) to make baskets and *Carapa grandiflora* (Umushwati). The most precious exotic species are: *Pinus patula*, *Acacia melanoxylon*, *Cupressus lusitanica* and *Eucalyptus spp* (Musabe, 2002).

## **1.4. Challenges for the Conservation of the Protected Areas**

### *1.4.1. High Population Density*

The afro-montane areas, where these protected areas are located, are amongst the most densely populated areas in Africa. This is probably due to the highly fertile soils and climate that enable farming to take place all year round and two to three crops to be harvested each year. More than 37% of afro-montane forests in Africa were destroyed by agricultural activities and the exploitation of timber (Wale Adeleke 1996).

As population increases, land and other essential resources become scarce, causing the dependence of the people on the park resources to increase. This has led to increased and unsustainable use, through legal exploitation in forest reserves and illegal access in national parks, of resources such as game-meat, timber, poles and stakes, fuel-wood, honey and bamboo. Vegetation around the protected areas has greatly declined. For example, in the past, Echuya used to extend into Rwanda but now the forest on the Rwandan side of the border has been cleared. In addition to this, the protected areas in Uganda were also frequently burnt in the past, leading to additional forest decline.

The destruction of these forests is generally followed by erosion. On average, erosion carries away 11 tons of soil per hectare every year in Rwanda (Waller, 1996). The Department of surveys and statistics (1986) in Rwanda also showed that the quantity of soil lost on slopes with more than 20 % gradient is estimated to be more than 25.7 tons/ha/year.

Erosion destroys the land that can be used for cultivation and considerably reduces land productivity. The current situation shows that erosion increases food insecurity as the number of people, together with their needs, continues to grow. As poverty increases in the region, the only choice local populations have is to over-exploit the available natural resources in the protected areas. Recently, people who were resettled in Gishwati Forest in 1994, after the genocide, were forced to leave due to destruction caused by the erosion and the land was no longer productive. In addition to this, erosion does not only affect land fertility; it also destroys infrastructures e.g houses, roads and bridges.

### *Uganda*

It is believed that the south-western part of Uganda, formerly called Rukiga Highlands, used to be covered by thick forests, which have been cleared by people for settlement, leaving relic forests such as Bwindi, Mafuga, Echuya, and Mgahinga. Old people in the area remember that the forest area has, indeed, been significantly reduced, citing that most of the areas currently settled upon, all used to be forested (Namara et al., 2001). Human population increase in south-western Uganda has significantly transformed the landscape since the early 1950s. The population of Kabale (then including the present Kisoro and Rukungiri districts) increased by 90% between 1948 and 1980, and by 1980 the region was cited as one of the most crowded rural areas in Africa (Ntozi, 1982; Butynski, 1984).

The 1991 population census indicated densities at 275 people/km<sup>2</sup> in Kisoro district, 256 people/km<sup>2</sup> in Kabale district and 125 people/km<sup>2</sup> in Kanungu district. These densities were higher in some areas immediately adjacent to the parks. For example, a density of 639 people/km<sup>2</sup> was recorded for Gisozi Parish, 330 people/km<sup>2</sup> for Rukongi Parish, and 274 people/km<sup>2</sup> for Gitenderi Parish, all adjacent to Mgahinga. Echuya is located in Nyakabande sub-county of Kisoro district, where the population density was already as high as 300-499 people/km<sup>2</sup> by 1991 and Bukimbiri sub-county with a population density of 150-299 people/km<sup>2</sup>. Its Kabale section is in Bufundi and Muko sub-counties, where the population density was recorded at 200-249 people/km<sup>2</sup> by the 1991 population census.

The provisional results of the 2002 Housing and Population Census indicate that Kabale District has an average population density of 290/km<sup>2</sup>, and this density has increased by 34 people/km<sup>2</sup> since 1991. Kisoro District has an average population density of 323/km<sup>2</sup>, and this density has increased by 48 people/km<sup>2</sup> since 1991. Kanungu District has an average population density of 160/km<sup>2</sup>, and this density has increased by 35 people/km<sup>2</sup> since 1991. The annual population growth rate of these districts, however, decreased between 1991-2002. The annual population growth rate of Kabale District was at 2.17% between 1980-1991, and decreased to 1.05% between 1991 and 2002. The annual population growth rate of Kisoro District was at 3.53% between 1980-1991, and decreased to 1.39% between 1991 and 2002. The annual population growth rate of Kanungu District was at 2.76% between 1980-1991, and decreased to 2.09% between 1991 and 2002. All three districts are below the national population growth rate of 3.39% people/km<sup>2</sup>. However, the population densities in these three districts are much higher than the national density at 85 people/km<sup>2</sup>, and these districts are still some of the most densely populated in the country. The trend in the annual population growth rates, however, indicates that the population is now more stable, with no immigration, and may indicate that people are actually moving to the less populated areas of Uganda.

Around Bwindi, Bakiga are the main ethnic group, accounting for about 90% of the population, Bafumbira account for about 9.5%, plus other smaller groups including the Batwa, Bahororo and Bahunde. The areas adjacent to Mgahinga are settled mainly by Bafumbira, with a few Batwa that comprise only about 0.5% of Kisoro District. Echuya is surrounded by the Bakiga, Bafumbira and Batwa (comprising about 5% of the population). The Bakiga and Bafumbira are primarily agricultural people, with a few households and owning few numbers of livestock. Traditionally, before the forests were gazetted as national parks, they also carried out logging/pitsawing, hunting in the forests and mining was also a major economic activity in Bwindi. Beekeeping is also a common secondary activity that has traditionally been carried out in and around the forests. The folklore of the Bakiga, Bafumbira and the other ethnic groups neighbouring the protected areas, depicts a traditional dependence on the forest resources for household implements, agriculture and medicine. The activities of beekeepers, healers, blacksmiths and craftspeople are still closely associated with the protected areas.

### *Rwanda*

Rwanda has been severely compromised by the dense population, losing 33% of its natural forest between 1958 and 1996 (Weber, 1987; personal communication, 2004). New settlements of local populations are a threat to the ecology of the region, which is already fragile (Rwanda development indicators, July 2001).

Ruhengeri and Gisenyi provinces, which surround PNV, are the most populated provinces, with 894,179 and 867,225 inhabitants respectively (RGPH, 2002). 823,654 inhabitants or 92.11% of people in Ruhengeri province live in rural areas, whilst the remainder live in urban centres. In Gisenyi province 800,033 (92.25%) live in rural areas.

The districts bordering PNV are densely populated compared to other districts of the same province. The Volcanoes Region was heavily occupied, as a consequence of the significant migration of population since the 1960's. The fertile land of the region attracted people who settled spontaneously on the foothills of the volcanoes. The government organized the settlements in such a way that the farmers were among those that settled (Jost, 1987).

This region was almost unoccupied in 1958 but in 1970 and 1978, it had to cater for 180,000 and 230,000 people respectively who lived around the Park (Faugère quoted by Jost, 1987). In 1962, there were 500 families in Kinigi commune living in 1,082 ha. In 1986, the same commune had 2,269 families (Jost, 1987). According to the current administrative organisation of districts, in 1988, the sectors of Kinigi District, which are closer to PNV, had 2,624 rugo (households). This population growth is the result of a considerable natural growth rate, which has continued to grow since 1950. Currently, the population growth rate is 3.1%. This growth rate is due to a low mortality rate and a high birth and fertility rates.

The population densities of the districts bordering PNV were less than 77 inhabitants/km<sup>2</sup> in 1948, according to the national average (Pierre Sirven quoted by Jost, 1987). In 1987, the density was more than 500 inhabitants/km<sup>2</sup> around PNV (Jost, 1987).

In 2002, the average density of the country was 309.9 inhabitants/km<sup>2</sup> while that of Ruhengeri and Gisenyi Provinces was 537.1 inhabitants/km<sup>2</sup> and 423.8 inhabitants/km<sup>2</sup> respectively (MINECOFIN, 2002). Some districts near PNV exceed, by far, the average density of these provinces. Such a high population density and the search for food, firewood and fodder has had a considerable impact on PNVs natural resources. The existing socioeconomic systems in the region seem to reconcile the urgent need to preserve the biological diversity with the survival of the local population and development needs. The local population continues to have a considerable impact on the natural resources of the forest because household income is very low and people cannot afford access to other sources of energy, other than wood.

Nyungwe National Park is the largest protected area in Rwanda. It offers many advantages to the local population who live near the forest. Nyungwe is located in a region with a high population density where more than 90% are farmers. (MINAGRI, 1984). GAPUSI (1998) states that the local population living near Nyungwe forest is 500,172 inhabitants.

As is the case everywhere in the country, the activities of the primary sector prevail and people still use traditional methods of agriculture. Agriculture remains the main activity of the local population living near the forest, and in the country. In addition to agriculture, there are other activities such as livestock-rearing (cattle, goats, pig, sheep-breeding) and gold and coltan mining, which is still carried out in some areas such as Bweyeye, Kamatsira, in the valleys of Banda. In the past you could find up to 4,000 to 6,000 miners in Nyungwe with numbers even reaching 10,000 (Gapusi, 1998). Hunting and other kinds of poaching are carried out illegally and timber exploitation of exotic species is also occurring in many villages near the forest.

#### *Democratic Republic of Congo*

Maps drawn by Henri Nicolaï of the Parc National des Virunga, show how local populations are grouped around PNVi. In the Rutshuru territory, he concluded "a density of up to 300 inhabitants per km<sup>2</sup> lives near the Mikeno Sector of the park. The population is grouped in the region between the park and the border. But there is also a difference between the west (Bwito) and east (Bwisha). The east is twice as densely populated (254 inhabitants per km<sup>2</sup> compared with 113 km<sup>2</sup> in the west)."

The local population around the southern sector is composed of people whose main activity is agriculture. There are serious conflicts between livestock and agricultural farmers, especially when cows destroy farmers' crops. The conflicts persist as the former feel stronger and more supported compared with the latter.

Land remains the main asset to people and cultivation of land is the main income-generating activity. As the population density increases, land is sub-divided amongst family members. In Jomba the average plot size is almost 44 acres (Dr. Bututu pers. comm.). Local populations remain very poor with insufficient incomes to send all children to school. In general, the land belongs to the family. According to 2003 statistics, the population growth is 12.36% at Jomba, 23.80% at Kibumba, and 2.82% at Bukima. This is a significant percentage increase, which constitutes a major threat to the natural resources of the park.

## **1.5 Management and Use of Land**

### *1.5.1 Land Acquisition /Tenure*

#### *Uganda*

Kamugisha et al., (1997) indicate that the land tenure system around the south-west is predominantly customary private ownership, with a few wealthy farmers holding leasehold titles. Due to the high population density, land fragmentation is also high. The population-cultivable land ratio has been decreasing since the 1930s. The population of the former Kigezi District is documented to have more than doubled between 1932-43, mainly because of immigration from Rwanda, and increased birth rates. In 1943 immigration from Rwanda or Congo to any part of Kigezi was officially halted (Purseglove, 1946). Between 1948-59, the Bakiga migrated northwards into Rukungiri Districts as land pressure mounted in the south. The government responded to this land pressure through three policies: land- reclamation, involving wetland drainage, the resettlement of large numbers of Bakiga in Toro, Bunyoro and Ankole from 1955-60 and the recruitment drive through the Kigezi Recruitment Agency that recruited Bakiga labourers to tea estates, mines, sugar estates and factories and other wage-offering opportunities (Ngologoza, 1969). This helped to reduce the pressure, but the population continued to increase naturally.

The practice of polygamy among the Bakiga and Bafumbira and the customary practice of inheritance, where a household head has to divide his land amongst his sons and the practices of land borrowing, purchasing and renting, all heighten the land fragmentation problem. The area is a patchwork of agricultural plots, terraces, woodlots and household compounds. Most swamps have been drained for agriculture and grazing.

The land problem in south-western Uganda, particularly in Kabale and Kisoro District has sometimes been described as land shortage. The reality, however, might be that there is a problem of land distribution between the wealthy and the poor sections of the community. Anecdotal data indicates that the wealthiest group of people, who comprise only about one-third of the community, control about two-thirds of the land, while the remaining two-thirds of the community only control one-third of the land. This has implications not only for land management practices, but also for demand for access to PA resources, including land. The issue of land distribution, thus, is a political one, and will not easily find its way onto the political agenda, especially when it is the wealthy people who control most of the decision-making fora (Kjersgard 1997).

#### *Rwanda/DRC*

Land is inherited through the paternal line around the Volcanoes, Virunga and Nyungwe Parks. According to local customs, land acquisition can also be carried out either by transfer, donation or sale. However, in Rwanda, this is done illegally because the decree law n° 09/76 of the 4<sup>th</sup> March 1976, paragraph 2, states that nobody is allowed to sell his/her land without prior and written authorization from the Minister of Land. In the region near PNV, there are other modes of land acquisition besides inheritance. These include:

- Renting: the heirs rent a portion of land against a certain amount of money paid annually or every farming season.
- Collaboration agreement: a landowner who cannot find seeds or tools may request someone who has them, but does not have land to join him/her for collaboration. The harvest is then divided between the parties.
- Sale: the landowner can sell a portion of his/her land.
- If a landowner requires additional manual labour, payment is sometimes made in the form of allowing the people who provide the labour to cultivate a portion of the land, as they are generally landless.

Around Virunga, especially in Jomba, there is a special mode of land acquisition whereby the landowner (the benefactor) can give a portion of his/her land to someone and the latter offers beer in return (symbolic).

### *1.5.2. Agriculture*

#### *Uganda*

Agriculture is the dominant economic activity around Bwindi, Mgahinga and Echuya forests. Below 1,800m, banana is the main perennial food-crop. In this region tea and, to a lesser extent, coffee is planted as a cash crop (Kamugisha et al, 1997). Tea is increasingly important as an income earner in areas around Kayonza where a tea factory is located and this has led to an improved road network in the area.

Above 1,800m, only annual crops are planted, mainly sorghum, sweet potatoes, millet, Irish potatoes, and, on higher slopes, peas and wheat. Irish potatoes, peas and wheat are also important as cash crops. Pyrethrum is being introduced as a cash crop and is gaining acceptance among the farmers around Kabale (Kamugisha et al, 1997). Tobacco is also grown as a cash crop around Echuya. Agriculture is mainly subsistence, where surplus is sold off, with the constraint of poor marketing infrastructure in some areas, especially around Bwindi and Echuya.

Cultivation covers most hill-tops and wetlands have been drained, while very little of the original forest outside the protected areas still remains. Land shortage, coupled with intensive use for subsistence agriculture, has led to soil degradation, poor yields and, ultimately, poverty. All this leads to high dependence on some protected area resources. Before 1991, a large part of Mgahinga was cleared by farmers who were evicted, after it was gazetted as a national park. Bwindi was extensively pit-sawn, and mining was also carried out in various areas of the forest. Agricultural encroachment had also occurred on the edges at various points. Bwindi and Mgahinga boundaries are well secured at the moment but some agricultural encroachment is reported on the edges of Echuya (Nature Uganda, 2003).

### *Rwanda*

In the region near PNV, agriculture is the main economic activity. The ecological conditions in the region contribute to the production of many varieties of food and cash crops. The most important food crops are: potatoes, beans, sorghum, wheat, peas and maize. The main cash crop is pyrethrum and it is grown along the western half of the park. Food production is subjected to the constraint of parcelling out land as a consequence of the growing population.

Land is rarely left fallow due to the scarcity of arable lands; the over-exploited fields will be exhausted if appropriate measures, such as the introduction of agricultural inputs, crop-rotation and monitoring are not taken into consideration. In the 1980s the Ruhengeri Resources and Management Project was developed to specifically target the Ruhengeri watershed around the PNV and to improve agricultural production and the supply of firewood and building poles. This project carried out several surveys, including studies of the attitudes of the local population towards the conservation of the park (Weber, 1987)

Although agriculture is the main activity for more than 90% of the local population, food production is insufficient. This is highlighted during periods of food shortage, especially in October-November and April-May of each year. Other consequences of this situation include malnutrition, low income and poverty among the local population. In the fields close to the park, crops are frequently damaged by wildlife contributing to a number of constraints to agriculture. This situation encourages the local population to resort to exploiting the natural resources of PNV to compensate for their losses. In 1994, during the period of insecurity in Rwanda, the local population of the district of Bukamba started to clear the park in search of arable land but the authorities stopped them immediately. This situation caused serious erosion as the vegetation had been destroyed and could no longer prevent run-off of soil during the rains. Cultivation of land within the park also occurs especially where the boundary is not clearly defined.

Around Nyungwe, agriculture encounters significant problems because the soil, which was previously protected by the forest, becomes poor and fragile over time. The residents are, therefore, always in search of new lands, which can be found within the park. The problem of soil-infertility, combined with the lack of available new land to farm, is leading to smaller and smaller farm sizes (Weber, 1987).

According to a socioeconomic study of the management unit of Nyungwe Area 3 (UGZ 3) (Bozena et al., 1993) out of 175 households surveyed in Nshili district in 1989, the total area of available land was 5,053,539 m<sup>2</sup>, with an average of 2.89 ha per household. Half of the land is used for food crops, 30% for tree plantations and unused land represents 13%.

In Mudasomwa district, the total area of available land was 1,784,320 m<sup>2</sup> belonging to 128 households surveyed, an average of 1.39 ha per household; more than half of the land is used for food crops such as: wheat, maize, sweet potato, Irish potatoes, peas, beans and soya beans. Tea, a cash crop, is also planted and provides a source of income to the people of this district. 61 % of the total area of available land is used for food crops, with trees and cash crops representing 22 % and 10 % respectively. Fallow land and pasture represents only 3 % and 1.5 % respectively. As one moves away from the forest, tree plantations and cash crop farms have been reduced, and food crop farms have been developed instead (Boneza and Al, 1993).

#### *Democratic Republic of Congo*

Agriculture is also the most common activity for people living around Virunga. Agriculture is the only activity for 72.9% of the population whilst the remainder of the population combine it with other profitable activities e.g. farmers-pastors (evangelists, former church leaders...), farmers-civil-servants (10%) (teachers, nurses, administration civil-servants), farmers-craftsmen (0.9%) builders, carpenters, soldiers and park-keepers. In the region of Bukima and Jomba, there are also stockbreeders, who are not considered to be farmers but whose number of cattle is not large. The main crops found in some sectors around Virunga include:

- ❑ Food crops: beans, maize, potatoes, sweet potatoes, sorghum, peas, banana trees, wheat, cassava and taro.
- ❑ Vegetable farming: cabbages, leeks, onion, garlic, spinach, celery, artichoke, radish, fennel, parsley, rhubarb and marrow.

Kibumba region has many hills and valleys. The farming methods used take into account these factors and terracing is used to fight erosion on the hills. These terraces are sometimes supported by anti-erosive hedges (*Eucalyptus* trees or *Paspalum*). In the valleys, people cultivate on raised mounds of soil in order to minimize the problems related to soil infertility. The furrows which separate the mounds will gather the stems of the preceding crops hidden in the ground and will be used as manure. These furrows will be converted into mounds in the next season, whereas the mounds will become furrows. This alternation of role renews soil fertility each season.

The local population living around PNV and Kibumba uses manure (DAP, Urea and NPK) for Irish potatoes. Pesticides are also used in the fight against pests in vegetable crops.

### 1.5.3. Access to Firewood

#### *Uganda*

As is the case elsewhere in rural Uganda, fuel wood is the main source of energy for cooking and heating in the areas around Bwindi Forest (Cunningham, 1992), with consumption in the area estimated at 140,000 m<sup>3</sup>/year (Kanongo, 1990). Most of the fuelwood (85%) is produced from farmers' woodlots (Kamugisha, et al., 1997), but over-population and limited efforts put into tree planting by some households still create some level of scarcity of fuelwood. Thus, there are some people who do, and who still have the desire to, access fuel wood from the protected areas.

Black wattle (*Acacia mearnsii*) and Eucalyptus (*Eucalyptus sp.*) trees were introduced by the colonialists in Kigezi during the 1910s, and by 1927 a law was passed to force people to plant them, because they had resisted planting the trees due to fear that they might be taxed on them. The other reason was that people believed that eucalyptus could destroy agricultural land and, after all, they saw a lot of natural trees around them and perceived no need to plant more (Ngologoza, 1969).

Today, the areas in the south-west are probably some of the most planted with woodlots in Uganda, thanks to interventions by various organizations. Many households have planted woodlots, mainly of Eucalyptus and black wattle. Most households can meet their wood needs for building (houses, fences, construction of granaries), fuel wood, hoe handles, walking sticks and ladles, bean and banana stakes. Some households are commercially exploiting their woodlots. However, land shortages, lack of labour, to some limited extent the fear that planting trees attracts vermin, or even sheer neglect in some households, leads to a lack of trees, in turn leading to dependence on illegal access (from Bwindi and Mgahinga), and unsustainable access from Echuya. Indeed, timber, poles, stakes, fuel wood and bamboo remain some of the most commonly illegally exploited resources from the two parks (ITFC in prep.).

#### *Rwanda*

Trees in the region near Volcanoes National Park can be seen in the form of large tree plantations, small private tree plantations and scattered trees in the landscape. Large tree plantations belong to the districts that manage these plantations. A considerable percentage of plantations (11,521 ha) belong to SOPYRWA, an association for the production of pyrethrum. The plantations were established to dry the flowers but, more recently, they have switched to solar driers and as a result, there may be fewer plantations established or maintained in the future (Munyangabe, 2002).

The local population does not have access to these large plantations. As a consequence, people enter the park to look for firewood. The most exploited species is bamboo. As far as firewood is concerned, the demand is higher than the supply. The quantity of other products such as crop residues and other fuel used in substitution for firewood is so small that the deficit continues to increase as well as the rate of forest degradation, which can reach more than 8,000 hectares of trees per year throughout Rwanda (MINITERE, 1998).

In the region near Nyungwe National Park, the use of various wood products from the forest offers a great opportunity to develop trade. For the local population living near Nyungwe National Park, wood is the main source of energy, used for cooking, lighting and other uses (Weber, 1987; Musabe, 2002). In some districts, there are buffer-zones from which the local population obtains firewood, whereas, in other areas, the forest is the only place where they can find it. This is the case in Kitabi in Mudusomwa district where the local population does not have access to firewood and where such a practice is a serious threat to forest conservation.

### *DRC*

At Bukima and Jomba, in Virunga park, the local population have tree plantations so the need to resort to the trees from the park is very low. There are not many tree plantations at Kibumba because the arable land area is very small. 50% of the local population does not have enough firewood and 53% of households use charcoal, together with firewood. There is also a shortage of firewood and this is due to the fact that most of the trees were cut when the refugee camps were established in this region, following the genocide in Rwanda (IGCP, 2001).

A firewood shortage has created a firewood market at the local level and bamboo, firewood and charcoal can be found for sale. For instance, in Kibumba a stick of bamboo is 80 congolese francs (Fc) (\$0,8) a sack of charcoal costs between 250 Fc (\$2,5) and 300 Fc (\$3), whilst a bundle of firewood is 50 Fc (\$0,5). The demand for wood favours the exploitation of trees from the park.

## **1.6 Poverty**

### *Uganda*

Wealth-ranking exercises carried out by different organizations around the area (Kjersgard 1997, ITFC in prep.), indicate that ownership of (quality) land, and livestock, household ability to hire labour (as opposed to selling labour), ability to send children to school (and the quality of the schools attended), level of farm production (whether one produces enough for their household and can sell off the surplus for income), quality of housing and sometimes ownership of transport means, are the main indicators of wealth. In some communities these are supplemented by more qualitative indicators of wealth, such as hygiene, generosity (caring for less fortunate relatives) and participation in community activities such as meetings where decisions are made. Poor people are typically described as those who have to sell their labour to supplement their incomes, own no livestock, have poor houses (not iron sheet roofed), produce only for subsistence and cannot afford to educate children. Some cannot even afford school uniforms for children to go to free schools under the Universal Primary Education programme. Such households usually own little and/or poor quality land. Education is one of the main factors, correlated with poverty, with higher percentages of uneducated people in the poorer sections of the community and less among the wealthier sections and more people in the wealthier categories with higher levels of education than in the poorer categories.

The areas around Bwindi, Mgahinga and Echuya forests are inhabited by some of the poorest people in Uganda. It was estimated that around Echuya, over 35% live below the poverty line of less than US \$1 per day and per capita income in the area is estimated at US\$ 20 per annum (Ministry of Finance Report, cited in Nature Uganda, 2003). Poor people are likely to have limited economic alternatives. The poor people cannot even access locally available channels of improving livelihoods, e.g. the local CBOs, like credit and savings groups, because they are excluded due to the fact that they can't afford the conditions of membership. They are, therefore, less likely to benefit from the interventions by NGOs if they are not well targeted (Kjersgard 1997, ITFC in prep.). The negative impact that the protected areas have on the community hits the poor the hardest, especially crop damage and restricted resource access. In addition, they are also more dependent on protected areas for their subsistence, or as an income source where they are used by richer people to exploit protected areas. As such, the poorest people seem to become significantly more negative towards the protected areas when they are restricted from accessing the resources therein, or when they suffer costs associated with protected areas (ITFC, in prep.)

### *Rwanda*

Rwanda is classified as one of the poorest countries in the world, with an average annual income of \$251 per person in 1998 (MINECOFIN, 1998). Around Volcanoes and Nyungwe National Parks, a good number of wealth indicators show lower standards of living of the local population. These indicators include the quality of the land, cattle, manpower, the possibility of sending children to school, crop production (if a farmer is able to feed himself and sell), the quality of the houses, means of transport, and ownership of assets such as a radio.

A high percentage of people living near these parks live in poverty, characterised by the following indicators:

- Low education levels
- Households with many members
- Poor quality housing
- No access to basic infrastructures (schools, hospital and health-centres, water, markets, etc.)
- Very small farms
- Shortage of food products
- Production is so poor that there is no surplus for sale

### *DRC*

People living near Virunga are very poor, having suffered from the recent civil wars in eastern DRC. There is no investment, people have little education and there is also a lack of qualified technical trainers. Moreover, such consequences of the civil war, as the displacement of households (whose main activity is farming and cattle-rearing) and the disruption to farming activities, together with the destruction of crops by wild animals, have all contributed to the decline of the economic situation.

The problems encountered by the local population near Virunga are also due to the lack of clean water in their region: cattle do not find enough water and farms and seedbeds are not watered. This increases the chances of poor health and of people becoming easily contaminated with skin diseases (scales, mycosis), worms, dysentery, cholera, and diarrhoea. As a result, expenditure is increased on top of other expenses related to agricultural, cattle-breeding and forest activities.

Poor infrastructure in Mikeno sector makes it difficult to obtain supplies from outside and to sell food products elsewhere. Indeed, the roads have been in a bad condition for several decades and continue to remain in this state due to the insecurity, which has prevailed for many years. Compared with some other villages in the region, this area receives few outside visitors.

The impact of the conflicts has further compromised agricultural production and food security. The poor productivity in such domains as farming and cattle breeding in the whole of Mikeno sector has been due to the following factors:

- ❑ Households involved in agricultural activities have been displaced
- ❑ Loss of inputs when trying to escape from violence and insecurity
- ❑ Local populations cannot afford to buy the inputs
- ❑ Bad roads
- ❑ Trade is disorganised
- ❑ Cattle-looting

One of the most serious consequences of poverty in the regions near these parks is the existence of a great number of vulnerable people. Vulnerable people are a category of people who cannot support themselves and depend on others for their survival. These include:

- ❑ Widows who have lost their spouses during the war and genocide
- ❑ Orphans (orphans who live together and orphans who are adopted in families)
- ❑ Handicapped people (disabled people, people who are mentally sick, old men or women who are lonely and poor people)

These vulnerable groups encounter several problems such as a lack of housing, a lack of food, no access to medical care and a lack of school fees for their children. As a result, these people are often forced to beg, enter into prostitution, juvenile delinquency or vagrancy.

### **1.7 The Batwa**

The Batwa culture is intimately bound to forests and their surrounding areas. To the Batwa, the forests signify a source of physical, emotional and spiritual well-being. The caves in Mgahinga were important spiritual and cultural sites for the Batwa, and a few still visit them (Cunningham et al., 1993).

Consultations in preparation for the current general management plan for the Bwindi-Mgahinga Conservation Area revealed that the desire to continue using cultural sites in the two parks still exist both among the Batwa and the non-Batwa. The Batwa have lived on the fringes of Bwindi Forest since it was gazetted as a forest reserve (1932-1991) but spent a lot of their time inside the forest (especially the men) gathering fruits, game meat, and wild honey. These activities however, were declared illegal and were hence reduced, when the forest was gazetted as a national park in 1991. The Batwa around Echuya were the traditional forest dwellers, solely dependent on the forest for subsistence use.

Near Virunga, PNV and Nyungwe National Parks, there are some small groups of Batwa whose living conditions are very poor. Marginalised by the rest of Rwandan Society, they have little or no land and have no access to forest resources, as they used to prior to the 1930s. As a result, several projects have started since the 1994 genocide to help these groups.

After the Bwindi and Mgahinga Forests were gazetted as national parks in 1991, the Batwa became some of the most dispossessed people in the communities. For them, the forests were the sole source of their livelihood and most of them did not even own land when they were evicted from the forest. Subsequently, they mostly depended on illegally accessed forest products, which they also exchanged for agricultural products. The Mgahinga and Bwindi Impenetrable Conservation Trust (MBIFCT), complemented by other, church-based organisations, implemented the resettling of the Batwa, mainly by purchasing land from community members and resettling the Batwa on the land by helping them to construct houses and providing them with initial relief handouts.

However, because most of the Batwa were not used to undertaking agricultural work, even after some of them had been given their own land, they continued to spend their time labouring for other people to obtain food. Consequently, the other community members have taken advantage of the Batwa's deprivation to exploit them. In fact, it was revealed that many of the non-Batwa members of the community are not happy with the efforts that many NGOs are putting into improving the conditions for the Batwa, because this deprives them of a source of cheap labour (Kamugisha, 1999).

Although, initially, the Batwa forest-based activities had no serious ecological impact on the forests, other ethnic groups are now using the Batwa to access resources in the parks (especially bamboo, fuelwood), and in Echuya, to commercially and unsustainably exploit bamboo. Indeed, large amounts of bamboo are exploited from this forest, particularly from the south-western corner, for construction. Since the upgrading of Bwindi and Mgahinga to national parks, Echuya has become a major source of bamboo in the area (Nature Uganda, 2003).

The Batwa are among the poorest category of people within communities around all the forests surveyed in this study. They are not well represented in decision-making fora. They remain, largely, a marginalised and stigmatised group of people, who do not and are not expected by most community members, to freely mix with other people or to participate in community activities. Many are illiterate and, even in their immediate communities, they are discriminated against, by not being allowed to be members of community groups. This means that they find it difficult to benefit from group activities, such as savings and credit schemes, or even to access information from NGOs that is transmitted through groups (Kjersgard 1997). Batwa needs for forest resources (wild yams, fish and wild honey) from the parks have not been considered for access in integrated resource use programmes, mainly because of the unsustainable ways of harvesting these resources. As such, the Batwa feel that their needs have been marginalised even in the multiple use programme, and yet the costs they incur due to the creation of the park are greater than for other community members. It was, therefore, decided that this group would be sampled separately in this study to assess their socio-economic status and attitudes to conservation independently.

## **1.8 Conservation Activities in the Central Albertine Rift working with Local Communities**

### *Uganda*

The main conservation problem that has faced Bwindi, Mgahinga and Echuya is the conflict of interest over land use, where local communities desire to utilise the resources as they want. Increased protection accorded to the Bwindi and Mgahinga Forests by government led to increased hostility between the park authorities and local communities. In addition to restricted access to the forest resources, local people incur high losses in the form of crop damage and livestock loss to wildlife.

To address these conflicts, a number of conservation and development interventions, addressing community needs relating to the conservation of the forests, have been implemented by UWA and the Forest Department in partnership with other organisations. Around Echuya, limited conservation and development interventions have been implemented. Kisoro Development Foundation has been supported under the UNDP/GEF Small Grants Programme to implement a community conservation programme in only three villages adjacent to the Kisoro part of the reserve. The project is encouraging tree planting and other land management activities and conservation education. It commenced in around 2001 and has a span of only 2 years. But Nature Uganda will soon start a larger Collaborative Forest Management project there, in collaboration with the National Forest Authority.

In the case of the two parks, the partners working with UWA for a long period have been CARE-Development Through Conservation Project, the Mgahinga and Bwindi Impenetrable Conservation Trust (MBIFCT) and the International Gorilla Conservation Programme (IGCP), the Institute for Tropical Forest Conservation (ITFC) and various church-based organisations mainly working with the Batwa. UWA has, amongst other programmes, implemented a Conservation Education Programme, mainly implemented by the Community Conservation Units in each park. The Education Programme sensitises the community on conservation and protected area values, plus helps in the implementation of benefit-sharing programmes and community-protected area conflict resolution (e.g. wildlife damage and illegal resource use). There is also a programme to enlist community participation in the park management. Under this programme, parish representatives are elected into an institution (one for each PA), called the Community Protected Area Institution (CPI), which is an institution through which communities channel their views to park management and vice versa. These institutions also supervise and monitor benefit-sharing programmes.

Park authorities have implemented benefit-sharing programmes since the early 1990s. These include controlled access to park resources and revenue-sharing. A programme to allow local communities to access park resources in a controlled manner, locally known as the multiple use programme, has been initiated to allow communities to access specified park resources including weaving material, honey and medicinal plants. The programme is implemented in about half of the parishes around Bwindi and two of those near Mgahinga. This programme is monitored by ITFC. Under the revenue-sharing programme, the wildlife statute allocates 20% of the gate entry fees to local governments around the parks. The community share of the revenue has mainly been used to develop social infrastructure, which was initially largely lacking in the area in the past. The communities prioritise the projects to be funded themselves.

In addition to this, the Mgahinga and Bwindi Impenetrable Forest Conservation Trust (MBIFCT) has also worked to direct a proportion of conservation revenues for community development. MBIFCT is an endowment fund and the original money for the endowment came from GEF through the World Bank. The Netherlands Government supported the running costs and programmes of the Trust at different times to allow the endowment to grow. However, the fund has in the recent past, been affected by fluctuations in the capital markets, mainly caused by the September 11<sup>th</sup> attack in New York.

CARE-Uganda had, until 2002, been implementing the sustainable agriculture programmes, aimed at reducing the demand for protected area resources and on-farm substitution of bamboo and trees, hoping to reduce the demand of park resources. The agriculture programme involved the promotion of improved livestock breeds, high-yielding crop varieties, soil conservation technologies and agriculture produce marketing. The tree and bamboo-planting programme involved the promotion of tree varieties for soil conservation, subsistence and commercial use. Farmers were allowed to get rhizomes from the park and planted bamboo on their farms, mainly around Mgahinga.

A programme was also developed to enhance community participation in the tourism industry, mainly supported by IGCP. Under the programme, local communities have been supported or encouraged by conservation organisations to actively tap tourism benefits in two parishes, one around Buhoma in Bwindi, and the other around Ntebeko near Mgahinga. Recently, the International Gorilla Conservation Programme has started some activities in and around Bwindi and Mgahinga.

### *Rwanda*

To tackle the threats to the PNV, ORTPN is working in collaboration with community development organizations and conservation agencies such as the Dian Fossey Gorilla Fund International, Dian Fossey Gorilla Fund/Europe, Care International, Mountain Gorilla Veterinary Project, Wildlife Conservation Society and The International Gorilla Conservation Programme. These organizations support activities that aim to:

- Improve park security, fight against gorilla poaching and, at the same time, fight against poaching other animals and any illegal activity;
- Stimulate activities which can contribute to the growth of tourist incomes through the monitoring of the mountain gorilla eco-tourism programme;
- Develop a system of communication through education where people learn more about the park and its natural beauty;
- Initiate some community development activities.

All these organisations work for the promotion of the park and its resources as well as for the interest of the local population living near the park. They initiate development activities, they provide jobs to the local population and they provide material or financial assistance. Some projects aim at getting access to specific resources such as medicinal plants and honey. A wall is under construction to avoid the damage caused by wild animals in the park. Where this wall is already in place, positive effects have been noticed and the production of food crops is improving. Some plants, such as maize, had been abandoned because wild animals were destroying them but they are now being cultivated again.

Around Nyungwe National Park, degradation continues, despite the determination to promote conservation (Combe, 1997, SORG, 1978, W.W.F., 1987). The Rwandan government approved a management plan for Nyungwe in 1984 (Vedder et al, 1987), which promoted an integration of forestry and nature conservation. At this time MINAGRI managed the entire forest, with some wildlife and tourism support from ORTPN. Most projects supported by MINAGRI focused on forest management activities. Four management units of different areas "Unités de Gestion de Zones" (UGZ) initiated afforestation activities around the forest and this created buffer-zones of pines, which are now ready for harvesting.

The Projet Conservation de la Forêt de Nyungwe (PCFN) was established by WCS in 1986. Its objectives were research, conservation, support to ORTPN and law enforcement, and education of the local communities (Weber, 1987). Since the genocide in 1994, ORTPN and PCFN have been the only agencies working in Nyungwe and now that Nyungwe is a national park, ORTPN has the mandate to manage the whole forest. The use of the buffer-zones at present, and how they could be used in future to help the local communities living around the forest, is of interest to conservation managers and this survey asked a few questions aimed at obtaining the views of the people about the use of these buffer-zones.

### *DRC*

Support for conservation programmes in DRC, that involves local communities, has been at a relatively small scale compared with that of Uganda. WWF has been working through PEVi/Kacheche to educate people around the park about conservation issues, to help them develop woodlots and buffer-zones to reduce human-wildlife conflict and, additionally, to provide a sustainable supply of fuelwood. This work has been ongoing since the late 1980s. The Dian Fossey Gorilla Fund Europe has been working with women's groups around the Mikeno sector and with the wives of rangers who have been killed in the park. Dian Fossey Gorilla Fund International has recently started a human health programme around the park to reduce the illnesses that afflict people and, at the same time, to reduce the risk of disease transmission to gorillas. IGCP is creating an enterprise development scheme for communities adjacent to the Mikeno sector and southern sector of the park. However, DRC has been slower to incorporate an ethic of community conservation, primarily because of the civil wars and the problems caused by refugee settlements and human migration in the region.

## **1.9 Report Outline**

The second chapter of the report summarises the sampling methods and the process of planning and implementation of the survey. From the start, we aimed to include both conservation and development practitioners in the design of the surveys so that data useful to both groups would be collected.

The third, fourth and fifth chapters summarise the results in three themes:

### *3. The socio-economic status of people living around protected areas in the Central Albertine Rift*

This chapter provides a summary of the status of people; household and population structure, their average farm size, house construction, livestock and other material assets and access to education and health

### *4. The economic situation and income generation*

This chapter focuses on where people make money, their access to markets, how easy it is to access credits and the constraints they face in making money.

### *5. The relationship between the local community and protected areas*

This chapter looks at the attitudes of people towards conservation and the protected areas adjacent to where they live, how relationships have changed over the recent past, what they access from the forest and how much different items cost, the problems of crop-raiding and issues concerned with bush-meat hunting. This chapter also looks at the use of buffer or multiple-use zones, where they exist.

The last chapter (6) summarises the main findings and puts it into context. Several policy recommendations that arise from the research are suggested.



### SECTION 3: SURVEY METHODS



*Boys using forest products to make toys M.Gray*

## 2.1 Planning the Surveys

The planning for these surveys took place over a period of about eight months. The three NGO partners, CARE, IGCP and WCS, wanted to ensure that all interested parties would have the chance to contribute to the process and design of the surveys. Development NGOs as well as Conservation NGOs participated to ensure that information of use to them was collected.

A series of meetings were held to coordinate the type of information different NGOs and Government institutions wanted to obtain. The first meeting, held in Ruhengeri, was held on May 15<sup>th</sup> 2001 and lasted for two days. This meeting brought together a number of conservation NGOs working in and around the PNV, Virunga, Nyungwe and other representatives from development NGOs working around these Protected Areas and one from CARE-DTC who brought with her the experiences of CARE in carrying out socioeconomic surveys in Uganda.

The meeting was organised in two working groups, with each member focusing on the protected area in which they worked: one group for Nyungwe Forest and the other for the Virunga Volcanoes. A number of conclusions were drawn with regard to the information that needed to be collected during the survey. Below is the summary of the information that was agreed on from each of the two parks.

Information recommended by the Virunga Volcanoes Group to be collected during the survey included:

- Information on the harvesting of natural products
- Information on crop-raiding
- Information on human demography.
- Information on agriculture and livestock farming.
- Information on water needs.
- Information on tree and bamboo plantations.

- Information on the attitudes of people towards conservation.
- Information on the local economy.

Information recommended by the group from Nyungwe Forest Reserve to be collected during the survey included:

- Information on bush-meat harvesting.
- Information on mining of coltan and gold in Nyungwe Forest.
- Information on the encroachment of the forest
- Information on bushfires in Nyungwe Forest.
- Information on the buffer-zone management and the attitudes of people towards the buffer-zone management.
- Information on the attitude of people towards the conservation of Nyungwe Forest.
- Information on human demography
- Information on local economy.

A second meeting to plan for the socioeconomic survey was held on November, 8<sup>th</sup> 2001 in Kabale, with the aim of developing the methods to be used in surveys around Nyungwe, PNV, Virunga, Mgahinga, Echuya and Bwindi. During this meeting, the participants agreed on the information format of the questionnaire surveys, and the information to collect using a PRA approach. This meeting discussed the sampling strategy for data collection, which answered some important questions such as: where to collect data, who would collect the data and who to collect the data from were all discussed during this meeting. The questionnaire format, definition of questions and the training approaches necessary for the survey to be accomplished successfully were agreed upon.

As a result of the November meeting, it was agreed that there would be a mix of male and female interviewers and people with experience in collecting data. However, finding experienced survey workers was possible only in Uganda where CARE-Uganda has already carried out a number of surveys but was not possible in Rwanda and DRC where this exercise was to be carried out for the first time. It was, therefore, agreed that from each parish in which the survey was to be carried out, an interviewer should be selected with at least secondary school year 4 or 6 level of education, or the equivalent. It was also decided to sample households in every parish bordering the protected areas (parish is an English term used in the English version of this report to refer to sectors or localités in Rwanda and DRC respectively). The interviewers were selected in the following ways:

#### *Uganda*

Since CARE had already carried out a number of surveys, it was justifiable to use their extension agents who would be less expensive because they wouldn't require a lot of training and would be more effective due to their experience. School teachers who were not fully engaged with their full-time teaching jobs, or those on leave, were selected as interviewers as well as S.6 leavers who were unemployed at that time.

### *Rwanda*

In all protected areas in both countries that were to be studied, there was a community conservation approach that was already in place, which involved the collaboration of protected Area Managers with communities neighbouring the protected areas, through an individual elected in each sector to be in charge of the environment. These were ultimately named ANICO (Animateur de la Conservation). Each ANICO member is one representative among the 9 elected people who make up the Administrative Committee in each sector. We selected the ANICO, who were known to have some basic education, as interviewers in PNV and Nyungwe, as well as school-teachers and S.6 leavers. Equal opportunities were given to both men and women in all sites.

### *DRC*

A selection of S.6 leavers were chosen based on personal knowledge of their abilities by staff from IGCP and WWF in Goma. Many of these were also teachers who were on vacation or unemployed.

## **2.2 Development of the Questionnaire.**

Before the second meeting a draft questionnaire was made which incorporated the ideas and data needs of the first meeting. This draft questionnaire was discussed and modified at the second meeting.

The questionnaire was built on a number of concepts as shown below:

### *Human Demography:*

- Human demography was identified as an important aspect in the questionnaire in that it would show the current population size around the forests, the demographic structure of the population, the number of children at school, and the number of people who have moved further away due to war and insecurity.
- Data collected included family size, education level, employment, status within the household, and time they have been living there.

### *Household Income and Agriculture*

- Questions about the structure of the house, ownership of radios, bicycles, motorbikes, number of livestock and land size were all made with the aim of providing a basic measure of wealth per household.
- Questions about field size and crops grown were asked to obtain a better understanding of the livelihoods and economies of the households around the forests.

### *Attitudes Towards Conservation*

- Questions were asked about the knowledge of the parks in their respective country, their knowledge of the protected area authorities and other NGO projects involved in conservation, with the aim of understanding how much people know about conservation in their country.
- Crop-raiding was also highlighted as important information to collect during the survey. This would help the park management to know where crop-raiding

was occurring, which animals were raiding the fields and where this threat was occurring most.

- Questions were asked about bush-meat hunting in general to obtain some idea of how much illegal hunting was taking place around the forests.
- Attitudes towards conservation were also important information for the park management, for them to evaluate and revise the community education programmes. The information that was collected included their attitudes towards the park and the factors that affect the people's attitudes towards conservation.
- Harvesting of non-timber forest products was also noted and measurements of the frequency and abundance of products harvested were obtained.
- Information about the management of the buffer-zone and the attitudes of local people towards the buffer-zone management. This information would establish what communities currently obtain from the buffer-zone and what it could be used for, once harvested.

#### *Health, Education and Access to Markets*

- Questions were also asked about access to health treatment and primary and secondary schools were asked to measure how difficult it is for people to access them and how it relates to their knowledge of conservation and wealth
- An understanding of the economics of households in the regions was also deemed necessary and the survey asked how people made money, where they went for credit and whether they benefited from tourism or membership of any association.

### **2.3 The Training Process**

After the selection of interviewers, it was important to train them before the survey. A four- day training programme took place prior to the survey in all sites. During the training, the trainers shared the lessons from other studies carried out previously in Uganda and Rwanda in order to prevent past mistakes being repeated. A number of points were emphasised during this training:

- The different options within the questions that made up the questionnaire were thoroughly explained and emphasised so that the interviewer would be able to select one, based on the response of the interviewee.
- The concepts within the questionnaire were clearly defined, so that the interviewers understood and used the same definitions during the interviews.
- The introduction of the questionnaire to the interviewee was another aspect that was emphasised during the training. This emphasised that interviewers should show respect to respondents and were not to interpret responses too quickly.
- Dress-codes were clarified so that the interviewers didn't compromise data collection by scaring the respondents through being overdressed but, equally, it was important to be smartly dressed in order to show respect to people
- It was emphasised during this training that the exercise should not be presented as official but more of an interaction with respondents to identify the issues. The idea of this was that it would create confidence in

the respondent, the end result being that more realistic responses would be obtained.

- Back translations were made with the interviewers for them to understand the questionnaire better.
- Gender sensitivity was emphasised during the interviewing process. It was stressed that, where possible, the interviewer would interview the husband in the first house and the wife in the second house.
- Many surveys that have been carried out in communities have raised expectations of funds flowing to the communities. Therefore, interviewers were reminded not to increase local community expectations during the exercise.
- The interviewers were trained in conservation values so that they could better explain the reasons for the survey.

Role-play was used during the training as a way of giving the interviewers practice in the technique of introducing themselves and settling an interviewee. Finally, the interviewers were sent into the villages near the training centres to pre-test the questionnaires so that problems and misunderstandings could be ironed out in advance.

## **2.4 Supervision in the Field**

The whole exercise would not have been successful without close supervision. Three supervisors were selected in Nyungwe, two in each of the remaining sites (Virunga Volcanoes and Bwindi-Echuya) with the task of monitoring the exercise and making sure that questionnaires were interpreted and answered correctly and that the transects were followed correctly. These people were permanently stationed in the field and interacted with each interviewer regularly so that they could check data-sheets coming in. In most sites, the supervisors were selected from the people who were employed on a full-time basis in the parks, which was, in itself, an advantage because they knew the importance of the exercise. The supervisors were trained with the interviewers so that they could understand the process.

In all sites, each supervisor controlled a number of interviewers and kept in close contact with all of them using the means of transport that was available at each site e.g. motorcycle and vehicles. It was in this way that they collected the completed questionnaires, and monitored the interviewers during the exercise, helping them with any difficulties they encountered.

## **2.5 Methods used in the Field to Sample Households**

The aspect of household sampling was difficult. In Uganda there were good lists of households and it would have been possible to use these to select a random set, however, in the other countries this was not available. In some sites that were to be surveyed, communities live in villages where households are grouped together and the people farm far away from the village. In other sites people live on their land and farm around their household. During one of the meetings to prepare for the survey, the participants evaluated ways of collecting the information, taking into consideration the two scenarios mentioned above. It was agreed, therefore, to use a transect

method to measure the influence and the dependence of the communities at different distances from the forest. In each parish/sector bordering the forest one transect was walked starting at the park/forest reserve boundary and walked in a pre-selected compass direction (compass direction was selected on a map (not in the field) to maximise the distance walked in a parish whilst, at the same time, running roughly perpendicular to the forest boundary). Each transect was 10km long except for those around Echuya Forest Reserve which were 5 km.

Forty one households were to be sampled along the 10km transect, and the criteria used was to have one household at the beginning of the transect located at the forest boundary (zero distance) and, subsequently, a household selected at every 250 m along the transect. The starting points of each transect were selected randomly, using the administrative maps of the countries being surveyed, as follows: the length of the parish/sector at the boundary was measured using ARCVIEW 3.2a and divided into 100 equal units. The starting point was made by selecting a random number from 1-100 and multiplying this by the unit length and translating this to the map in ARCVIEW. A random compass direction was also selected by selecting a direction that maximised the distance of the transect in the parish/sector. The transect start points were all identified and marked using a GPS (Global Positioning System) and ribbon tapes.

## **2.6 Data Entry and Treatment**

After the collection from the field, data were entered into a computer to allow easy interpretation and analysis. The table for data entry was developed in an Excel file format. The selection of the computer-literate individuals in all sites was carried out prior to the training of the interviewers. They also attended the training prior to the survey so that they could understand the questionnaire and its concepts for easy data interpretation when entering data in the computer. In addition they received a second training, which focused on the Excel datasheet, its basics, meanings of the various columns and coding of the responses. All these tools would help them to interpret the questionnaire before entering the data so that they could identify mistakes and submit them to the supervisor for verification with the interviewer as the survey proceeded.

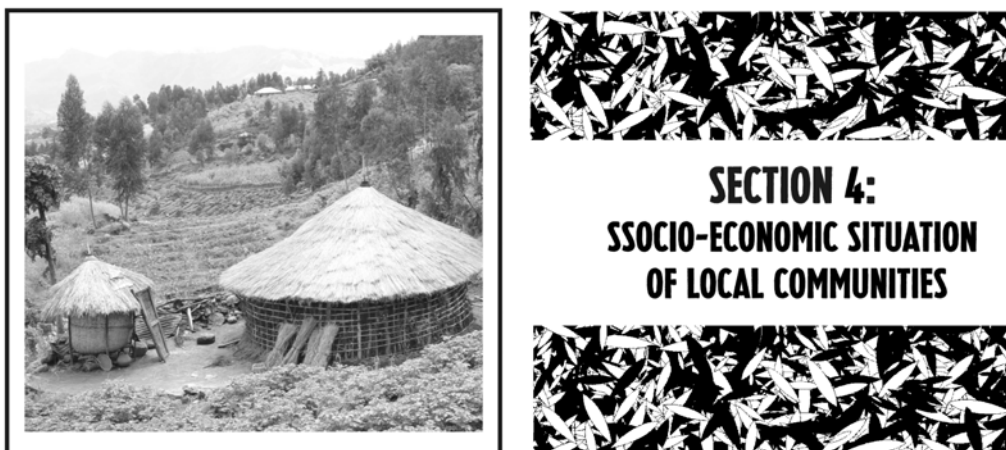
The data entry lasted about four weeks at all sites, starting during the survey and continuing afterwards. However, there was a need then to “clean” the data entered and check any anomalies. This led to a series of meetings, held by conservation NGO representatives involved in the process, to identify mistakes in the data and clean them. Data cleaning was finished by March 2003 and the data were then analysed.

## **2.7 Data Analysis**

Summaries of the data were made using the Excel ‘Pivot Tables’ function and calculating means for each forest and Batwa group by Andrew Plumtre and Helga Rainer. More complex analyses, such as parametric and non-parametric correlations, logistic regression and Chi square statistics, were made in SPSS for Windows,

version 9.0 by Andrew Plumtre. Maps were made of spatially explicit results, (eg. means per parish/sector) by Maryke Gray in ARCVIEW 3.2a.

It was decided at the start of the analysis that the data set was very extensive and that not everything could be analysed for the main report. The total number of households surveyed was 3,907 representing 22,812 people. This report, therefore, gives the basic summaries of the data in terms of mean measures per household, per parish/sector or per forest. Following the publication of this report the data will be made available on the internet for others to analyse if they wish to.



*Traditional house near Virunga Volcanoes M.Gray*

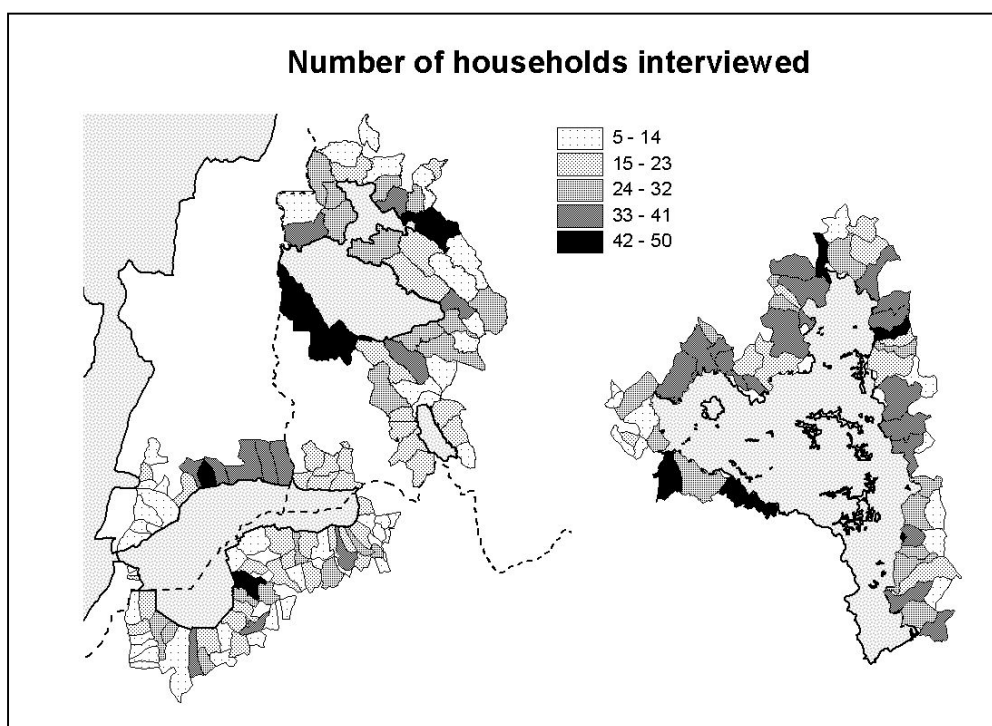
This first chapter of the results presents the responses to questions that were posed to households about their socio-economic status, the structure of the population and their employment. Care must be taken when interpreting these results because responses may not always have been true, depending on whether the respondent thought that their answer would influence the allocation of resources from a project in the future. This is always one of the constraints of questionnaire surveys and where we think answers may have been influenced in this way we have indicated so in the text. The most likely area where responses may not have been truthful is where people were asked about illegal activities in the forests. However, there is good evidence that what people stated they harvested from forests does match with ranger-based monitoring data collected from the forests (M.Gray pers. comm.) and so we are fairly confident in the results presented here.

A total of 3,907 households were visited around each of the different parks. These households represented 22,812 people. Table 3.1 gives the number of households per Batwa community or other ethnic group around each forest. Data were analysed separately for the Batwa communities and sample sizes increased to include more of this ethnic group because of their very low social status in society and their extreme poverty. All other ethnic groups were combined and analysed for each forest separately.

**Table 3.1.** The number of households visited for the Batwa communities and the other ethnic groups around each forest (the forest name is used for the other ethnic groups with the Batwa excluded). The number of parishes visited varied around each park depending on the size of the park and the size of the parishes. Batwa were selected from several parishes around the parks wherever communities occur.

Forest group	Number of households sampled	Number of parishes sampled
Batwa Bwindi	60	-
Batwa DRC	9	-
Batwa Echuya	15	-
Batwa Mgahinga	15	-
Batwa PNV	21	-
Bwindi	696	31
Echuya	147	11
Mgahinga	124	6
Nyungwe	1,398	54
PNV	974	61
Virunga	448	31

The number of parishes sampled around each forest varied because of their relative sizes. In any analyses by parish only, those parishes with more than five households sampled were analysed (Figure 3.1).



**Figure 3.1.** The number of households interviewed per parish around each of the protected areas. Nyungwe is displaced to the north-east in all figures in this report for better placement on the figure.

### 3.1 Household Structure

#### 3.1.1 Age Structure

Figure 3.2 shows the age structure in five-year intervals from 0-90 and in 10-year intervals, for each of the six protected areas. The structure shows the typical triangular shape indicative of poverty and high child mortality. Between 59-66% of the people interviewed were 20 years or younger at each of the sites. However, interestingly, the protected areas in Uganda had a lower number of children in the 0-5 age category than the 6-10 category which may indicate that some of the population control programmes in this region are having an effect. This would need further research to prove this, however.

Analysing the age structure in terms of males and females showed that there was a similar pattern for both sexes in terms of the general structure of the population. However, for all forests except Virunga Park, after analysing three age categories (0-20, 21-55 and 56-120) it was found that there were differences between the sex structures over the age of 20, with a relative decline in the percentage of men between the ages of 21-55 but with a higher percentage of men over the age of 55 (Table 3.2).

There are several factors that could explain this: some men migrate to find work outside their homes once they are adult; men may be more likely to contract AIDS because they are generally more mobile and, hence, may die as a result; thirdly, the wars in this region may have led to the deaths of more men in this age category.

**Table 3.2.** The average age and the percentage of men and women in the households interviewed around each of the five forests in three age categories (0-20, 21-55, 56-120 years). These data exclude the Batwa.

Forest	Sex	Average age	0-20	21-55	56-120
Bwindi	Male	20.8	32.19	13.58	3.01
Bwindi	Female	20.0	33.52	15.77	1.86
Echuya	Male	21.9	30.14	14.50	3.20
Echuya	Female	20.8	32.88	17.01	2.28
Mgahinga	Male	22.7	31.61	12.98	4.57
Mgahinga	Female	22.3	30.05	17.91	2.76
Nyungwe	Male	21.1	32.42	14.57	3.01
Nyungwe	Female	20.7	31.45	16.18	2.36
PNV	Male	20.7	31.06	13.37	3.10
PNV	Female	21.4	32.79	16.41	2.91
Virunga	Male	21.2	30.64	17.62	2.83
Virunga	Female	20.2	29.15	17.77	1.95

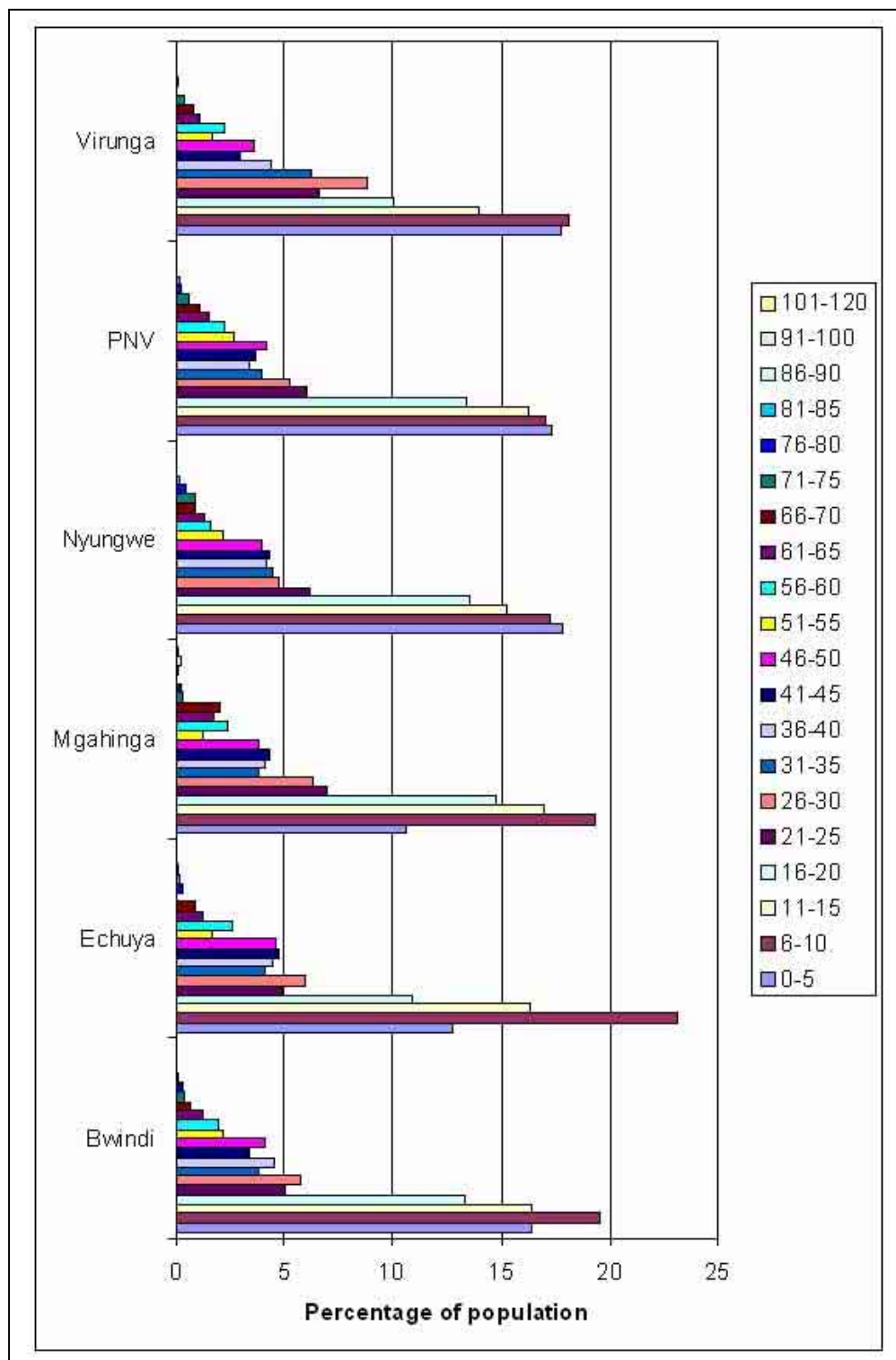


Figure 3.2. Age structure of members of the households surveyed around each of the six protected areas. Virunga = Parc National des Virungas, DRC; PNV=Parc National des Volcans, Rwanda; Nyungwe=Nyungwe Park; Mgahinga=Mgahinga Gorilla National Park; Echuya = Echuya Forest Reserve; Bwindi = Bwindi Impenetrable National Park.

### 3.1.2 Household Size and Composition

Average household size was fairly constant between forests, varying between 4.7-6.7 people per household (Table 3.3). Children (aged 18 or younger) form between 45-67% of the household, depending on the forest or ethnic group. On average, the sex ratios were close to 50:50 per household except for the Batwa communities in Echuya and Mgahinga. The Batwa communities are few in number and this difference may be due to the smaller sample sizes. However, certain forests had a much higher percentage of female-headed households, particularly around the Parc National des Volcans, which is a result of the war and genocide in Rwanda (Table 3.3). The percentage of households made up of orphans was significantly different between forests ( $F=8.1$ ,  $df=7,3803$ ,  $P=0.000$ ) with Nyungwe having a significantly lower percentage in comparison with the other forests.

**Table 3.3.** Average household composition for the Batwa communities and for other ethnic groups around the different parks.

Forest group	Average number per household	Percentage of occupants who were male	Average percentage <19 years old per household	Average percentage of households that are headed by a woman	Percentage of household that are orphans
Batwa Bwindi	4.82	48.10	52.60	11.67	2.77
Batwa DRC	5.33	52.08	45.83	0.00	0.00
Batwa Echuya	6.07	57.14	63.74	0.00	0.00
Batwa Mgahinga	6.73	63.37	67.33	0.00	0.00
Batwa PNV	4.71	49.49	48.48	0.00	2.02
Bwindi	6.53	49.77	58.06	6.18	2.99
Echuya	5.95	48.05	56.29	8.16	3.32
Mgahinga	6.72	49.22	51.38	4.84	2.52
Nyungwe	5.85	50.16	59.14	8.87	0.82
PNV	5.32	47.56	57.24	17.04	3.52
Virunga	5.68	51.18	54.27	6.03	3.10

Households around Bwindi and Mgahinga had significantly more members compared with Virunga, Nyungwe and Echuya, which in turn were significantly larger than households around PNV and Batwa around PNV, Bwindi and DRC (ANOVA:  $F=19.87$ ,  $df=7,3808$ ,  $p<0.001$  – Tukeys HSD test).

Linear regression analysis between the distance of the household from the forest and the number and percentage of children per household was only significant for Virunga park in DRC. Here, there were a significantly higher number of children the further from the forest a household was positioned (% children per household:  $F=5.3$ ;  $d=1,444$ ;  $P=0.022$ ; Number of children per household:  $F=5.6$ ,  $df=1,445$ ;  $P=0.019$ ).

## 3.2 Property and Assets

### 3.2.1 Fields

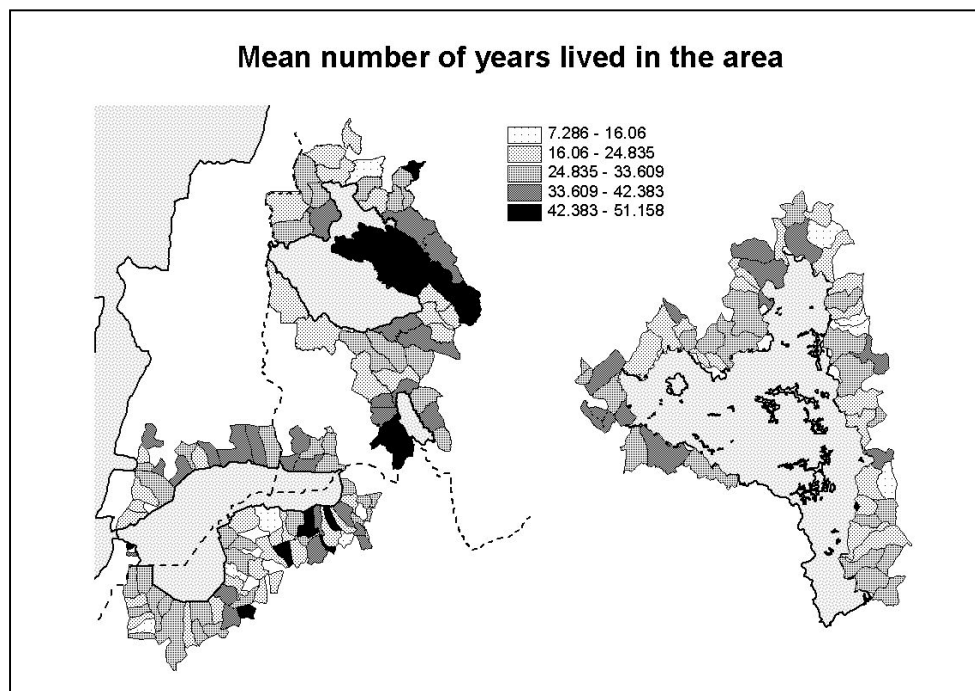
People on average have lived between 27-35 years around the forests (Table 3.4). Time lived at a site varied with location, with several sites nearer the forests having been cleared for agriculture relatively recently (Figure 3.3). Time lived at a site is determined by the age of the respondent and how recently they have cleared land in the region.

**Table 3.4.** Average time spent on site and average number of fields, percentage of fields that border the parks and percentage that have pine or eucalyptus plantations growing on them.

Forest group	Years lived at current location	Average number of fields	Percentage of fields at park edge	Percentage of fields that are plantations
Batwa Bwindi	5.06	1.18	40.74	0.00
Batwa DRC	32.78	1.89	23.53	0.00
Batwa Echuya	7.17	0.00	0.00	0.00
Batwa Mgahinga	5.33	0.00	0.00	0.00
Batwa PNV	14.63	1.10	26.09	0.00
Bwindi	28.99	4.52	17.86	6.08
Echuya	35.03	7.50	19.49	1.28
Mgahinga	33.84	7.29	30.31	0.85
Nyungwe	26.32	2.90	11.21	16.31
PNV	27.89	3.57	4.60	18.81
Virunga	33.91	4.98	15.32	9.41

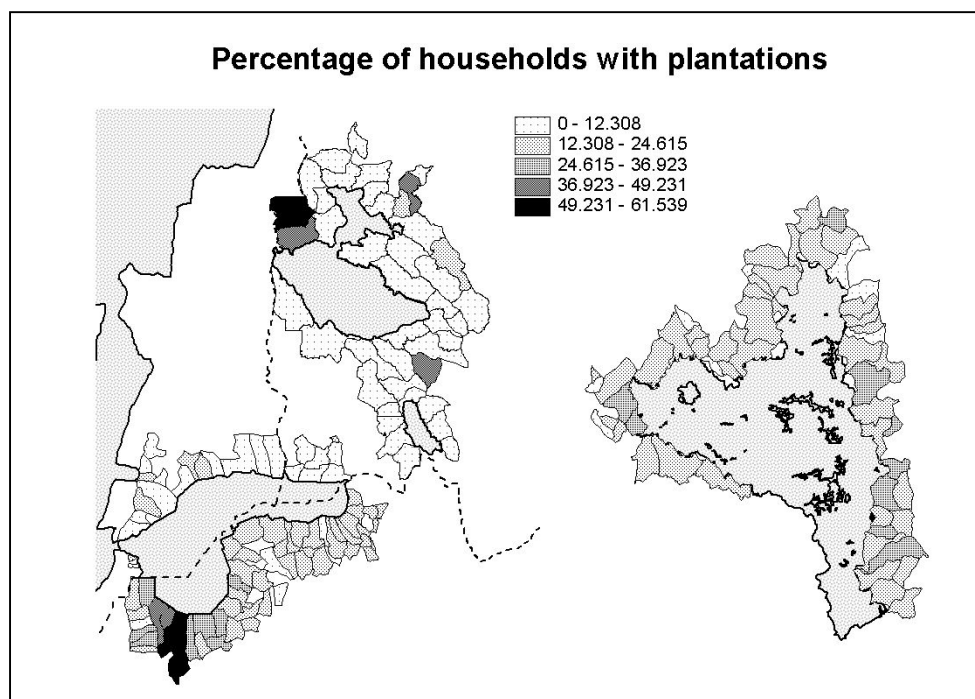
The average number of fields per household varied between forests from 2.9 to 7.5. The Batwa communities had very few or no fields (Table 3.4). Field sizes are reasonably well known in Rwanda and DRC because people have been taxed on them. In Uganda, however, field sizes are not well known by the owners and these were simply classed into small, medium and large. Average field sizes around Nyungwe were larger (3.4 ha) compared with PNV (1.1 ha) and Virunga park (1.9 ha).

There were significant positive correlations for each forest between field sizes and number of fields. Households situated near the parks had significantly larger field area for Nyungwe ( $r=0.109$ ,  $P<0.01$ ) and PNV ( $r=0.252$ ,  $P<0.01$ ) and significantly smaller area for Virunga Park ( $r=0.124$ ,  $P<0.01$ ). Ranked total areas of fields were not significantly different with distances from the forest around Bwindi, Echuya and Mgahinga.



**Figure 3.3.** The average number of years the interviewee had lived in a parish.

There were significantly more households in Rwanda (Nyungwe and PNV) that devoted some land to tree plantation (Table 3.4; Figure 3.4). This is clearly visible when crossing the border from Kisoro district in south-western Uganda to Rwanda. It is probably a result of the large tree planting programmes that took place in Rwanda from the 1970s to the early 1990s.



**Figure 3.4.** The percentage of households with some land set aside to grow tree plantations.

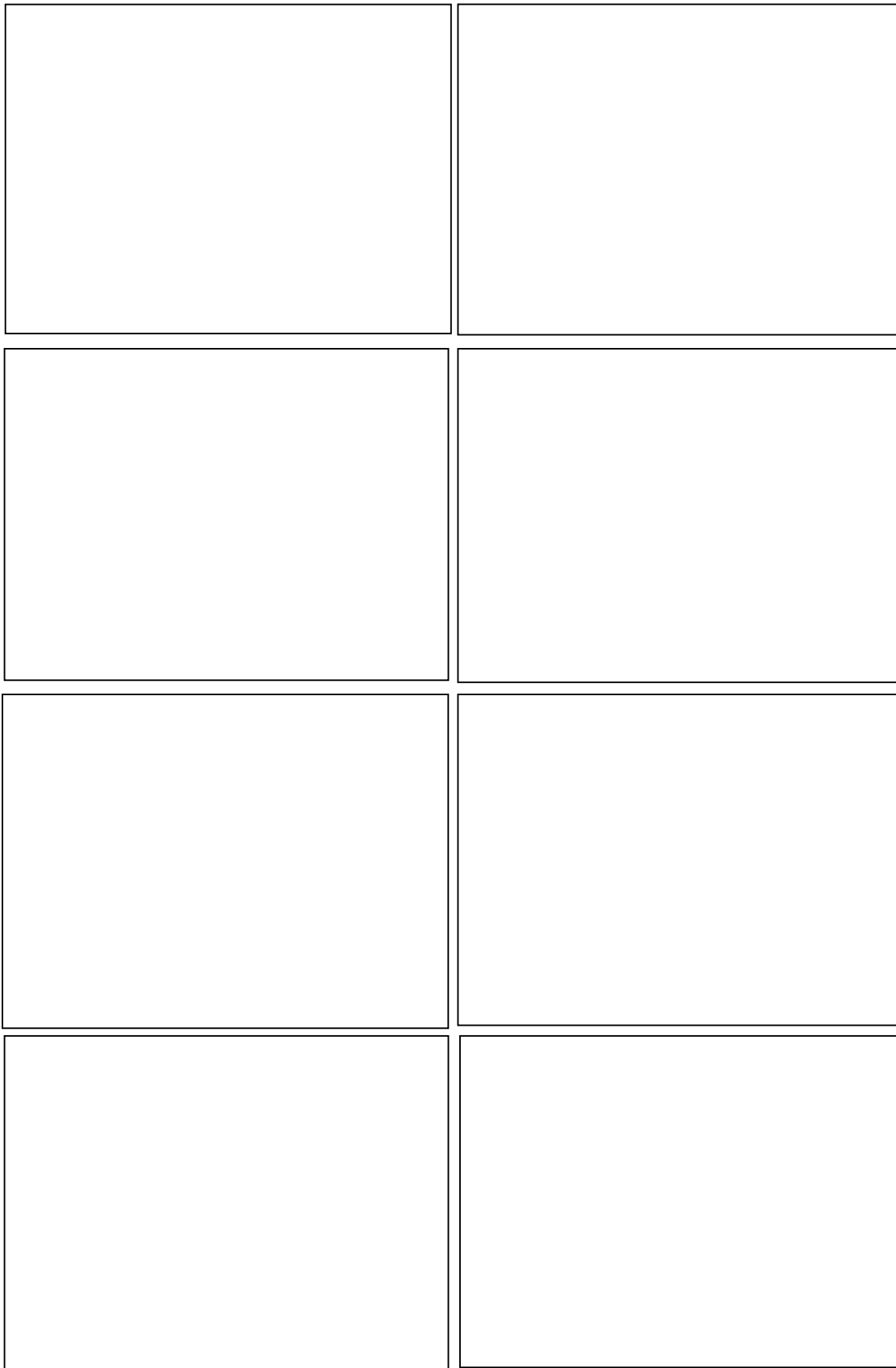
### 3.2.2 House Structure

The structure of houses varied between forests, both in terms of the wall and the roof (Table 3.5). The predominant wall structure was mud although brick was used more frequently in Rwanda. The predominant roof material was metal sheeting, although tiles were used more particularly around Nyungwe.

**Table 3.5.** The percentage of households with houses constructed of different wall and roof materials.

Wall	Mud	Brick	Cement	Planks	Metal sheet	Grass	Rocks	Other
Batwa Bwindi	96.67	0.00	0.00	1.67	0.00	1.67	0.00	0.00
Batwa DRC	11.11	0.00	0.00	0.00	0.00	88.89	0.00	0.00
Batwa Echuya	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa Mgahinga	66.67	33.33	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	23.81	0.00	4.76	0.00	0.00	71.43	0.00	0.00
Bwindi	96.55	2.73	0.00	0.00	0.00	0.00	0.00	0.00
Echuya	97.28	2.04	0.00	0.00	0.00	0.00	0.00	0.00
Mgahinga	85.48	1.61	3.23	0.00	0.00	0.00	9.68	0.00
Nyungwe	67.45	25.46	1.43	5.36	0.00	0.00	0.21	0.07
PNV	49.59	22.90	1.85	0.72	1.54	10.47	1.85	10.99
Virunga	82.59	2.46	0.45	5.58	0.00	7.81	0.67	0.45
Roof	Grass	Tiles	Metal sheet	Tarp	Other			
Batwa Bwindi	70.00	0.00	30.00	0.00	0.00			
Batwa DRC	100.00	0.00	0.00	0.00	0.00			
Batwa Echuya	100.00	0.00	0.00	0.00	0.00			
Batwa Mgahinga	66.67	0.00	33.33	0.00	0.00			
Batwa PNV	80.95	0.00	9.52	9.52	0.00			
Bwindi	19.97	0.29	77.87	0.00	0.00			
Echuya	10.20	0.00	88.44	0.68	0.00			
Mgahinga	23.39	0.81	75.81	0.00	0.00			
Nyungwe	14.45	47.50	35.69	0.43	1.93			
PNV	18.17	16.84	51.44	8.73	4.62			
Virunga	41.29	0.00	54.69	3.35	0.67			

Figure 3.5, on the next page, shows the spatial location of house types and shows that there is a strong regional distribution in house structures, which is probably dependent on the availability and cost of construction materials. Houses with grass walls and tarpaulin roofs occur, primarily, around the Kinigi district near the PNV. This region is where many people have settled or have been displaced by insecurity, which is why they are living in more temporary structures.



**Figure 3.5.** The spatial distribution of various types of house construction

### 3.2.3. Livestock

Few households had much in the way of livestock (Table 3.6). Households in Uganda tended to have more livestock than other sites, with the Batwa communities having the lowest numbers of livestock. Numbers of animals have probably declined around PNV and Virunga because of the insecurity during the late 1990s, which led to the loss of many domestic animals (Figure 3.6). Pigs tended to be raised in Gikongoro district, east of Nyungwe, a pattern that was found by Olson (1994) for Rwanda, confirming the reliability of these results.

**Table 3.6.** The average number of domestic livestock per household.

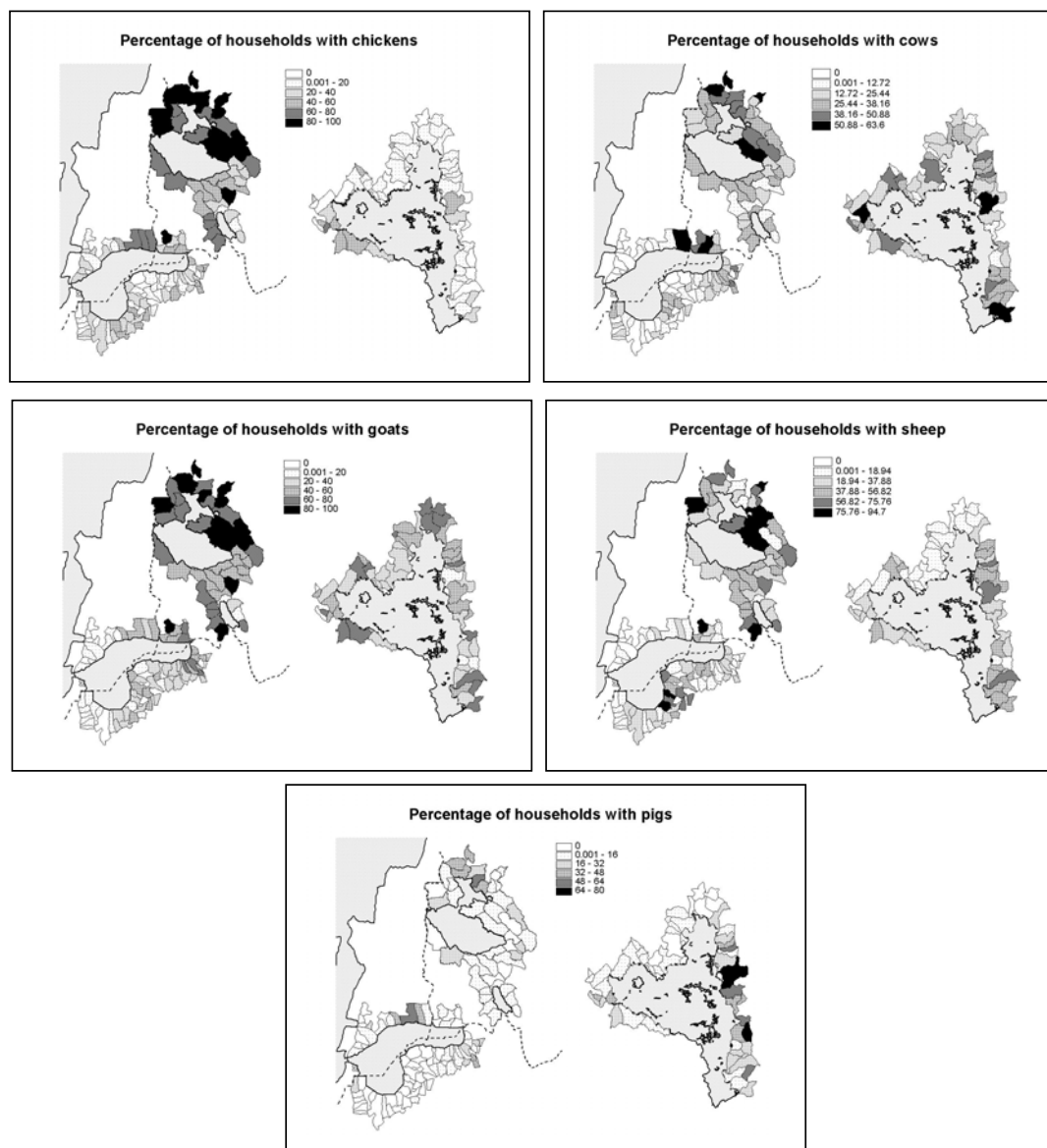
	Cows	Sheep	Goats	Pigs	Chickens	Total
Batwa Bwindi	0.00	0.00	0.42	0.03	0.27	0.72
Batwa DRC	0.00	0.11	0.00	0.00	0.56	0.67
Batwa Echuya	0.00	0.40	0.00	0.00	0.00	0.40
Batwa Mgahinga	0.00	0.00	0.07	0.00	0.00	0.07
Batwa PNV	0.38	0.14	0.00	0.00	0.52	1.04
Bwindi	1.01	1.06	2.66	0.26	3.35	8.34
Echuya	0.93	1.11	2.13	0.13	3.14	7.44
Mgahinga	1.44	0.94	1.65	0.01	1.40	5.44
Nyungwe	0.55	0.66	1.19	0.23	0.41	3.04
PNV	0.29	0.63	0.72	0.06	1.03	2.73
Virunga	0.30	0.22	0.68	0.19	1.26	2.65

### 3.2.4. Ownership of Material Possessions

In an attempt to obtain a measure of wealth of the household, questions were asked about the ownership of certain items that are known in the region to be a sign of improved earning ability. These included the ownership of a radio, bicycle and motorbike (Table 3.7). These measures of wealth were in addition to the type of house structure, field number and livestock number reported above. In general, households in Uganda possessed more of these items compared with the other forests (Figure 3.7). This may be a result of the civil war in Rwanda and eastern DRC where many people lost possessions during looting sprees.

**Table 3.7.** The percentage of households that own a radio, bicycle or motorbike.

	Radio	Bicycle	Motorbike
Batwa Bwindi	33.33	0.00	0.00
Batwa DRC	11.11	0.00	0.00
Batwa Echuya	6.67	0.00	0.00
Batwa Mgahinga	6.67	0.00	0.00
Batwa PNV	33.33	0.00	0.00
Bwindi	69.40	22.56	1.72
Echuya	62.59	19.05	1.36
Mgahinga	58.06	44.35	5.65
Nyungwe	46.92	3.22	1.00
PNV	47.64	12.01	0.10
Virunga	32.37	12.95	0.00

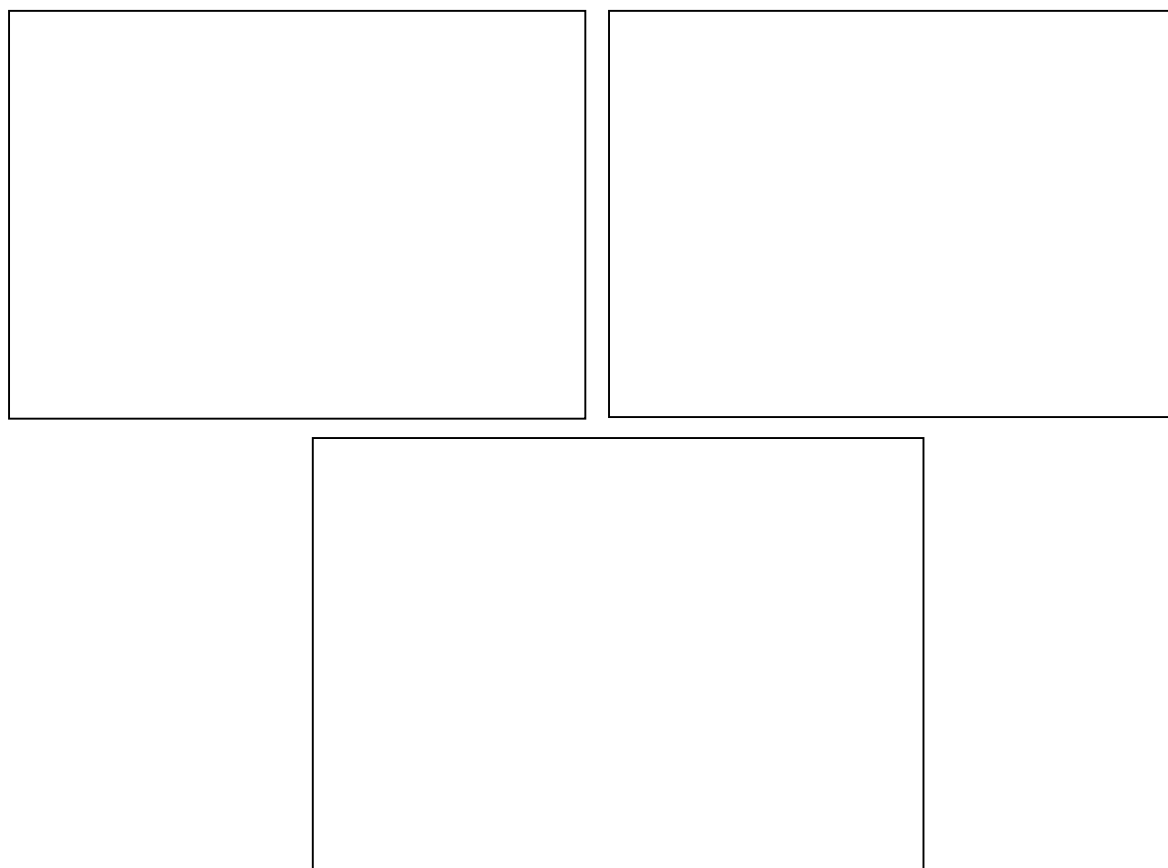


### 3.3 Crops and Cooking Fuel

#### 3.3.1. Crops Grown

The types of crops grown at the time of the questionnaire and whether they were primarily important for sale or for household consumption, was determined. The distribution of some of the common staple crops grown around the forests varied with each forest, (Figure 3.8), as did the distribution of some of the cash crops (Figure 3.9). Table 3.8 shows the crops that more than 40% of households grew for sale and the additional crops that more than 20% of households grew for sale.

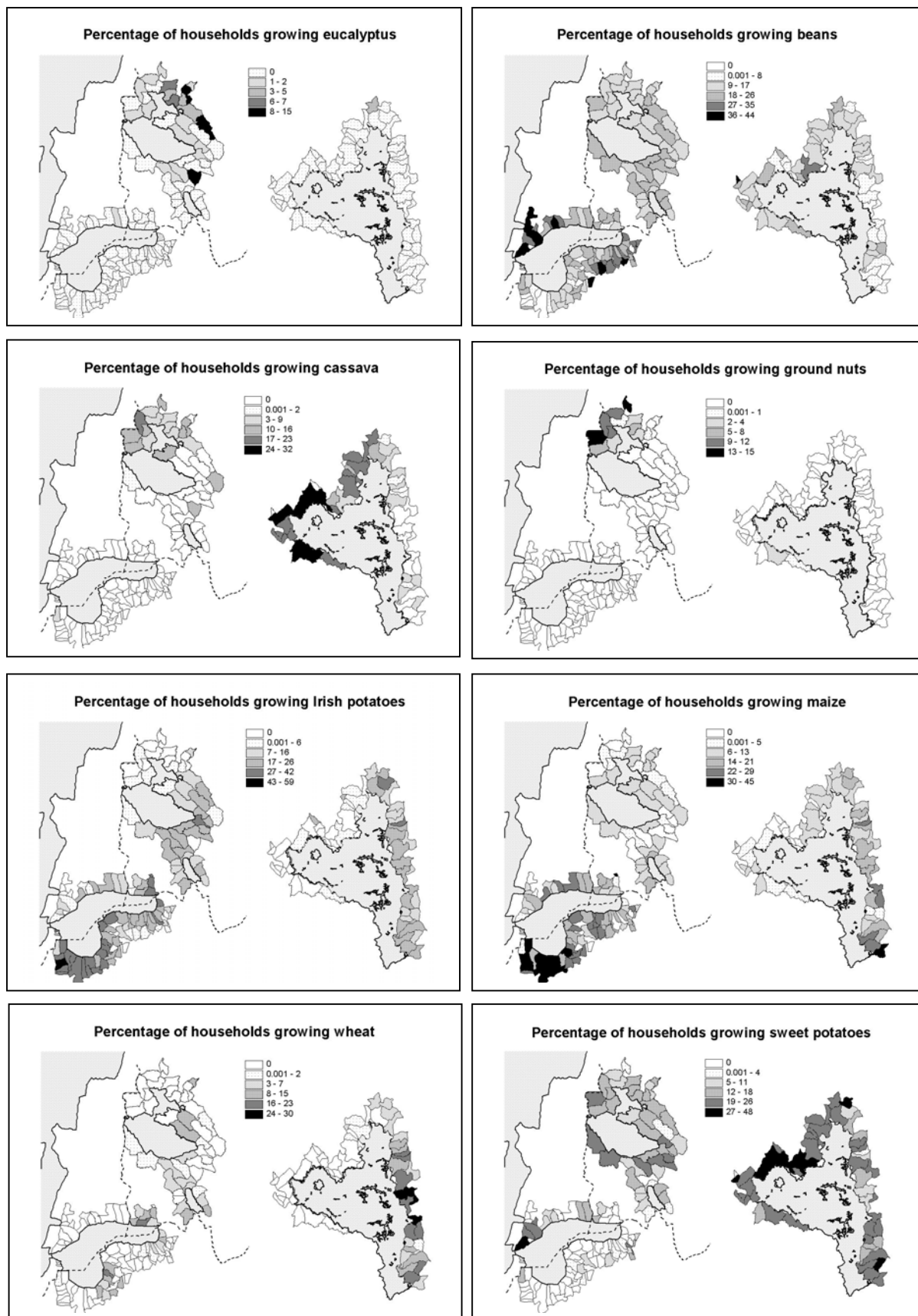
Few households around Mgahinga grew any crop primarily for sale.



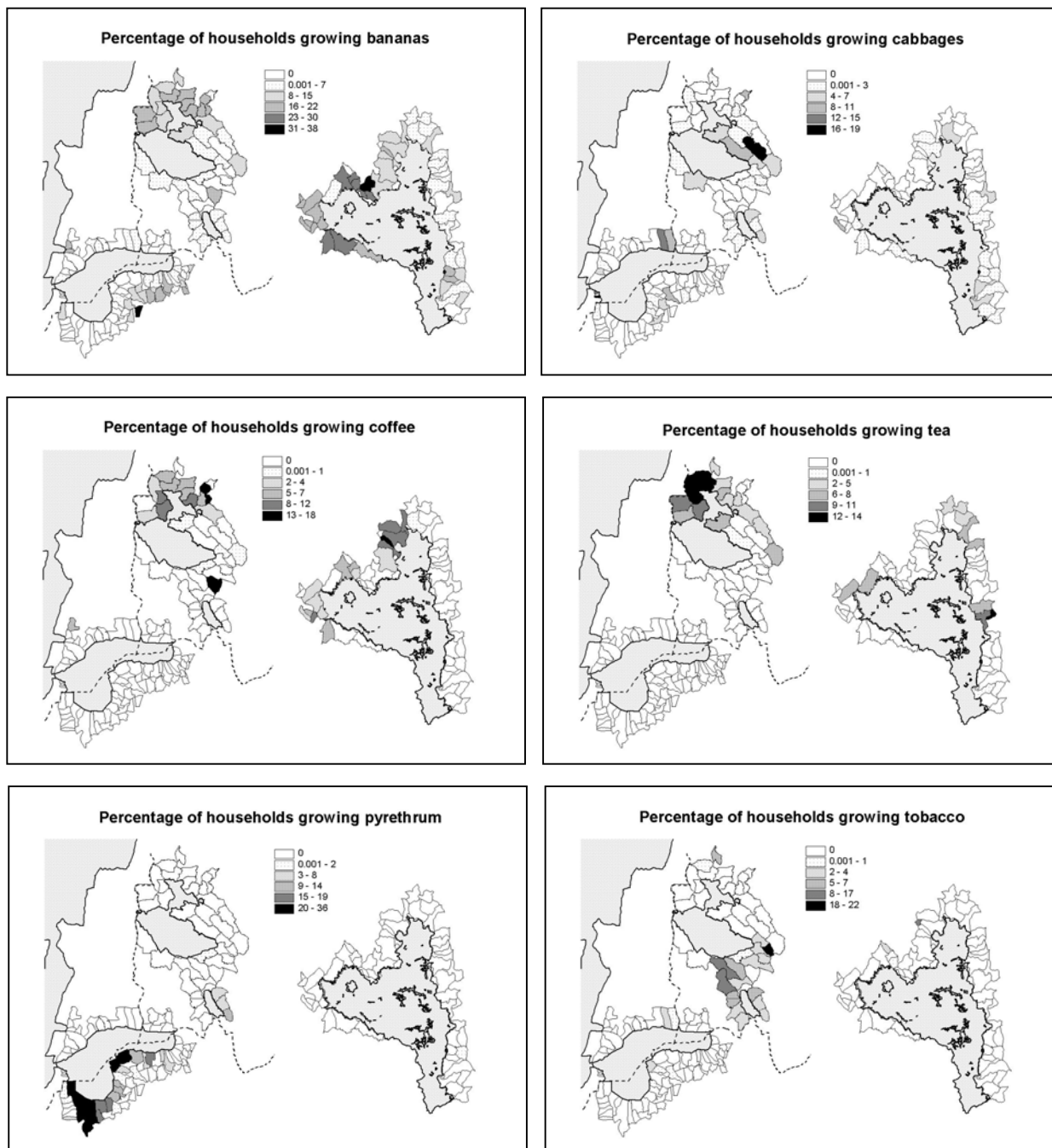
**Figure 3.7** The percentage of households with radios, bicycles or motorbikes per parish.

**Table 3.8.** The crops grown for sale around each forest. Those grown for sale by more than 40% of households and those additional crops grown for sale by more than 20% of households are listed.

	<b>Crops grown by &gt;40% of households</b>	<b>Additional crops grown by &gt;20% of households</b>
Bwindi	Coffee, trees, tea, tobacco	Sugar cane, tomatoes
Echuya	Pyrethrum, tobacco	
Mgahinga		
Nyungwe	Plantains, tea, coffee	Cabbage, pineapple, sugar cane, tomatoes
PNV	Plantains, cabbage, leeks, Pyrethrum, tomatoes	Irish potatoes, peas, sorghum
Virunga	Plantains, cabbage, carrots, leeks, tobacco	Irish potatoes, peas, sorghum



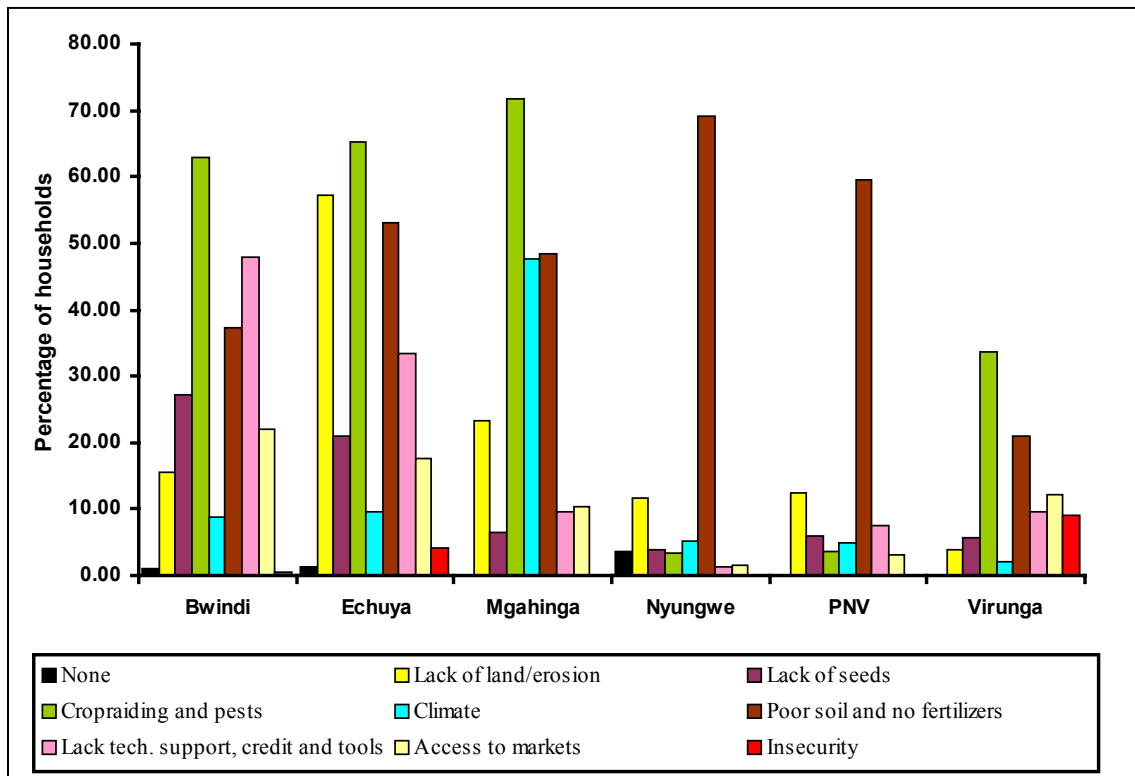
**Figure 3.8.** The percentage of households growing various staple crops.



**Figure 3.9.** The distribution of crops primarily grown to raise income for a household. Bananas in the top left figure are primarily plantains.

### 3.3.2. Constraints for Farming

Each household respondent was asked what he/she perceived to be the constraints for farming that they faced. This open question elicited many different responses but they could be divided into nine categories (Figure 3.10). Constraints varied by forest and respondents in Uganda listed many more than those in Rwanda and DRC. In Rwanda, soil fertility and lack of access to fertilizers were identified as the major constraints, whilst in DRC these and crop-raiding or pests were the major constraints.



**Figure 3.10.** The major constraints for farming identified by the interviewees in each household around the five protected areas.

### 3.3.3. Fuel used for Cooking

The households surveyed either used fuelwood, charcoal or the remains of agricultural production (maize stems, grass, banana leaves, sorghum stems and leaves etc). Most households used firewood (Table 3.9) although some households also used charcoal when they could afford it. The greatest shortage of fuel appeared to be around the PNV where over 10% of households and over 30% of Batwa households used agricultural remains some of the time.

**Table 3.9.** The percentage of households that used various sources of fuel around the different protected areas. The quantities of firewood (bundles) and charcoal (sacks) used per week are also shown.

	Firewood		Charcoal		Agricultural Products
	Percentage	Quantity/ Week	Percentage	Quantity/ Week	
Batwa Bwindi	100.00	5.10	0.00	0.00	0.00
Batwa DRC	88.89	2.11	0.00	0.00	0.00
Batwa Echuya	100.00	4.07	0.00	0.00	0.00
Batwa Mgahinga	100.00	4.60	0.00	0.00	0.00
Batwa PNV	57.14	2.05	0.00	0.00	38.10
Bwindi	98.99	4.76	8.76	0.10	0.43
Echuya	99.32	3.30	2.72	0.02	0.00
Mgahinga	95.16	3.92	20.97	0.39	0.00
Nyungwe	98.43	5.11	1.14	0.01	0.93
PNV	88.50	3.62	3.49	0.03	13.86
Virunga	95.09	2.30	5.13	0.07	1.56

The source of where fuelwood is harvested is given in table 3.10. Few households admitted to using the forest as their source of fuelwood apart from the Batwa and the people living around Echuya Forest, where it is legal to harvest firewood from the forest. It is likely that use of the forest is higher but that people were reluctant to admit to using it.

**Table 3.10.** The source of fuelwood collected by households. Values are the percentage of households that use that source.

	Fields	Forest	Buffer-Zone	Buy	Other
Batwa Bwindi	5.00	0.00	0.00	0.00	95.00
Batwa DRC	0.00	0.00	0.00	0.00	100.00
Batwa Echuya	0.00	100.00	0.00	0.00	0.00
Batwa Mgahinga	40.00	40.00	13.33	0.00	0.00
Batwa PNV	0.00	23.81	0.00	19.05	33.33
Bwindi	73.42	0.29	0.00	10.63	14.66
Echuya	39.46	46.26	6.12	4.76	0.68
Mgahinga	71.77	0.00	4.84	20.97	1.61
Nyungwe	44.28	2.15	17.88	11.16	24.32
PNV	53.70	0.41	0.00	32.34	10.88
Virunga	60.04	5.58	6.25	9.15	18.30

### 3.4 Education, Employment and Health

#### 3.4.1. Education

The level of education and whether they were still at school was determined for each member of the household. In addition, questions were asked about the distance they travelled to school, both in terms of time, and in terms of the number of kilometers. A large percentage of respondents had some level of primary education for most sites although the Batwa groups tended to have lower percentages ( $F=35.67$ ,  $df=7,3803$ ,  $P=0.000$ ). Households around Bwindi and Echuya had significantly higher percentages to those around Mgahinga, Nyungwe, PNV and Virunga. All forests had significantly higher numbers compared with the Batwa in Rwanda and DRC. Some level of secondary education was significantly more likely in Uganda compared with the other countries (Figure 3.11). Households around Mgahinga, Bwindi and Echuya had significantly more members with secondary education than those around Virunga and PNV, which were, in turn, significantly higher than those households around Nyungwe ( $F=40.33$ ,  $df=7, 3803$ ,  $P=0.000$ ). Also, levels of current school attendance are higher in Uganda because of the free education for primary school children. Very few households had someone with university level education. The 1.01% of Batwa with university education around PNV was due to one individual.

**Table 3.11.** The percentage of household members with only primary education, with some form of secondary education (post primary), or university education and the percentage of household members currently attending school.

	Percentage with primary education	Percentage with secondary education	Currently attending school	University educated
Batwa Bwindi	37.37	0.00	25.95	0.00
Batwa DRC	12.50	0.00	12.50	0.00
Batwa Echuya	44.74	0.00	41.21	0.00
Batwa Mgahinga	47.52	0.00	36.63	0.00
Batwa PNV	30.30	7.07	17.17	1.01
Bwindi	60.20	13.74	43.24	1.58
Echuya	57.55	15.26	45.88	2.86
Mgahinga	44.78	17.05	39.02	0.72
Nyungwe	50.51	3.98	22.13	0.21
PNV	54.07	6.75	28.37	0.19
Virunga	40.16	9.35	20.08	0.24

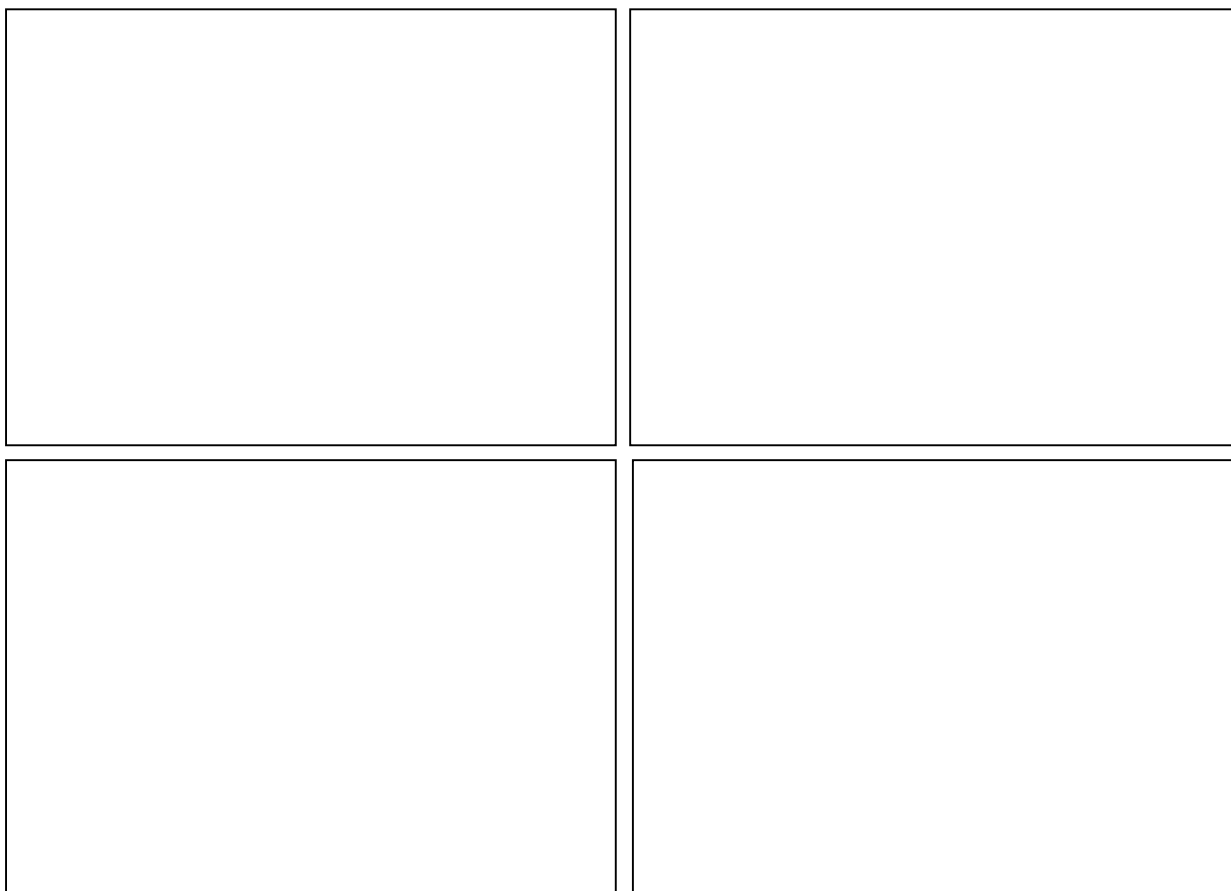
An analysis was carried out to assess whether distance from the forest-edge affected education. Separate tests were made for each forest and the percentage of household members with only primary education or secondary and tertiary education was analysed. Around Bwindi, Mgahinga and Virunga there was no linear relationship between distance from the forest and the percentage of people with primary or secondary+ education. However, for Echuya, Nyungwe and PNV there was a significant relationship for primary education but not secondary education. In each case the further the household was from the forest, the higher the percentage of members who had primary education.

The average distance to a primary and secondary school also varied between forests (Table 3.12) and around each forest (Figure 3.11). Interestingly, the distance was, on the whole, greater around the Ugandan forests and yet a higher percentage of Ugandans have education. It would appear that the value people put on education and, probably the fact that it is free for primary level, offsets the longer distances students have to travel in Uganda.

Distance to school did appear to affect the percentage of household members who attended school for the different forests. Around Bwindi there was a significant relationship between distance to primary and secondary school and the percentage of households with primary or secondary education respectively (Primary:  $F=5.72$ ,  $df=1,644$ ,  $p=0.017$ ; Secondary:  $F=21.81$ ,  $df=1,604$ ,  $p=0.000$ ). For Nyungwe the relationship was significant for only primary level education ( $F=24.83$ ,  $df=1,1009$ ,  $p=0.000$ ). For Echuya, Mgahinga and Virunga the relationship was only significant for secondary schools and level of secondary education (Echuya:  $F=5.14$ ,  $df=1,79$ ,  $p=0.03$ ; Mgahinga:  $F=6.15$ ,  $df=1,118$ ,  $p=0.015$ ; Virunga:  $F=5.58$ ,  $df=1,420$ ,  $p=0.019$ ). In each case the further the school was, the lower the percentage of people with education, apart from Mgahinga where the percentage of secondary educated household members increased as distance to school increased. In this case distance would not appear to be very important.

**Table 3.12.** The average distance in kilometers and hours travelled between households and the nearest primary and secondary school.

	Dist. to primary (km)	Dist. to primary (hrs)	Dist. to secondary (km)	Dist. to secondary (hrs)
Batwa Bwindi	1.60	0.71	7.57	3.63
Batwa DRC	2.33	0.78	7.00	2.00
Batwa Echuya	4.07	0.57	15.80	2.20
Batwa Mgahinga	6.27	0.95	8.92	0.98
Batwa PNV	0.91	0.24	5.90	1.61
Bwindi	2.45	1.02	13.27	3.77
Echuya	1.73	0.76	10.67	2.96
Mgahinga	2.59	0.87	7.46	2.54
Nyungwe	2.50	0.76	9.62	2.73
PNV	1.43	0.46	3.41	1.16
Virunga	2.63	0.68	5.96	1.45



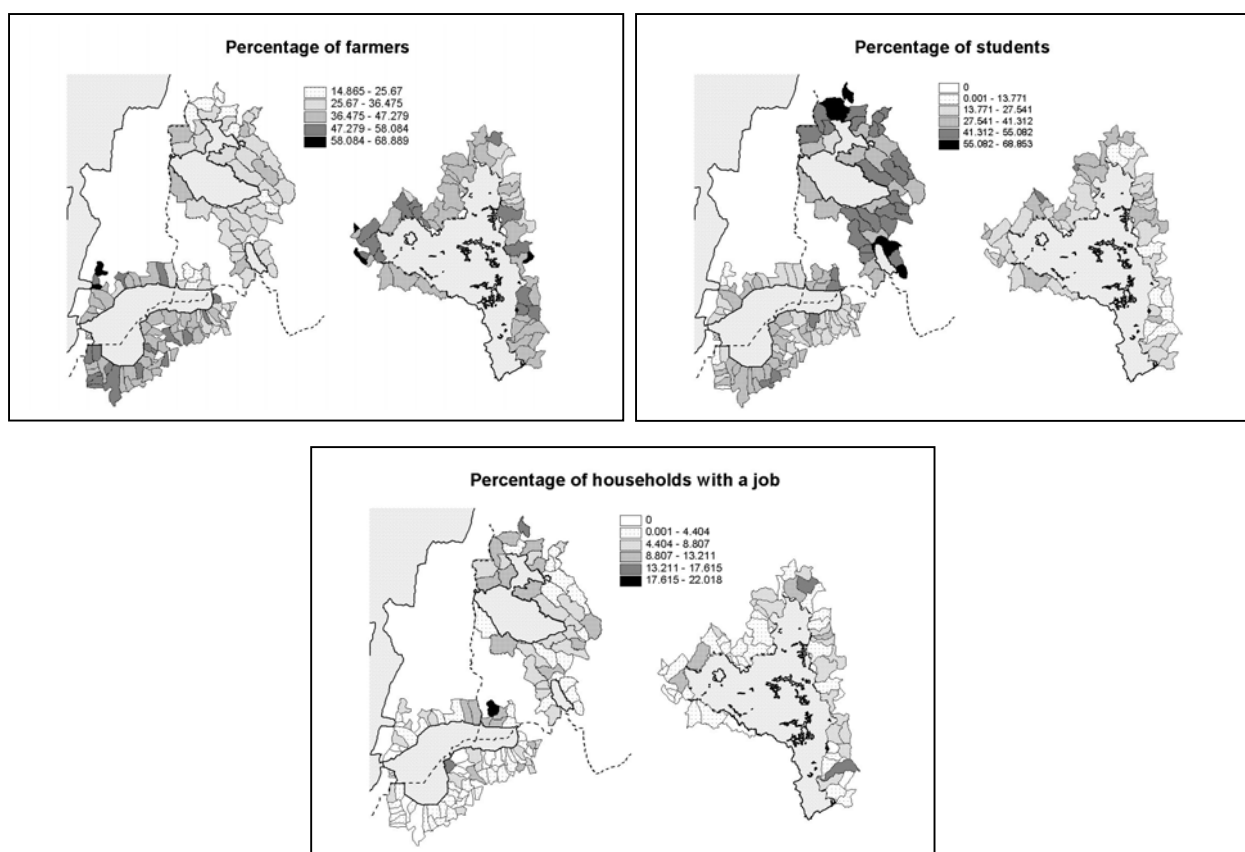
**Figure 3.11.** The percentage of household members with primary and secondary education and the distance travelled, in kilometers, and the time taken, in hours, to attend secondary school.

### 3.4.2. *Employment*

Many of the households visited had few people with any form of employment living in them (Table 3.13). The bulk of household members classified themselves as either unemployed, students at school or farmers. Many of the unemployed people would be children who are not at school, given the high percentage of young people in each household (Table 3.2, Figure 3.2). This is clearly shown in Uganda where primary education is free and, hence, student numbers are higher (Figure 3.12). This relationship is significant when tested with an ANOVA ( $F=83.28$ ,  $df=7,3803$ ,  $p=0.000$ ) with Bwindi, Echuya and Mgahinga significantly higher than the other forests (Tukeys HSD test) and PNV higher than Nyungwe, Virunga and the Batwa. Types of employment included shopkeeper, working for the government, carpenter, electrician, mechanic, priest, driver, tailor, traditional doctor, crafts-maker, and mason.

**Table 3.13.** The percentage of household members who consider themselves to be unemployed, students, farmers or with some form of employment.

	Unemployed	Student	Farmer	Employed
Batwa Bwindi	36.68	25.95	36.33	1.04
Batwa DRC	66.67	12.50	20.83	0.00
Batwa Echuya	56.04	41.21	0.00	0.00
Batwa Mgahinga	62.38	36.63	0.00	0.99
Batwa PNV	38.38	17.17	25.25	19.19
Bwindi	20.26	43.24	29.89	6.61
Echuya	17.39	45.88	31.01	5.50
Mgahinga	22.33	39.02	29.17	9.24
Nyungwe	29.41	22.13	44.14	4.22
PNV	26.51	28.37	41.86	3.26
Virunga	29.86	20.08	44.56	5.15



**Figure 3.12.** The percentage of household members who consider themselves to be farmers, students or employed.

Correlations between education level and whether someone was employed were highly significant ( $r=0.21$ ,  $P=0.000$ ) and the mean age of employed people (34.6 yrs) was significantly lower ( $T=-8.99$ ,  $p=0.000$ ) than unemployed people (38.6 yrs). When analysed separately, the average age of people with employment was significantly younger than those with no employment for each of the five protected areas (36-40 mean age unemployed vs. 32-36 mean age for employed). The percentage of students, employed people and farmers per household was significantly correlated with the time the people had lived there, but time lived at a site was not correlated with distance from the forest.

### 3.4.3 Health

Interviewees were asked where they usually went to be treated for illnesses and how far they had to travel to obtain this treatment. The percentage of interviewees who used different sources of treatment is given in Table 3.14. In many cases, households around Echuya specified more than one treatment centre but for the most part the local health centre was the main source of treatment.

The distance people travelled for treatment varied greatly. For instance, the distance to hospital was greatest in Echuya (Table 3.15) but because of a good road and public transport it was highly used (Table 3.14). Travel time to hospital or the health centre around Echuya, therefore, did not differ greatly, even though the distances differed.

**Table 3.14.** The primary source of treatment when a person fell sick for most illnesses. Values are the percentage of households that stated the treatment type. 'Other' includes selecting forest herbs, visiting the military camps, prayer and doing nothing.

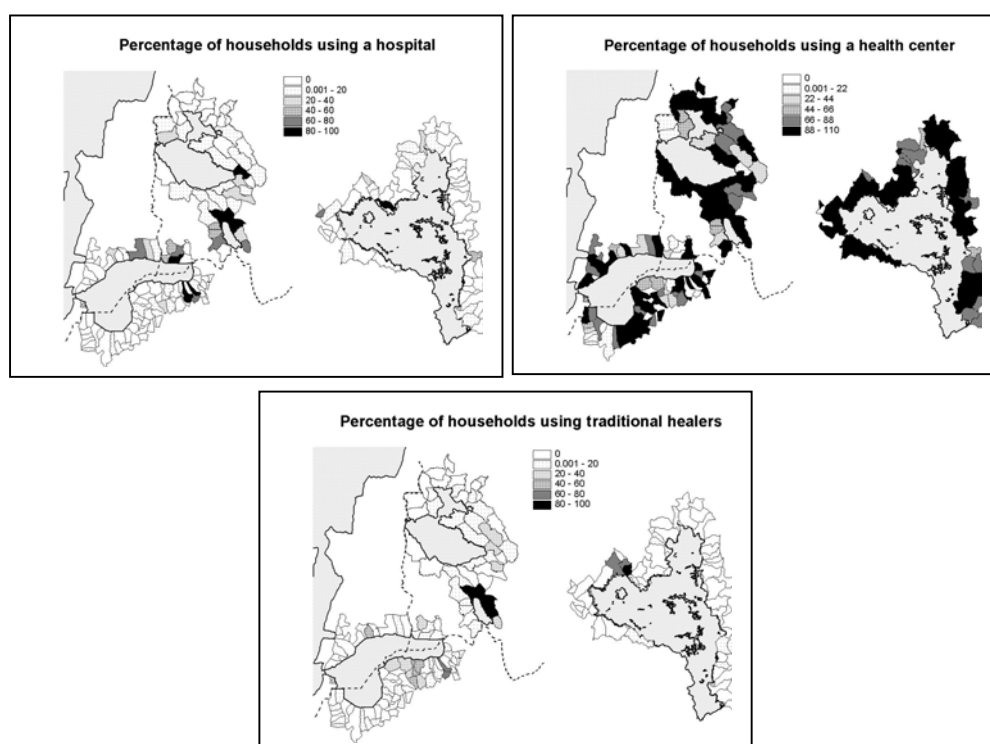
	Hospital	Health centre	Local healer	Buy medicine	Other
Batwa Bwindi	0.00	98.33	1.67	0.00	0.00
Batwa DRC	0.00	66.67	22.22	0.00	0.00
Batwa Echuya	0.00	60.00	0.00	40.00	0.00
Batwa Mgahinga	26.67	73.33	0.00	0.00	0.00
Batwa PNV	0.00	76.19	19.05	0.00	0.00
Bwindi	12.10	79.68	5.33	8.21	0.00
Echuya	58.50	78.23	43.54	0.00	0.68
Mgahinga	43.55	41.94	11.29	4.03	0.00
Nyungwe	9.23	91.77	5.29	1.07	1.57
PNV	11.09	70.94	10.37	15.93	1.23
Virunga	14.29	72.26	8.71	2.68	0.89

**Table 3.15.** The average distance (km) and average time (hrs) to find treatment for the different types of treatment centres.. No value is given for buying medicine around Echuya because nobody stated that they did this.

	Hospital		Health centre		Local healer		Buy medicine	
	km	hrs	km	hrs	km	hrs	km	hrs
Bwindi	9.99	2.99	5.22	1.88	4.14	2.08	6.84	2.57
Echuya	14.88	2.71	10.40	2.49	5.25	1.58		
Mgahinga	6.22	2.91	4.06	1.47	7.13	3.06	4.80	2.20
Nyungwe	7.79	2.46	7.60	1.87	15.99	3.31	6.00	1.38
PNV	5.34	2.12	3.68	0.86	2.73	1.07	2.93	1.22
Virunga	5.13	1.28	3.42	1.01	4.18	0.76	3.21	0.84

Distance to hospital differed significantly between forests ( $F=8.47$ ,  $df=5,463$ ,  $p=0.000$ ) and Echuya was significantly further than Bwindi which was, in turn, further than the other four forests which did not differ significantly with each other. However, in terms of time to hospital treatment, Bwindi was significantly further than Mgahinga, Echuya and Nyungwe, which were significantly further than PNV. All were significantly further than Virunga ( $F=9.02$ ,  $df=5,512$ ,  $P=0.000$ ). Distance to a health-centre was also significantly different between forests, both for km travelled ( $F=5.53$ ,  $df=7,2637$ ,  $p=0.000$ ) and for time ( $F=57.64$ ,  $df=7,2929$ ,  $p=0.000$ ). In terms of distance (km) Echuya and Nyungwe were significantly further than PNV and Virunga. In terms of time, Echuya, Bwindi, Nyungwe and Mgahinga were significantly further than Virunga and PNV.

The spatial distributions of households using hospitals, health-centres and traditional doctors are mapped in Figure 3.13. This shows that in most parishes, people visited a health-centre as their primary source of treatment.



**Figure 3.13.** The percentage of households per parish that use a hospital, a health-center or a local healer as their primary source of health treatment.

Correlations were made between the distance a household resides from the forest edge and the time to treatment at a hospital, health-centre or healer. Both, time to reach a hospital and health-centre were significantly negatively correlated with distance from the forest (Hrs to hospital:  $r=-0.096$ ,  $p=0.029$ ; Hrs to health centre:  $r=-0.105$ ,  $p=0.000$ ), implying that people living nearer the forest had to travel further for health treatment at either of these treatment centres. However, there is a lot of scatter around these relationships given the low 'r' values.

Distance and time to hospital, health-centre or healer were also correlated with the household size, number of students per house and number of children per house. Only household size was positively correlated to distance from hospital (both in km or hrs) implying that the further a household was from a hospital the larger it was.

### 3.5 Discussion

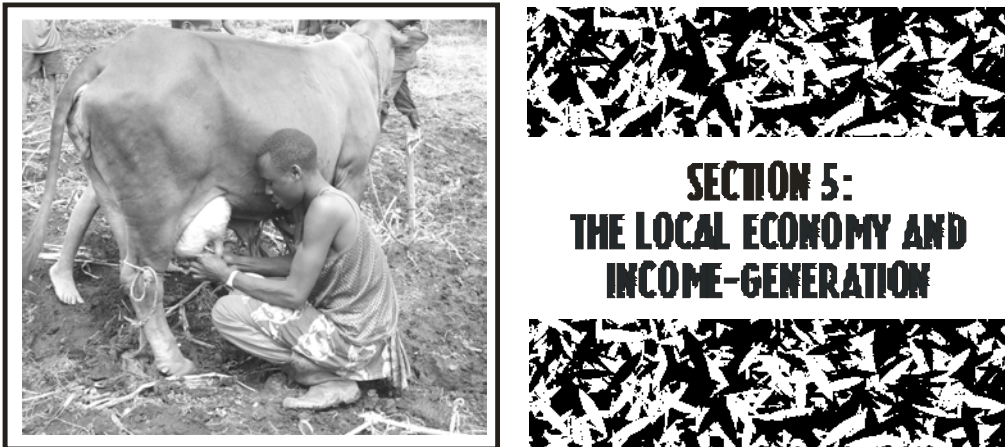
The results presented here show the socio-economic situation of people living within 10 km of Bwindi, Echuya, Virunga Volcanoes and Nyungwe. As can be seen from the demographic structure (Figure 3.2), these communities either suffer high mortality or people emigrate elsewhere when older and average age is very low (20-22 years) per household. The Batwa communities are similarly affected in Bwindi DRC and PNV but have a lower average age around Echuya and Mgahinga (average age: Bwindi: 22.3; Echuya: 18.1; Mgahinga:15.6; DRC:25.3; PNV:20.2). The demographic structure is typical of people living below the poverty line. The structure of houses, their ownership of bicycles, land, livestock and other indicators of wealth all show clearly that these people are very poor.

Much of the aim of collecting the data in this chapter was to provide a baseline of the poverty level, education level and access to medical facilities to allow future monitoring of any changes in future. Many development projects in the region are targeting poverty alleviation as a goal and the data presented here could be used in future to measure whether they have been successful or not.

Many development projects have encouraged the development of tree plantations to provide building poles, timber and fuelwood (Weber, 1987). This is particularly pronounced in Rwanda where *Eucalyptus* plantations have been developed throughout the country. It is very noticeable that, when crossing the Rwanda-Uganda border from Ruhengeri to Kisoro, the amount of woodlots and plantations diminishes drastically. This is clearly shown in the use of fuelwood around the parks, with households around Mgahinga constrained to using charcoal much more than other sites because of this lack of wood.. The development of woodlots in this region should be a priority to, not only supply fuel, but also to stabilise soil loss on the steep hills.

Households around Bwindi and Echuya had the highest number of people with primary education whilst the numbers in Mgahinga were somewhat lower. Households in Uganda had significantly more members with secondary education. On the whole, it appears that people in Uganda try, wherever possible, to educate their children, possibly because at the moment there are more opportunities for emigration and employment in Uganda in comparison with Rwanda and DRC who have had over 10 years of insecurity.

In relative terms, it appears that people living around Bwindi, Echuya and Mgahinga are wealthier than those surveyed in Rwanda and DRC. They own more goods such as radios, bicycles and motorbikes, they own more land and livestock, they can afford tin roofs and they can afford to send more children to secondary school. This difference may be, in part, a result of the political conflicts that have occurred over the past 10 years in Rwanda and more recently in eastern DRC. Uganda's conflicts finished in the mid 1980s and the country has been relatively stable in this region since then. However, there are probably other factors such as access to markets and the growth of the economy at a national level that are contributing to these differences in relative wealth. The next chapter of results looks further into the economic situation of people, their access to markets, where they derive their income from and which ways they can access money to start small projects



*Milking cows in Rwanda M.Gray*

This second results chapter presents the results of the responses to questions posed to households about their economic situation. These questions focused on income generating activities, access to credit, use of credit, access to markets, tourism and beekeeping. Analysis of ownership of different assets was undertaken to establish wealth rankings across the region.

#### **4.1 Indicators/Measures of Wealth**

##### *4.1.1 Surrogate Measures of Wealth*

It is difficult to measure wealth in a society that primarily depends on subsistence farming. One way that the survey and this report attempted to address this issue was to collect information on the property, assets and investment in higher education for each household.

Property, assets and investment in education that were measured included ownership of:

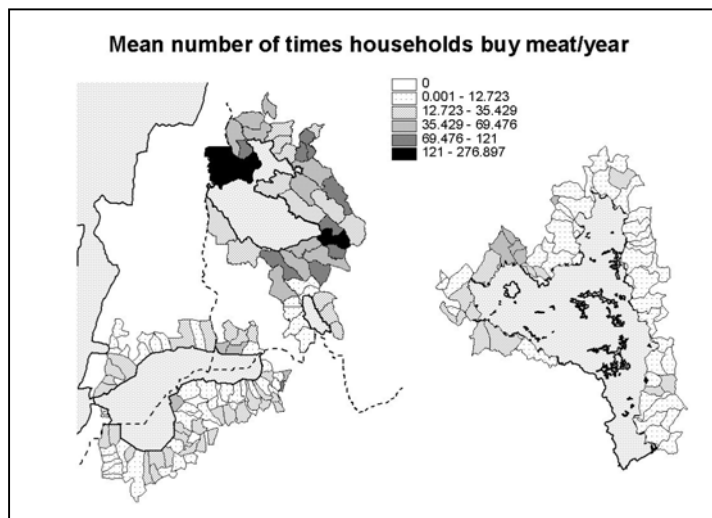
- Land (number of fields and plantations)
- Type of house structure (wall and roof construction)
- Number of livestock (cows, sheep, goats, pigs, chickens)
- Material possessions (radio, bicycle and motorbike)
- Number of children at secondary school (primary school education is free in Uganda and hence only secondary school attendees were considered to represent wealth).

Discussion and presentation of the results of the survey of these properties and assets can be found in the first results chapter (section 3.2). Additional indicators are presented below.

#### 4.1.2 Purchase of Meat

Consumption and purchase of meat is also indicative of a certain amount of wealth. No relationship between the frequency of buying meat and distance to the forest was observed ( $r=0.025$   $P=0.000$  Not significant). When the same analysis was conducted separately for beef, mutton, goat and pork, no relationship was observed either.

Figure 4.1 illustrates that households around Bwindi generally buy meat more frequently per year compared with households around other forests. Similar patterns are observed for beef, mutton, goat, pork, rabbit and chicken, separately (Figure 4.2).



**Figure 4.1** The average frequency of buying meat per year per parish

#### 4.1.3 Composite Measure of Wealth

It was desirable to try to generate one composite score of wealth for a household that could be used in subsequent correlations with other variables. Combining ownership of assets should give a more accurate reflection of wealth, as ownership of one asset would not necessarily reflect that the household is in a different wealth category e.g. a household may have received a bicycle as a result of a development project.

Consequently, a multivariate analysis (principal components analysis) was performed to derive scores for each household that might represent its wealth status. The following variables were entered into the analysis:

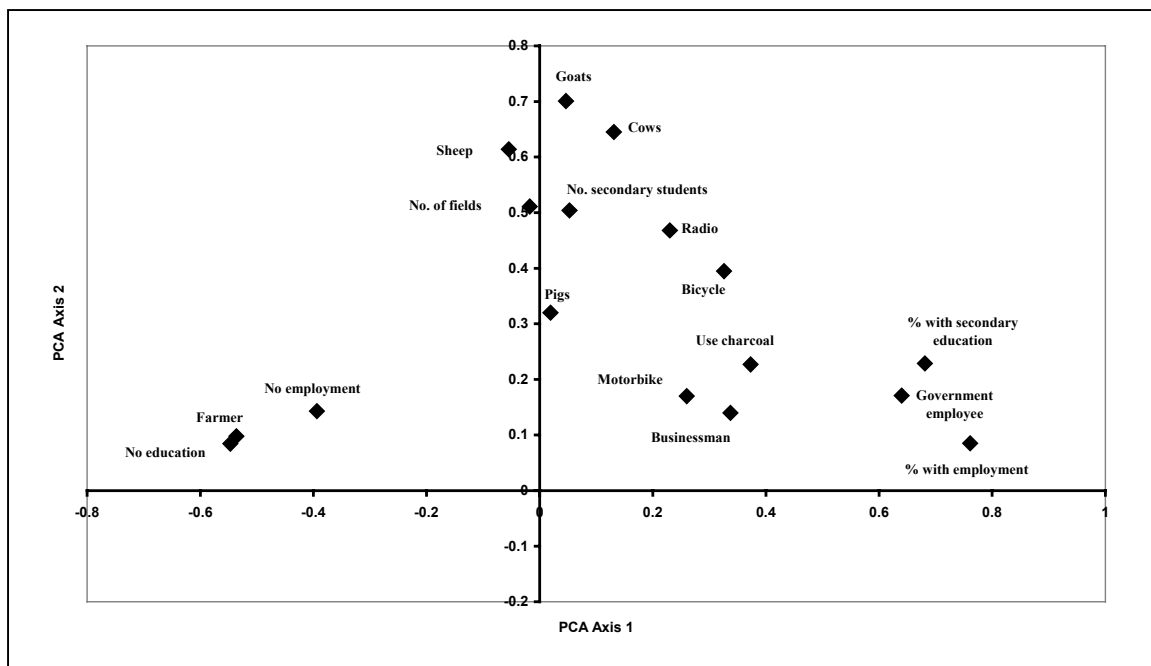
1. Whether a household owned a bicycle or not
2. Whether a household owned a radio or not
3. Whether a household owned a motorcycle or not
4. Number of fields a household owned
5. Number of students at secondary school
6. Number of cows
7. Number of goats
8. Number of sheep
9. Number of pigs
10. Percentage of household with employment
11. Percentage of household with secondary level education
12. Whether a household used charcoal or not

- 13. Number of businessmen per household
- 14. Number with government positions
- 15. Number with no employment
- 16. Number with no schooling
- 17. Number of farmers



**Figure 4.3** The average frequency of purchase for different types of meat.

Principal Components Analysis (PCA) takes these variables and tries to explain the maximum variation between households as measured by these variables. This maximum variation effectively fits a line through a cloud of points in a 17 dimensional space (17 variables above - if there were only two variables entered it would be similar to fitting a regression line between the two variables). It then fits a second line, ensuring that the first and second lines are not correlated and that the next greatest variation in the points is explained. The result is that you obtain two axes (lines) that can be used to map the centroids (weighted centers) of the 17 variables in 2 dimensions, which explains the maximum variation between households using these measures of wealth (Figure 4.2). To produce this figure, PCA was carried out with Varimax rotation and Kaiser normalization (for more details consult a statistics book).

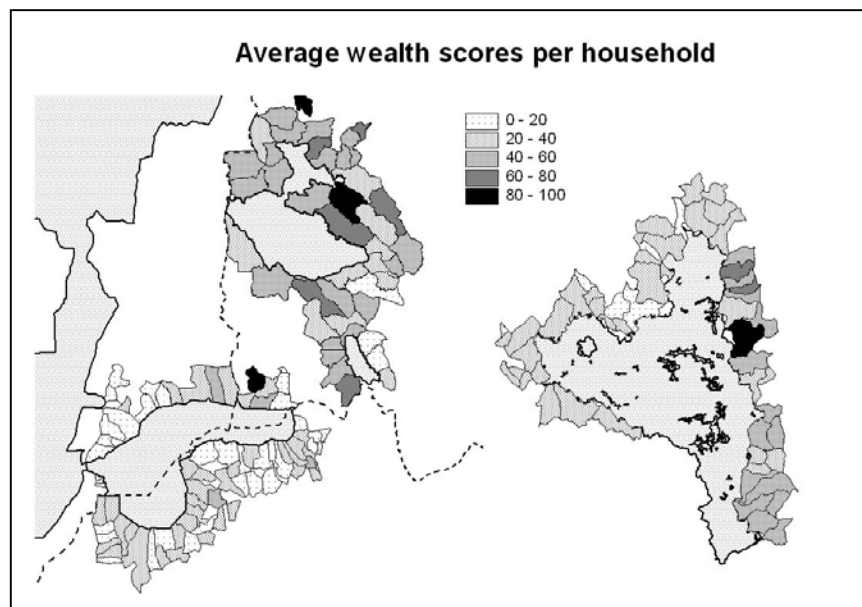


**Figure 4.2.** The first two axes of the principal components analysis plotted to show the location of the centroids of the 17 variables entered into the analysis. PCA Axis 1 maximises the variation between households and the distance of the centroids along the axis indicate which factors tend to be associated in the same households (if close together) and which explain much of the difference between households (if far apart).

What the above figure shows is that employment and, to some extent education, explains the greatest variation between households whilst the number of livestock, fields and ownership of a radio and bicycle explain the next greatest source of variation between households with this data set. What it also shows is that the number of goats, sheep, cows, fields and ownership of radios and bicycles are not correlated strongly with employment (because Axis 2 is uncorrelated with Axis 1) but explains the next greatest source of variation between households. Interestingly, the number of students at secondary school is also not strongly correlated with employment, but is associated with households with livestock and more fields. Several variations of this PCA with different variables entered were tried but this one

was selected for use because it was felt that Axis 1 best represented a composite measure of wealth and livelihood security. Employment not only provides wealth but also security because of the constant flow of income. It was felt that, although a number of livestock is a measure of wealth, it is not the best measure of wealth because it can only be turned into cash when the livestock is sold, which usually occurs when the economic situation in the household is poor. Scores for each household were calculated from the PCA Axis 1 and these were used as measures of composite wealth.

When the average score of PCA axis 1 per parish was mapped (Figure 4.4), parishes around Bwindi, Mgahinga and eastern Nyungwe generally showed a higher percentage of wealthier households. The eastern side of Nyungwe is one of the poorest regions in Rwanda in terms of rural income (Olson *et al.*, 1995). The reason it ranks highly here is because people own livestock in this region because the soils are poor for agricultural production, which gives them an average score, and many work in the tea plantations and hence have some regular, if small, income stream. A negative relationship between the number of people per household and the PCA composite score of wealth was observed ( $r = -0.176$ ,  $P = 0.000$ ) indicating that larger households are poorer.



**Figure 4.4** The average PCA score per household mapped for each parish and converted into 20% intervals from the lowest to the highest score.

## 4.2 Revenue Generating Activities

### 4.2.1 Sources of Income to a Household

Respondents were asked to list their main sources of income and rank them as high, medium or low importance to them. Table 4.1 shows the main two sources of revenue. The main two sources of revenue were the items of 'high importance' with the highest percentage scores. In all forests this was sale of agricultural produce (excluding cash crops such as tea, tobacco and coffee). Agriculture dominated the sources of income to a household and if all high, medium and low classes were combined all groups exceeded 70%. The second source of revenue of 'high importance' rarely exceeded 20% of households interviewed. Table 4.1 gives the most cited sources after agriculture. Tourism is valued little by the people, even around Bwindi (0.09% - high importance). Only the Batwa, however, valued tourism because they could earn some money from dancing for tourists (2.63% -high importance).

High scoring second sources of revenue varied between employment and livestock, depending on the forest. Interestingly 6.14% of the Batwa interviewed indicated that 'activities in the park' were of high importance to them as a source of revenue. This is the only group that admitted to utilizing the park in order to access resources for revenue generation.

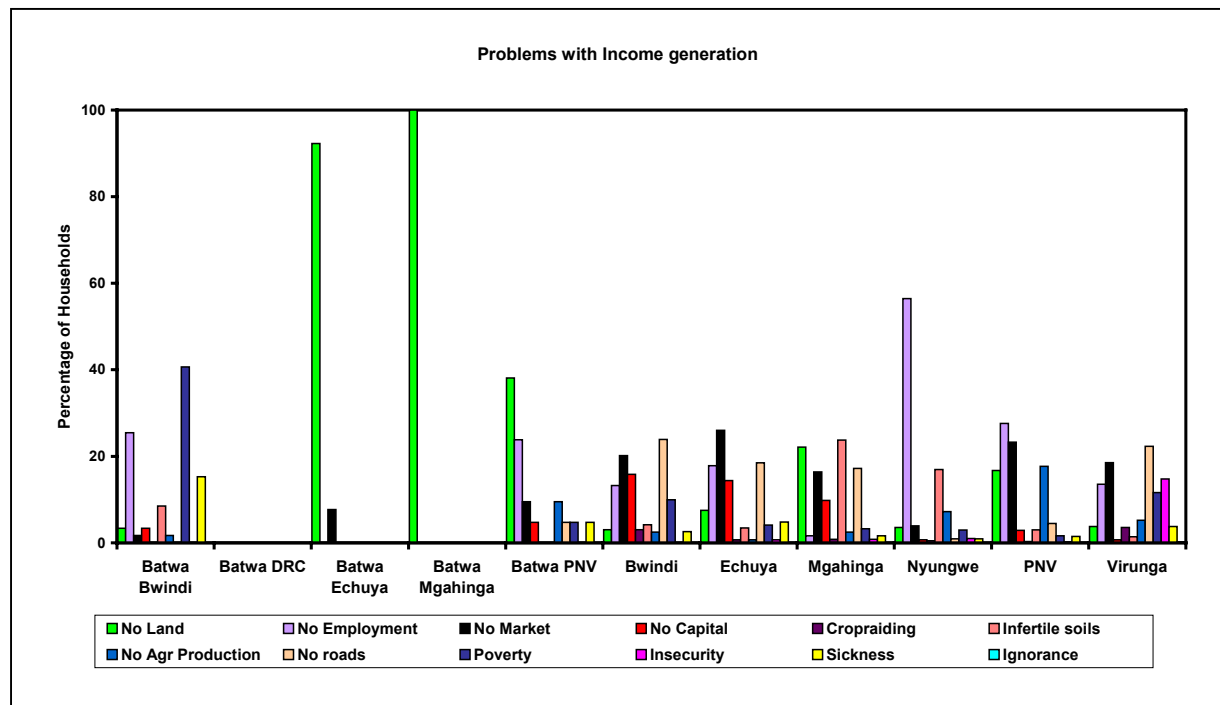
**Table 4.1** The two most commonly cited sources of revenue ranked as of 'high importance' to people's incomes, for each forest. The percentage of respondents who stated it was of 'high importance' is given. The responses from Batwa in all three countries were combined to provide a large enough data set.

Forest	Source of revenue with the largest % of respondents who assigned 'high importance'	% of respondents	Source of revenue with the second largest % of respondents who assigned 'high importance'	% of respondents
Bwindi	Agriculture	40.54	Employment	5.07
Echuya	Agriculture	33.96	Livestock	5.66
Nyungwe	Agriculture	55.84	Livestock	11.11
MGNP	Agriculture	50.00	Livestock	21.12
PNV	Agriculture	58.22	Employment	2.00
Virunga	Agriculture	51.53	Employment	5.98
Batwa (all)	Agriculture	22.81	Employment	14.91

### 4.2.2 Problems with Making Money

People interviewed were also asked about the problems they faced in making money. Many reasons were suggested and these were grouped into eleven categories (Figure 4.5). The Batwa in Echuya, Mgahinga and PNV all stated that a

lack of land was the main reason they could not make money. For other people a lack of roads and access to markets were commonly cited as reasons why they could not make money. In Rwanda the lack of employment opportunities was also frequently cited.



**Figure 4.5** Reasons why people have problems making money. The percentage of households that gave these reasons are plotted per forest.

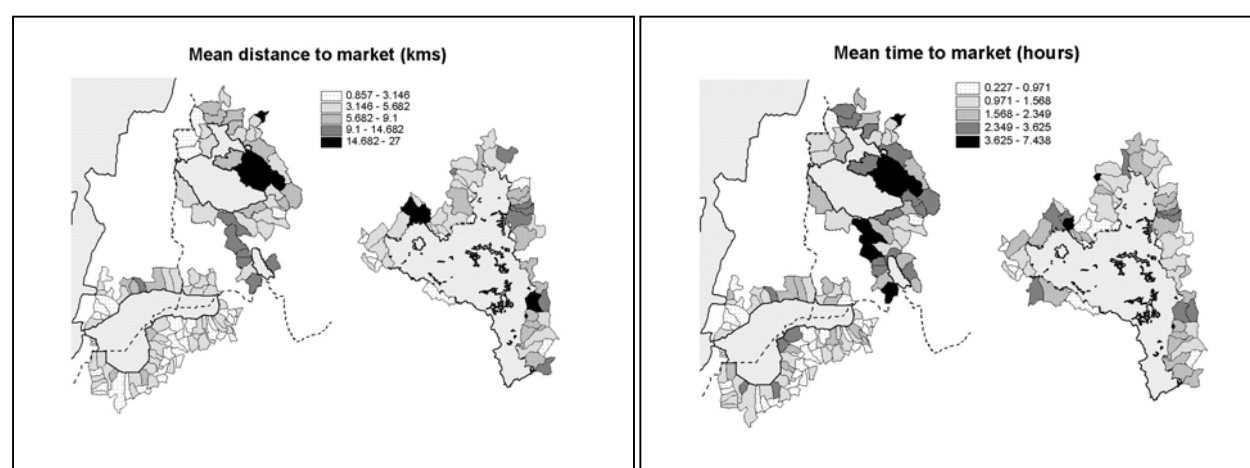
### 4.3 Markets

#### 4.3.1 Distance to Markets

Interviewees were asked how far they had to travel to get to the nearest market where they could sell their crops or other goods. Distances varied between forests. The Batwa in Echuya were the furthest, on average, from the nearest markets (Table 4.2) and households in general in Echuya tended to be further from a market compared with other forests.

**Table 4.2.** Average distance to nearest market (km) per forest and Batwa group

	Average of Distance to market (km)
Batwa Bwindi	2.72
Batwa DRC	8.22
Batwa Echuya	10.57
Batwa Mgahinga	5.07
Batwa PNV	4.10
Bwindi	6.45
Echuya	8.29
Mgahinga	3.83
Nyungwe	7.62
PNV	3.38
Virunga	5.14

**Figure 4.6** The mean distance and time taken to reach a market mapped for each parish.

The spatial distribution of distances to markets shows that some parishes around Bwindi are further from markets than households around Echuya but that the mean for all parishes is higher for Echuya (Figure 4.6).

#### 4.3.2 Relationship between Crops Grown and Distance to markets

Correlations were made between the average distance to the nearest market (in km and hrs) and the percentage of people growing certain crops per parish. A significant relationship between distance to and average hours to the nearest market was observed for a small number of crops grown. Non-timber forest products (NTFPs) harvested from the forest, as well as yams, cassava, millet, passion fruit, peas, sweet peas, tobacco and wheat showed a significant, positive correlation, indicating that households that grow these crops tend to live further away from markets. The relationship between growers of beans, carrots and manioc (only in relation to average hours to market) showed a negative relationship (Table 4.3), indicating that these people tended to grow these crops if they were near markets.

The relationship between distance to market and composite measure of wealth was negative ( $r = -0.101$ ,  $p = 0.000$ ) and highly significant although the  $r$  value was low, indicating a lot of scatter around the correlation. This result is not surprising as it indicates that the closer to markets households are, the wealthier they are likely to be.

**Table 4.3** The percentage of households per parish growing a specific crop (see section 3) or admitting to harvesting NTFPs from the forest correlated with average distance and time to market per parish. R-values are given with their significance level: (ns= not significant; \*=0.05; \*\*=0.01; \*\*\*=0.001).

Crop/Item	Average distance to market	Average hours to market
NTFPs from forest	0.219**	0.247***
Bamboo	ns	ns
Beans	-0.384***	-0.298***
Cabbages	ns	ns
Carrot	-0.177*	-0.230***
Cassava	0.178*	0.154*
Coffee	ns	ns
Eucalyptus	0.156*	0.187**
G-nuts	ns	ns
Irish Potatoes	ns	ns
Maize	ns	ns
Manioc	ns	-0.149*
Millet	0.199**	0.243***
Passion fruits	0.159*	0.243***
Peas	0.378***	0.329***
Pineapple	ns	ns
Pyrethrum	ns	ns
Sorghum	-0.216**	ns
Soya beans	ns	ns
Sugar cane	ns	ns
Sweet potatoes	0.180*	0.140*
Tea	ns	0.150*
Tobacco	0.236***	0.326***
Tomatoes	ns	ns
Wheat	0.325***	0.277***
Yams	0.198**	0.243***

Distance to market was negatively correlated ( $r = -0.116$ ,  $p = 0.0000$ ) with distance to forest edge, as was overall time (hours) to market ( $r = -0.105$ ,  $p = 0.0000$ ) and distance to forest. This indicates that markets are nearer to households the further from the forest one moves. When each forest was analysed separately, PNV and Nyungwe Forests showed a negative relationship between distance or time to market and distance to forest indicating that markets tended to be further from the forest. For PNV the negative relationship was observed for both distance ( $r = -0.344$ ,  $p = 0.0000$ ) and time in hours ( $r = -0.329$ ,  $p = 0.0000$ ) to market, whereas around Nyungwe the negative relationship was only observed in relation to distance to market ( $r = -0.173$ ,  $p = 0.000$ ) and no significance obtained for time to market. The other forests showed no significant relationship.

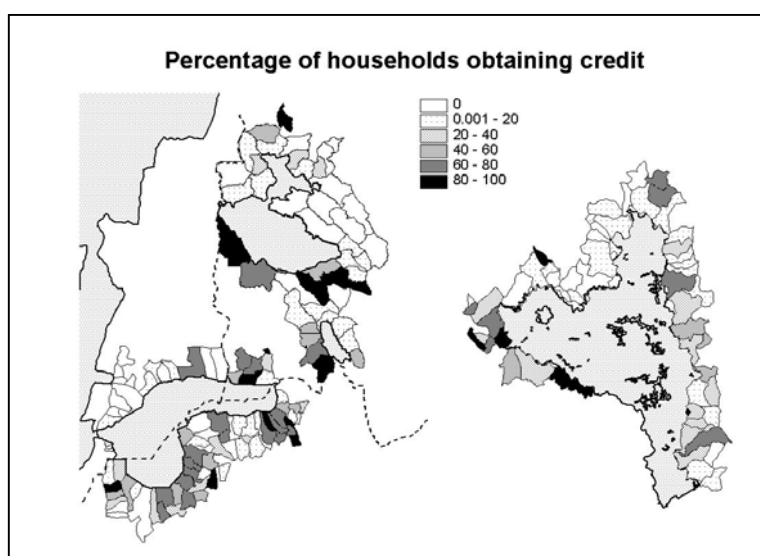
## 4.4 Access and Use of Credit Across the Region

### 4.4.1 Sources of Credit

People were asked whether they can obtain credit locally and, if so, where would they go to get it. In Uganda people were also asked if they could obtain grants from anywhere. Of the Batwa groups interviewed only those around PNV could obtain any credit (Table 4.4). The spatial distribution of people's access to credit is very patchy (Figure 4.7).

**Table 4.4** The percentage of respondents who stated it was possible to obtain credit or grants (in the case of Uganda) locally.

	Obtain Credit	Obtain Grants
Batwa Bwindi	0.00	23.33
Batwa DRC	0.00	
Batwa Echuya	0.00	0.00
Batwa Mgahinga	0.00	6.67
Batwa PNV	33.33	
Bwindi	28.28	16.43
Echuya	41.50	0.00
Mgahinga	56.45	25.00
Nyungwe	27.18	
PNV	44.14	
Virunga	8.04	



**Figure 4.7** The percentage of households that stated that credit could be obtained locally.

The main sources of credit in Rwanda tended to be from co-operatives, whereas in Uganda, credit was primarily obtained from micro-credit projects and communities. Around PNV in DRC the main source of credit was from the local community (Figure 4.8). Figure 4.9 gives more detail on the main source of credit per forest.

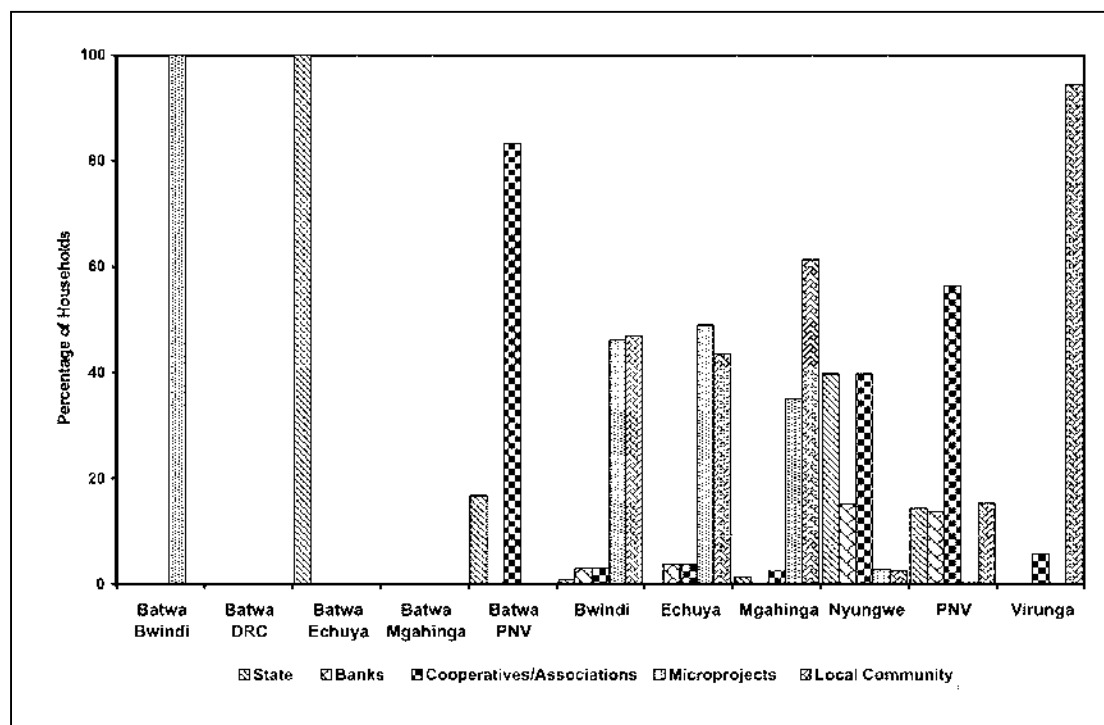


Figure 4.8 The main sources of credit cited by households.

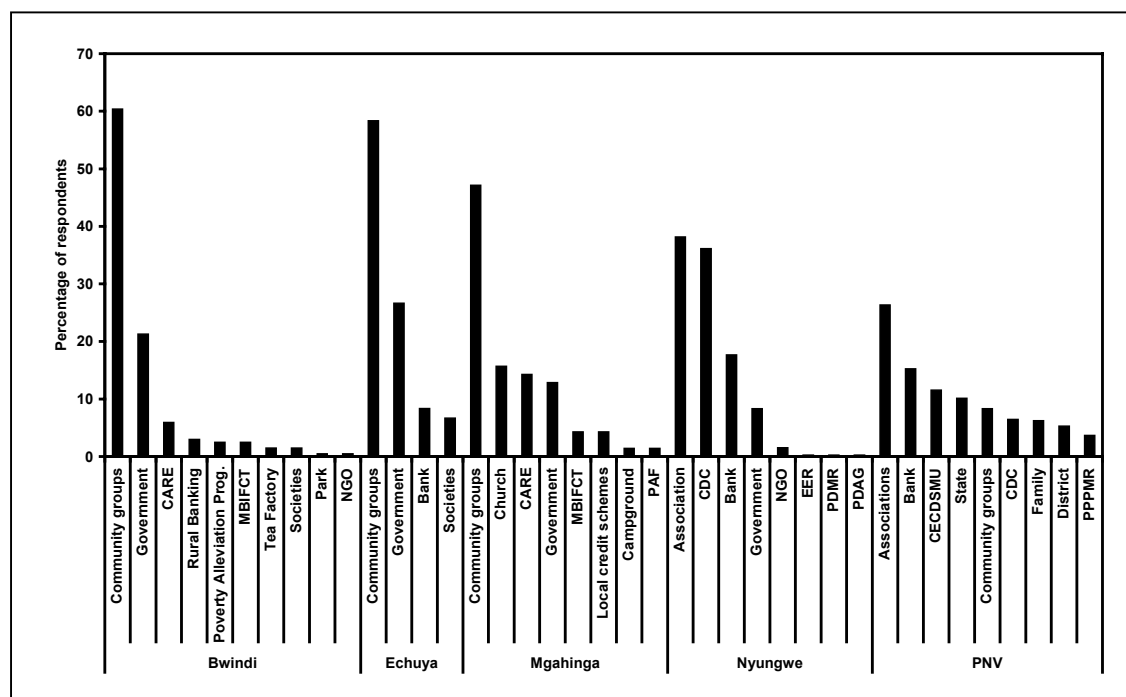


Figure 4.9 The main source of credit cited by households giving the names of organisations that were frequently cited.

4.4.2 Use of Credit

Interviewees were also asked what they would do with credit or a grant if they could obtain it. How respondents would use credit varied more between the Batwa than other groups living around the forests (Figure 4.10). Around all of the forests, except Bwindi, the Batwa primarily would use credit to purchase land, whereas the Bwindi Batwa would buy livestock. The difference around Bwindi may be due to the interventions of the MBIFCT (Bwindi Trust Fund) which has bought land for the Batwa (58% of the Batwa community in south-west Uganda have been given land by the MBIFCT) Amongst the other groups, credit obtained would be used to improve agricultural production or to start businesses, except in Nyungwe, where people would buy livestock (Figure 4.10).

Combining all forests, there was no relationship between access to credit and distance from the forest. It might be expected that better educated households might be more able to access credit but there was no relationship between access to credit and numbers of students in a household. Borderline significance was observed around Nyungwe between number of children at school and access to credit ( $P=0.049$ ) and, similarly, around Mgahinga for both number of children at school ( $P=0.033$ ) and distance to forest ( $p=0.0163$ ) against access to credit. There was no significant relationship around the other forests. It may also have been expected that wealthier people would have stated that it is possible to access credit but a correlation between percentage of people stating it was possible access credit per parish and the average wealth score per parish was not significant. This is, in part, because some of the credit schemes mentioned include local cooperative schemes where people loan to one member of the group each month and the person receiving cash rotates each month.

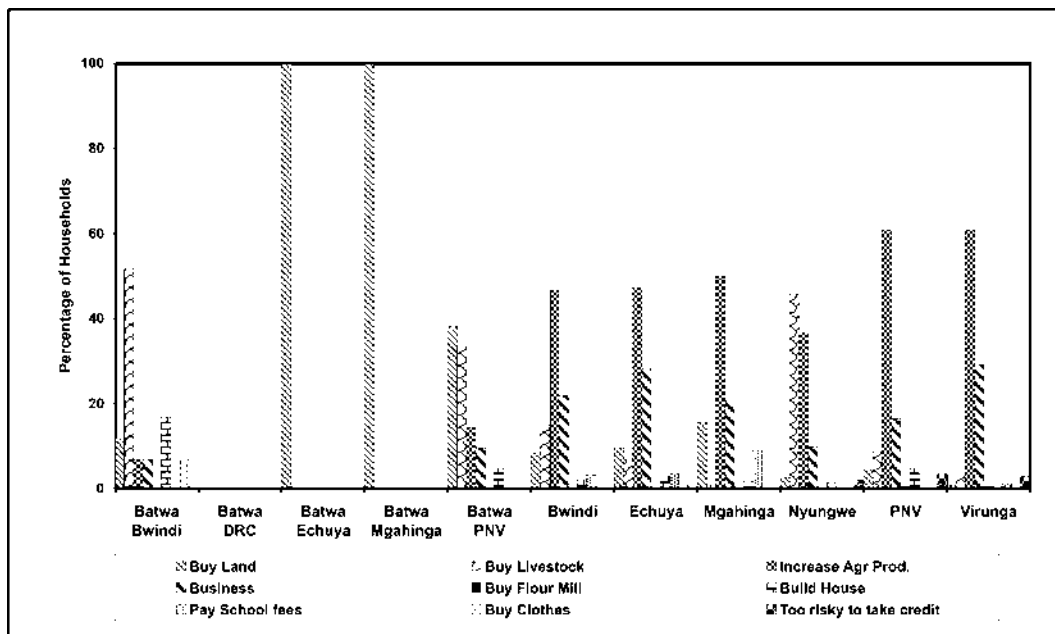


Figure 4.10 How people would use credit if they could obtain it.

## 4.5 Using the Forest to Make Money Legally

Section 5 of this report looks at the use of the forest by people and the collection of non-timber forest products (NTFPs). In several of the forests the collection of NTFPs was illegal and people were, consequently, nervous about giving accurate responses. It was therefore difficult to calculate an income that people could make from NTFPs. However, there are legal ways in which people are benefiting from the forest and these include employment, tourism and beekeeping.

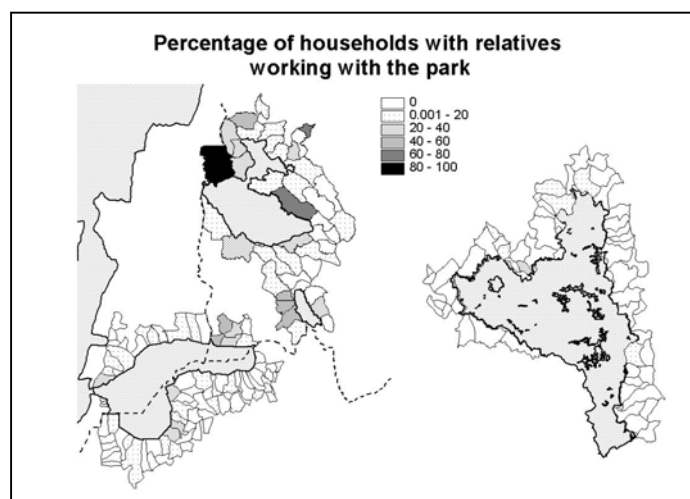
### 4.5.1 Employment

The presence of the forest leads to some employment. People work as park or forest rangers/guards, tourist guides, trail cutters, and in administration. Interviewees were asked about whether anyone from their family works in the park or forest reserve (Table 4.5).

The percentage of households with relatives working in Bwindi, Echuya and Mgahinga was quite high, given the number of people that live at the edge of the forest. The spatial distribution shows that the tourism area around Buhoma in Bwindi employs relatives from over 80% of households interviewed. The percentage of people with relatives working in the park is also high around Ruhija in Bwindi where the Institute for Tropical Forest Conservation is located (Figure 4.11).

**Table 4.5** The percentage of households that stated that they have a relative who works in the forest, that they benefit from tourism now or that they used to benefit from tourism.

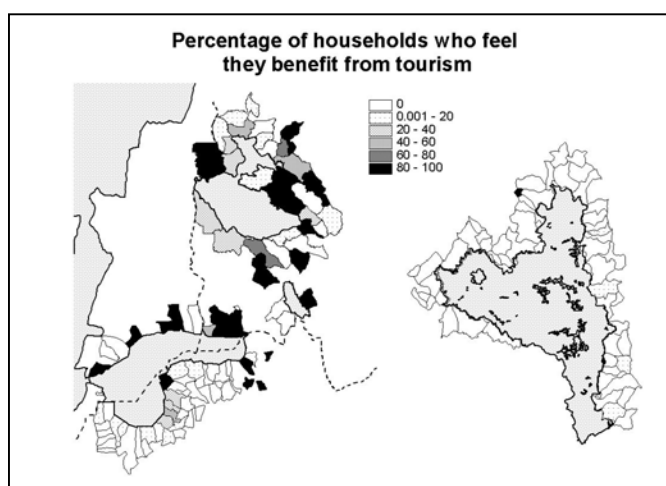
	Relative works in forest	Benefit from tourism	Benefited from tourism in past
Batwa Bwindi	1.67	23.33	33.33
Batwa DRC	0.00		0.00
Batwa Echuya	0.00	0.00	0.00
Batwa Mgahinga	0.00	0.00	6.67
Batwa PNV	14.29	8.33	0.00
Bwindi	20.32	32.92	4.61
Echuya	19.73	5.41	0.68
Mgahinga	25.81	87.84	38.71
Nyungwe	1.72	0.29	0.57
PNV	3.18	10.89	5.03
Virunga	6.25	10.81	6.92



**Figure 4.11** The percentage of households per parish that stated they had a relative working in the forest or park.

#### 4.5.2 Tourism

Households were asked if they felt they were benefiting from tourism now or if they had benefited in the past. Following the insecurity in Rwanda, it was felt that some people would state that they benefited in the past but do not benefit now. Apart from the Batwa in Bwindi, more households felt that they benefited more at the time of this questionnaire (2002) than they had in the past (Table 4.5). A higher percentage of households around Bwindi and Mgahinga were benefiting from tourism than around other forests in the region. This can probably be attributed to the relatively well-established tourism with little interruption from insecurity over the last decade.



**Figure 4.12** The percentage of households that stated they benefit from tourism mapped per parish.

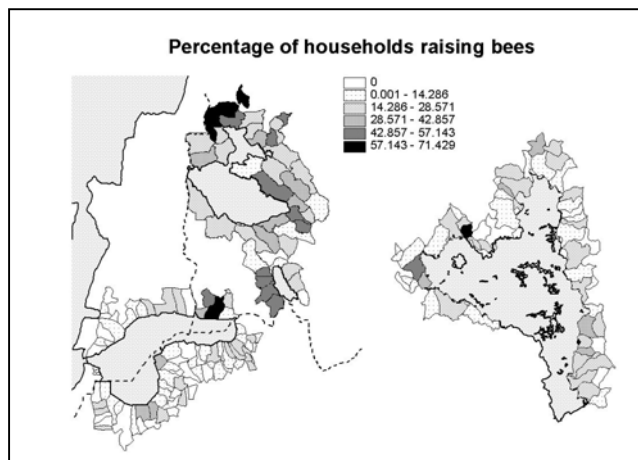
The spatial distribution of households benefiting from tourism is, again, fairly patchy (Figure 4.12). Until recently, tourism has been very low in Nyungwe so it is not surprising that so few households stated they benefited. The PNV though, at the time of this survey, had gorilla tourism up and running well and yet few parishes stated they were benefiting in any way. In DRC households in some parishes felt they benefited from tourism while in Rwanda few did, despite the fact that there has been less attempt to involve local communities in protected area management or to get benefits from the forest to the communities in either place.

#### 4.5.3 Beekeeping

Beekeeping is an income-generating activity that has been associated with the forests. People who keep bees state that they get more honey if the hive is in the forest because more flowers are available for the bees. Quite a large percentage of households stated they kept bees (Table 4.6) and of those that did keep bees a large percentage stated that they sold their honey as well as consumed it themselves. The multiple use programme in Uganda allows the keeping of hives within Bwindi and Mgahinga, whereas it is illegal in DRC and Rwanda. As a result of this, higher percentages of people keep bees in Uganda and the quantities of honey harvested are higher (Table 4.6).

Households situated between 0-3 km from the forest had a higher than expected number of people keeping bees compared with people living further than three km away ( $X^2=34.79, df=3, p=0.000$ ).

Figure 4.13 shows the distribution of parishes that keep bees around these forests. Every parish around Bwindi, Echuya and Mgahinga has some households that keep bees but there are several around the other forests that did not keep bees at all. One limiting factor may be the market for honey. If people are wealthier in Uganda, as it appears from this study they are, then they may be able to afford to buy honey more often than in Rwanda or DRC. There have also been projects to help people from south-western Uganda market honey in towns and cities outside the region and these have probably contributed to this result also.



**Figure 4.13** The distribution of households raising bees around the forests. The percentage of households raising bees is plotted.

**Table 4.6** The percentage of households that keep bees, the percentage of these people who sell their honey, the average quantity harvested per year (litres) and the percentage of households with bees in a beekeeping association.

Forest	Keep bees	Sell honey	Quantity honey harvested /yr	In an association
BatwaBwindi	11.67	0.00	2.25	0.00
BatwadRC	11.11	0.00	2	
BatwaEchuya	14.29	100.0	2.5	50.00
Batwamgahinga	0.00			
BatwaRW	19.05	75.0	6.75	0.00
Bwindi	30.30	55.71	6.5	38.06
Echuya	31.29	93.48	14.79	94.11
Mgahinga	41.13	78.43	16	89.74
Nyungwe	16.46	60.43	17.54	27.15
PNV	11.41	52.25	16.78	73.33
Virunga	7.59	79.41	9.6	75.00

The poorest and the richest people (as defined by the quartiles of axis one in the Principle Component Analysis) tended to keep bees more often than would be expected compared with the people who were in the middle two quartiles of the wealth ranking ( $X^2=10.91, df=3, P=0.012$ ). It would appear that beekeeping is carried out when people have little other opportunity to make money or when they have the money and time to do it.

#### 4.6 Discussion

This study was carried out in one of the poorest and most densely populated parts of Africa. People here have little access to opportunities to improve their livelihoods and have so little land that they cannot increase their wealth by farming. Over the past 10 years there has been a major effort in this region to reduce the poverty of the people here as well as improve the conservation of the protected areas, particularly in south-western Uganda. Integrated Conservation and Development Projects (ICDPs) have been implemented, a trust fund was created that supports local projects in the community, revenue from tourism receipts have been shared with the community and development NGOs have been working in the region to improve farming practices and help create markets for products. The results of this study clearly show that these projects have had an impact. People in south-western Uganda are wealthier, have greater access to credit and feel they benefit from tourism more than people in Rwanda and DRC.

In early 1990 people in Rwanda were wealthier than people in Uganda. At that time, Uganda was recovering from war. People in Rwanda and DRC have become poorer as a result of the insecurity in these countries during the 1990s and early 2000s. However, even in 1990 when tourism was at an all time high in Rwanda people probably were not benefiting around the PNV, as they do today around Bwindi.

Access to markets does seem to have some impact on wealth creation, however people around Bwindi and Echuya, where wealth is relatively high still, had large distances to travel to markets (Table 4.2). Consequently although access may have some effect it is not the only reason people are poorer. What is probably more important is that a market for products exists and that people can afford to buy them. Produce in south-western Uganda is sold in the main towns and cities in the country. For example, potatoes (Irish) from Kabale/Kisoro districts are sold in Masindi about 500km away. As a result, there are opportunities to make money in this region. It is possible that opening up trade between DRC, Rwanda and Uganda with the budding peace in the region may help increase wealth amongst the people living here.

What is clear is that development support should help create markets for products and improve access to more distant markets. Providing credit schemes to allow the development of businesses is one way to help people in finding alternative ways of generating an income, although these also need to be linked to market development. People in Uganda had more access to micro-projects and funds within the community. They also had access to grants, which people stated they preferred because they didn't have to pay them back. These factors could have contributed to increased wealth in the region also.



*Man with dead duiker, Virunga Volcanoes A.Plumptre*

A series of questions was asked of interviewees about their knowledge of conservation in their country, their attitudes towards conservation of the forests they live near, problems they face from the forest (focusing on crop raiding), and their use of the forest. Finally, specific questions about multiple use zones and use of buffer zones were asked of communities living adjacent to specific forests. These related to issues of use of the forest where this is allowed or potential uses where it is not allowed.

## 5.1 Conservation Knowledge and Attitudes

### 5.1.1. Protected Areas and Their Benefits

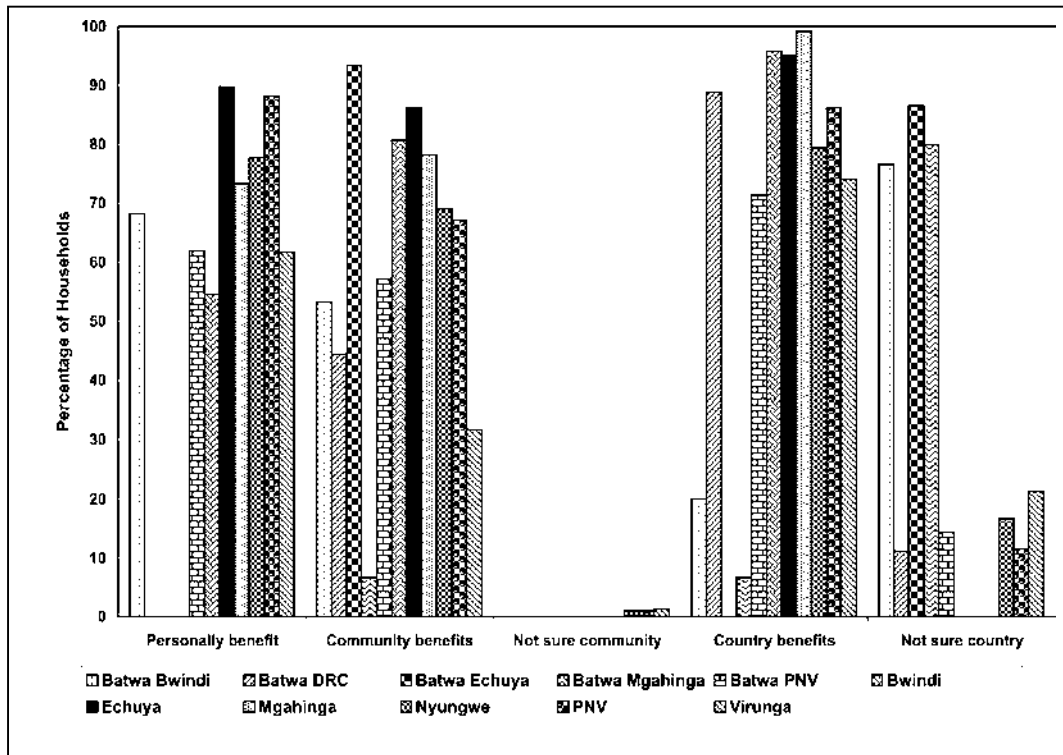
People were first asked how many protected areas they knew in their country. Many people knew only the one they lived next to. People living around Bwindi, Echuya and Mgahinga often knew of two or three protected areas because of their proximity to them. (Table 5.1).

**Table 5.1.** The number of protected areas known by interviewees. Each bar represents the percentage of households in a particular community.

	Average number of protected areas known	Minimum number known	Maximum number known
Batwa Bwindi	1.02	1	2
Batwa DRC	0.89	0	1
Batwa Echuya	1.87	1	3
Batwa Mgahinga	1.47	1	2
Batwa PNV	0.86	0	2
Bwindi	1.67	0	5
Echuya	1.94	0	5
Mgahinga	2.31	1	4
Nyungwe	1.23	0	5
PNV	1.12	0	5
Virunga	1.92	0	7

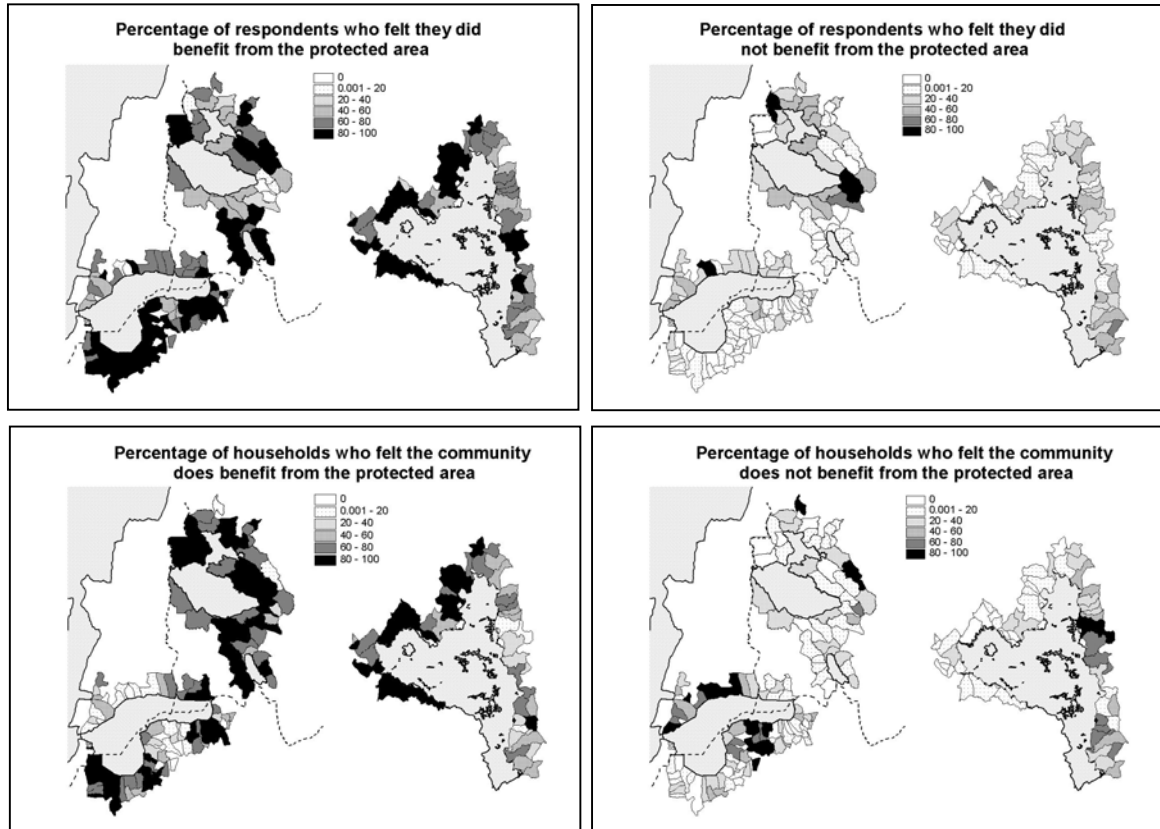
About 20-25% of people around PNV and Virunga could not name one protected area and this may be due to a misunderstanding of the concept of the term 'protected area.' Rwandan respondents did not have the choice that Ugandan and Congolese have in that there are only three parks and two forest reserves in Rwanda but many more in the other two countries.

Interviewees were asked if they personally benefited from parks and reserves, if their community living around them benefited and if their country benefited. If they stated they benefited or not they were also asked why they thought this was so.



**Figure 5.1.** The percentage of households that stated they personally, their community and their country benefited from protected areas. Where they were not sure, this was also recorded.

For the most part, people felt that they benefited from the parks and reserves, as did their community and country (Figure 5.1). People were more certain about their personal and community benefits than about the country benefits. The Batwa living around Virunga Park in DRC, Mgahinga Gorilla Park and around Echuya Forest Reserve in Uganda, all felt that they did not benefit from the protected areas but the Batwa around Bwindi (68%) and PNV (62%) felt they did benefit. The causes of these differences are unclear because people are allowed access to Echuya and it would be expected that the Batwa living there would feel they benefited more than the Batwa around PNV, for instance, who are allowed less access. Some employment of the Batwa, and some projects to help them, have been set up around PNV and Bwindi which may have led to their responses.

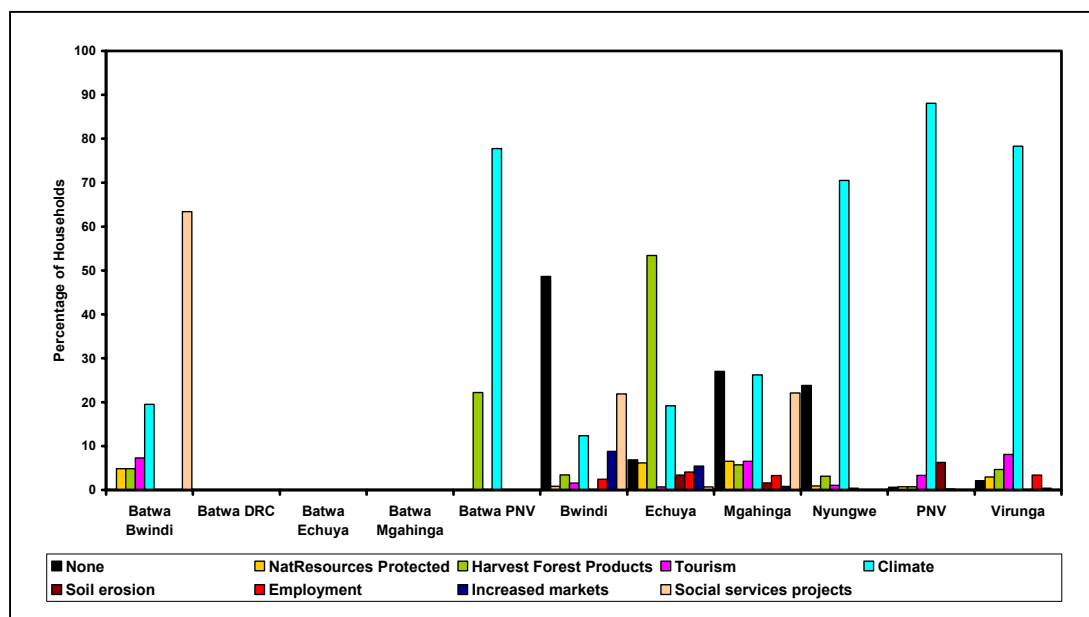


**Figure 5.2.** The percentage of respondents who felt they or their community benefited from the presence of a protected area or felt they or their community did not benefit.

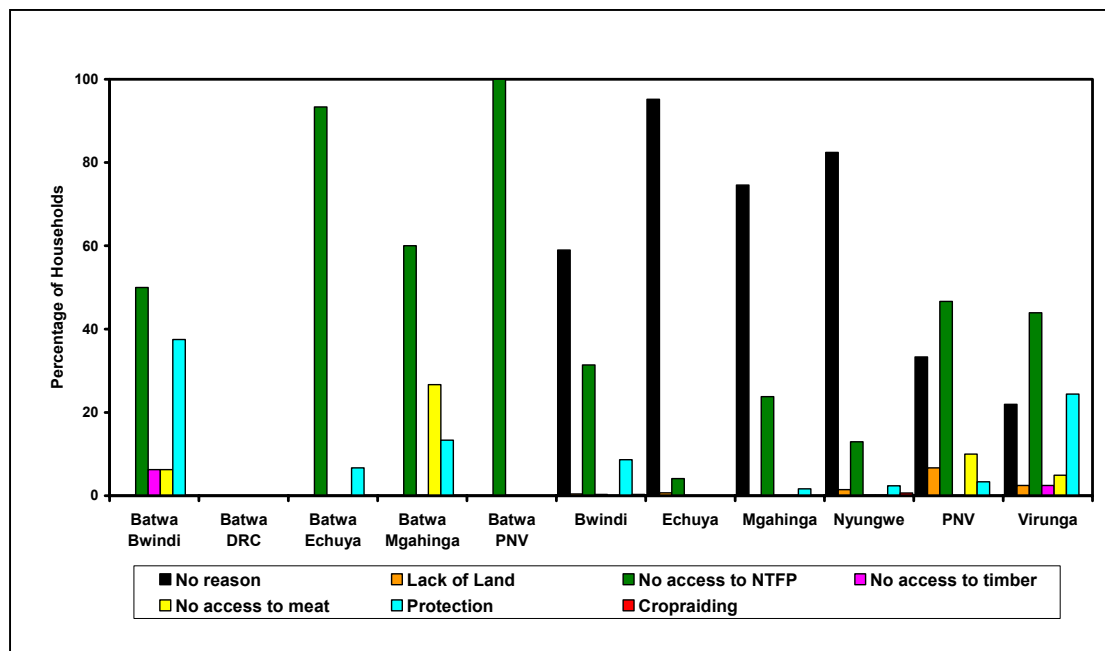
The spatial distribution of people who felt that they or their community benefited or did not benefit from the protected area is interesting (Figure 5.2). People living in the Kinigi Commune near the PNV felt their community did not benefit and yet this is where most of the tourism activities are centred for the gorilla tourism in Rwanda. People living on the western side of Nyungwe Forest felt that they benefited more than those on the east. This may be because tourism is concentrated in the west and may also result from a community education programme that has been working in the west, managed by ORTPN and Projet Conservation de la Foret de Nyungwe (PCFN). It is also interesting to note that some of the higher percentages of households who felt they did not benefit personally from the protected area are around Bwindi Impenetrable National Park where many thousands of dollars have gone into community projects and improved livelihoods programmes. It is possible that people in these parishes are not associating these programmes with the conservation/presence of the park and this is why they feel they do not benefit. This is an important aspect to address if it is true. It is also possible that they see their neighbours in adjacent parishes benefiting more than they do and this difference in how they benefit has led to their attitude, rather than it being relative to how people benefit in Rwanda or DRC for instance.

Reasons given for benefiting from the protected areas were grouped into nine categories. Interestingly, for many communities the role these forests play in climate control is one of the most cited reasons for personal benefits from the forest (Figure 5.3). Around Echuya the ability to harvest forest resources ranked highly.

The presence of social services projects around Mgahinga and Bwindi also contributed to people's impressions that they benefit from a protected area.

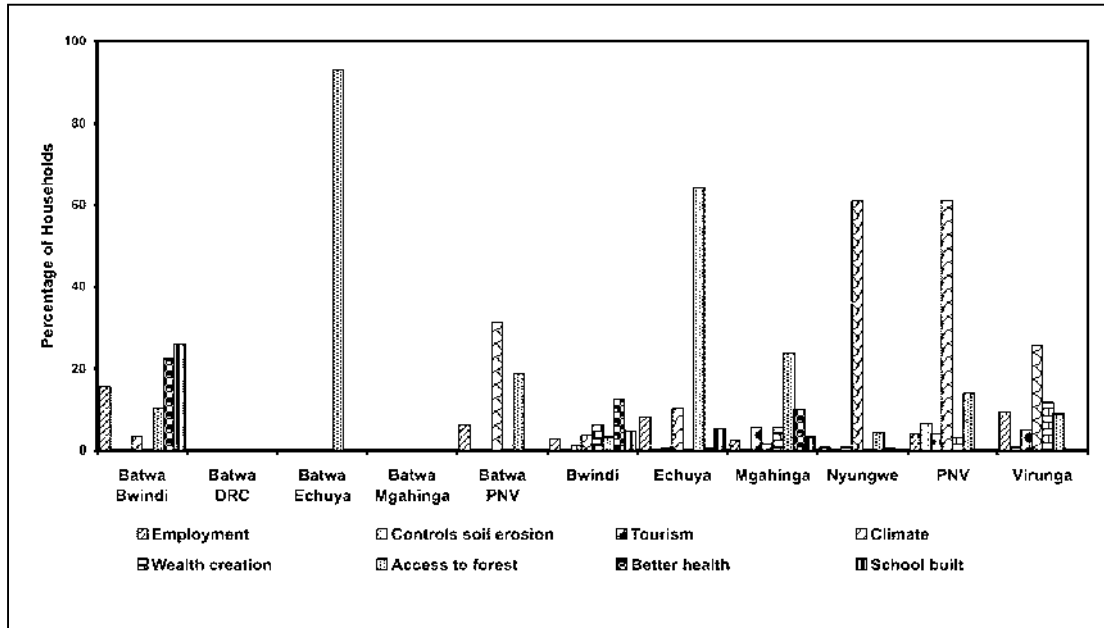


**Figure 5.3.** The reasons people felt that they benefited from protected areas. The percentage of households that gave a positive response are plotted for each community.



**Figure 5.4.** Reasons given for why people felt they did not benefit from a protected area. The percentage of households that gave a negative response are plotted for each community.

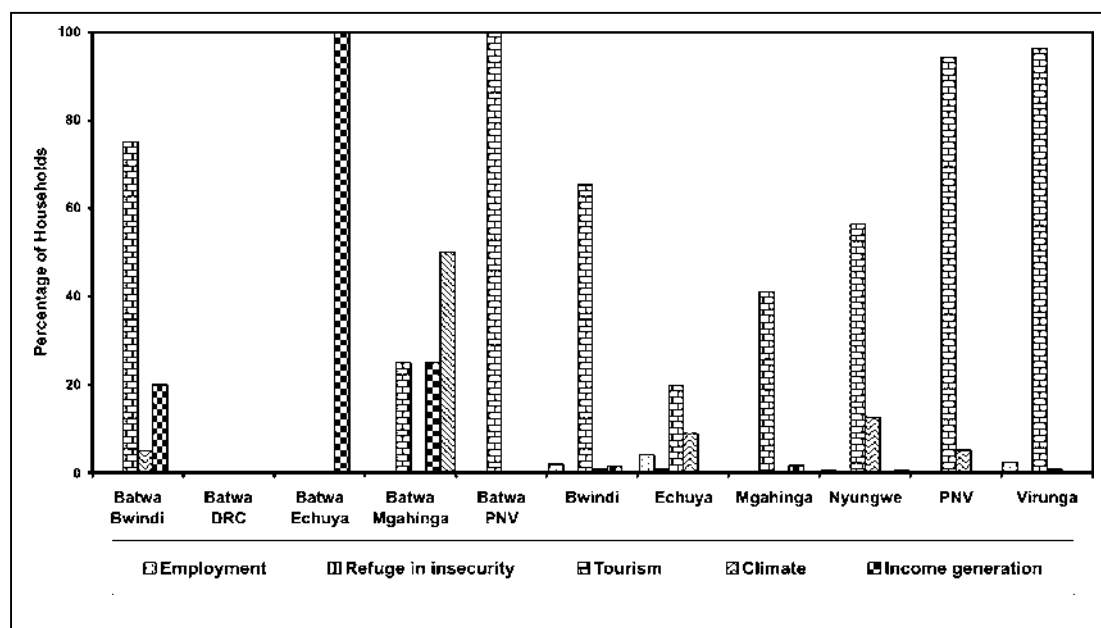
When people were asked why they did not benefit from a protected area, lack of access to harvest non-timber forest products (NTFP) was one of the most commonly cited reasons, particularly among the Batwa communities (Figure 5.4). Protection by parks staff was a reason cited for why they did not benefit from the forest, particularly in Bwindi and PNV where protection is probably most intensive, given the number of guards. This indicates that effective law enforcement is a deterrent to people but also leads to negative attitudes towards the protected areas. Crop-raiding by wildlife was mentioned as a problem but by very few people.



**Figure 5.5.** The reasons given for why people believed their community benefited.

Interviewee’s responses about why they felt their community benefited from the forest varied (Figure 5.5). The two reasons why they felt their community did not benefit were due to lack of access and insecurity. Batwa around Mgahinga felt that lack of access to the forest meant that their community did not benefit whilst access for firewood was the main reason cited by Batwa and other ethnic groups around Echuya for why their community benefited. Climate was cited frequently, particularly in Rwanda and DRC. The building of schools and clinics leading to better health were reasons given for benefiting around Bwindi and Mgahinga.

Answers to the question about how their country was benefiting put tourism and income generation as the two main reasons for benefiting (Figure 5.6). Reduction in the availability of land and crop-raiding were given as reasons as to why the country was not benefiting. Climate featured less than previously, yet it is probable that the watershed functions of these forests are as important to people downstream as they are to the people living next to the protected areas. Education has obviously imparted the message that forests are good for climate and watersheds but that income generation ranks higher than this when citing a reason for why the country benefits. Only the Batwa around Mgahinga consistently cited reasons as to why the country was not benefiting (reduces available land). Again, crop-raiding was mentioned as a problem but only by a few respondents.



**Figure 5.6.** Reasons cited for why the country was benefiting from the presence of protected areas.

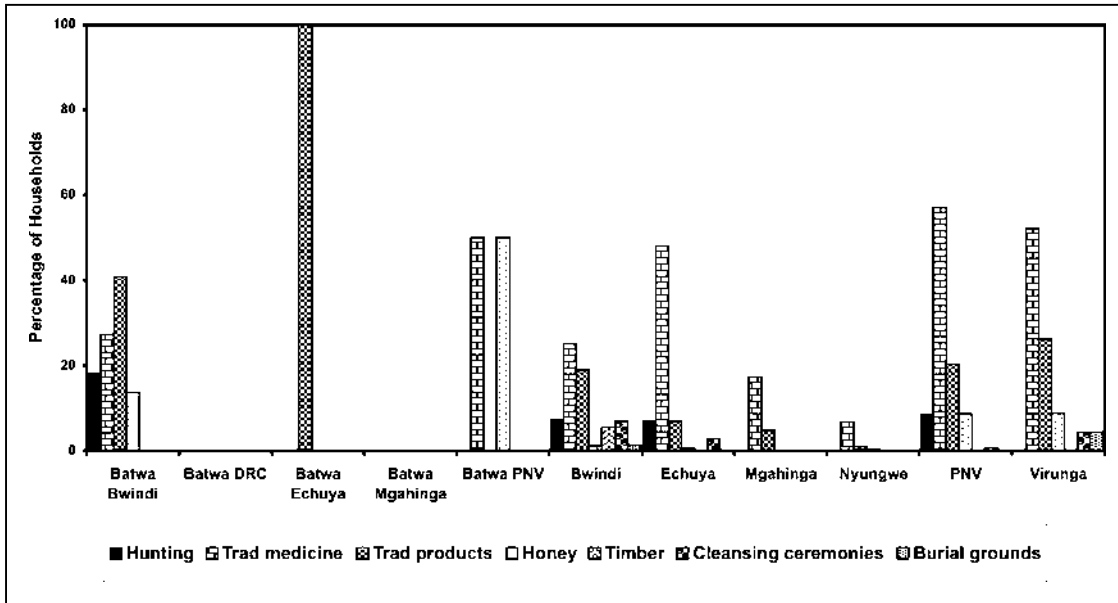
### 5.1.2. Cultural Values of the Forest

Interviewees were asked whether the forest was important to them culturally. If the response was ‘yes’ they were asked how and if ‘no’ they were asked if it used to be important to them in the past (Table 5.2). It is interesting to note that few Batwa around Echuya, Mgahinga and PNV feel that the forest is important culturally now, when many felt it was in the past.

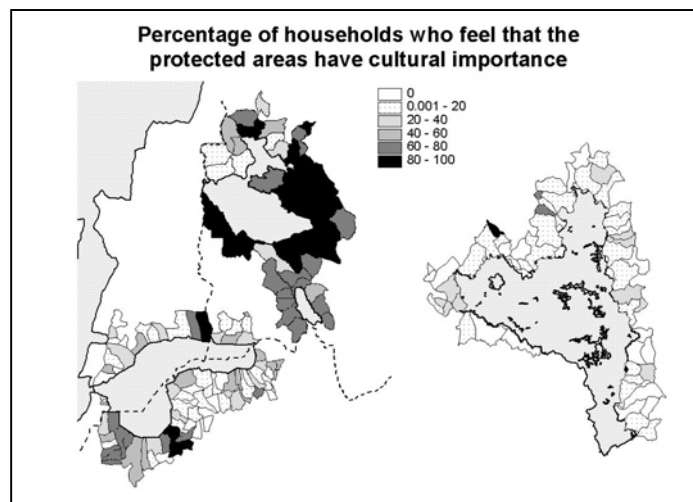
**Table 5.2.** The percentage of respondents that felt the forest was culturally important to them now or was important to them in the past if it wasn’t now.

	Culturally important now	Culturally important in past
Batwa Bwindi	40.00	51.67
Batwa DRC	66.67	100.00
Batwa Echuya	6.67	93.33
Batwa Mgahinga	0.00	93.33
Batwa PNV	19.05	86.67
Bwindi	68.82	36.31
Echuya	70.75	43.24
Mgahinga	23.39	76.47
Nyungwe	9.44	28.65
PNV	35.71	55.56
Virunga	30.94	89.23

The reasons as to why it was important, culturally, were varied but could be grouped into two main groups: access to products and cultural ceremonies (Figure 5.7). The Batwa communities only cited access to forest products as being culturally important whilst other ethnic groups around Bwindi, Echuya and Virunga cited the importance of cleansing ceremonies and burial grounds.



**Figure 5.7.** The cultural values interviewees placed upon the forests near where they lived. The percentage of responses are plotted for each community.



**Figure 5.8.** The percentage of households that felt that the forest has cultural importance to them mapped for each parish around the forests.

The spatial distribution in the percentage of households that believed the forest was important to them, culturally, shows that certain parishes around Bwindi feel this more than others, while around Echuya, the percentage is much more similar (Figure 5.8). When Bwindi was a forest reserve it was used by people far more than it has been since it became a park in 1991. The forests in Rwanda and DRC have been stopping people using them for much longer and this may be one reason for the lower levels of cultural values in these two countries.

### 5.1.3. Relations with Conservation Agents

People were asked about their knowledge of the different conservation organisations and the protected area authorities, their current relationship, how their relationship with the protected area authorities has changed over time and they were asked for suggestions about how the park authorities could better work with them. Thirty nine organisations were identified as having some link with conservation. They included tour operators, development NGOs, conservation NGOs and protected area authorities/government.

**Table 5.3.** The percentage of respondents who believed that they benefited in some way from the presence of these conservation organisations, the percentage that also had problems with the protected area and with the protected area staff.

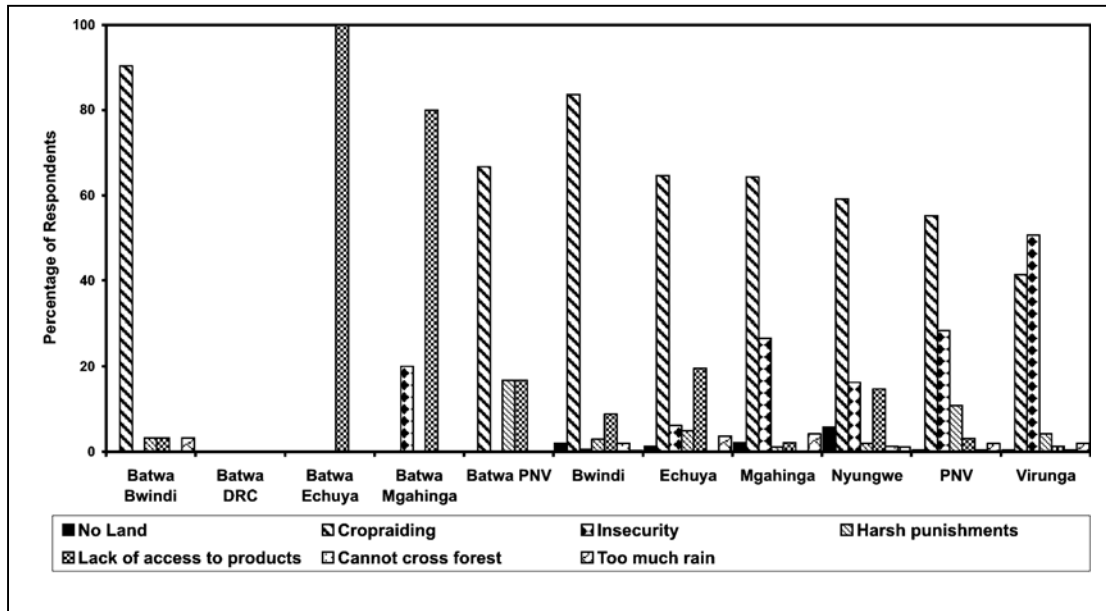
	<b>Benefit from organisations</b>	<b>Problems with the protected area</b>	<b>Problems with staff of protected area</b>
Batwa Bwindi	65.31	50.00	13.33
Batwa DRC		88.89	11.11
Batwa Echuya	13.33	0.00	40.00
Batwa Mgahinga	10.00	13.33	20.00
Batwa PNV	7.69	47.62	47.62
Bwindi	77.16	48.28	12.50
Echuya	31.71	56.85	6.16
Mgahinga	95.24	80.65	12.10
Nyungwe	19.60	29.61	5.87
PNV	77.43	26.93	9.79
Virunga	88.78	73.15	15.21

Most respondents (>75%) living near the Virunga Volcanoes and Bwindi felt that they benefited from the presence of these organisations (Table 5.2) but few living around Echuya and Nyungwe felt they benefited. This is probably due to the fact that there are far fewer organisations working in these areas and the amounts of money available are much lower. The Batwa, on the whole, felt that they did not benefit apart from those living around Bwindi who have received support from some projects. Despite the feeling that they benefit from these organisations many still expressed dissatisfaction due to perceived problems with the park and, to a lesser extent, with parks staff (Table 5.3).

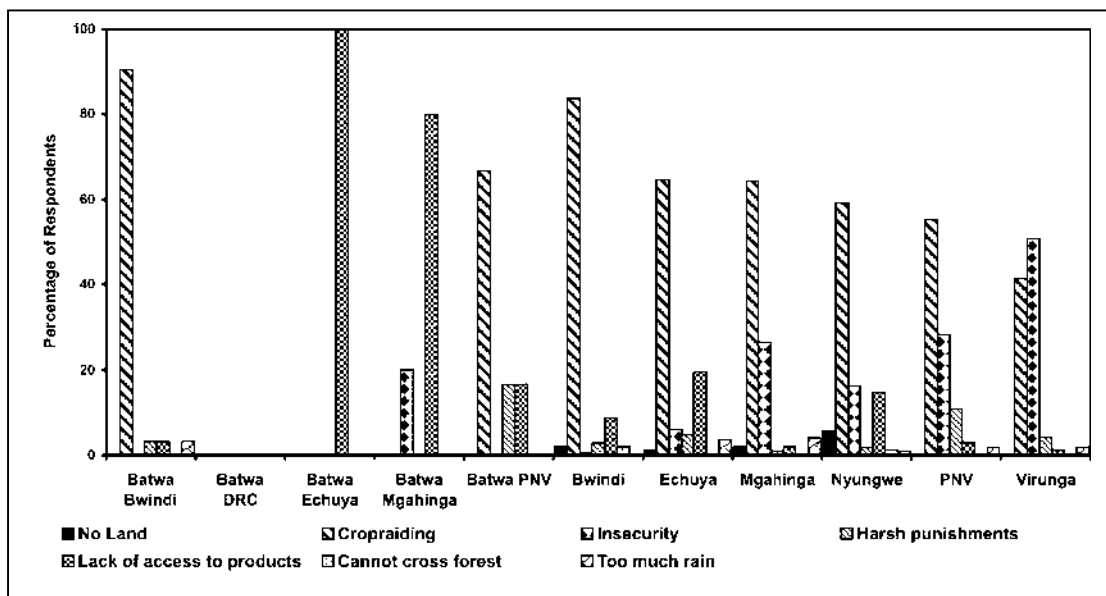
Those respondents who felt that they benefited from the conservation agents listed a variety of reasons why they thought this was so. Answers were grouped into five categories (Figure 5.9). Education and, to a lesser extent, advice to farmers and climate were given as reasons for why they benefited by most respondents. Presumably, they felt that the climate and the fact that the organisations protect the forest helped them. Alternatively, they may have been taught that climate is important and they simply repeat this each time they are asked about benefits of the forests. Logistic regression between the percentage of the household with secondary education and whether they believed they benefited from the conservation organisations showed that households with better education also valued the conservation organisations ( $r=0.147$ ,  $P=0.000$ ).

Those respondents who felt that the forest was a cause of problems gave many reasons for why they thought this was so. These were grouped into seven main categories (Figure 5.10). Crop raiding figured highly and for the Virunga Volcanoes, insecurity was an issue. Interestingly, climate was blamed here because the forests

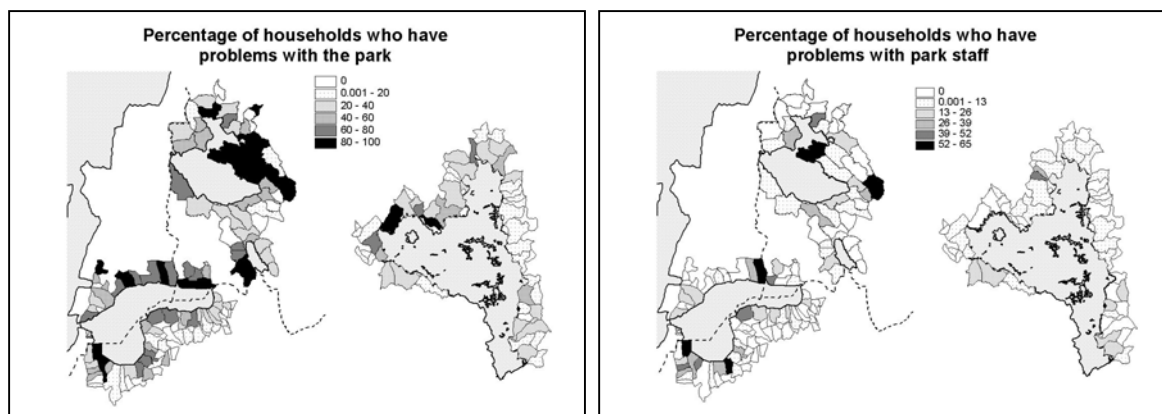
created too much rain. The Batwa, again, complained about the lack of access to forest products, which was not really answering the question (Do you face problems caused by the park?). Interestingly, Nyungwe respondents who saw few benefits from conservation organisations also perceived the fewest problems.



**Figure 5.9.** How respondents felt they benefited from the presence of conservation agents. The percentage of respondents who felt they benefited are plotted.

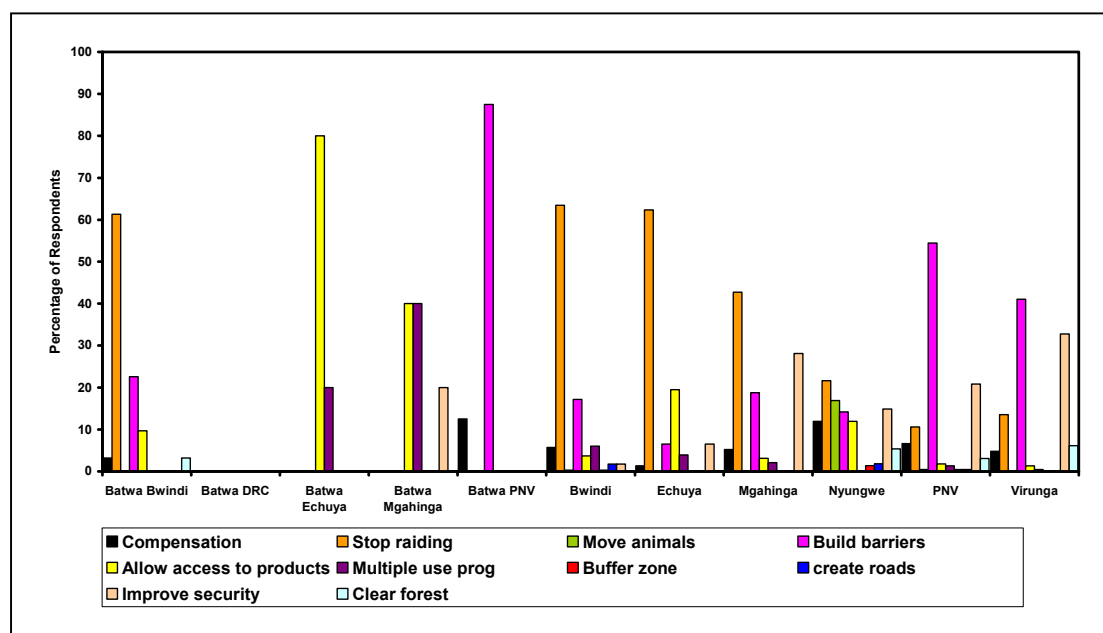


**Figure 5.10.** The reasons why respondents felt they faced problems caused by the park.



**Figure 5.11.** The spatial distribution of responses to the question as to whether people have a problem with the presence of the forest/park or with the staff of the protected area.

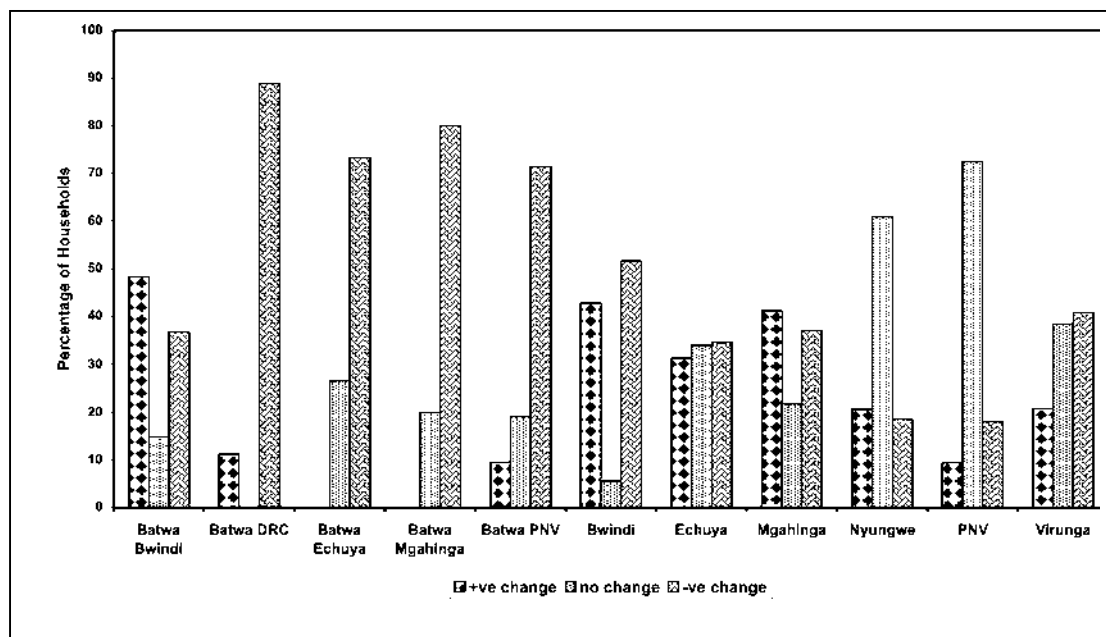
The spatial distribution of responses to the questions about problems with the protected area or its staff show that around Bwindi, these attitudes are much greater in the north than in the east or the south (Figure 5.11). Parishes adjacent to the forests indicated more problems than those further away, which is not surprising, as crop-raiding by wild animals was cited as one of the most common problems (Figure 5.10). Logistical regression of people having a problem with the park against distance was significant ( $r=-0.25$ ,  $P=0.000$ ).



**Figure 5.12.** Suggested solutions to tackle the problems respondents identified that were due to the presence of the forest near to where they live.

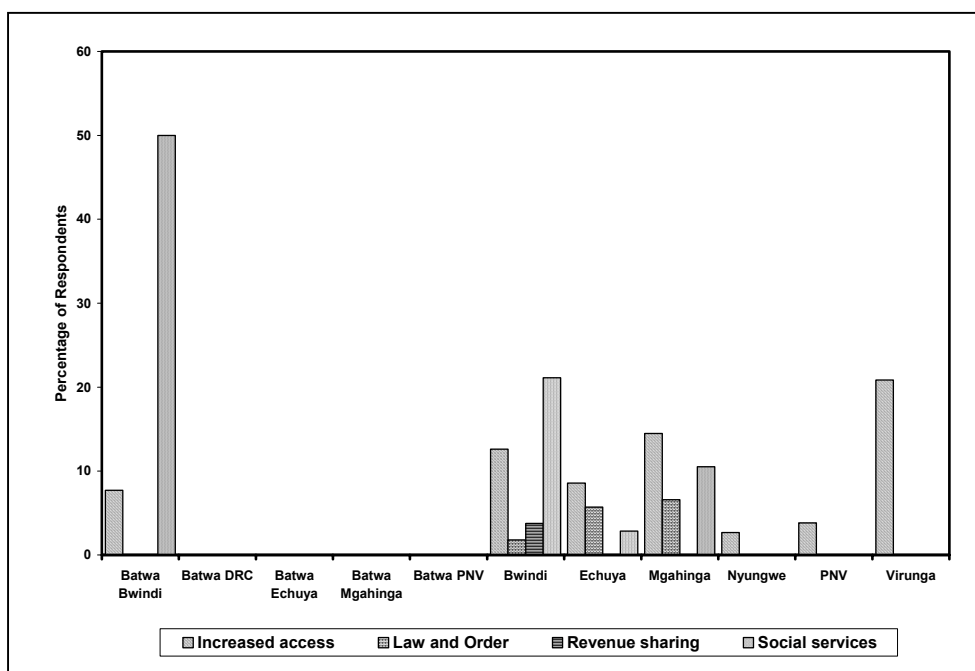
Respondents were also asked to suggest some solutions to the problems they faced (Figure 5.12). Antagonistic responses such as moving the animals or clearing the forest/giving away land were not very common. Suggestions to stop crop-raiding and increase access to the forest were the most common.

People were asked if the relationship between themselves and the protected area authorities has changed and, if so, whether positively or negatively (Figure 5.13). Most of the Batwa believed that things were worse between themselves and the protected area authorities. People living around Nyungwe and PNV did not see much change happening, either way, and those living around Bwindi, Echuya and Mgahinga were split about evenly as to whether things have become better or worse.

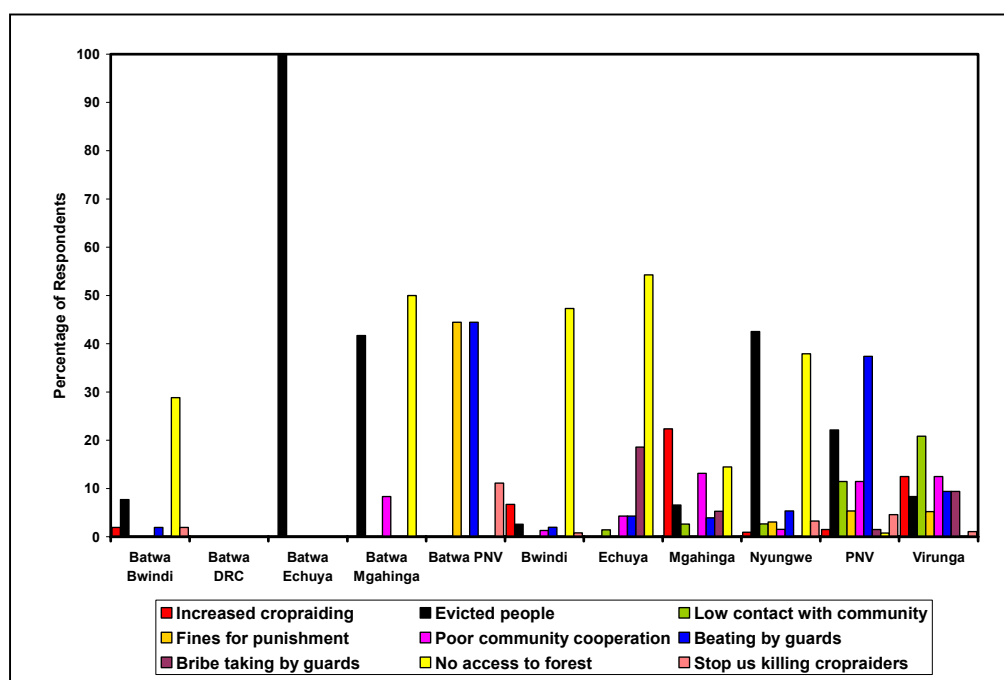


**Figure 5.13** The percentage of households that believe that relations between them and the protected area authority have changed positively, have not changed or have changed negatively.

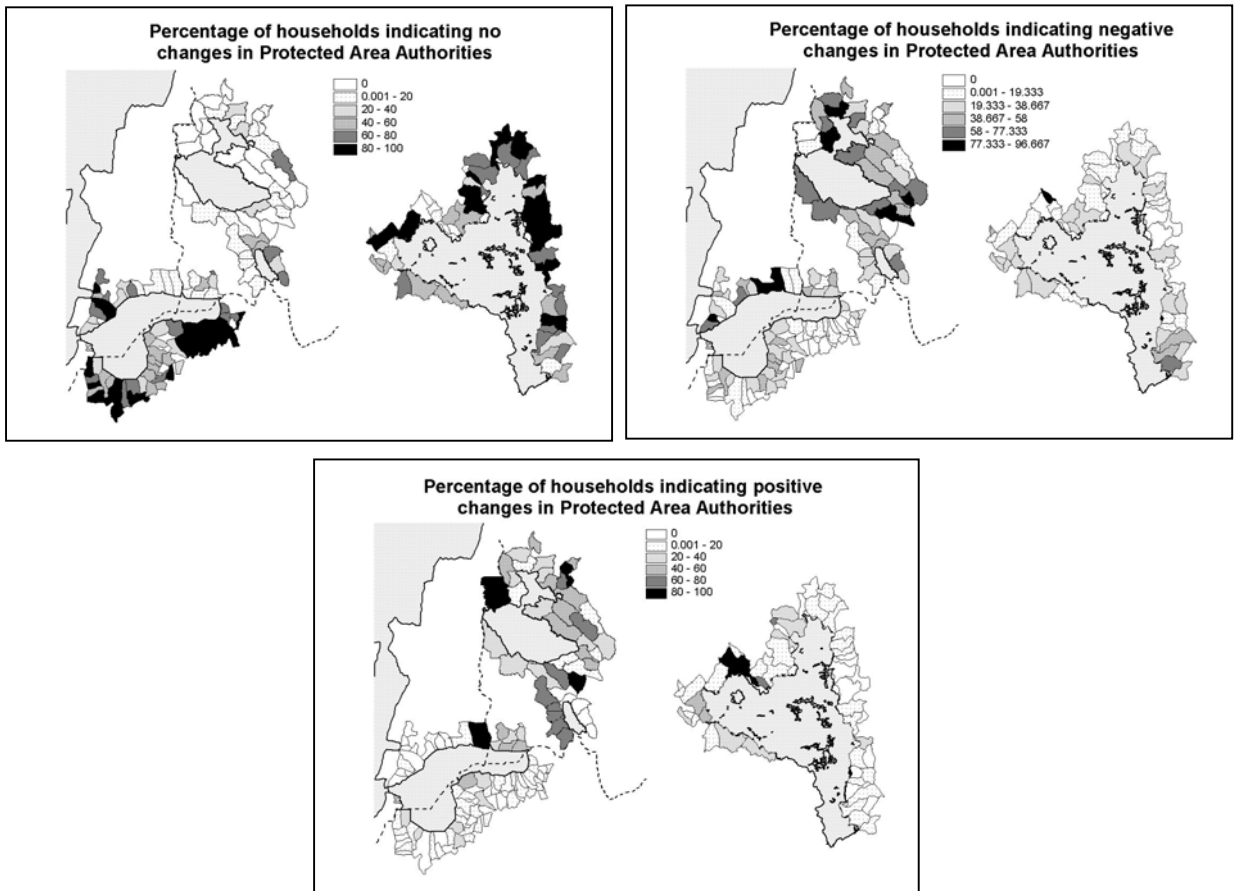
The respondents were then asked why they believed relations had changed positively (Figure 5.14) or negatively (Figure 5.15). Improvements in the relationships were primarily due to the activities that increased social services, access to the forest and, around Bwindi, revenue sharing between the protected area authority and the community. Factors that led to perceptions that the relationship had deteriorated included eviction from the forest, in the case of the Batwa, and people around Nyungwe and PNV, lack of access to the forest (even in the case of Echuya where access is allowed but has had to be curtailed because of the over-harvesting of bamboo), beatings by guards in PNV, bribe-taking in Echuya and Virunga, and increased crop-raiding in Mgahinga (Figure 5.15).



**Figure 5.14.** Reasons why people believed that their relations with the protected area authority had improved.



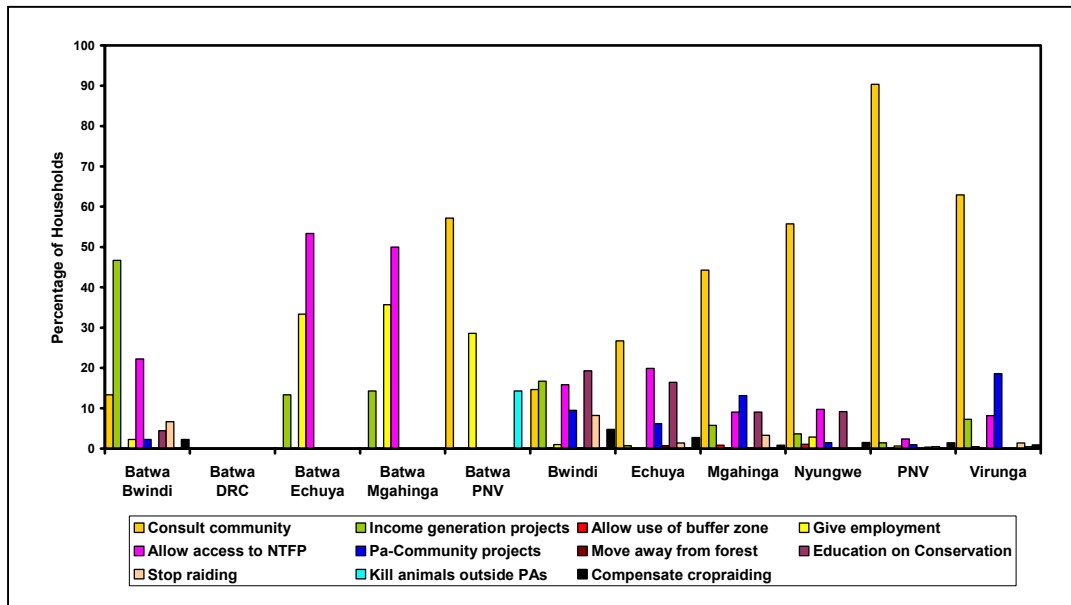
**Figure 5.15.** Reasons why people believed relations had deteriorated between them and the protected area authorities.



**Figure 5.16.** The spatial distribution in responses as to whether relations between households and the protected area authorities had changed or not.

When mapped, the perception about changes in the relationship with protected area authorities is revealing (Figure 5.16). For the most part, all parishes around Nyungwe feel that there has been little change apart from the few near the tourism site at Uwinka and where there have been initiatives to encourage the making and sale of crafts to tourists by PCFN. The tourism area in Bwindi at Buhoma also registers a high percentage of people believing that things have changed for the better. However, this pattern is not repeated in Rwanda's Kinigi Commune, where PNV tourism activities are concentrated, with few positive changes and more negative ones perceived. The western side of Echuya Forest believes things are better while the eastern side does not see a change or thinks it's worse. This may be due to people being given access to harvesting bamboo around the time of the interviews.

Interviewees were also asked how they thought the park authorities could better work with them, given that they have the mandate to conserve the protected area (Figure 5.17). Consultations with the community were by far the most common suggestions followed by allowing people access to harvest NTFPs and the development of income-generating projects/community projects.



**Figure 5.17.** Responses to a question about how protected area authorities could better work with the community given they have the mandate to conserve the protected areas.

## 5.2 Crop Raiding and Hunting

### 5.2.1. Crop-Raiding by Wild Animals

Households were asked about crop-raiding to determine the percentage that suffer loss of crops to animals coming from the forest, to determine which species crop-raid most frequently and to obtain information on measures they have used to control raiding. A high percentage of respondents stated that they lose crops to animals from the forest (Table 5.4), given that those interviewed ranged between 0-10,000 m from the forest boundary. Few of the Batwa from Echuya and Mgahinga suffered crop loss because they do not have fields (Table 3.4). Respondents indicating they lost crops tended to have more fields (Logistic Regression  $r=0.1242$ ,  $p=0.000$ ), with more that were at the forest edge ( $r=0.317$ ,  $p=0.000$ ).

**Table 5.4.** The percentage of households that suffer crop loss to wild animals and the responses about where the animals come from.

	Suffer crop loss	Forest	Plantations	Nearby/fields
Batwa Bwindi	53.33	51.67	0.00	0.00
Batwa DRC	66.67	44.44	0.00	22.22
Batwa Echuya	6.67	6.67	0.00	0.00
Batwa Mgahinga	0.00	0.00	0.00	0.00
Batwa PNV	36.84	36.84	0.00	0.00
Bwindi	51.80	47.77	1.58	1.73
Echuya	58.90	56.16	0.68	2.05
Mgahinga	74.80	74.80	0.00	0.00
Nyungwe	36.62	28.56	5.08	2.86
PNV	34.91	19.92	3.41	11.35
Virunga	49.89	44.07	1.79	4.03

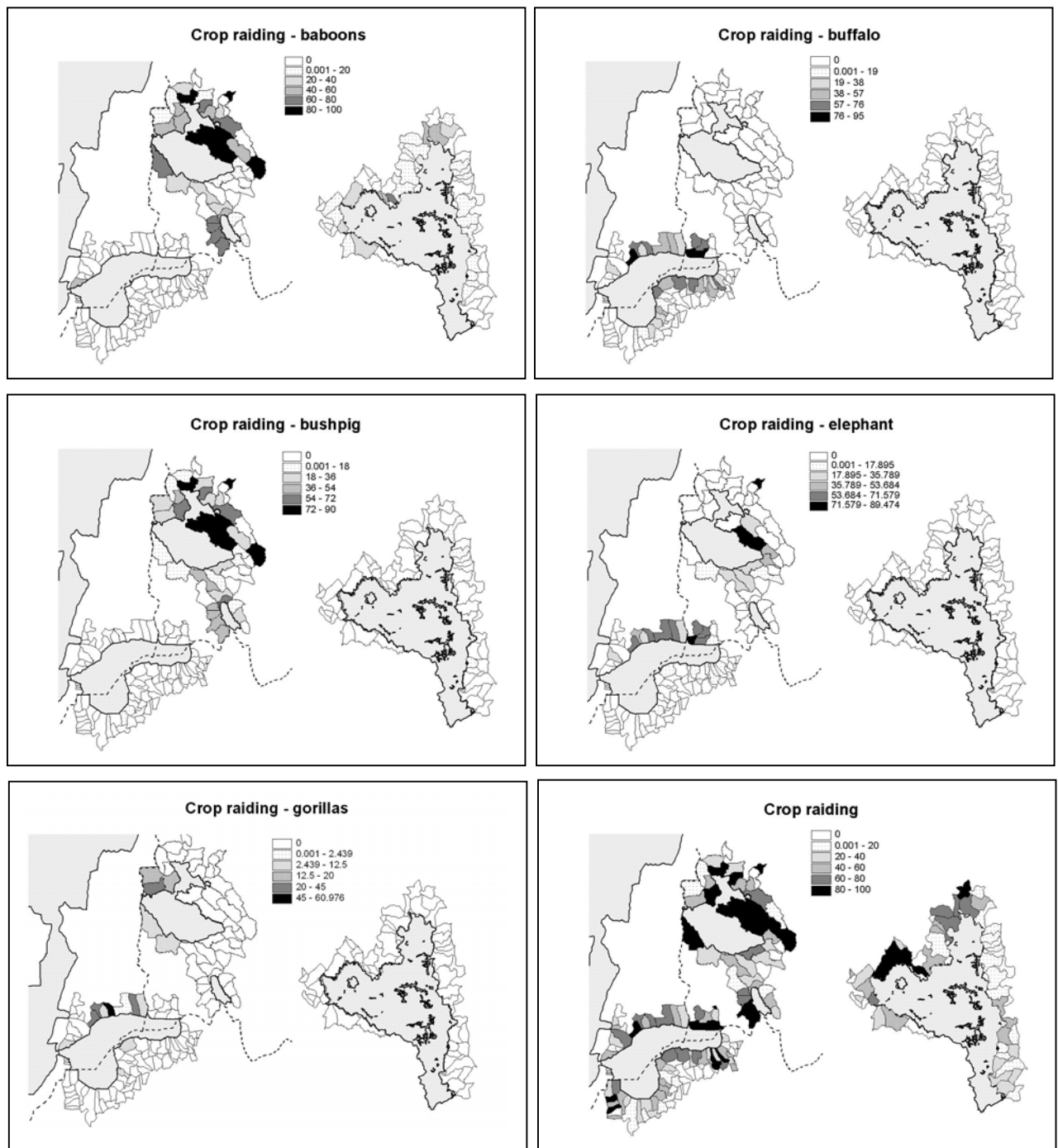
The majority of the respondents stated that the animals came from the forest, except in Rwanda, but a few also admitted that the tree plantations and even adjacent fields harboured some species (Table 5.4). Species that come from outside the forest include porcupines, rats and jackals. Twenty species of animal were listed as the main crop-raiding species, of which one was the domestic cow (0.8% of named animals around PNV) and the rest were wild animals. Buffalos, elephants, bushbucks and porcupines were considered the main problem animals in the Virunga Volcanoes. Baboons and other monkeys were the main pests for Nyungwe and Baboons, other monkeys and bushpigs were the main pests for Bwindi and Echuya (Table 5.5). Gorillas ranked fairly highly around the Virunga Park in DRC but elsewhere were not mentioned much.

**Table 5.5.** Respondents were asked to name all animals that crop-raid their fields. This table gives the percentage of animals named for each forest.

Species	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Civet/cat	0.31	0.00	0.00	0.95	0.80	0.00
Bushbuck	0.71	0.00	4.04	0.00	24.67	9.58
Baboon	27.60	24.45	0.00	22.12	0.00	2.50
Birds	4.99	5.24	9.56	2.97	3.18	0.21
Buffalo	0.00	0.00	24.63	0.00	42.97	36.25
Bushpig	21.89	23.14	0.00	0.71	0.80	0.00
Chimpanzee	2.34	0.00	0.00	1.31	0.00	0.21
Duiker	0.10	2.18	8.46	0.00	0.00	0.00
Porcupine	0.00	0.87	17.28	0.59	11.94	0.00
Elephant	7.74	0.44	21.32	0.00	3.45	30.83
Forest hog	0.10	0.00	0.00	0.83	0.00	0.00
Gorillas	2.65	0.00	0.00	0.00	1.06	15.21
Hare	0.00	0.00	0.37	0.12	0.00	0.00
Hyrax	0.00	0.44	1.84	0.00	1.59	0.00
Jackal	0.41	4.80	3.31	1.55	1.59	0.00
Mongoose	0.10	2.18	0.00	0.95	0.00	0.00
Monkey	30.35	33.62	9.19	67.42	4.51	3.96
Rat	0.41	2.62	0.00	0.12	2.12	0.42
Squirrel	0.31	0.00	0.00	0.36	0.53	0.83

Given the results in Table 5.5 it is not surprising to find large differences between the forests in which species crop-raid and where (Figure 5.18). Species such as buffalo and elephant do not occur any longer in Nyungwe and gorillas never have, so there are no signs of raiding here. The parishes to the north of Bwindi appear to have high levels of crop-raiding in comparison with the south and the east. This was also the same region that had problems with the park (Figure 5.11), for which crop-raiding was most commonly stated as a reason as to why these problems exist (Figure 5.10). However, several parishes that are not bordering a forest also stated that they have problems from crop-raiding species such as baboons and bushpigs and it is very unlikely they do have this problem. Raiding is a very emotive issue around all forests in this region and people are prone to exaggerate the impacts they face in the hope that they will receive compensation. A study of crop-raiding around PNV showed that animals rarely move further than 100 m from the forest edge, although occasionally they can move up to 1 km. However, a questionnaire survey carried out

in 1996 showed that people complained about raiding animals up to 3 km from the forest (A. Plumptre in prep.).



**Figure 5.18.** The spatial distribution in crop-raiding for some of the more common raiding species: baboon, buffalo, bushpig, elephant and gorilla. Values are the percentage of time that a species was mentioned as a crop-raider in that parish. The percentage of households that stated they had a problem of crop-raiding is also shown.

The frequency of crop-raiding was asked of people interviewed. Answers were classified into three categories: 1=each week; 2=each month, 3=occasionally. The results for the more commonly cited species are summarised in Table 5.6. Apart from primates (baboons and monkeys) most species in most forests raided fields occasionally. Around Echuya and Nyungwe birds and bushpigs were cited as regular pests, raiding each week, and porcupines raided each week around Echuya and PNV. Gorillas and elephants were stated to raid crops each month around Bwindi but, from reports with UWA, this is exaggerated. Interestingly, rats and birds, two pests that probably do raid each week were mostly stated to raid occasionally. Their impacts are low however, and hence, tend to be considered to be less of a problem. They also do not come from the protected area necessarily and hence people are also less likely to complain about their actions.

**Table 5.6.** The percentage of responses for each forest and species of crop-raider where people indicated they raided each week, each month or only occasionally. Where the percentage of responses is higher than 50% it is highlighted in bold.

	Frequency	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
<b>Anteiopes</b>	Each week			0.00		<b>52.86</b>	27.50
	Each month			33.33		7.14	2.50
	Occasionally			<b>66.67</b>		40.00	<b>70.00</b>
<b>Baboon</b>	Each week	4.43	<b>91.07</b>		<b>63.98</b>		<b>66.67</b>
	Each month	11.44	7.14		9.14		16.67
	Occasionally	<b>84.13</b>	1.79		26.88		16.67
<b>Birds</b>	Each week	0.00	<b>91.67</b>	23.08	<b>88.00</b>	0.00	0.00
	Each month	4.44	8.33	3.85	4.00	11.11	0.00
	Occasionally	<b>95.56</b>	0.00	<b>73.08</b>	8.00	<b>88.89</b>	<b>100.00</b>
<b>Buffalo</b>	Each week			46.27		29.01	33.33
	Each month			17.91		14.81	10.92
	Occasionally			35.82		<b>56.17</b>	<b>55.75</b>
<b>Bushpig</b>	Each week	23.94	<b>58.49</b>		<b>66.67</b>		
	Each month	14.08	26.42		0.00		
	Occasionally	<b>61.97</b>	15.09		33.33		
<b>Elephant</b>	Each week	5.26		3.45		0.00	8.84
	Each month	<b>76.32</b>		5.17		0.00	6.80
	Occasionally	18.42		<b>91.38</b>		<b>100.00</b>	<b>84.35</b>
<b>Gorilla</b>	Each week	13.04				0.00	6.15
	Each month	<b>56.52</b>				0.00	4.62
	Occasionally	30.43				<b>100.00</b>	<b>89.23</b>
<b>Monkey</b>	Each week	6.40	<b>87.01</b>	<b>76.00</b>	<b>70.68</b>	<b>76.47</b>	<b>68.42</b>
	Each month	5.72	5.19	4.00	7.73	0.00	15.79
	Occasionally	<b>87.88</b>	7.79	20.00	21.58	23.53	15.79
<b>Porcupine</b>	Each week		<b>50.00</b>	21.28	33.33	<b>75.00</b>	
	Each month		0.00	6.38	33.33	2.27	
	Occasionally		<b>50.00</b>	<b>72.34</b>	33.33	22.73	
<b>Rats</b>	Each week	16.67	<b>100.00</b>			0.00	0.00
	Each month	33.33	0.00			27.27	33.33
	Occasionally	<b>50.00</b>	0.00			<b>72.73</b>	<b>66.67</b>

How people deal with crop-raiding was also asked. Barriers that people have tried include bamboo and stick fences, rock walls, ditches, setting traps to catch the animals and guarding fields (Table 5.7). The rock wall was cited much more frequently around Mgahinga because CARE has worked with the communities there to surround the park with a wall. This has not stopped all incidences of crop-raiding

though (Figure 5.18). Most people around PNV and Virunga stated that they do nothing to stop crop-raiding, which may mean that the levels of damage here are lower and of less consequence to them or it may be because they cannot stop the animals. Most people around Nyungwe, Echuya and Bwindi spend time guarding their crops or use another method to stop raiding other than building barriers (other techniques include putting string around the field or soap around the field edge as animals are deterred by the smell of these).

**Table 5.7.** The percentage of times a method to reduce crop-raiding was mentioned per forest or Batwa group.

	Do nothing	Rock wall	Ditch	Bamboo fence	Stick fence	Traps	Guarding /Other
Batwa Bwindi	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Batwa DRC	83.33	0.00	0.00	0.00	0.00	0.00	16.67
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	100.00
Batwa Mgahinga	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	0.00	0.00	0.00	0.00	60.00	0.00	40.00
Bwindi	10.53	0.77	0.00	0.22	0.00	1.10	87.39
Echuya	0.00	0.00	5.19	0.00	0.00	28.57	66.23
Mgahinga	3.11	50.78	4.66	3.11	1.04	24.35	12.95
Nyungwe	2.61	0.00	0.00	0.00	0.00	0.00	97.39
PNV	56.47	0.00	2.16	0.43	0.00	4.31	36.64
Virunga	69.55	1.34	8.66	0.15	0.00	2.54	17.76

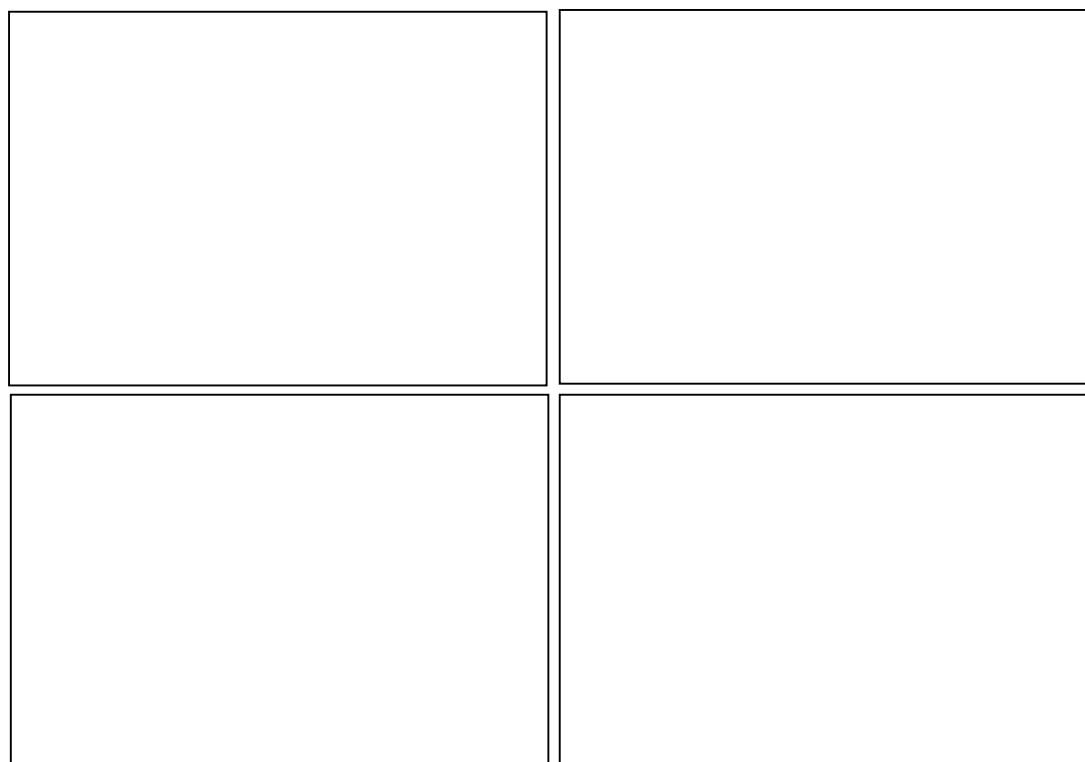
### 5.2.2 Hunting Wild Animals

Following questions about crop-raiding, and as a way of working up to questions about illegal activities such as hunting in the forest, the people were asked if they ever killed animals that entered their fields. It was hoped that if the people did not see the interviewers reacting to this admission they would be more willing to admit to hunting in the forest. Following questions about killing animals and crop-raiding, the sale of bushmeat was asked about by asking the question 'do people living near you buy wild meat?' Questions about frequency and prices for different species followed this. Finally, interviewees were asked if the people living near them hunted in the forest and how often they did this (Table 5.8). The responses were totaled for those who admitted that hunting took place and for those who agreed that it happened or did not know. It is probable that many of those who stated they did not know did not want to admit it happened but did know about it. Despite the fact that these activities are illegal, quite a large percentage of households admitted that they did take place.

**Table 5.8.** The percentage of households that admitted to killing animals they found in their fields, the percentage that admitted that people near them bought bush meat and the percentage that stated that people living near them hunted in the forest. The percentage stating yes to the latter two questions and the percentage stating yes or don't know are both given.

	Kill in fields	Buy bushmeat - yes	Buy bushmeat – yes & don't know	Hunt in forest - yes	Hunt in forest – yes & don't know
Batwa Bwindi	36.67	10.00	10.00	15.00	26.67
Batwa DRC	11.11	11.11	22.22	0.00	0.00
Batwa Echuya	0.00	0.00	60.00	0.00	0.00
Batwa Mgahinga	0.00	0.00	60.00	0.00	6.67
Batwa PNV	33.33	4.76	52.38	4.76	4.76
Bwindi	9.50	3.45	3.88	19.57	34.96
Echuya	13.10	1.36	6.80	26.53	31.97
Mgahinga	14.63	3.23	27.42	2.42	2.42
Nyungwe	5.72	1.86	15.45	2.58	2.58
PNV	5.04	7.50	43.37	8.02	11.42
Virunga	6.04	9.17	52.35	6.49	7.61

The spatial distributions of households that stated that they hunted animals in their fields, that neighbours bought bushmeat (yes or yes and don't know) and that hunted in the forest is given in Figure 5.19. Around Bwindi, Echuya and Virunga Volcanoes the same areas consistently show up for the three aspects of hunting which gives some confidence that the results may be true.



**Figure 5.19.** The spatial distribution in the percentage of households that admitted to killing animals in their fields, that neighbours bought bush meat, (yes or yes and don't know) and those who stated that neighbours hunted in the forest.

Those households that admitted to killing animals in their fields were asked which species were killed, how often and whether they ate them or not. Most households stated that animals were killed occasionally for most forests, however around Bwindi more species seemed to be killed each month (particularly antelopes and bushpigs) than the other forests (Table 5.9). All antelopes were combined into one category, as some respondents obviously did not know the species concerned. Antelopes, bushpigs, buffalos, elephant, Gambian rats, porcupines, hyrax and forest hogs were always stated as having been eaten. Occasionally people stated they ate monkeys (including baboons) but not chimpanzees.

The animals that people stated as having been hunted in the forest were very similar to those hunted in the fields (Table 5.10). Two households around Bwindi mentioned that they had hunted gorilla and they were probably aware of the trade in gorilla infants that has been taking place over the past 2-3 years in this region. Only antelopes were hunted in every protected area.

**Table 5.9.** The species of animal killed in fields and how often they are killed for each forest. The values given are the percentage of responses for each species and forest separately.

Species	Frequency	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Antelopes	Each week	10.53	0.00	5.26	0.00	0.00	0.00
	Each month	89.47	33.33	5.26	0.00	0.00	0.00
	Occasionally	0.00	66.67	89.47	100.00	100.00	100.00
Baboon	Each week	7.14	0.00		0.00		
	Each month	35.71	0.00		0.00		
	Occasionally	57.14	100.00		100.00		
Bushpig	Each week	23.33	0.00		0.00		
	Each month	63.33	0.00		33.33		
	Occasionally	13.33	100.00		66.67		
Buffalo	Each week			0.00		0.00	0.00
	Each month			8.33		0.00	0.00
	Occasionally			91.67		100.00	100.00
Monkey	Each week	3.23	0.00	0.00	5.26	0.00	0.00
	Each month	35.48	20.00	0.00	0.00	0.00	0.00
	Occasionally	61.29	80.00	100.00	94.74	100.00	100.00
Porcupine	Each week	33.33	0.00	0.00		0.00	
	Each month	33.33	0.00	0.00		0.00	
	Occasionally	33.33	100.00	100.00		100.00	
Elephant	Occasionally	0.00	0.00	0.00	0.00	100.00	0.00
Chimpanzee	Occasionally	0.00	0.00	0.00	100.00	0.00	0.00

Tests were carried out to assess whether people who admitted to killing in fields, had knowledge about buying bush-meat, or about hunting in the forest, and whether they tended to have fewer livestock, or lived closer to the forest. The low number of respondents that admitted these behaviours made logistic regression impossible because the models often did not predict any of these behaviours. Instead the number of livestock per household and the distance from the forest were ranked into four categories.

**Table 5.10.** The animals that people stated were most commonly hunted in the forests. Numbers are the percentage of households interviewed.

Species	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Antelope	26.01	16.33	1.61	0.86	12.42	7.37
<b>Baboon</b>	3.30	2.04	0.00	0.00	0.00	0.22
<b>Buffalo</b>	0.00	0.00	2.42	0.00	1.95	2.01
<b>Bushpig</b>	16.67	21.09	0.00	0.00	0.00	0.00
<b>Jackal</b>	0.29	2.04	0.00	0.00	0.00	0.00
<b>Francolin</b>	0.29	2.04	0.00	0.00	0.00	0.00
<b>Gambian rat</b>	0.14	0.68	0.00	1.36	0.00	0.00
<b>Monkey</b>	3.02	8.84	0.81	0.50	0.21	0.00
<b>Porcupine</b>	0.57	4.76	0.00	1.14	0.41	0.00
<b>Hyrax</b>	0.00	1.36	0.00	0.00	0.21	0.89
<b>Gorilla</b>	0.29	0.00	0.00	0.00	0.00	0.00

The numbers of cows, sheep, goats and pigs per household were ranked separately as follows: 0=0, 1-5=1, 6-15=2, 16+=3. The ranks were summed and then ranked again: 0=0, 1=1, 2-5=2, 6+=3. Distance from the forest was ranked: 0-1000m=1, 1000-3000=2, 3000-6000=3, 6000+=4.

Killing in fields: People with more livestock were more likely to kill in their fields ( $X^2 = 15.10$ ,  $df=3$ ,  $p=0.002$ ) which may be influenced by wealth and because they tended to have more land. People living closer to the forest, not surprisingly, were more likely to admit to killing animals in their fields ( $X^2 = 8.21$ ,  $df=3$ ,  $p=0.042$ ).

Buying bush-meat: people with fewer livestock admitted, more often than expected, that they knew about people buying bush-meat ( $X^2 = 9.91$ ,  $df=3$ ,  $p=0.019$ ). They also lived closer to the forest ( $X^2 = 39.65$ ,  $df=3$ ,  $p=0.000$ ), on average. People living within three km of the forest were more likely to know about buying bush-meat than expected, although people living up to 10 km from the forest admitted that they knew about people buying bush-meat.

Hunting in the forest: people living within 3km of the forest were more likely than expected to know about hunting in the forest ( $X^2 = 68.05$ ,  $df=3$ ,  $p=0.000$ ) but there was no significant relationship with the number of livestock.

Respondents who had stated that they knew people bought bush-meat were also asked about the prices of bush-meat species (Table 5.11). Not every interviewee knew the prices and, consequently, some prices are lacking for forests where species were known to be hunted (Table 5.10). Bush-meat is significantly more expensive in DRC than elsewhere. This may be due to insecurity at the time and the consequent lack of availability, or else, people may have been giving prices for larger quantities of meat than one kilo. Antelopes were rarely seen in Nyungwe in comparison with Bwindi, PNV and Mgahinga and it is not surprising that the price was double around this forest.

**Table 5.11.** The price of bush-meat species as reported by respondents who knew people who bought bush-meat. Prices have been converted to US dollars at the exchange rates at the time of the survey.

Species	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Antelope /kg	0.80	0.00	1.52	3.16	1.55	9.34
Buffalo /kg	0.00	0.00	1.57	0.00	0.70	8.78
Bushpig /kg	0.79	0.43	0.00	0.00	0.00	0.00
Gambian rat/animal	0.00	0.00	0.00	0.56	0.00	0.00
Porcupine/animal	0.00	0.00	0.00	1.89	0.00	0.00

### 5.3 Use of the Forest to Supply Livelihood Needs

#### 5.3.1. Grazing of Livestock

Interviewees were asked whether they grazed any livestock in the protected areas near where they lived. Few people (only 27 in total) admitted to this (Table 5.12) but the largest percentage was around Echuya. Distances they moved with their cattle into the forest varied by forest. The reasons people gave for taking the animals into the forest included: food (14 respondents), water (1 respondent) and insecurity (1 respondent). Seventy two percent of respondents, who admitted to grazing their animals in the forest, stated that they only grazed them in the forest in the dry season, while 28% stated that they grazed their livestock at any time of year. It is known that grazing is a common problem in the forests and these results may be due to people being unwilling to admit to it. However, there are few households with many animals in this region and it may not be worth most households grazing their livestock in the forest.

**Table 5.12.** Households that admitted to grazing livestock in the forests. The percentage of households that admitted to doing this, the average and maximum distances they admitted to entering (few people gave these distances which is why there are no results for some forests).

	Percentage grazing livestock in forest	Average distance into forest (km)	Maximum distance into forest (km)
Bwindi	0.43		
Echuya	2.72	1.00	1.00
Mgahinga	0.00		
Nyungwe	1.14	0.79	3.00
PNV	0.21	2.00	2.00
Virunga	0.45		

#### 5.3.2 Collection of Forest Products

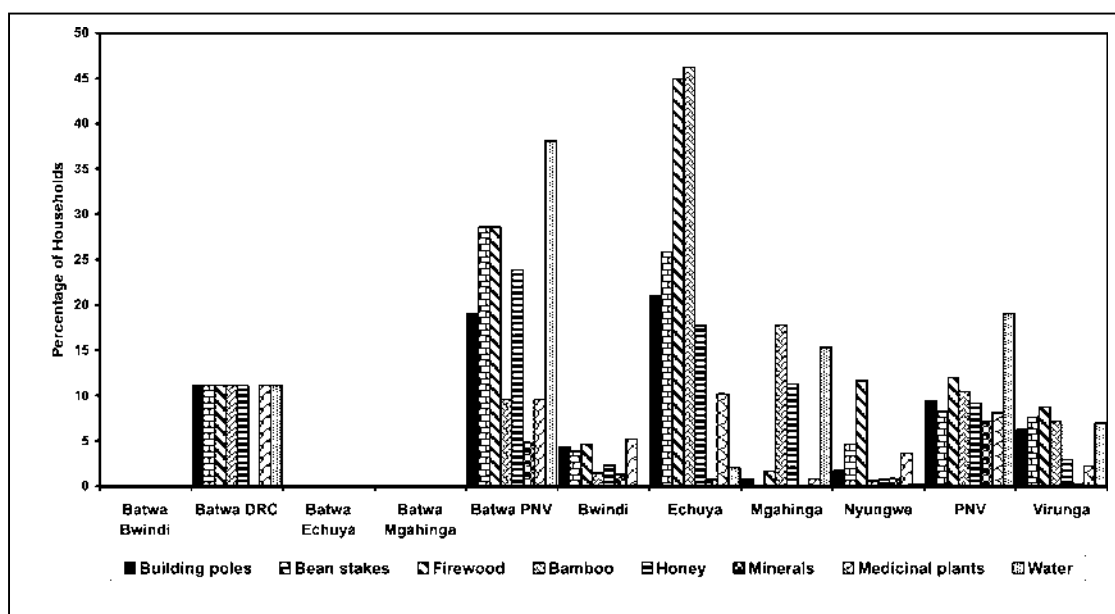
Interviewees were asked about whether they collected forest products, if so what they collected, how often and whether they sold or bought forest products. Many respondents admitted to harvesting forest products (Table 5.13), particularly so in Echuya Forest Reserve where harvesting products is legal, unlike the other forests.

What people harvested from the forest also varied between forests (Figure 5.20), although the Batwa from Echuya and Bwindi did not give these details during their interviews.

**Table 5.13.** The percentage of respondents who admitted to harvesting forest products.

	Percentage harvesting forest products
Batwa Bwindi	33.33
Batwa DRC	11.11
Batwa Echuya	100.00
Batwa Mgahinga	0.00
Batwa PNV	52.38
Bwindi	13.38
Echuya	74.66
Mgahinga	19.35
Nyungwe	22.75
PNV	17.71
Virunga	14.09

People admitting to harvesting products from the forest were significantly poorer ( $X^2=31.3$ ,  $df=3$ ,  $p=0.000$ ) than average, using the composite wealth rank described in the economics section of this report (chapter 4). They were also more likely to live within 3 km of the forest boundary ( $X^2 = 207.9$ ,  $df=3$ ,  $P=0.000$ ).



**Figure 5.20.** The percentage of households harvesting different forest products for each forest. Although the Batwa in Echuya and Bwindi did admit to harvesting forest products they would not give details about what they collected.

The spatial distributions of people harvesting forest products are shown in Figure 5.21. These show that for most forests, only certain parishes harvest particular items.

Of the people who admitted to harvesting forest products, the percentages that harvested particular products are given in Table 5.14. This shows that the Batwa around Virunga all harvested all products apart from minerals. Firewood and medicinal plants are most harvested in Bwindi, while in Echuya it is firewood and bamboo. In Mgahinga bamboo, honey and water are harvested and in PNV it is water, firewood and bamboo. Finally, in Virunga it is firewood, bean stakes, bamboo and water that tend to be harvested. These figures hide a large number of plant species, however, with over 100 plant species collected in Nyungwe (Musabe, 2002).

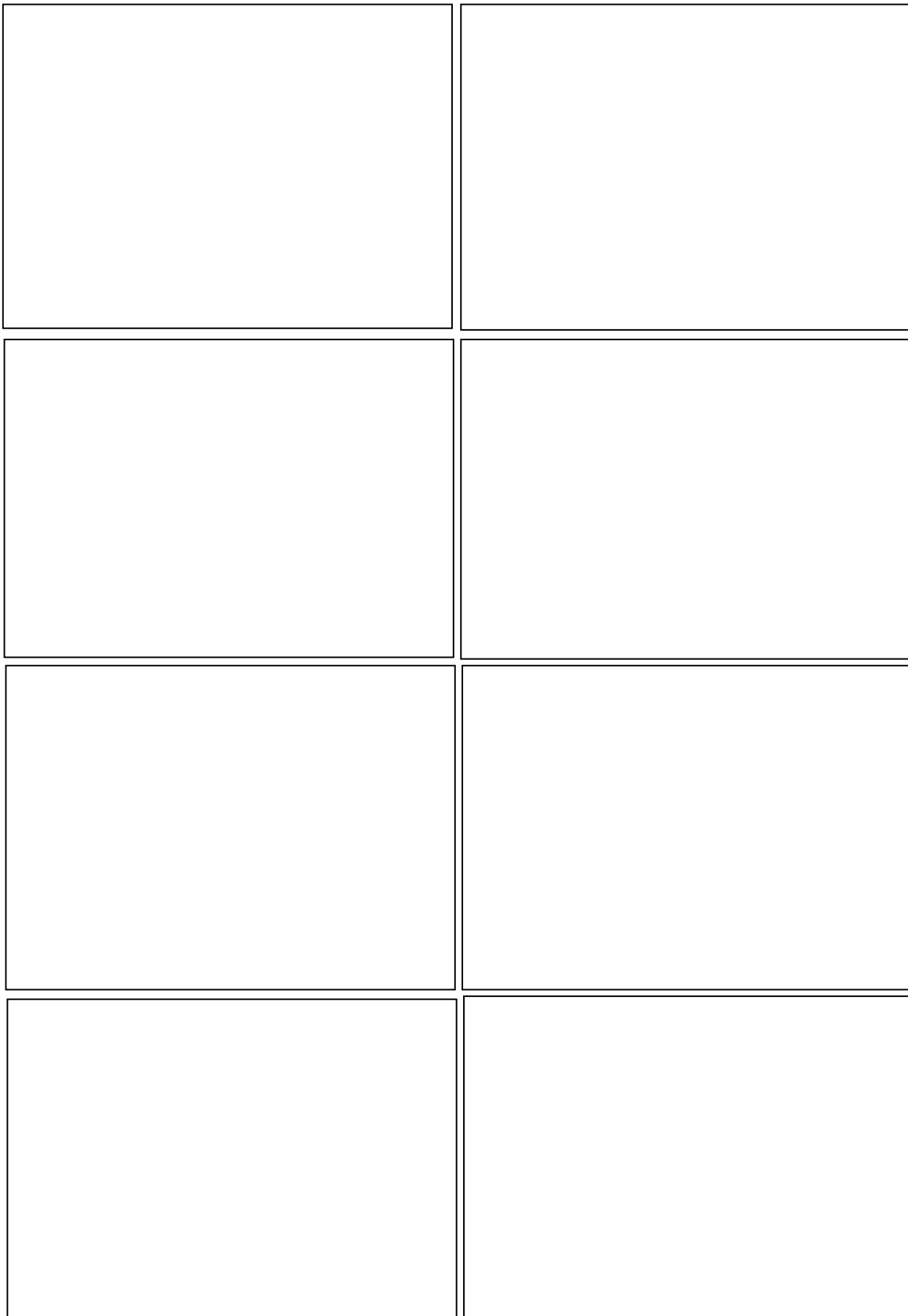
**Table 5.14.** The percentage of households that admitted to harvesting and who harvested particular products from the forest.

	Batwa DRC	Batwa PNV	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Building poles	100.00	36.36	32.21	28.25	4.17	7.55	53.32	44.44
Bean stakes	100.00	54.55	28.99	34.63	0.00	20.13	46.37	53.97
Firewood	100.00	54.55	34.36	60.14	8.33	51.26	67.81	61.90
Bamboo	100.00	18.18	10.74	61.96	91.67	2.52	59.12	50.79
Honey	100.00	45.45	17.18	23.69	58.33	3.14	51.58	20.63
Minerals	0.00	9.09	9.66	0.91	0.00	3.77	40.57	1.59
Medicinal plants	100.00	18.18	38.65	13.67	4.17	16.04	45.79	15.87
Water	100.00	72.73	0.00	2.73	79.17	0.94	100.00	49.21

Interviewees were also asked how often they harvested products from the forest, whether they sold them and, if so, how often and whether they bought them and how often. Tables 5.15-5.21 give the results. Apart from firewood, most households harvested, bought or sold products occasionally.

**Table 5.15.** The frequency of collection, sale and buying of building poles (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	0.00	30.00	1.67	0.00	0.00	0.00	0.00	3.33	16.67
Batwa DRC	0.00	0.00	11.11	0.00	0.00	0.00	0.00	0.00	33.33
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	0.00	0.00	19.05	0.00	0.00	4.76	0.00	0.00	4.76
Bwindi	0.00	4.45	1.01	0.14	1.29	3.16	0.14	3.30	5.17
Echuya	4.08	6.80	21.09	1.36	0.00	9.52	1.36	1.36	14.97
Mgahinga	0.00	0.00	0.81	0.00	1.61	9.68	0.00	0.00	16.94
Nyungwe	0.29	0.50	2.86	0.00	0.00	3.72	0.07	0.72	15.81
PNV	0.62	0.00	1.54	0.10	0.00	10.27	0.10	0.62	39.63
Virunga	0.22	0.00	5.36	0.00	0.00	22.54	0.22	0.45	29.46



**Figure 5.21.** The spatial distribution in percentage of households that admit to harvesting various forest products.

**Table 5.16.** The frequency of collection, sale and buying of bean stakes (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	0.00	13.33	1.67	0.00	0.00	0.00	0.00	0.00	6.67
Batwa DRC	0.00	0.00	11.11	0.00	0.00	11.11	0.00	0.00	11.11
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	14.29	0.00	14.29	23.81	0.00	4.76	0.00	0.00	0.00
Bwindi	0.00	3.45	0.86	0.00	1.72	0.43	0.14	1.58	4.02
Echuya	4.76	4.08	36.05	2.04	1.36	16.33	2.72	2.72	38.78
Mgahinga	0.00	0.00	0.00	0.00	0.00	8.87	0.00	0.81	16.13
Nyungwe	0.64	1.65	7.08	0.00	0.00	1.65	0.00	0.07	5.58
PNV	0.10	0.10	1.23	0.00	0.10	3.59	0.10	0.41	40.45
Virunga	0.67	0.00	6.47	0.00	0.45	21.43	0.22	1.12	35.04

**Table 5.17.** The frequency of collection, sale and buying of firewood (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	1.67	6.67	23.33	0.00	0.00	0.00	0.00	1.67	1.67
Batwa DRC	11.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa Echuya	93.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	19.05	9.52	0.00	23.81	0.00	0.00	0.00	0.00	0.00
Bwindi	0.86	3.74	0.57	1.15	0.43	1.29	1.44	0.72	4.31
Echuya	44.22	8.16	8.16	9.52	0.68	2.72	33.33	9.52	10.20
Mgahinga	0.00	0.81	0.81	0.00	5.65	4.03	0.81	6.45	4.84
Nyungwe	13.45	0.50	3.93	0.14	0.07	0.43	3.43	0.93	3.00
PNV	1.64	0.31	5.54	1.75	1.13	3.49	7.29	3.49	22.90
Virunga	4.24	0.22	3.79	0.89	1.34	17.86	5.36	1.56	17.63

**Table 5.18.** The frequency of collection, sale and buying of bamboo poles (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	1.67	10.00	1.67	0.00	0.00	0.00	0.00	0.00	0.00
Batwa DRC	11.11	0.00	0.00	0.00	0.00	11.11	0.00	0.00	33.33
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	0.00	4.76	4.76	0.00	0.00	0.00	0.00	0.00	0.00
Bwindi	0.00	1.87	0.14	0.00	0.00	0.00	0.00	0.00	0.29
Echuya	7.48	14.97	43.54	5.44	2.72	10.88	7.48	8.84	41.50
Mgahinga	0.00	0.00	18.55	0.00	0.00	1.61	0.00	0.81	10.48
Nyungwe	0.07	0.00	0.50	0.00	0.00	0.50	0.21	0.14	1.57
PNV	0.82	0.10	4.00	0.10	0.10	5.34	0.10	0.62	30.08
Virunga	0.45	0.67	5.80	0.22	0.00	18.75	0.89	0.45	29.02

**Table 5.19.** The frequency of collection, sale and buying of honey (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	16.67	11.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa DRC	0.00	0.00	11.11	0.00	0.00	11.11	0.00	0.00	0.00
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	0.00	0.00	23.81	0.00	0.00	4.76	0.00	0.00	0.00
Bwindi	0.43	2.87	0.14	0.14	1.15	0.14	0.14	1.15	3.59
Echuya	0.00	0.68	31.29	0.68	1.36	20.41	0.68	0.00	18.37
Mgahinga	0.81	0.00	10.48	0.00	1.61	2.42	0.00	4.03	2.42
Nyungwe	0.07	0.00	0.64	0.00	0.00	4.79	0.00	0.21	3.72
PNV	0.72	0.00	1.95	0.10	0.10	3.08	0.10	0.51	6.16
Virunga	0.22	0.00	2.46	0.00	0.00	3.35	0.67	1.34	4.46

**Table 5.20.** The frequency of collection, sale and buying of medicinal plants (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	0.00	11.67	1.67	0.00	0.00	0.00	0.00	0.00	0.00
Batwa DRC	11.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	0.00	4.76	4.76	0.00	0.00	0.00	0.00	0.00	0.00
Bwindi	0.57	4.60	2.73	0.29	2.16	2.59	0.14	4.17	9.34
Echuya	2.72	6.12	14.29	1.36	0.00	4.76	1.36	0.68	3.40
Mgahinga	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nyungwe	0.14	0.29	3.22	0.00	0.00	0.29	0.21	0.00	0.64
PNV	0.31	0.00	1.33	0.00	0.00	1.03	0.31	0.00	5.75
Virunga	0.00	0.00	2.01	0.00	0.00	0.89	0.00	0.00	1.56

**Table 5.21.** The frequency of collection, sale and buying of water (each week, each month or occasionally). Values are the percentage of households that admitted to doing this.

	Frequency of collection from forest			Frequency of sale			Frequency of buying		
	Each week	Each month	Occ.	Each week	Each month	Occ.	Each week	Each month	Occ.
Batwa Bwindi	1.67	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa DRC	0.00	0.00	11.11	0.00	0.00	0.00	0.00	0.00	0.00
Batwa Echuya	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Batwa PNV	19.05	0.00	14.29	0.00	0.00	4.76	0.00	0.00	0.00
Bwindi	0.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.86
Echuya	1.36	0.68	0.68	0.00	0.00	0.68	0.00	0.00	0.68
Mgahinga	0.81	0.81	14.52	0.00	0.00	0.00	0.00	0.00	0.00
Nyungwe	0.14	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
PNV	5.54	0.10	9.55	1.64	0.10	1.64	3.49	0.10	8.32
Virunga	5.13	0.22	1.56	0.00	0.22	0.67	2.01	13.62	2.23

**Table 5.22.** The average price per unit of forest product around each forest. Prices are given in US dollar equivalents.

Forest Product	Unit	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Building poles	Pole	1.58	0.45	1.26	0.56	1.58	1.58
Bean stakes	Bundle	0.51	1.15	1.70	0.33	0.94	1.64
Firewood	Bundle	0.47	0.60	1.31	0.30	0.90	0.64
Bamboo	Pole	0.31	0.30	1.61	0.11	0.31	0.31
Bamboo (firewood)	Bundle	0.43	1.91	1.43	0.24	1.71	0.49
Honey	kg	2.65	1.76	2.59	1.21	2.25	3.79
Minerals		0.57			2.84	2.55	
Medicinal plants	Handful	1.34	0.81		0.90	8.97	3.67
Water	20 litres	0.35	1.71			0.15	0.21

The average price of forest products was calculated in US dollars from values given by respondents per standard unit (Table 5.22). Standard units were selected during the training process with the enumerators and sizes were standardised between all sites.

Finally, interviewees were asked if they made anything from these forest products and, if so, what. Bamboo had the most cited uses followed by wood (Table 5.23). Baskets and winnowing trays were the most commonly made items. The average price of these items varied between forests even for similar items such as baskets (Table 5.24).

**Table 5.24.** The average price for items made from forest products as stated by respondents (US\$).

	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
Alcohol					0.21	0.29
Baskets	0.79	0.59	2.99	0.13	0.56	2.04
Beds					1.99	5.20
Chairs				1.70	1.49	3.00
Crafts				0.54		
Doors				25.53	5.85	5.00
Granary					2.13	7.80
Hives		1.79		0.64		
Hoe sticks		0.17		0.16	0.21	
Mats		2.13		1.06	2.62	1.17
Ropes		0.17			0.68	0.08
Stretchers	17.14				5.32	
Winnowing trays	0.86	0.51	0.29		0.21	0.85

Table 5.23. The percentage of the total number of responses given for each forest on what people make from forest products.

Forest product	Artifact made	Bwindi	Echuya	Mgahinga	Nyungwe	PNV	Virunga
<b>Bamboo</b>	Banana supports	0.00	0.85	0.00	0.00	0.00	0.00
	Baskets	2.94	23.08	73.08	31.58	14.29	25.58
	Beds	0.00	0.00	0.00	0.00	2.60	0.00
	Bows	0.00	0.00	0.00	0.00	0.65	0.00
	Building poles	0.00	0.00	0.00	0.00	22.73	0.00
	Ceiling mats	0.00	1.71	0.00	0.00	1.95	0.00
	Chairs	0.00	0.00	0.00	0.00	2.60	0.00
	Crafts	0.00	0.00	0.00	15.79	0.00	0.00
	Granaries	0.00	0.00	0.00	0.00	4.55	6.98
	Hives	0.00	5.98	0.00	5.26	0.65	0.00
	Mats	0.00	0.00	0.00	0.00	18.83	10.85
	Ropes	0.00	0.00	0.00	0.00	6.49	2.33
	Slats	0.00	0.00	0.00	0.00	1.30	0.78
	Stretchers	2.94	0.00	0.00	0.00	1.95	0.00
	Winnowing trays	0.00	9.40	23.08	0.00	4.55	2.33
<b>Grass</b>	Baskets	0.00	0.85	0.00	0.00	0.00	0.00
	Mats	0.00	4.27	0.00	1.75	0.00	0.00
<b>Honey</b>	Alcohol	0.00	0.00	0.00	0.00	5.84	4.65
	Candles	14.71	0.00	0.00	0.00	0.00	0.00
	Medicine	8.82	0.00	0.00	0.00	1.30	0.78
<b>Wood</b>	Beds	0.00	0.00	0.00	0.00	0.00	1.55
	Chairs	0.00	0.00	0.00	3.51	0.00	2.33
	Crafts	0.00	0.00	0.00	14.04	0.00	0.00
	Doors	0.00	0.00	0.00	1.75	1.95	0.78
	Hives	0.00	0.00	0.00	1.75	0.00	0.00
	Hoe sticks	0.00	0.85	0.00	3.51	0.65	0.00
	Planks	0.00	0.00	0.00	7.02	0.00	39.53
	Plates	0.00	0.00	0.00	0.00	0.00	0.78
	Mingling sticks	0.00	0.00	0.00	1.75	0.00	0.00
<b>Other plants</b>	Baskets	44.12	13.68	0.00	0.00	0.65	0.00
	Hives	0.00	3.42	0.00	0.00	3.25	0.00
	Mats	0.00	10.26	0.00	0.00	0.65	0.00
	Medicine	0.00	0.85	0.00	0.00	0.00	0.00
	Ropes	0.00	3.42	0.00	0.00	0.00	0.00
	Stretchers	2.94	0.85	0.00	0.00	0.00	0.00
		Winnowing trays	20.59	10.26	0.00	0.00	0.00

### 5.3.3 On-farm Substitution

One way to reduce the impact of people on the forest is to encourage on-farm substitution of forest products (ie. people grow them on their land). Interviewees were asked if they ever planted forest plants on their land and, if not, why not? (Table 5.25) People around Bwindi and Mgahinga, in particular, practice this which is probably due to the ICDPs that have encouraged it. The reasons people did not grow

forest plants varied (Figure 5.22). Lack of land and lack of access to the forest to collect seeds/cuttings were the main reasons people gave, although quite a few did not see a need to grow any plants.

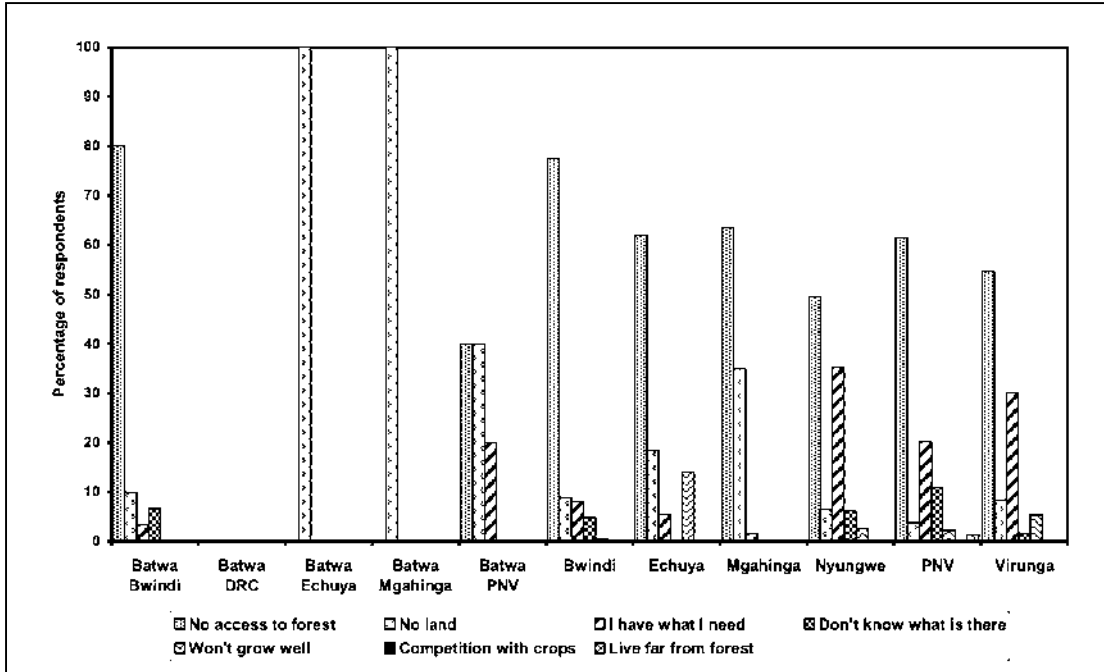


Figure 5.22. The reasons people gave for not growing forest plants on their land.

### 5.3.4 Farming in the Forest

Households were also asked questions about farming in the forest, which is illegal in all forests. They were first asked if people around where they lived farmed in the forest and then asked if they had ever farmed in the forest themselves. Few people stated that people farmed in the forest at the time of the questionnaire but around Mgahinga many people had farmed in the past (Table 5.25). This is because Mgahinga was heavily encroached in the 1980s and people have been evicted from it since then. Nyungwe also had a problem with encroachment and the insecurity in Rwanda during the 1990s but, presently, this is under control and few people are farming in the forest.

## 5.4 Buffer Zones and Multiple-Use Zones

Finally, people were asked specific questions about the use of either buffer-zones that surround some protected areas or the use of multiple-use zones which occur in Bwindi and Mgahinga. These questions were specific to a forest and were not asked of everyone.

#### 5.4.1 Bwindi – Multiple-Use Zones

People were asked around Bwindi and Mgahinga whether they benefited from the multiple-use zones in the park, if they thought their community benefited, whether they actually collected anything from them and, if not, whether they would like to be able to in future. About 20% of people felt they benefited from the presence of multiple-use zones but, interestingly, only in Mgahinga did the same people admit to collecting products from the multiple-use zone (Table 5.26)

Fewer people around Bwindi were actually collecting from the forest than the people who felt they were benefiting. This could be because people use traditional healers who have access to the multiple-use zones.

Many people wanted to have access to the forest if they were able to, even though there has been a decline in the use of the multiple-use zones over the past few years (A.McNeillage pers. comm.).

**Table 5.25.** The percentage of households that have grown forest plants on their land (on-farm substitution), which stated that they knew people who cultivated in the forest now and who admitted, themselves, to cultivating in the forest at some point.

	On-farm substitution	Neighbours cultivated in forest	Household cultivated in forest in past
Batwa Bwindi	31.67	0.00	35.00
Batwa DRC	0.00	0.00	0.00
Batwa Echuya	0.00	0.00	0.00
Batwa Mgahinga	0.00	0.00	86.67
Batwa PNV	4.76	0.00	4.76
Bwindi	31.46	0.14	7.63
Echuya	18.37	0.00	9.59
Mgahinga	41.13	0.81	83.87
Nyungwe	11.09	2.22	21.24
PNV	5.86	0.21	1.26
Virunga	11.19	0.22	0.00

**Table 5.26.** The percentage of respondents who felt they a) benefited from the multiple-use zones in Bwindi and Mgahinga, b) their community benefited, c) they actually collected from the multiple-use zones, and d) they would like to collect in future if they couldn't now.

	Benefit	Community benefits	Collect anything	Want to collect in future
BatwaBwindi	28.33	60.00	10.00	61.02
BatwaMgahinga	0.00	33.33	0.00	80.00
Bwindi	22.66	43.23	9.67	78.65
Mgahinga	21.77	27.42	21.77	83.93

#### 5.4.2 Parc National des Volcans Buffer-Zone

A narrow buffer-zone has recently been created around the PNV, which has been planted with exotic trees to provide a narrow buffer between the community and the park. For the most part, people were in favour of the buffer-zone (Batwa: 94.12%; Others: 71.08%). People were also asked how the buffer-zone should be managed. Table 5.27 summarises the results. Interestingly, the highest response from most people was that there was a need to guard the buffer-zone to stop people carrying out illegal activities in it. There was also a strong request to manage the buffer differently and with the local community.

**Table 5.27.** The percentage of respondents who gave suggestions about how the buffer-zone should be managed.

	<b>Batwa PNV</b>	<b>PNV</b>
Plant trees	37.50	15.78
Plant bamboo	37.50	6.12
Fence/stop crop raiding	31.25	13.20
Grazing	6.25	3.54
Beekeeping	6.25	1.93
Cultivate/return to farming	6.25	4.83
Manage with and for community		17.71
Guard/protect		30.60
Benefit farmers who owned land		0.97

#### 5.4.3 Nyungwe Forest Buffer Plantations and Virunga Park Buffer

Nyungwe has a large area of pine plantations that buffer much of the forest, which should be harvested or, at least thinned, soon. This provides an opportunity to decide whether pines should be replanted or whether the buffer-zones could be used for something else that might benefit the local population more. Questions were asked about whether households benefited from the buffer-zone and whether the buffer-zone should continue to grow pines or not.

Virunga Park has no buffer-zone around the volcanoes but it does have a buffer plantation of trees in the Nyamulagira sector. Households near this sector were asked if they benefited and whether trees should continue to be grown there.

A large percentage of households felt that they did benefit from the buffer-zones (Table 5.28). Masozera (2002) showed that households that felt they benefited from the buffer-zones also tended to have a more positive attitude towards the conservation of the forest. In Nyungwe few people wanted to replace the trees but in Virunga most people wanted the trees replaced by something else. The enumerators did not record what people suggested it might be replaced with. When people were asked who should manage the buffer-zone it was mostly suggested that the community or local authorities should do so. The park authority (ORTPN or ICCN) with Central Government was also suggested fairly widely. Around Nyungwe NGOs were suggested by some people, possibly because they don't trust Government or local leaders to manage them properly.

**Table 5.28.** The percentage of respondents who stated that they benefited from the buffer-zones near Nyungwe and Virunga Park (Nyamulagira sector) and who thought trees should be replaced by something else. Households were also asked who should manage the buffer-zone and responses were given for the 3 main categories of answers.

	<b>Nyungwe</b>	<b>Virunga</b>
Benefit from buffer-zone	42.66	91.95
Should replace trees	15.67	92.31
<i>Who should manage buffer?</i>		
Community	40.23	55.17
NGOs	13.36	0.00
Park Authority/Government	39.38	27.59

## 5.5 Discussion

Given the nature of the questions asked in this section, it pays to be careful when interpreting the results. As stated in the Methods Section (Chapter 2), every effort was made to avoid people lying about activities by employing enumerators from the parishes around the forests who would have a much better idea of what was true and, who were asked to probe for details, if they felt someone was hiding the truth. Despite this, it is possible that certain results are underestimates of the truth. The questions about bush-meat hunting and collection of forest products were both about illegal activities and people may not have given true replies to these questions. However, given the number of households interviewed there were still a large number of households admitting that there was hunting taking place in the forests or that they harvested NTFPs. The statistical analyses also supported the results in that people living near the forest and who were poorer on average tended to be involved in these activities, which is what would be expected.

In addition to this, data from ranger-based monitoring in the Virunga Volcanoes confirms the pattern of responses in the parishes adjacent to the massif from the questionnaire data (figure 5.23).

It is clear from these results that people living around these forests derive benefit from the use of the forests. A consistent desire to have access to the forests and harvest forest products was expressed by all people but in particular by the Batwa communities. The problem the conservation community faces is that granting access to everyone living around the forest will lead to the degradation of the forest. These are some of the most biologically rich forests in Africa and, as such, are globally important for conservation. Where people are allowed access to the forest and where law enforcement is low in Echuya (2 guards for the forest) 74% of households admitted to harvesting products from the forest and 100% of the Batwa living there (Table 5.13). Law enforcement at the other sites, combined with education, has reduced the percentage of households admitting to accessing the forest to 13-22%. Around Bwindi and Mgahinga a reasonable number of households had practiced on-farm substitution, having been encouraged by development projects but elsewhere few households practiced this. Many people cited lack of land and the fact that they would have to reduce the food crops they planted as a reason not to practice on-farm substitution.



**Figure 5.23.** Maps showing a) cropraiding by buffalos, b) honey harvesting and c) water collection based on data from within and outside the Virunga Volcanoes. Points within the protected area represent sightings by the rangers while on patrol (ranger-based monitoring) and the shading of the parishes represents relative percentage of households responses obtained from this survey. Ranger-based monitoring data obtained from IGCP (unpublished).

Many hundreds of thousands of dollars have been invested in ICDPs, a trust-fund, and other activities, to improve community relations around Bwindi and Mgahinga Forests and yet the percentage of people admitting to accessing the forest illegally in these two (13-19%) was not very different to other areas (Nyungwe, PNV and Virunga) where law enforcement has mainly occurred (14-22%). Working with communities bordering the forest may not completely reduce the illegal activities but it may lead to better relationships with the protected area authorities, which allows less aggressive tactics in dealing with illegal activities. It would be expected, therefore, that Mgahinga and Bwindi would have more respondents claiming that relations between themselves and the protected area authorities have improved and this is the case. However, there were also more people around these two protected areas who believed that relationships had deteriorated, than around the other protected areas, where they believed the relationships to be stable.

People around Bwindi were also the least likely of the communities living around the forests to state that they were benefiting from the presence of the forest. This should be of concern to those development projects that have been working in this region. It

is possible that people may see their neighbours benefiting from the projects associated with the park and, therefore, perceive that they are losing out, even though, in reality, they may be better off than forests where no such projects occur. It is also possible that the effects of law enforcement activities are considered more important than the benefits that this group of people receive around these forests.

It is also possible that people living in this region have been given the possibility of voicing their concerns about the park and tended to be more outspoken than in Rwanda or DRC, as a result, or because they perceive that, by complaining, they may receive more benefits in the future. This pattern needs more careful evaluation and probably requires a more in-depth study to tease out why this is so. An ongoing study assessing the effectiveness of ICD activities around Bwindi is currently taking place and may shed some light on the findings here.

When people were asked about benefits of the forest for themselves, or their communities, tourism ranked very low. Tourism was only perceived as being useful to the country. Yet the responses differed from those in Section 4 where people were asked directly if they benefited from tourism and higher percentages of people felt they did benefit. Consequently, tourism is not necessarily associated with the forest in the minds of the respondents.

Developing this link in people's minds should be part of any tourism development programme. It is interesting, though, that many people (over 60% for most communities) felt that they did benefit from the presence of the forest (Figure 5.1) and could name several reasons why. A comparison with the same question posed around the PNV in 1979 and 1984 (Weber 1987, 1989) showed that the percentage of households that felt that they were personally benefiting from the park had increased from 26% in 1979, to 49% in 1984 and up to 88% in this survey. The percentage of respondents that stated that they thought the country was benefiting, though, has remained constant around the PNV since 1984, at 85%. It is interesting to look at how people feel they are benefiting from the forests compared with responses in 1979 and 1984 (Weber 1987). This survey showed that people understand the importance of forests for climate regulation much better now. (88% vs 19% in 1979 and 21% in 1984). Other benefits cited had not changed greatly. This probably results from education programmes that have been operating around the park and in the country because similar percentages were given for Nyungwe and Virunga parks for climate regulation.



**SECTION 7:  
LESSONS LEARNED AND  
POLICY RECOMMENDATIONS**



Pitsawyers cutting up eucalyptus trees, Uganda A.Plumptre

## **6.1 Socio-economic Situation of Communities around the Forests**

The results presented here are a summary of the status of local communities living around these forests. Many more analyses could be undertaken with the data and once this report has been published the data will be made available on a website for others to analyse further. The analyses we have presented here aim to provide a baseline situation, which can be monitored for changes in future.

The results of this survey show the socio-economic situation of people living within 10 km of Bwindi, Echuya, Virunga Volcanoes and Nyungwe. As can be seen from the demographic structure, these communities suffer high mortality rates, people emigrate elsewhere when they become older and the average age is very low (20-22 years) per household. The limited economic opportunities which exist in many areas adjacent to protected areas mean that many middle-aged men and, sometimes women, migrate to look for economic opportunities elsewhere, usually to look for casual or formal employment or to become involved in trade

The high mortality rate, resulting from poor accessibility to quality health services compounded by the current HIV/AIDS scourge, may also be contributing to this population structure. But whether this population structure is a result of mortality or migration, it has serious implications for natural resource management. With fewer men in the age category of 21-55, the labour force needed for natural resource management activities is greatly reduced. It is typical in south-western Uganda and Rwanda to see mostly women working in the fields, while men are either away or drinking in bars. This stretches women's labour because they have to produce enough subsistence for their households, plus surplus for income. Women from poorer households actually have to sell their labour (in digging) to earn income for household needs. Moreover, the income that migrant men earn is rarely ploughed back into agriculture, or even household maintenance (Kjersgard, 1997). As such, little effort is put into conservation activities, including soil-management, tree-planting and management. Migration of men in the community may affect the adoption rates of new conservation and land management technologies, if not taken into consideration by Government and NGOs implementing programmes in the region.

The Batwa communities are similarly affected in Bwindi DRC and PNV but have a lower average age around Echuya and Mgahinga (average age: Bwindi: 22.3; Echuya: 18.1; Mgahinga:15.6; DRC:25.3; PNV:20.2). Mortality among the Batwa was higher than in other communities, because most of them will not seek medical services, even where they are available, but depend on local herbs, even for illnesses that need modern medicines. The discrimination that the Batwa face by other community members, including workers in public facilities, may also discourage them from going to health units when they are sick. The demographic structure is typical of people living below the poverty line. The structure of people's houses, their ownership of bicycles, land, livestock and other indicators of wealth all show clearly that these people are very poor.

Generally, the socio-economic situation of the people in Uganda has improved over the last decade due, largely, to relative political and economic stability. Compared with the communities studied in Rwanda and the DRC, more people in Uganda own goods such as radios, bicycles and motorbikes, can afford iron sheet roofs and they are able to afford to send more children to secondary school. They own more land and livestock too. This difference may be, in part, a result of the political conflicts that have occurred over the past 10 years in Rwanda and, more recently, in eastern DRC. Uganda's conflicts finished in the mid 1980s and the country has been relatively stable in this region since then. However, there are probably other factors such as access to markets and the growth of the economy at a national level that are contributing to these differences in relative wealth.

Having very poor people around these protected areas has serious implications for conservation. Poor households are likely to have limited economic alternatives and are more dependent on the protected area for their subsistence, or as an income source where wealthier people may use them to exploit the protected areas. Other research has also demonstrated that it is difficult for poor households to access locally available channels to improve their livelihood, e.g. the local CBOs credit and savings groups, whose membership tends to be socially stratified according to wealth and education. The poor are, thus, logistically excluded since they can't afford the conditions of membership. They are also less likely to benefit from interventions by NGOs if not well targeted (Kjersgard 1997, ITFC in prep.). Moreover, the negative impact that the protected areas have on the community hits them the hardest, especially crop damage and restricted resource access. As such, the poorest people seem to become significantly more negative towards the protected areas when they are restricted from accessing the resources therein, or when they suffer costs associated with protected areas, as has been revealed by results of a study made by ITFC (in prep.).

Crop-raiding remains a challenge for local communities and conservation organizations around the protected areas. Though pilot interventions mainly experimenting on the use of live fences have been implemented in some parishes around Bwindi, these are still far from solving the problem. Around Mgahinga, and PNV the communities, in conjunction with park management, erected a stone wall. But the problem is not totally solved. Crop damage creates negative attitudes among the community, especially when they perceive that little is being done to solve it. Crop damage is actually one of the reasons why park-edge households do not plant trees, because they believe that trees create a habitat for problem animals.

Access to social services, such as health units and schools has also generally improved, especially around the national parks in Uganda where the UWA Revenue

Sharing Programme and the Mgahinga and Bwindi Impenetrable National Forest Conservation Trust have devoted lots of funds for social infrastructure development. In addition, the Universal Primary Education Programme in Uganda has led to increased enrolment in primary schools. However, school dropout rates are still high, partly because of poverty, with some households unable to afford primary school requirements such as uniforms and books. As secondary education is not free in Uganda and costs more in Rwanda and DRC, many children drop out after primary level. In the region there is also a low appreciation of the value of education in many rural areas. In particular, many do not see the need to educate girls and tend to marry them off early. In general, the education levels of women are consequently lower than those of men.. The lack of education for women, in turn, contributes to high rates of population increase, as women start bearing children at an early age. Also, uneducated people do not easily adopt family-planning. This then contributes to high rates of population increase.

## **6.2 The Local Economy**

This study was carried out in one of the poorest and most densely populated parts of Africa. Farming remains the major source of livelihood, and people have little access to other opportunities to improve their livelihoods. The problem of land shortage in south-western Uganda, Rwanda and the Goma region of eastern DRC, means that there is a limit to the extent people can increase their wealth by farming.

For most of the Batwa, lack of any land to practice some form of production remains the major problem. Even when organizations, such as the MBIFCT in Uganda, have resettled some Batwa households around BINP, many others remain landless and the entire Batwa population near MGNP seems to be largely landless. There are several projects trying to help the Batwa in northern Rwanda and land has been purchased for some groups. Land shortage is also a problem for the other ethnic groups in this part of Africa because of the high population densities and the system of land apportioning by inheritance.

Over the past 10 years there has been a major effort in this region to reduce the poverty of the people here as well as improve the conservation of the protected areas, particularly in southwestern Uganda. Here, Integrated Conservation and Development Projects (ICDPs) have been implemented, a trust-fund was created that supports local projects in the community, revenue from tourism receipts have been shared with the community and development NGOs have been working in the region to improve farming practices and help create markets for products. The results of this study clearly show that these projects have had an impact. People in south-western Uganda are relatively wealthier, have greater access to credit and feel that they benefit from tourism more than people in Rwanda and DRC. In the tourism area of Buhoma, research has revealed that over 90% of the local community do benefit from tourism in some way, largely through primary employment in the park, tourism facilities, sale of produce (agricultural produce, small livestock, tree products), trade, services including entertainment, and sale of crafts (ITFC forthcoming).

Access to markets does seem to have some impact on wealth creation, however, people around Bwindi and Echuya, where wealth is still relatively high had large distances to travel to markets For many, protected area-adjacent communities, lack of market for their produce, largely a result of the poor road networks, further limits their livelihood options. The terrain around all these parks is difficult because of the

steep hills and so the road network is poor and many areas are remote. Thus, some communities cannot produce some of the marketable products, especially if they are perishable, because they are constrained by the inability to get them to market. Even when produce is storable, the traders who make it to these remote areas offer very low prices. The remoteness of the areas also implies that there are very few avenues for alternative means of employment.

This study, however, demonstrated that although access to markets may have some effect on wealth creation, it is not the only reason as to why people are poorer. What is probably more important is that a market for products exists and that people can afford to buy them. Produce in south-western Uganda is sold in the main towns and cities in the country. For example, potatoes (Irish) from Kabale/Kisoro districts are sold in Masindi about 500 km away. Similarly the potatoes grown in Ruhengeri supply much of the rest of Rwanda. As a result, there are opportunities to make money in this region. It is possible that opening up trade between DRC, Rwanda and Uganda with the budding peace in the region may help increase wealth amongst the people living there. What is clear is that development support should help create markets for products and improve access to more distant markets. Providing credit schemes to allow the development of businesses is one way to help people to find alternative ways of generating an income. However, these need to be linked to market development as well. People in Uganda had more access to micro-projects and funds within the community. They also had access to grants, which they stated were preferable because they don't have to pay them back. These factors could have also contributed to increased wealth in the region. However, caution needs to be taken in making any interventions aimed at improving the livelihood opportunities of these communities.

As previously mentioned, research has revealed that membership of community group/institutions, access to services and interventions within communities in the south-west is largely socially defined and poor or marginalised people (including women and the Batwa) are largely excluded from such benefits because they don't have the means, or even do not access the necessary information. Even the most grassroots-based CBOs have been found to exclude the poorest people. As such, creative techniques need to be applied by development interventions in order to reach the poorest people otherwise such interventions could easily end up widening the wealth gaps within communities.

### **6.3 Community-Forest Interactions**

The data shows that people living around these forest parks derive benefit from the use of the forests. Around Echuya Forest Reserve, the perceived benefits to the individual, the community and the country are equally high. Over 50% of households around all forests felt that they personally benefited from the presence of the forest and only Bwindi and Virunga parks had responses lower than 70%. On average though, more households felt that the country benefited from the forest than they did. This may point to the general perception that park-adjacent households do not get a fair portion of park benefits, though they bear the bulk of the protected area costs. Instead, revenue from the protected areas is invested at community and country levels. Community benefits cannot compensate for individual household losses, especially as a result of wildlife damage.

In contrast, around Echuya, there are more benefits going to the individual household, in terms of resource harvest from the forest. It is true that the reason why

integrated conservation and development interventions have been implemented around Bwindi and Mgahinga is to fill this gap, i.e. to bring park-related benefits to the household level. However, it should be noted that the magnitude of many of these interventions is usually small, and many households may not realize a positive impact that is large enough to improve their economic situation and change their attitudes drastically.

A consistent desire to have access to the forests and to harvest forest products was expressed by all people, in particular, by the Batwa communities. The problem the conservation community faces is that granting access to everyone living around the forest will lead to the degradation of the forests. These are some of the most biologically-rich forests in Africa and, as such, are globally important for conservation. A restriction on access to protected area resources remains the main source of conflict between communities and protected area managers. It has been revealed that despite the numerous ICD interventions, being implemented amongst local communities, law enforcement, perhaps combined with education, remains the major reason for reducing illegal access to park resources (ITFC in prep).

Working with communities bordering the forests may not completely reduce the levels of illegal activities but is expected to lead to better relationships with the protected area authorities, which allow for less aggressive tactics in dealing with illegal activities. It would be expected, therefore, that Mgahinga and Bwindi would have more respondents claiming that relations between themselves and the protected area authorities have improved and this is the case. However, there were also more people around these two protected areas who believed that relationships had deteriorated than around the other protected areas where they believed the relationships to be stable.

First of all, we should note that a perception of relations is shaped by the nature of interaction between communities and park staff. If the most frequent interaction between communities and protected area staff is during law enforcement operations; searching for people who have broken the law, including punishing or deterring illegal entrants, then the community will view their relationship with protected area staff negatively. There are only four Community Conservation Rangers (CCRs) in Bwindi, and three in Mgahinga. There were none at the time of this survey around PNV, Nyungwe and Virunga, although now (2004) community conservation wardens have been appointed in Rwanda. In Bwindi and Mgahinga, the ratio of CCRs to Law enforcement Rangers (LERs) is approximately 1:6. This leads to communities interacting more with LERs, and less with CCRs, because the LERs are more evenly distributed. Each CCR in Bwindi, on the other hand, is responsible for a very large area (five or so parishes) and cannot meet the communities as often, for logistical reasons.

One of the challenges of community conservation has been the slow rate at which the attitudes of park staff towards communities has changed, from viewing them as poachers by default, to viewing them as useful partners, in accordance to the changes in protected area management policy. However, the immediate result of policy changes and increased protected area management-community dialogue might be that communities around Bwindi and Mgahinga have been given the opportunity to voice their concerns about the park and, as a result, tend to be more outspoken than in Rwanda or DRC. They may also feel that, by complaining, they may receive more benefits in the future.

Secondary, perception of relations with protected area staff is intricately related with perception of benefits from those protected areas. We need not over-estimate the extent to which ICD interventions around BINP and MGNP have had an impact on the demand for protected area resources and subsequently, on the levels of illegal resource access. There is an indication that the demand for protected area resources and the levels of illegal resource access are still at levels that should cause concern. However, attitudes to the parks and park staff-community relations have greatly improved in comparison with when the parks had just been gazetted (Chapter 5; ITFC in prep.).

People around Bwindi were also the least likely of the communities living around the forests to state that they benefited from the presence of the forest. This should be of concern to development projects that have been working in this region. The issue here may be a result of how different people define 'benefits'. One may perceive a school as a benefit to individuals and communities. Another individual may not define 'community' benefits in individual terms. In any case, some people may feel that the government (which in areas around protected areas includes protected area authorities) has a responsibility to provide schools and health units. Therefore, when they are provided as part of the revenue-sharing programme, they are taken for granted. A person may identify income from park-related employment, or from sale of produce to tourists, as a benefit resulting from the park but he/she may not identify the school for his/her children as a benefit, which may have been financed from revenue sharing or the trust-fund. The reason for this is if the individual has no child going to that particular school then he will feel it is of no use to him, personally. Many individuals among local communities define 'benefits' from the park more as household benefits, not as community benefits. As a result, when asked about protected area benefits, the individual is bound to cite those things that they have individually benefited from. Appreciation of community benefits takes a lot of education and sensitization that links these benefits to the presence of the protected areas. That said, ICD/social services interventions around Bwindi and Mgahinga are cited among the main reasons why attitudes towards the parks have improved in the last decade. They are also cited to have increased cooperation between park authorities and the communities (ITFC in prep.). So their value in contributing to conservation goals is undoubted, even when their impact may take longer to be realized than expected. In addition, although many people around Bwindi and Mgahinga felt they did not benefit at all (about 45% and 25% respectively), it is noted that a significant number of people identified social services projects as benefits. This is good because it shows that some people do associate these projects with the parks. It is also encouraging that many people recognize the role of these forests in climate control and see this as a benefit resulting from the protected areas. This indicates increased awareness of the forests' ecological roles.

In this study, tourism ranked very low as a benefit resulting from the forests. Tourism was mainly perceived as being useful to the country. Yet the responses differed where people were asked directly if they benefited from tourism and higher percentages of people felt they did benefit. This may be because of the definition of 'benefit' as 'individual benefit' as mentioned above. In the case of tourism, benefit in many people's minds implies hard cash, because they all imagine the thousands of dollars that tourism generates in the tourism areas and in the country. So, if individuals are not earning some of that money directly, they may not easily consider themselves as beneficiaries, and it may take some probing to link tourism to other benefits such as revenue-sharing. This is especially true in areas outside the tourism sites, given the very localized nature of tourism.

In Bwindi and Mgahinga, tourism can easily be cited as a benefit from the park around Buhoma and, to a lesser extent, around Ntebeko, and around PNV, Kinigi and Bisate regions benefit, but not in other areas around the parks. Developing the link in people's minds between tourism and other park benefits, especially revenue-sharing, in all areas around the park, should be part of the tourism development programme. It is encouraging though, that over 60% of people in most communities surveyed, felt that they did benefit from the presence of the forest and could name several forms of benefit. However, it is unlikely that tourism revenue for these protected areas will ever bring benefits to everyone living near them. The numbers of people are high and gorilla tourism is selective and it does not bring many people to visit the parks. Therefore, revenue generated by this type of tourism when shared between everyone living around the forests would be very little per person.

## 6.4. Policy Recommendations

The preliminary analyses presented suggest several policy recommendations.

### 6.4.1 Development Recommendations

1. **Continue to support income-generating activities.** The people in this region are some of the poorest in Africa. The results presented here show that the communities in south-west Uganda are relatively richer following ten years of development investment in poverty alleviation in the region. Where people were allowed access to a forest (Echuya) a large percentage of the households admitted to using it (Table 5.11) However, given the large number of people living adjacent to these protected areas this is unlikely to be sustainable and there is a need to develop other methods of generating income.
2. **Supply water to communities around Virunga Volcanoes.** Most of the communities living adjacent to the Virunga Volcanoes (In DRC, Rwanda and Uganda) entered the forest to collect water (Table 5.12). This can take up a considerable amount of time that could be better used elsewhere if it was available. In doing so, some people become involved in other activities in the forest, which are illegal. Supplying water to communities living outside the forest, through boreholes and rainfall collection methods, will not only aid these people by freeing up time but also help protect the forest.
3. **Promote family-planning in region.** The demographic results for south-western Uganda indicate that the number of births has been falling in the region in the past 5 years (Figure 3.2). This may be due to family-planning projects which have been operating in the region for some time but may also be due to men emigrating from the region to find work leading to later marriage ages. There is little available land left in the region and people are migrating to other parts of the country, which has sometimes led to conflict with the people in those regions. Lack of land conservation in the areas that men migrate to, leads to degradation of the land in those areas and forest loss. Encouraging planned family sizes is essential to break this cycle of poverty and environmental destruction.

4. **Improve access to markets and add market value.** There was a significant relationship between wealth and access to markets. Around Bwindi, Nyungwe and Echuya the nearest markets are between 6.5-8 km away, on average. There is potential to help communities in this region and to add value to products they sell, particularly export goods (tea, coffee, tobacco at present) by using the conservation of the forests as a by-product of supporting the communities. Gorilla and chimpanzee-friendly tea or coffee could probably sell as well as shade coffee does for bird conservation in Latin America. Offsetting the costs of market access by increasing the value of goods may help develop export products in the region.
5. **Improve access to micro-credit on the basis of social capital.** Enterprise development requires capital to drive it. Access to capital is a major barrier to the development of local enterprise in order to access markets. In a recent economic study in Uganda, one of the most influential factors in reducing the poverty rate was access (within 10km of household) to credit not requiring capital. However, this, along with income-generating activities and marketing activities, should not be held in isolation in the need to promote group development and co-operative type initiatives, as the platform for advice, technology transfer and social credit, considering it as a priority for marginalised groups.
6. **Provide support to the Batwa.** The Batwa responses are consistently very different to those of other people in the region, and show that they are considerably poorer and have much lower access to mechanisms to reduce their poverty, such as credit schemes. It is recommended that these people and other marginalised groups (such as people at the park-borders) are specifically targeted with income-generating programmes, as they appear to lose out if not targeted.

#### 6.4.2 Conservation Recommendations

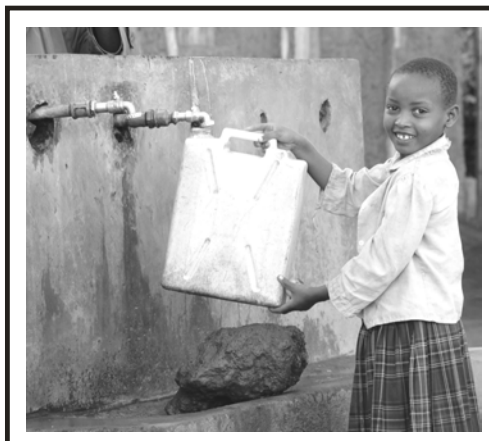
1. **ICD projects need to take place with law enforcement.** The increased positive relationship between people and the park in areas where ICD projects have been operating over the past 10 years is a good sign and has been found in a more in-depth study that followed this one, undertaken by ITFC. However, the large percentage of negative relations, particularly around Bwindi, is a concern. The main complaints made by those interviewed are a lack of access to the forest around Bwindi and how the guards treat them when they are caught in the forest, even after 10 years of ICD support to help them become less reliant on the forest. There are several factors that may lead to this response. Firstly, people may be jealous of their neighbours if they see them benefiting from an ICD project when they don't benefit. Secondly, the whole process may encourage them to complain in the hope of receiving more support in the future. The research by ITFC indicates that the main factor that stops people entering the forest to carry out illegal activities is the level of law enforcement and not the support they have received from ICD projects. ICD planning should take this into account and should also contribute to the support of community-friendly law enforcement activities, together with supporting the local communities. Clarifying why policing is needed and explaining why, in the long term it can benefit people, is necessary if the role of park guards is to be better appreciated.

2. **Relationships between park guards and local communities need improving.** It was clear from the responses that the people did not work well with protected area staff. Accusations of bribery, beatings, and fines were some of the common causes of complaint. The new Community Conservation Department in ORTPN and the existing one in UWA should work on training guards how to work with local communities so that they are seen to be fair and firm, rather than aggressive and cheats. It may be worth looking at policing practices in the UK and elsewhere, where they have been working on promoting community policing practices that minimise conflict in problem areas. There is a need to channel more resources into community conservation activities and to recruit more staff.
3. **Evaluate the multiple use programme in Bwindi and, if positive, expand it to Nyungwe and Echuya.** The multiple-use zones in Bwindi were developed to allow controlled access to the forest to harvest specified forest products. This experiment needs to be fully evaluated and, if necessary, modifications made and adopted in other forests. Given the very fragile nature and limited area of the vegetation in the Virunga Volcanoes it may not be possible to allow access here but access areas could be developed in Nyungwe. Echuya already has a lot of access, being a forest reserve, and this needs to be better managed and controlled. Multiple-use zones were located in Bwindi with respect to the distribution of the gorillas but not with respect to other species. There is a need to develop zoning, based on the distribution of more general biodiversity in these forests so that the impacts are minimised for a wider spread of species.
4. **Improve coordination between conservation and development projects.** Conservation projects are trying, not only to conserve the forests in this region, but also to support the development of local communities. However, there are much larger sources of funds for development and many different development projects in the region. Many of the needs identified in this study could be supported by development projects already working on the issues but who are not linking the activities to the conservation of the forests. There is a need to work together to reduce the negative impact development projects have on the environment and to develop ways in which they can support conservation through their activities.
5. **The Batwa.** More of the Batwa households admitted to hunting bush-meat and harvesting plants from the forests. Most of these activities are illegal because resources are limited for the number of people who want to harvest them. There should be an effort to assess how the Batwa could benefit from the forest while at the same time minimising their impacts. Are there options for tourist experiences with Batwa guides? Can they be allowed to harvest specific products that others cannot? What are the options for employment?

## 6.5 Conclusion

The results of this survey are a 'snapshot' of people's livelihoods in the Central Albertine Rift in 2002. They can be used as a baseline for monitoring changes in levels of poverty, attitudes and behaviour towards the conservation of these forests. The people surveyed here are some of the poorest in Africa and make a living from

very small parcels of land. Family sizes are large because infant mortality is high, with 50% of the population under 20 years of age. If infant survival improves there will be severe pressure on the land available and few options other than emigration. Emigration is still possible in Uganda where land is still available in the north and east of the country and in DRC where land is available to the west of Virunga park, but it is much more of a problem in Rwanda. There is a dire need to improve infant survival and at the same time to reduce family sizes in this region if the protected areas are not to face huge pressures in the future. The recent invasion of the Virunga Volcanoes in DRC by Rwandan farmers is a case to highlight, where the pressures to find more land led to the deforestation of over 15 km<sup>2</sup> of forest for farmland, before it could be halted. Conservation practitioners need to work more closely with development organisations to ensure that these forests survive in the future.



## SECTION 8: REFERENCES



*TNew water point in Rwanda M.Gray*

- ACNR (2000), *Tumenye Ibidukikije mu Rwanda*, Kigali.
- AREDI, (2000) *Etude socio-économique sur la conservation de la forêt de Nyungwe*. Unpublished report
- Bahigiki, E. and Vedder, A. (1987). *Etude Socio-economique et Propositions Ecologiques sur la Forêt de Nyungwe (UGZ-3)*. MINAGRI/Wildlife Conservation Society. Kigali, Rwanda (213 pp).
- Bisidi, Y. (1996) *PEVI : Programme d'Education Virunga/Kacheche*. Unpublished report.
- Bisidi, Y. (2003) *WWF project technical progress report/Virunga Environmental Programme*
- Bozena, S.W, Munyambaraga, N; Mbahunzineza, M., (1993). *Etude socio-économique de la zone du projet PASP-NYUNGWE /UGZ3*. Report to MINAGRI et BANQUE MONDIALE
- Cunningham, A. B. (1992). "People, Park and Plant Use. Research and recommendations for multiple use zones and development alternatives around Bwindi Impenetrable National Park, Uganda". CARE International, Kampala, Uganda.
- Cunningham, A. B., Wild, R., Mutebi, J. and Tsekeli, A.. (1993). *People and Wild Plant Use: Mgahinga National Park. An investigation into past, current and possible future utilisation of wild plants, and appropriate resource substitutions around Mgahinga Gorilla National Park, Uganda*. Report to CARE International, Kampala, Uganda.
- Davenport T., Howard, P. and Mathews, R. (eds) . (1996). *Echuya and Mafuga Biodiversity Report*. GoU-Forest Department.
- Delvingt W, Le Joly, J. Mankoto Ma M. (1990), *Guide du Parc National des Virunga*, IZCN- PNVi.

- Gapusi, R. Jean (1998) *Identification d'option pour la conservation de la biodiversité avec les communautés riveraines de la forêt de Nyungwe*, Kigali : Minagri, 1998. - 26 p.
- Gapusi, R. Jean (1999) *Identification et analyse des options stratégiques pour la conservation de la biodiversité de la forêt de Nyungwe* - Kigali : Ministère de l'agriculture, de l'environnement et du développement rural, 43 p. : ill. - Bibliographie: pp. 41-43.
- Habiyambere, T., (1999). *Synthèse et Analyse diagnostique de l'état de la biodiversité au Rwanda*, CEFDHAC, UICN.
- IGCP, (2001) *Etude sur le prélèvement des ressources du Parc vis a vis des relations entre le PNVi-Secteur Mikeno et les populations riveraines*. Unpublished report.
- IGCP, (2003) *Etude de faisabilité pour l'établissement des entreprises agropastorales de base appuyant la conservation du Parc National des Virunga*. Unpublished Report.
- IGCP, (2003) *Etude de faisabilité pour l'établissement des entreprises agropastorales de base appuyant la conservation du Parc National des Volcans*. Unpublished report.
- INECN (1992) *Compte rendu de la 2<sup>ème</sup> session de travail sur la conservation et la gestion des forêts afro-montagnardes*, Bujumbura.
- ITFC (in prep.) *Bwindi and Mgahinga National Parks in Uganda: has 15 years of ICD programming succeeded in increasing support for conservation among local communities?* Report of an assessment study of selected Integrated Conservation and Development Strategies implemented in BINP and MGNP.
- Kabugi, B. (2001) *Plaidoyer pour une Stratégie de Gestion Participative : Une alternative pour réduire la pression anthropique sur les ressources du PNVi Sud*. Mémoire, inédit ISDR, Bukavu.
- Kambale, K et Balole, B (2001) *Etude sur le Prélèvement des Ressources du Parc ; vis-à-vis des Relations entre le PNVi- Secteur MIKENO et les Populations Riveraines*. Mission de consultation effectuée pour le compte de PICG/ ICCN.
- Kamugisha, J.R. (1999). *Towards increased involvement and participation of Batwa/Abayanda communities in conservation*. Proceedings of workshops and proposals for field intervention. Mgahinga and Bwindi Impenetrable Forest Conservation Trust, Kabale, Uganda.
- Kamugisha, J.R., Ogutu, Z.A. and Stahl, M. (1997). *Parks and People - Conservation and Livelihoods at Crossroads. Four Case Histories*. Regional Soil Conservation Unit (RSCU), Swedish International Development Co-operation Agency (SIDA) Nairobi, Kenya.

- Kanongo, M. (1990). *Draft Report of baseline data, report for CARE-Development Through Conservation (CARE-DTC) Project. Phase 1. Dec. 1989-Feb. 1990.* DTC Project, Ikumba, Uganda.
- Kisoro Development Foundation. (2002). *Echuya Forest Community Conservation Project Baseline Survey Report.* Unpublished report.
- Kjersgard L. (1997). *People's participation in community and local government institutions around Bwindi Impenetrable Forest National Park, Uganda.* Report of a study under the Institutional Development Program, CARE-DTC.
- Masozera, M. (2002) *Socio-economic impact analysis of the conservation of the Nyungwe Forest Reserve, Rwanda.* Unpublished MSc thesis, University of Florida, Gainesville.
- MINAGRI, (1984) *Plan d'action pour la conservation et l'aménagement des forêts naturelles de la crête Zaire-Nil.* Direction générale des Forêts, Kigali, 63p.
- MINAGRI, (1988) *Etude du secteur Forêt, Bois au Rwanda. Analyse et propositions techniques pour l'exploitation et la transformation, tome 3,* Direction générale des Forêts, 70p.
- MINAGRI, (1992) *Evaluation d'un plan d'action pour la conservation et l'aménagement des forêts naturelles de la crête Zaire-Nil.* Direction générale des Forêts, Kigali.
- MINECOFIN (1998) *Principaux indicateurs de l'économie nationale, Kigali, 1998.* Report.
- Munyaligoga, V., (1992). *Rythmes d'activités et régime alimentaire d'un groupe de singes Cercopithecus mitis de la forêt de Nyungwe.* Mémoire, UNR, 86p.
- Musabe, T. (2002) *Use of non-timber forest products (NTFPs) and its impact on the conservation of Nyungwe Forest Reserve in Rwanda.* Unpublished report to WCS.
- Namara A, Gray, M and McNeilage, A. (2001). *People and Bwindi Forest. A Historical Account as Given by Local Community Members.* Institute of Tropical Forest Conservation, Kabale, Uganda. Mimeo
- Nature Uganda. (2003). *Enhancing the Livelihoods of Local Communities dependent on Echuya Forest Reserve.* Application for Funding to the European Commission Directorate General for Development submitted by Royal Society for the Protection of Birds.
- Ngologoza, P. (1969). *Kigezi and its People.* East African Literature Bureau.
- Olson, J.M. (1994) *Farming Systems of Rwanda: Echoes of the Historic Land Divisions Reflected in Current Land Use.* Rwanda Society –Environment project. Working Paper 2. pp. 20
- Olson, J.M., Manyara, G., Campbell, D.J., Lusch, D.P. and Hu, J. (1995) *Exploring Methods for Integrating Data on Socioeconomic and Environmental Processes*

*that Influence Land-use Change: a Pilot Project*. Report to Biodiversity Support Program, WWF. Pp. 88.

Plumptre, A.J., Masozera, M., Fashing, P.J., McNeilage, A, Ewango, C., Kaplin, B.A., and Liengola, I. (2002) *Biodiversity Surveys of the Nyungwe Forest Reserve in SW Rwanda*. WCS Working Paper No. **19**: 1-93

Plumptre, A.J., Behangana, M., Davenport, T., Kahindo, C., Kityo, R., Ndomba, E., Nkuutu, D., Owiunji, I., Ssegawa, P., and Eilu, G. (2003) The Biodiversity of the Albertine Rift. *Albertine Rift Technical Reports* No. 3, pp105.

Purseglove, J.W. (1946). Land use in the over-populated Areas of Kabale, Kigezi District, Uganda. *East African Agricultural Journal*, July 1946.

Sorg, T.P., (1978) La forêt naturelle de Nyungwe (Rwanda) exploitation ou protection. *Journal Forestier Suisse*, p445-452.

Uganda National Parks (1995) *Bwindi Impenetrable National Park Management Plan (1995-99)*. Uganda Wildlife Authority, Kampala, Uganda.

Uganda Wildlife Authority (2002). *Bwindi Impenetrable National Park & Mgahinga Gorilla National Park General Management Plan, 2002-2012*. Uganda Wildlife Authority, Kampala, Uganda

Vedder, A., (1988) *Nyungwe Forest Conservation Project*, Final report, NYZS, New York.

WCS, (2001) *Conservation strategies for the Albertine Rift*. Report of Workshop in Cyangu, Rwanda.

Weber, W. (1987). *Ruhengeri Resource Analysis and Management*. ETMA/SECID/USAID, Rwanda.

Weber, W., (1989). *Conservation and Development on Zaire-Nile Divide. An analysis of value conflicts and convergence in the management of afro-montane forests in Rwanda*. Ph.D. Thesis, University of Wisconsin, Madison.

Weber, W, (1993) *Forest-population relations along the Zaire-Nile divide, a sectoral analysis for the ZND evaluation*. Unpublished report.

## **The Wildlife Conservation Society (WCS)**

The Wildlife Conservation Society is dedicated to saving wildlife and wildlands. This mission is achieved through a conservation program that protects some 50 living landscapes around the world, manages more than 300 field projects in 53 countries, and supports the largest system of living institutions in the USA – the Bronx Zoo, the New York Aquarium, the Wildlife Centres in Central Park, Queens and Prospect Park, and the Wildlife Survival Centre on St Catherine's Island, Georgia. We are developing and maintaining pioneering environmental education programmes that reach more than three million people in the New York metropolitan area as well as in all 50 United States and 14 other countries. We are working to make future generations inheritors, not just survivors.

WCS has been a driving force in conservation in Africa since the 1920s when the Bronx Zoo's first president, William Hornaday, initiated a programme to save the white rhinos of South Africa. Since this time the WCS Africa Programme has been characterised by pioneering conservation work such as the first field studies and census of the mountain gorillas by George Shaller in Congo (1959), creation of the Nouabale-Ndoki national park in Congo Republic (1993), Masoala park in Madagascar (1996), and Nyungwe National Park in Rwanda (2001). WCS focuses on the use of scientific information to manage conservation areas and as such has more field scientists on the ground than any other conservation organisation in the world. Currently the WCS Africa Programme works in 14 countries protecting a range of spectacular and diverse ecosystems across the continent. While Africa has some of the richest landscapes of the natural world it also faces extreme challenges of poverty, high human population growth and rapidly changing political systems. WCS Africa programme recognises these challenges and the subsequent pressures on biodiversity. Throughout its field-based programmes WCS works with governments, national institutions and local communities to conserve Africa's natural heritage for both Africans and the world at large. To learn more about WCS visit: [www.wcs.org](http://www.wcs.org)

## **The International Gorilla Conservation Programme (IGCP)**

IGCP operates in a Landscape context, focusing on key conservation targets and working with a variety of different stakeholders to reduce the threats to conservation. These stakeholders include the park authorities, local and regional governments, local people and environmental experts, all of whose activities have an effect on the environment and the natural resources in that landscape.

The strategy of IGCP is based on three axes:

- Establishing a strong information base to allow decision-makers to understand the dynamics between the human population and the natural habitat/wildlife.
- Strengthening the protection of the habitat and mountain gorillas through regional collaboration by the three countries and structured mechanisms for transboundary conservation.
- Reducing threats to the conservation targets by assisting the human population in developing livelihood strategies that are complementary to, and even contribute to conservation objectives.

The goal of IGCP is the long-term conservation of the mountain gorilla and its regional high-and medium altitude forest habitat in Rwanda, the Democratic Republic of Congo and Uganda.

## **CARE**

CARE International is a federation of currently 12 NGOs in the Americas, Europe, Asia and Australia that implement programmes in over 70 countries worldwide. Our vision is a world of hope, tolerance and social justice, where poverty has been overcome and people live in dignity and security. We seek to be a global force and a partner of choice within a worldwide movement dedicated to ending poverty, and to be known everywhere for our unshakable commitment to the dignity of people.

Our main technical sectors of expertise and interest are:

- Natural Resource Management, especially co-management of natural resources
- Reproductive health, especially adolescent friendly and community based services
- Civil Society strengthening and alliance building, policy analysis and advocacy
- Agri-business & rural financial intermediation especially with small farmers
- Emergency Response
- Peace and Reconciliation

This report summarises the results of a baseline socio-economic survey of people living within 10 km of six protected areas in the central Albertine Rift region of Africa (Eastern Democratic Republic of Congo, Rwanda and Uganda). It contains the remaining habitat of the mountain gorilla as well as one of the largest montane forests in Africa - Nyungwe National Park in Rwanda. This region has some of the highest densities of people on the continent, as well as high biodiversity and conservation values. As a result, there are major challenges to the conservation of protected areas, many of which have become islands of natural habitat in a sea of agriculture. This region has been piloting mechanisms to integrate local communities in conservation and this survey compares and contrasts communities where pilot projects have been implemented and where they have not.

A total of 3,907 households, representing 22,813 people were sampled from all the parishes and districts surrounding the six protected areas. The results are mapped in GIS to show patterns of wealth, attitudes and behaviour around the protected areas for each parish. The results are numerous and highlight the extreme level of poverty that people face in this region. The survey was designed in collaboration with development organisations and is intended to provide information useful for the planning of development and conservation projects.

Three main chapters provide results on:

- The socio-economic situation faced by communities adjacent to protected areas
- The local economy and income generation
- Relationships between the local community and protected areas

A concluding chapter draws some of the general lessons learned from the study and proposes policy recommendations for both conservation and development. It is hoped that this baseline information will allow future monitoring of the impact that development projects have on the livelihoods of the people in the Central Albertine Rift.

