EEEGL

ENTERPRISE ENVIRONMENT AND EQUITY IN THE VIRUNGA LANDSCAPE OF THE GREAT LAKES

THE POTENTIAL SUPPLY OF PLANT RESOURCES FOR LOCAL COMMUNITY USE IN BWINDI IMPENETRABLE NATIONAL PARK BEEKEEPING ZONES, S. W UGANDA

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II) Executive summary

When Bwindi was gazetted a national park in 1991 local people were barred from accessing the forest for plant resources. As such conflicts between park managers and the local people were common. When the multiple use programme was established in Bwindi Impenetrable National Park (BINP) in 1994, the conflicts tremendously reduced. The multiple use programme allows plant harvest in 7 parishes, and beekeeping in 6 parishes around BINP. Due to increased demand by more local people to participate in the programme when almost all the 20% area zoned for the programme has been used, a review of the multiple use programme in 2004 recommended the rezoning of the beekeeping zones to also allow plant harvest.

We carried out Participatory Rural Appraisals (PRAs) in six beekeeping parishes of BINP to get a shortlist of the plants requested by the local people. We then carried out subjective focused searches and transect/plot methods to determine the abundance of the plants requested by the local people in the beekeeping zones of BINP.

From the PRAs a total of thirty seven (37) plant species were requested by local people from all the six parishes. Results show that the beekeeping zones of Bwindi have a low potential in plant resources probably due to the area being located at very high altitudes (reaches up 2607m a.s.l). Less than 30% of the requested plants were common when we used both subjective focused searches and transect/plot methods. Plant resources recommended for harvest varied from parish to parish as follows; Kaara and Kashasha parish 10 plants each, Kitojo parish 7 plants, Kiyebe parish 5 plants, Mushanje and Nyamabare parishes 4 plants each. We recommend the formation of forest resource user groups like in other plant harvest zones for monitoring plant harvest offtakes. We further recommend the setting up of permanent sample plots in the zones for more studies to determine plant harvest sustainable levels.

III) Acknowledgements

This study is a continuation of another study undertaken by UWA and ITFC in 2004 (Bitariho *et al* 2004). It has been funded by CARE-EEEGL programme. This study will culminate in the drafting of new multiple use MoUs for BINP. CARE-EEEGL contracted ITFC on behalf of Uganda Wildlife Authority (UWA) to implement the study. We would like to thank the key plant resource users whom we worked with in the village interviews and forest surveys. Many thanks to Douglas Sheil and Miriam vanHiest for their comments on the draft report. Geoffrey Muhanguzi of CARE-EEEGL is appreciated for coordinating comments from various stakeholders that shaped up this report. ITFC volunteers Badru Mugerwa and Peter Kabano were very instrumental in the data collection and the tedious work of entering data for analysis. ITFC field assistants Philemon Tumwesigye, Byaruhanga Christopher, Zoreka Damazo, Twehikire Benon, Tumuhangirwe Marius, Mbabazi Richard and camp-keeper Sigirenda Valentine were very instrumental during the data collection and recording. Thanks also go to other ITFC and UWA staff who contributed to this study in one way or the other.

IV) Acronyms used

BINP	Bwindi Impenetrable National Park
CARE	DTC-CARE's programme of Development Through Conservation
CARE-EEEGL-	CARE's programme of Enterprise Environment and Equity in The Virunga Landscape of the Great Lakes
CSO	Civil Society Organisation
ITFC	Institute of Tropical Forest Conservation
MoU	Memorandum of Understanding
MUZ	Multiple Use Zone
NTFPs	Non-Timber Forest Products
PRAs	Participatory Rural Appraisals
UNP	Uganda National Parks
UWA	Uganda Wildlife Authority

1.0 Introduction

Plant use by local people around Bwindi is as old as mankind that has lived there. For centuries Bwindi forest has been a source of livelihood for local people. The forest was used for extraction of plant resources used for food, weaving (baskets, granaries and stretchers), medicinal and house construction purposes. The forest was also used as a source of protein from bush meat and fish from Bwindi rivers.

Bwindi forest is one of the few remaining Pleistocene refugia of the Albertine Rifts (Butynski, 1984, Marchant & Taylor, 1997).The importance of Bwindi as a Pleistocene refugia forest has resulted in many forest tree species such as *Podocarpus milanjianus*, *Maesopsis eminii* and *Ficalhoa macrophylla* and thus became an important source of timber from late 1940s up to mid 1980s. Bwindi was gazetted a forest reserve in 1948 and subsequently the major activity then was timber extraction (Forest Act, 1964; Butynski, 1984). This gazettement did not stop the local people from using other forest resources such as plants for medicinal, food and basketry purposes. Control of plant harvest then was through the issue of free permits by forest guards for the harvest of lianas and vines while medicinal plants were harvested anytime needed (Butynski, 1984; Wild, 2001).

In 1961, Bwindi was gazetted an animal sanctuary mainly to protect the mountain gorilla population (Butynski, 1984; Wild, 2001). With more worldwide concern for the protection of the mountain gorillas (*Gorilla gorilla beringei*) and in recognition of the global importance of its biodiversity, Bwindi was gazetted a national park in August 1991. Events then led to local people being barred from accessing the forest resources some of which were crucial for their livelihoods. Conflicts between park managers and the local people soon arose and the people protested the creation of the park. For example, numerous fires were deliberately set, burning up to 5% of the park in 1991 and 1992 and there was severe harassment of park staff then (Butynski, 1984, ITFC, 1999, Wild, 2001). These conflicts were not only restricted to Bwindi, but also other parks such as Mgahinga, Rwenzori and Kibaale that were established in the same period.

After the 1992 Rio de Janeiro conference (commonly called the “Earth “Summit”), events led to a shift in park management that stressed the involvement of local communities in park management. New terms such as “collaborative forest management”, “sustainable forest use”, equitable sharing of forest benefits and conservation of biodiversity emerged (CBD, 1993). Bwindi was designated a World Heritage Site in 1994. The changing political perspectives mentioned above led to Uganda National Parks (UNP) then (now UWA) to integrate sustainable use of forest resource into Bwindi park management. Together with various stakeholders including CARE’s-Development through conservation (DTC) and the Institute of Tropical Forest Conservation (ITFC), Bwindi park management in 1994 devised and started a collaborative management programme for Bwindi that included multiple-use programme and revenue sharing.

The multiple-use programme involved local people accessing non-timber forest products (NTFPs) such as weaving and medicinal plants from Bwindi forest. The programme followed recommendations by Scott (1992) and Cunningham (1992). It allows low impact plant harvesting and beekeeping in specified zones called multiple use zones (MUZs) within Bwindi park (figure 1) (Wild and Mutebi, 1996; ITFC, 1999; Wild, 2001). Twenty per cent of Bwindi was zoned for this activity at the park periphery. The intention was to improve relations between park authorities and neighbouring communities. The multiple use programme started as a pilot scheme in 1994 in the parishes of Mpungu, Rutungunda and Nteko for plant resource extraction and Kitojo, Nyamabare, Kashasha, Nshanjare and Byamihanda for beekeeping and honey collection (Wild and Mutebi, 1996; ITFC, 1999). The Bwindi’s multiple use programme has expanded and now includes 7 plant resource extraction zones and 6 beekeeping zones (Bitariho *et al* 2006) see figure 1.

Reviews of the multiple-use programme in 1995 (Bensted-Smith *et al* 1995) and 2004 (Bitariho *et al* 2004) recommended expansion of the programme to other areas in order to benefit more people. However, as 13 zones already covered the 20% quota allocated for multiple use zones

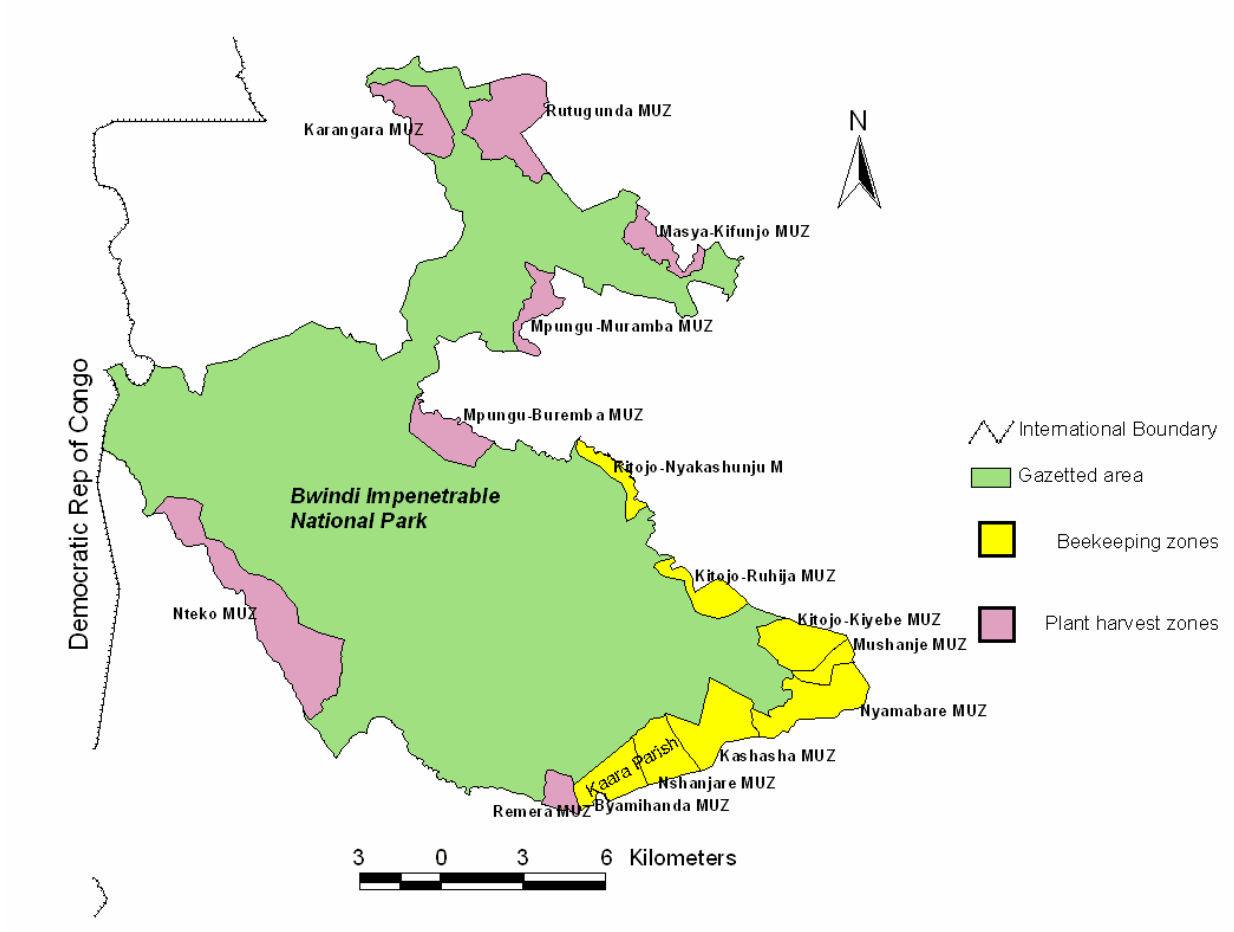
this was not possible. As a compromise, Bitariho *et al* 2004 recommended that the beekeeping zones could also provide plants for local people use. When a new program of CARE (Enterprise Environment and Equity in the Virunga Landscape of the Great Lakes-EEEGL) started and availed funds in 2008, ITFC was tasked by UWA to assess the potential of the beekeeping zones to supply plant resources for local community use.

Before plant exploitation begins, it is imperative to carry out an inventory to determine the plant stock and set quotas to prevent over-exploitation (Peters, 1994, Cunningham, 2001, Bitariho *et al* 2006). Almost any type of plant resource harvesting conducted in a tropical forest has an impact on the forest ecology. Presently, the major constraint to managed plant resource harvesting is lack of data on the availability of forest species and their response to disturbance. There is no quantitative baseline data on abundance and distribution of resource plants in Bwindi to serve as a benchmark for setting harvesting quotas and for rigorous monitoring of the harvested resource plants (Feinsinger, 1997; Bitariho *et al* 2006). This is a serious drawback to good forest management and any attempt to exploit forest resources in such a scenario has the potential to be plagued by destructive harvesting, over-exploitation and the attendant negative ecological impacts in the forest. If the role of wild plants in providing a range of basic needs is to be maintained, then resource management for sustainable harvesting rather than over-exploitation should take place.

Determining sustainable plant resource harvest involves long time studies (over 5 years) that involve determining resource plant yields (biomass production), mortality rates and recruitment rates (Hall & Bawa, 1993, Godoy & Bawa, 1993, Peters, 1994; Sheil *et al* 2005, Sheil & May, 2002; Ticktin, 2004). Yet in most cases protected area managers need immediate answers from researchers on the decisions to take to allow plant resources harvest from the protected areas. This is often the situation faced by researchers and park managers in Bwindi Impenetrable National Park (BINP). ITFC was tasked to establish plant resource offtakes in MUZs of BINP. We developed a rapid assessment method using stem density for determining plant offtakes for local community use in the MUZs of BINP. This rapid assessment method

was applied to most of the MUZs. We present here the application of the method in six beekeeping zones of Kaara, Kashasha, Nyamabare, Kitojo, Kiyebe and Mushanje parishes of BINP.

Figure 1: The Bwindi Impenetrable National Park Multiple Use zones



2.0 Study objectives

The main goals of this study was to assess the potential of the six beekeeping zones to supply plant resources requested by the local people and to recommend to park management plants to be harvested from the forest and an initial allowable harvest annual offtake quota for the plants. Subsidiary objectives include to:-

(i) Determine the presence or absence of the requested plants.

(ii) Compare requested plant abundance determined by two different methods of subjective focused search and transect/plot methods.

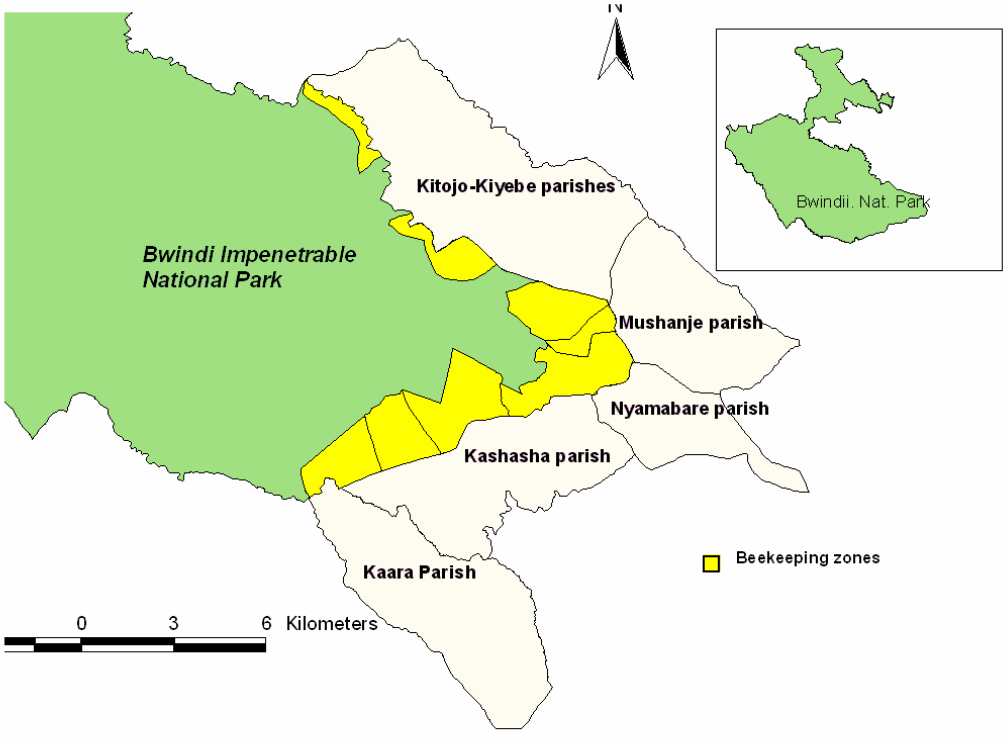
(iii) Determine the abundance of the requested plants in forests adjacent the beekeeping zone parishes.

3.0 Methods

3.1 Study sites

The six beekeeping zones are located in the southeastern part of BINP in Rubanda county of Kabale district. There are Nyamabare, Kashasha, Kaara, Kitojo, Kiyebe and Mushanje parishes (figure 2). The southeastern part of Bwindi is the highest point in the park with an altitude of up to 2607m a.s.l at Rwamanyonyi hill in Nyamabale and Mushanje parish (Butynski, 1984). The major vegetation types there are high altitude plant species such as montane bamboo (*Arundinaria alpina*) and *Hagenia abyssinica* trees.

Figure 2: Study Area map



3.2 Participatory Rural Appraisal (PRA)

During the month of August 2004, a team comprising of a civic society organization (CSO) member from Kabale district, community conservation section park staff of BINP management, ITFC researchers and a field coordinator of CARE-REPA carried out participatory rural appraisals (PRA) in the six beekeeping parishes of BINP to review the multiple use program (Bitariho *et al* 2004). Detailed PRA method can be got from Bitariho *et al* 2004 report. Local people from the six parishes requested to be allowed to harvest plants for medicinal and weaving purposes in addition to their beekeeping (Bitariho *et al* 2004). A list of the requested plants was then compiled by the PRA team together with the local communities (see appendix).

3.3 Subjective Focused Searches

Due to the rugged terrain nature of Bwindi forest, there are diverse microhabitats that make the forest to have plants with clumped distributions. We used subjective focused searches in order to locate and identify plants that might not be detected by the transect/plot method. Together with plant resource user specialists, we subjectively looked for the requested plants in the forests adjacent each beekeeping parish while at the same time collecting samples for herbarium specimen identification.

3.4 Plant Resource Sampling

3.4.1 Sampling Design

Three belt transects of 10m width and 1km lengths (1 ha) running from the forest edge into the beekeeping zone were established in each parish. These were used to assess the requested tree species. Transects were chosen because they are efficient and account better for heterogeneity than alternatives (Hall & Bawa, 1993; Hladik and Dounias, 1993, Tuxill and Nabhan, 1998, Bitariho *et al* 2007). On each transect, nested square quadrats (see figure 3 and table 1) were placed every 100m to assess requested shrubs, lianas, vines and herbs species (Hall & Bawa, 1993; Tuxill and Nabhan, 1998; ITFC, 1999; Bitariho *et al* 2007). Size of the sub-plots varied with the adult life-form of the target plant species as shown in Table 1.

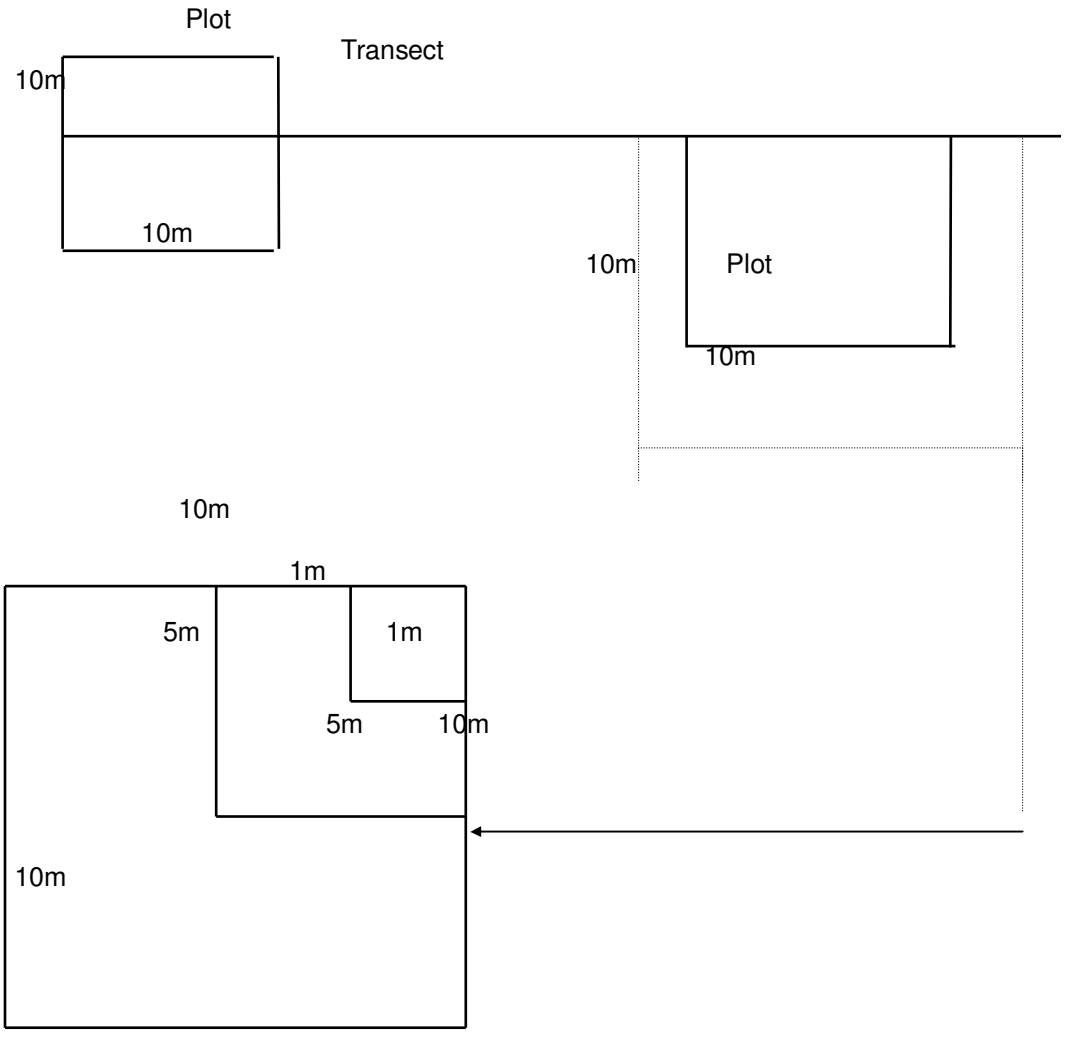
Lianas were considered as large, woody bare-stemmed climbers while vines were predominantly herbaceous, leafy smaller climbers.

The belt transects were used to enumerate the requested resource trees whose diameters are ≥ 10cm dbh. (Diameters at breast height were measured at 1.3m height). Inclusion of large stems in transects was based on a perceived central line within the stem lying within the transect boundary at the point where the diameter was to be measured. For the quadrats, the stems enumerated were only those rooted within the plots. In some cases where climbers and shrubs formed clonal extensions of larger individuals, we treated them as separate plant individuals (ITFC, 1999; Bitariho *et al* 2007).

Table 1 Quadrat sizes for the various plant life-forms (ITFC 1999; Bitariho *et al* 2007)

Quadrat Size (m)	Plant Life-form
1 x 1	Herbs
5 x 5	Vines and small shrubs (including their seedlings)
10 x 10	Lianas and large shrubs (including their seedlings)

Figure 3: Nested plot layout on transect



3.4.2 Selective Resource User Assessment

We assessed resource plant quality from the resource users' perspective by asking the herbalists and basket weavers who accompanied us during the survey (ITFC, 1999; Bitariho *et al* 2007). They categorized the plants into three user-classes of; "Poor" (when the plants were too young or too old and brittle), "Fair" (when the plants were useable but not ideal) and "Good" (when the plants were ideal for use) (ITFC, 1999).). A plant species may have a high stem density in the forest but be unusable from the resource users' point of view. These would be classified as poor, when a plant was classified as harvestable, then its stems would be suitable for use by the resource users.

3.5 Data analysis and assumptions

We calculated stem densities as a measure of abundance of the requested plants. Plants with sufficiently high stem density for harvesting were considered to be those with stem density of ≥0.1 stems/ha, ≥10 stems/ha and ≥40 stems/ha for trees, woody climbers/shrubs and vines respectively at the lower limit of 95% confidence interval (ITFC, 1999; Bitariho *et al* 2007). The stem densities were then plotted on bar graphs showing the 95% confidence interval error bars (figures 6 to 21). These confidence intervals were then used to determine the level at which the plants could be considered abundant enough for harvest.

In order to recommend annual harvest offtake quotas for the requested plants, the stem density of each abundant and harvestable plant were extrapolated to the entire forest zones adjacent each three parish to get an estimate total of plant stock. We then used a conservative cutoff limit of 1% of harvestable plant resource stock available in the forest as the recommended annual plant stems to be harvested (ITFC, 1999; Zuidema, 2000; Stewart, 2001; Ticktin, 2004; Bitariho *et al* 2007). Then for all medicinal trees and shrubs that are harvested for bark, we assumed the average bark mass to be 0.45 kg per tree after Bitariho *et al* (2006) work on *Ocotea usambarensis* and *Rytigynia kigeziensis*. They estimated that average bark mass for the two plants (at height of 2m) were about 0.45kg/tree.

4.0 Results

4.1 Participatory Rural Appraisal

Plants requested by local people from the six beekeeping parishes' were of diverse life-forms. These were trees, lianas, vines and herbs that serve many purposes such as use for medicinal, food, weaving and house construction purposes. There were 37 plant species requested from all the six parishes. 10 of these were for weaving purposes (basketry and granaries), 24 for medicinal purposes, 1 for food and 2 for making beer boats, mortars and beehives. (See appendix).

4.2 Focused searches and transect/plot methods comparisons

A comparison of the requested plant abundance found by subjective focused searches and transect/plot methods revealed little difference in the species that were classified as "common", "rare" or not found. Between 62-81% of the requested plants were not encountered at all using subjective focused searches while between 70-89% of the requested plants were also not encountered using transect/plot methods (figure 4& 5). Also from the two figures, only between 16-30% and 11-27% of the requested plants were classified as common by subjective focused search and transect/plot methods respectively. This shows that the beekeeping zones (southeast of Bwindi) have a very low potential for plant resources even when the two methods of sampling are used. The fact that the southeastern part of Bwindi is located at very high altitude limits its potential to have diverse plant resources.

Figure 4: A Comparison of subjective focused search and transect/plot methods (Kaara, Kashasha and Kitojo)

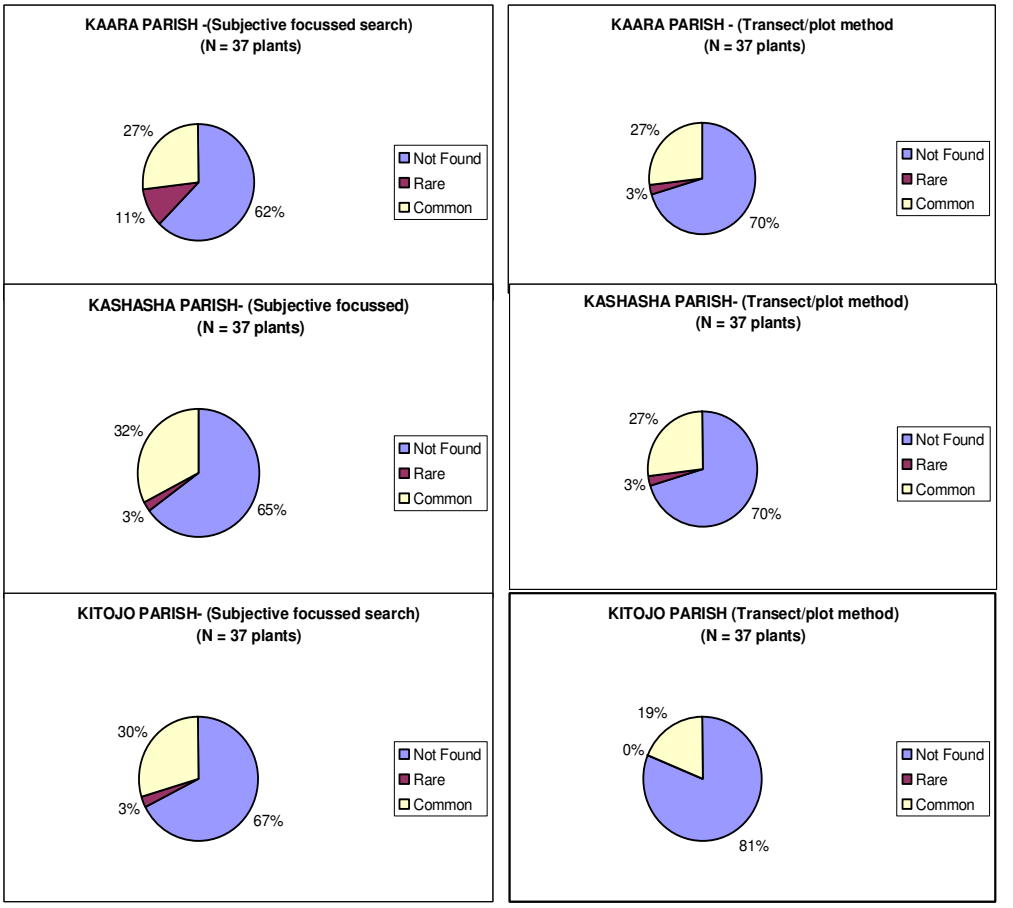
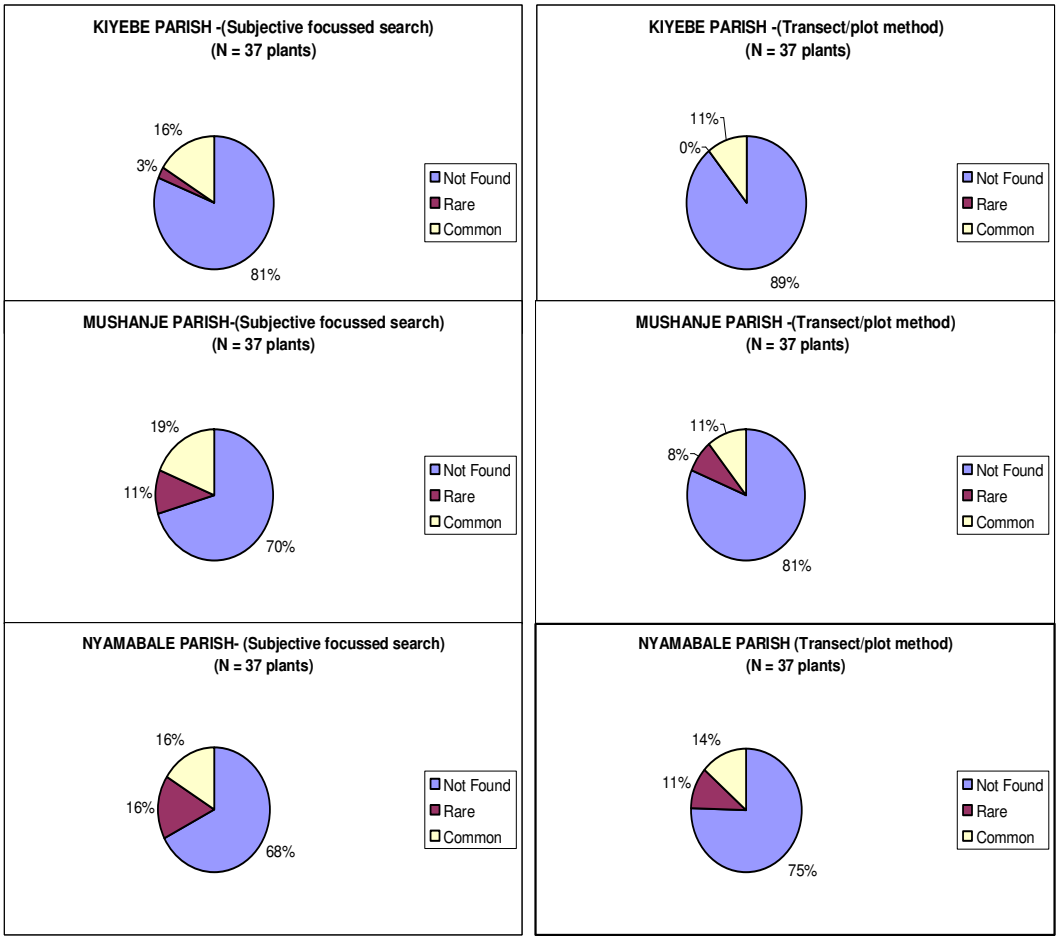


Figure 5: A Comparison of subjective focused search and transect/plot methods (Kiyebe, Mushanje and Nyamabale parishes)



4.3 Abundance of the most commonly occurring plant species

4.3.1 Requested plants from Kaara parish

Figures 6, 7& 8 show the abundance of the requested plants from the forest adjacent Kaara parish. From the three figures, only 10 out of the 37 requested plants had a sufficiently high stem density of the desirable and harvestable individuals. These were; *Draceana laxissima* (Enchenche), *Smilax anceps* (Enshuri), *Salacia elegans* (Bwara), *Pristimera gracifolia* (Endengamatare), *Securidaca welwitschii* (Entaro), *Rytigynia kigeziensis* (Nyakibazi), *Prunus Africana* (Omumba), *Bersama abyssinica* (Omukaka), *Croton macrostachys* (Omurangara) and *Myrianthus holstii* (Ekyufa). Another plant *Sericostachys scandens* (Omuna) that was also requested is a vigorous sprouting climber and grows with numerous stems that cover almost all the entire forest gaps of BINP. This plant was encountered and we saw no need of counting its stems. We therefore included it as another plant with high stem density. Kaara parish therefore has 11 plant species of the desirable individuals with a high stem density that could be harvested.

Figure 6: Abundance of requested vines in Kaara parish

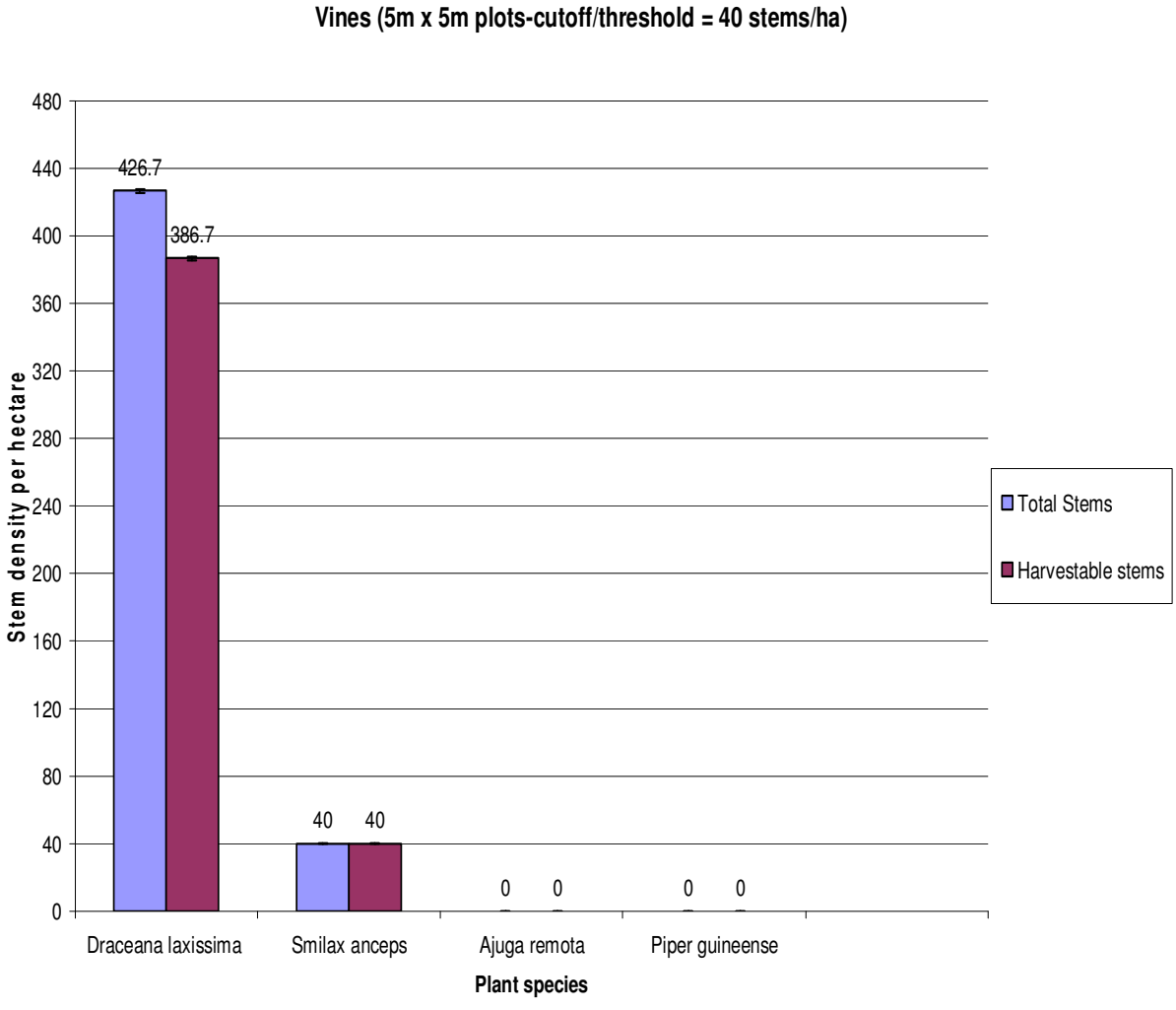


Figure 7: Abundance of requested lianas/shrubs in Kaara parish

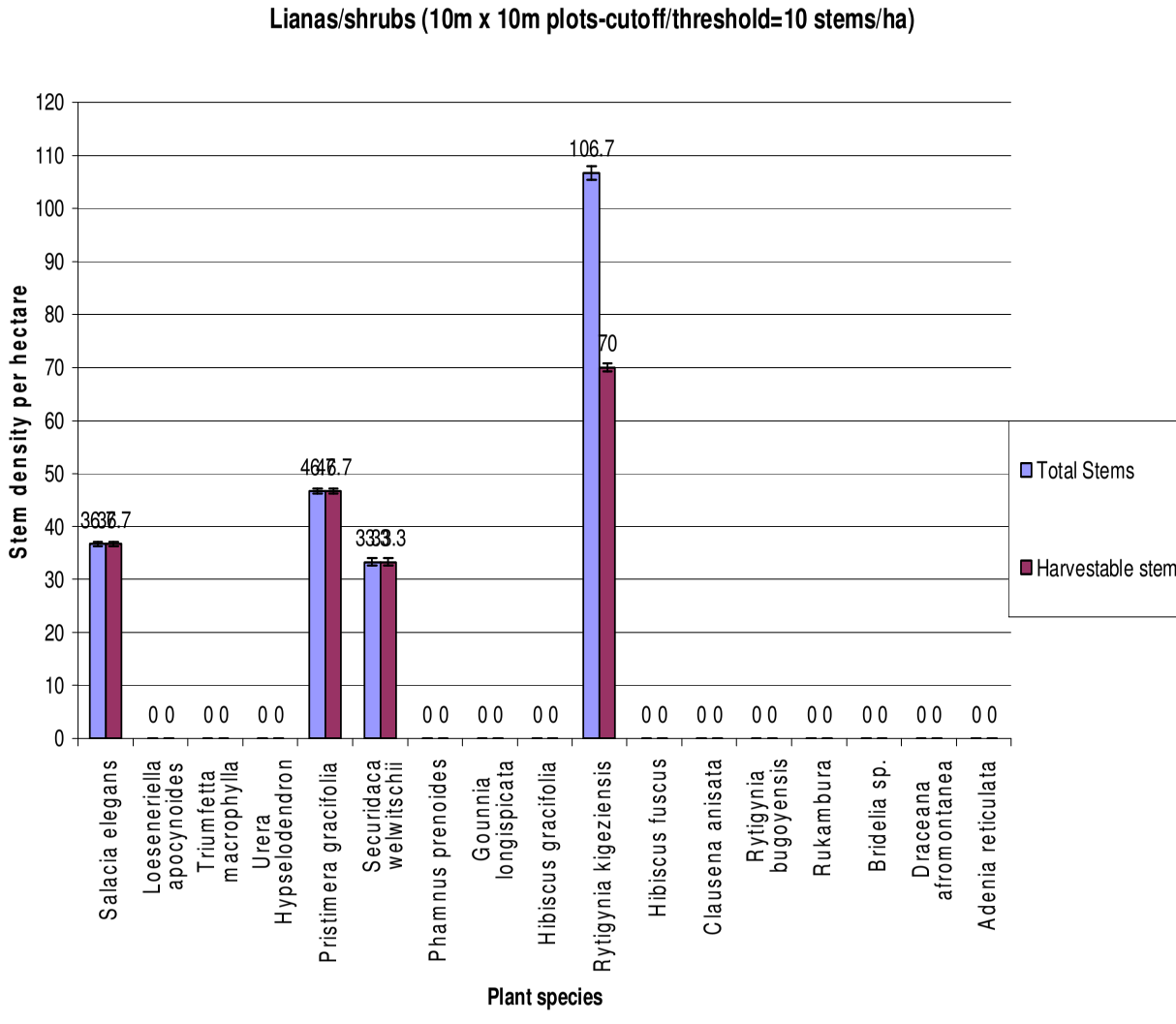
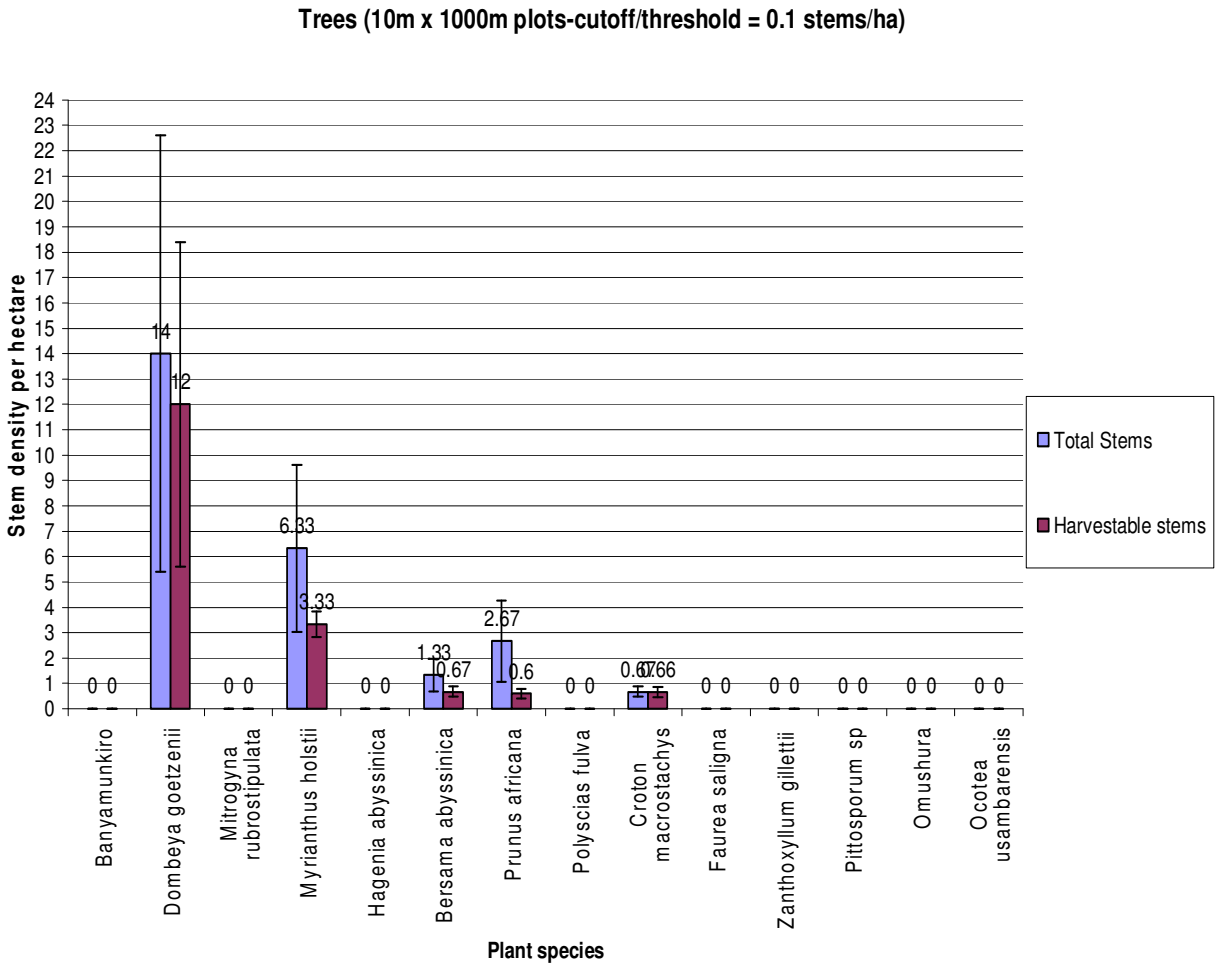


Figure 8: Abundance of requested trees in Kaara parish



4.3.2 Requested plants from Kashasha parish

Figures 9, 10 & 11 show the abundance of the requested plants from the forest adjacent Kashasha parish. From the three figures, only 11 plants out of 37 had a high stem density. These were; *Draceana laxissima* (Enchenche), *Salacia elegans* (Bwara), *Urera hypselodendron* (Emishe), *Pristimera gracifolia* (Endengamatare), *Securidaca welwitschii* (Entaro), *Dombeya goetzenii* (Emikore), *Faurea saligna* (Emirengyere), *Polyscias fulva* (Omungo), *Rytigynia kigeziensis* (Nyakibazi), *Prunus Africana* (Omumba) and *Bersama abyssinica* (Omukaka). Like for Kaara parish above, another plant species *Sericostachys scandens* (Omuna) requested was also encountered and therefore included as another

plant with very high stem density. Kashasha parish therefore, has 12 plant species with high stem density of the desirable plants that can be harvested.

Figure 9: Abundance of requested vines in Kashasha parish

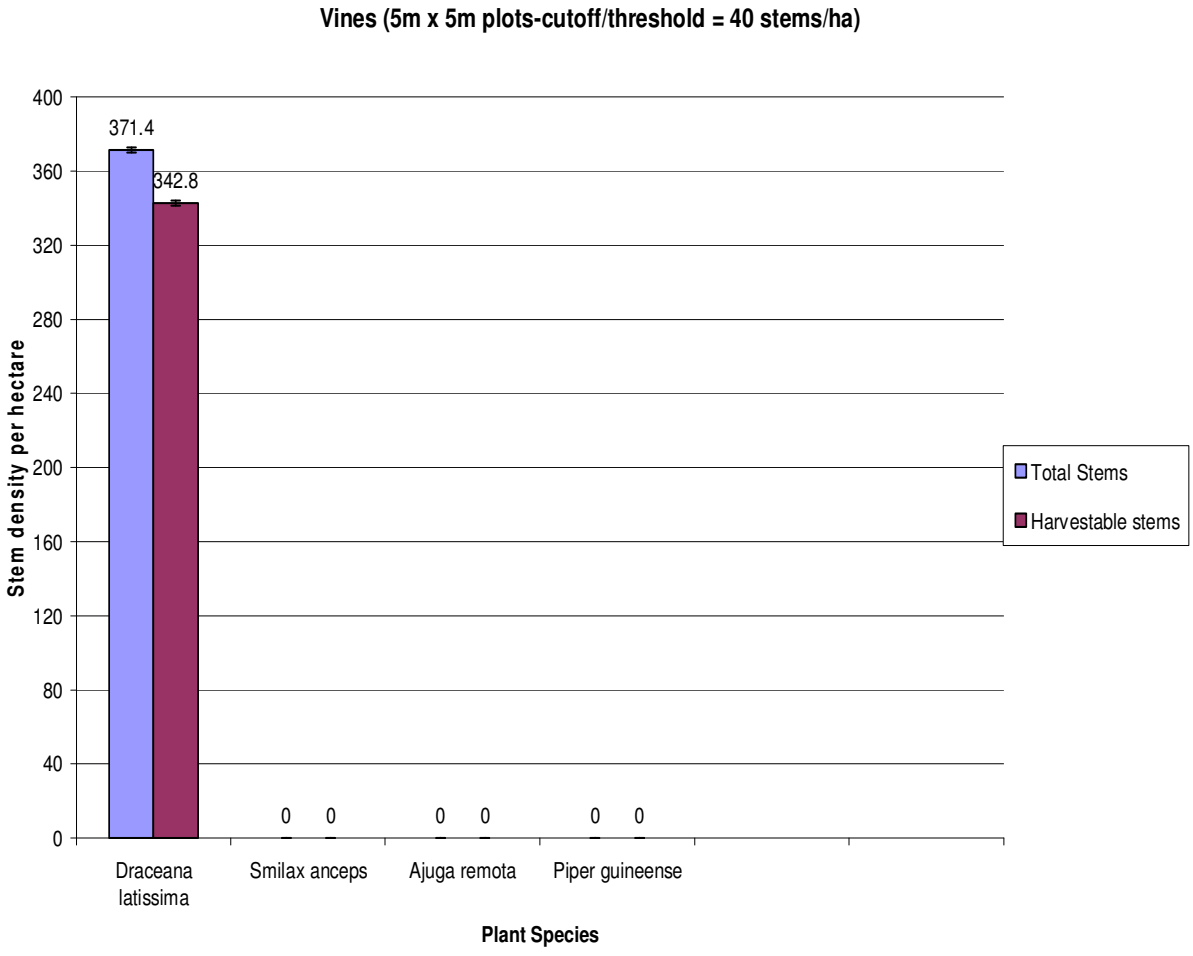


Figure 10: Abundance of requested lianas/shrubs in Kashasha parish

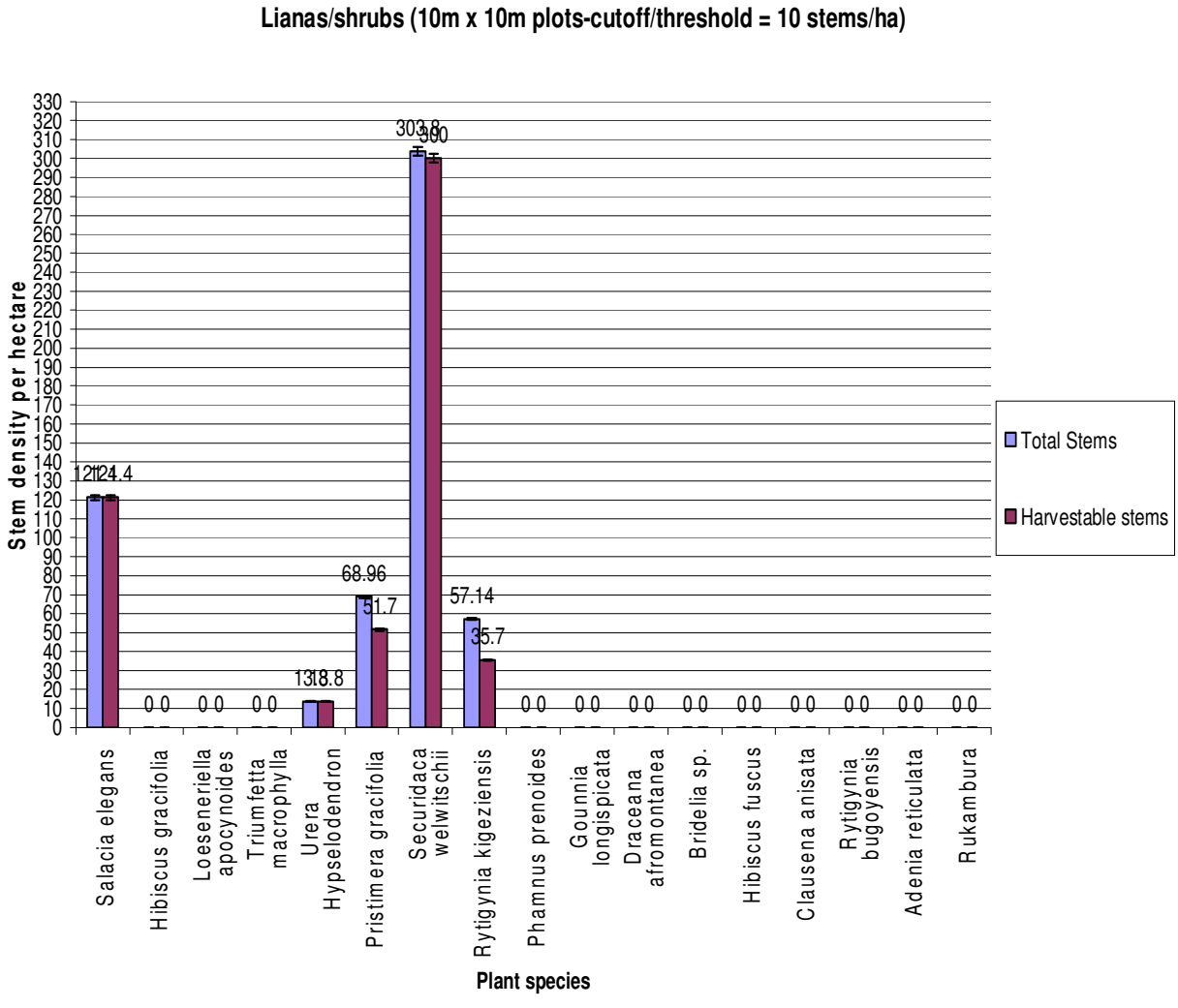
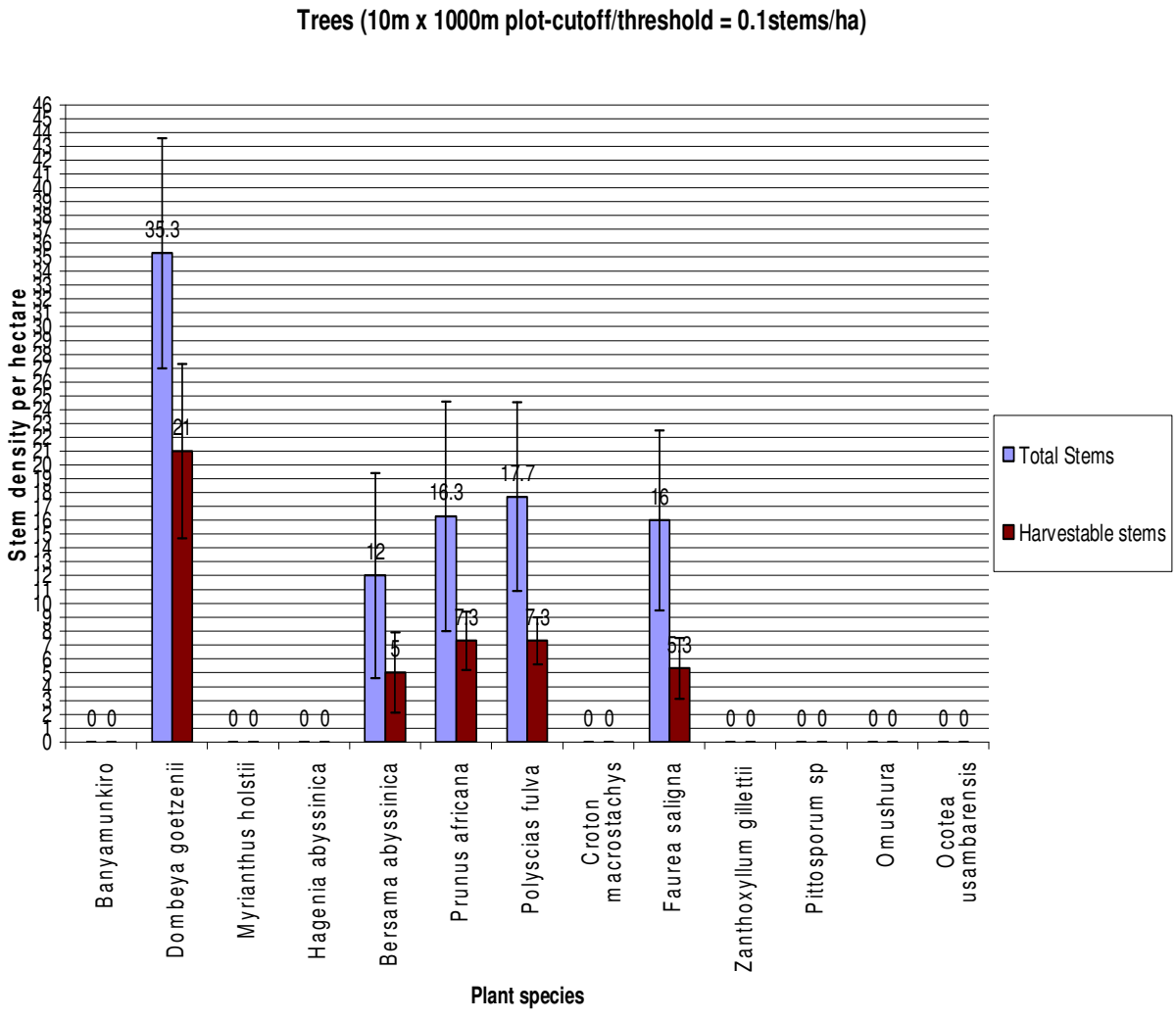


Figure 11: Abundance of requested trees in Kashasha parish



4.3.3 Requested plants from Kitojo parish

Figures 12, 13 & 14 show the abundance of requested plants from the forest adjacent Kitojo parish. Only 6 out of the 37 plants had a high stem density to be harvested. These were; *Salacia elegans* (Bwara), *Securidaca welwitschii* (Entaro), *Dombeya goetzenii* (Omukore), *Rytigynia kigeziensis* (Nyakibazi), *Prunus africana* (Omumba) and *Ocotea usambarensis* (Omwiha). Other two plants *Setaria plicatilis* (Obutami) and *Sericostachys scandens* (Omuna) were also encountered and included as those with high stem density although we did not count them due to their growth forms as mentioned above. The *Setaria plicatilis* is a grass like plant and like *Sericostachys scandens* where it occurs, it tends to grow with

numerous stems difficult to count. These two plants were therefore also considered for harvest and thus included with the 6 recommended plant species for harvest (total 8 plant species for Kitojo parish).

Figure 12: Abundance of requested vines in Kitojo parish

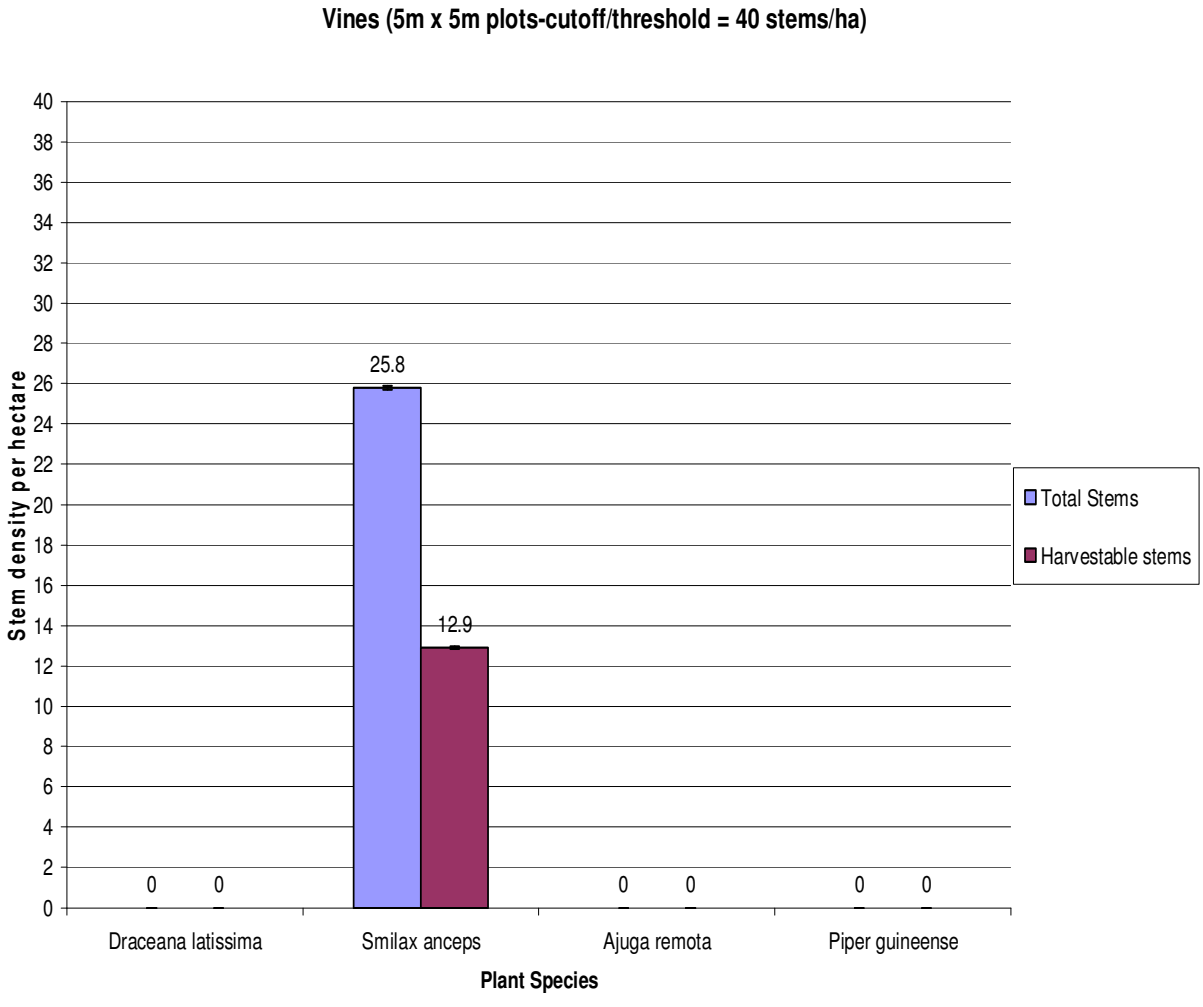


Figure 13: Abundance of requested lianas/shrubs in Kitojo parish

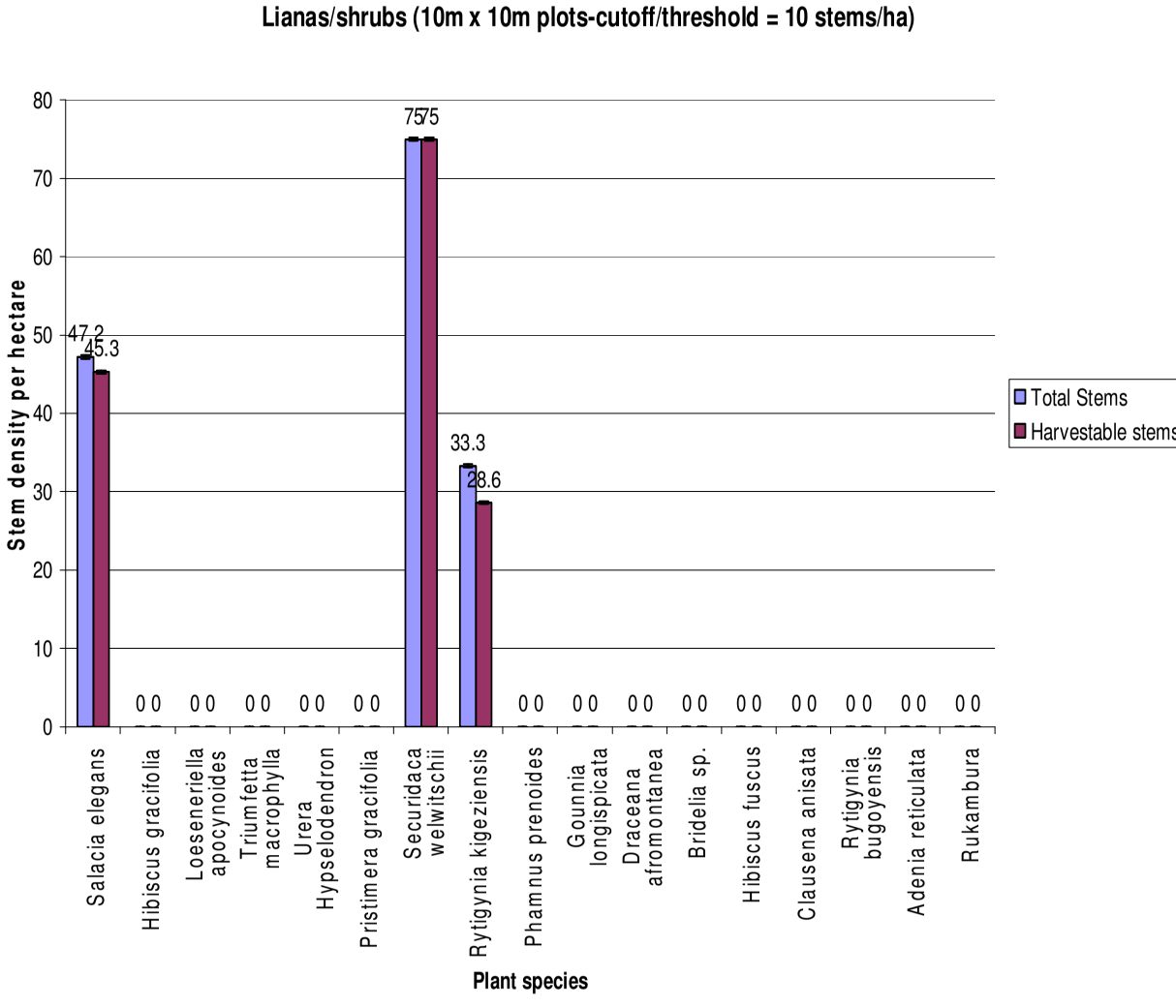
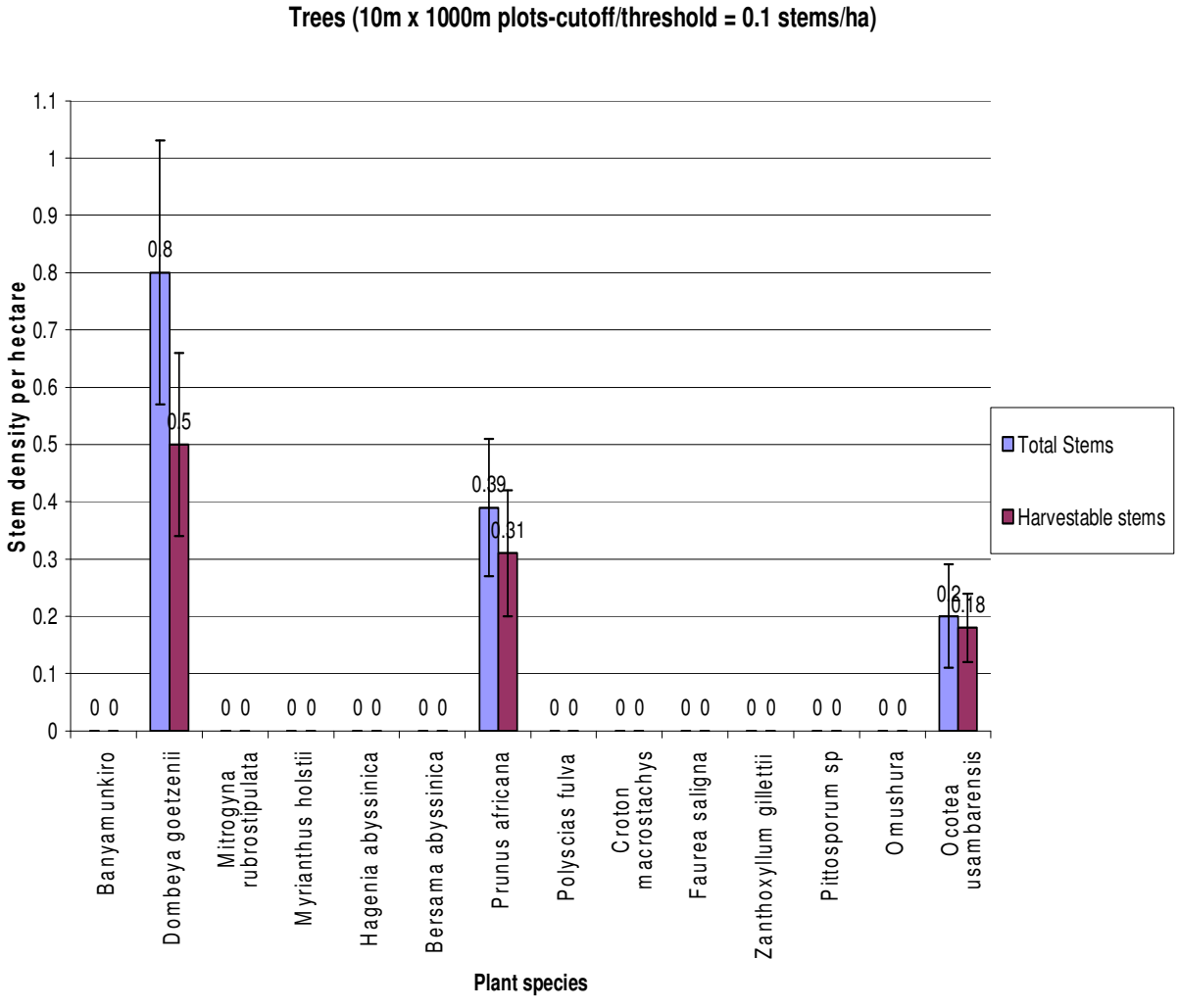


Figure 14: Abundance of requested trees in Kitojo parish



4.3.4 Requested plants from Kiyebe parish

Figures 15 and 16 show the abundance of the requested plants from the forest adjacent Kiyebe parish. From the two figures, only 4 plants had a high stem density. These were; *Securidaca welwitschii* (Entaro), *Dombeya goetzenii* (Omikore), *Rytigynia kigeziensis* (Nyakibazi) and *Prunus Africana* (Omumba). Kiyebe parish did not have any harvestable vines for harvest .There were other two plants of *Setaria plicatilis* (Obutami) and *Sericostachys scandens* (Omuna) observed (like in Kitojo) and therefore considered to have high stem densities (≥40 stems/ha). These were added to the 4 recommended plant species for harvest (total 6 plant species) in Kiyebe parish.

Figure 15 Abundance of requested lianas/shrubs in Kiyebe parish

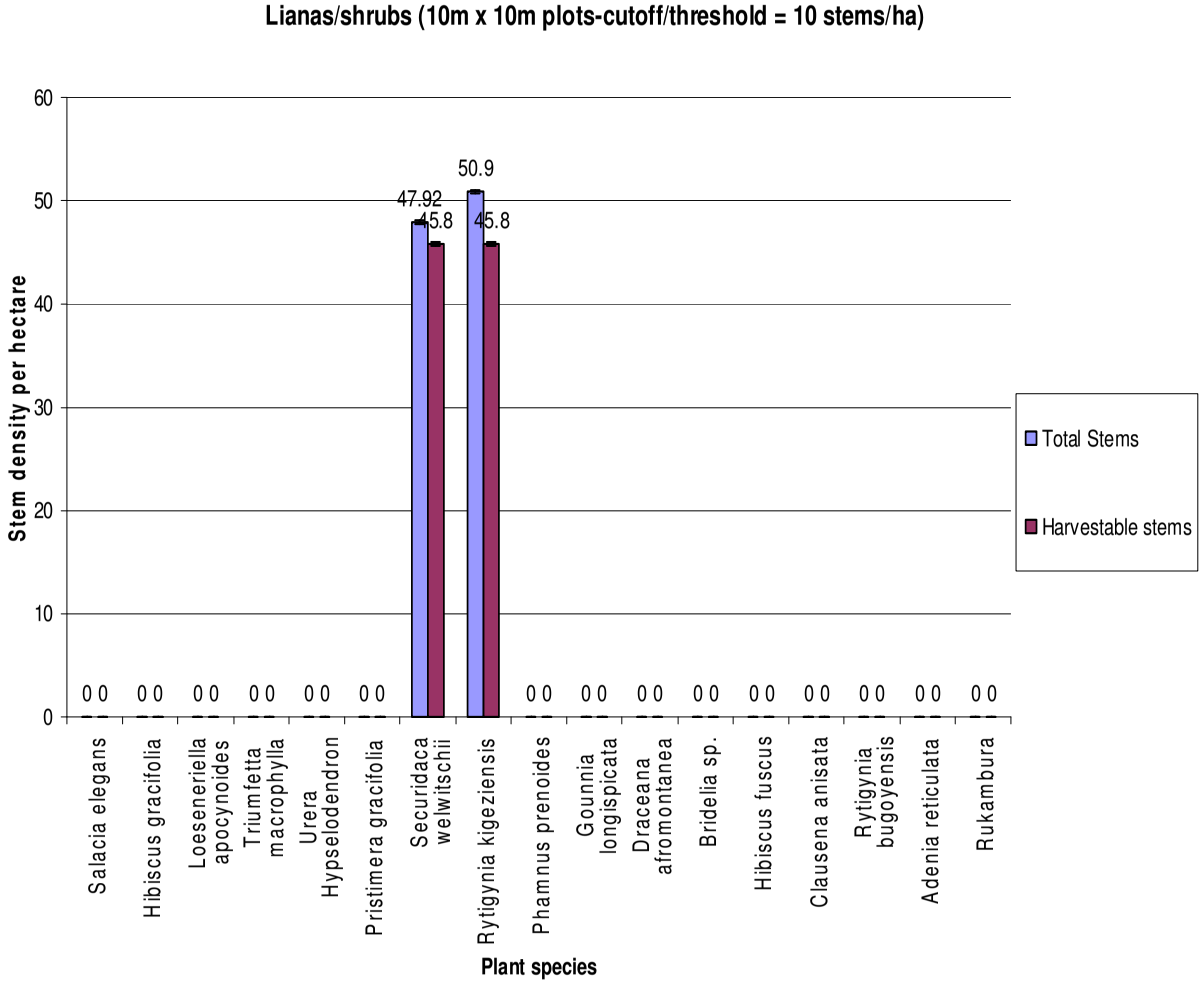
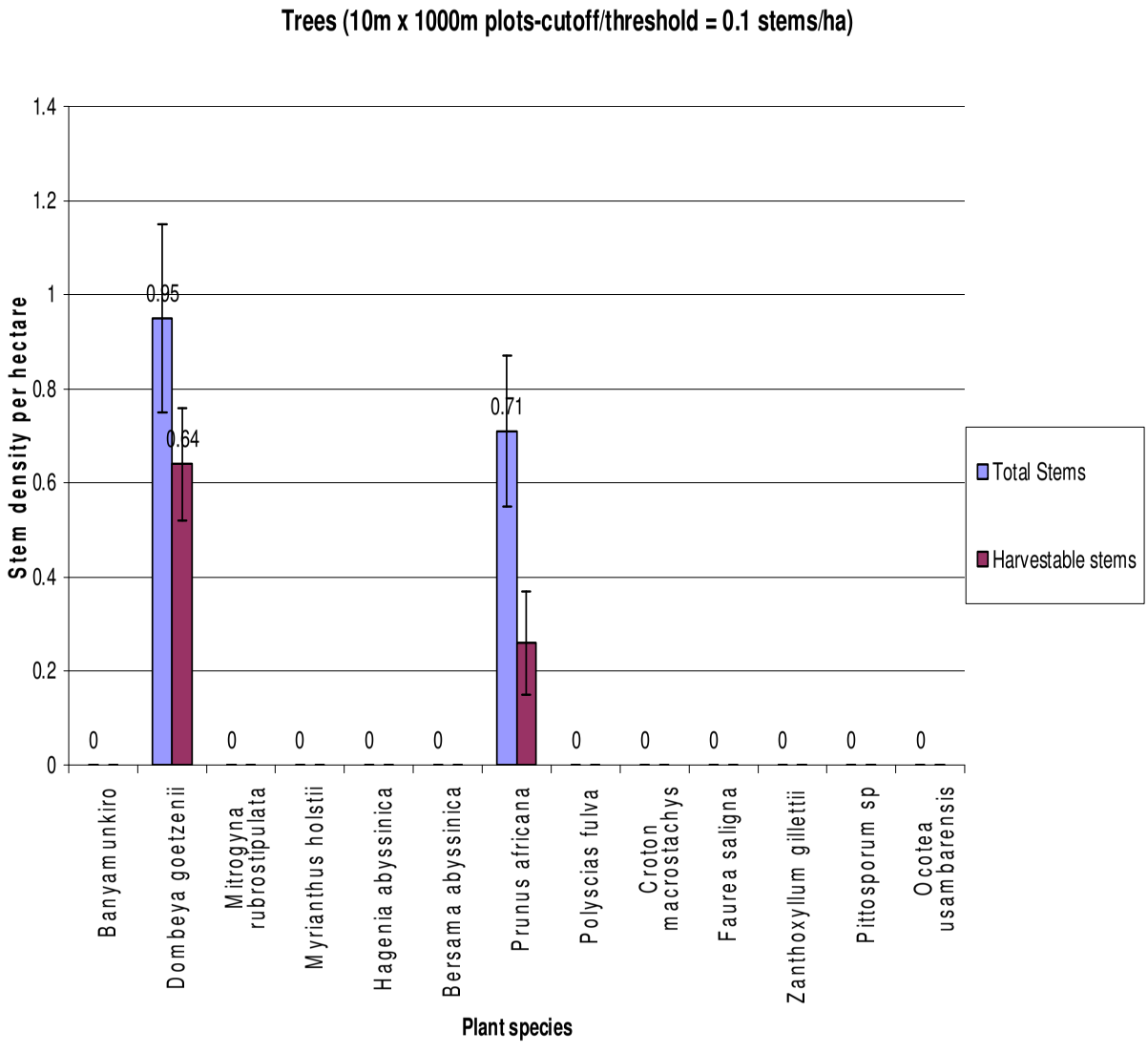


Figure 16 Abundance of requested trees in Kiyebe parish



4.3.5 Requested plants from Mushanje parish

Figures 17 and 18 show the abundance of the requested plants from the forest adjacent Mushanje parish. From the two figures, only 5 plants had a high stem density of the desirable stems to be harvested. These were; *Urera hypselodendron* (Emishe), *Dombeya goetzenii* (Emikore), *Hagenia abyssinica* (Omugyesi), *Polyscias fulva* (Omungo) and *Hagenia abyssinica* (Omurengyere). Like observed in Kiyebe parish, Mushanje parish did not have any harvestable vines for harvest. Also *Setaria plicatilis* (Obutami) and *Sericostachys scandens* (Omuna) were encountered and also included with the other plants of high stem density as mentioned above. Mushanje parish therefore has 6 plant species with high stem densities enough to be harvested.

Figure 17 Abundance of requested Liana/shrubs in Mushanje parish

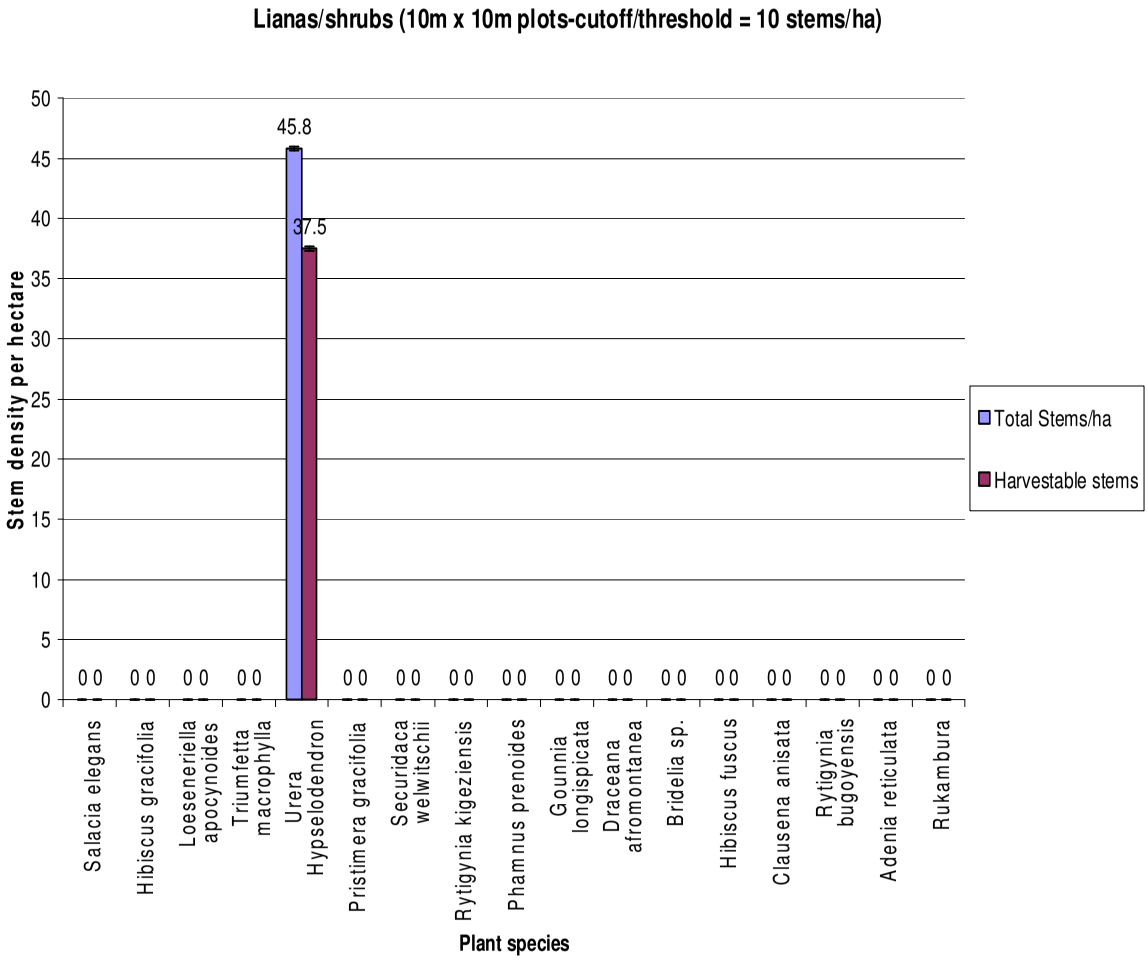
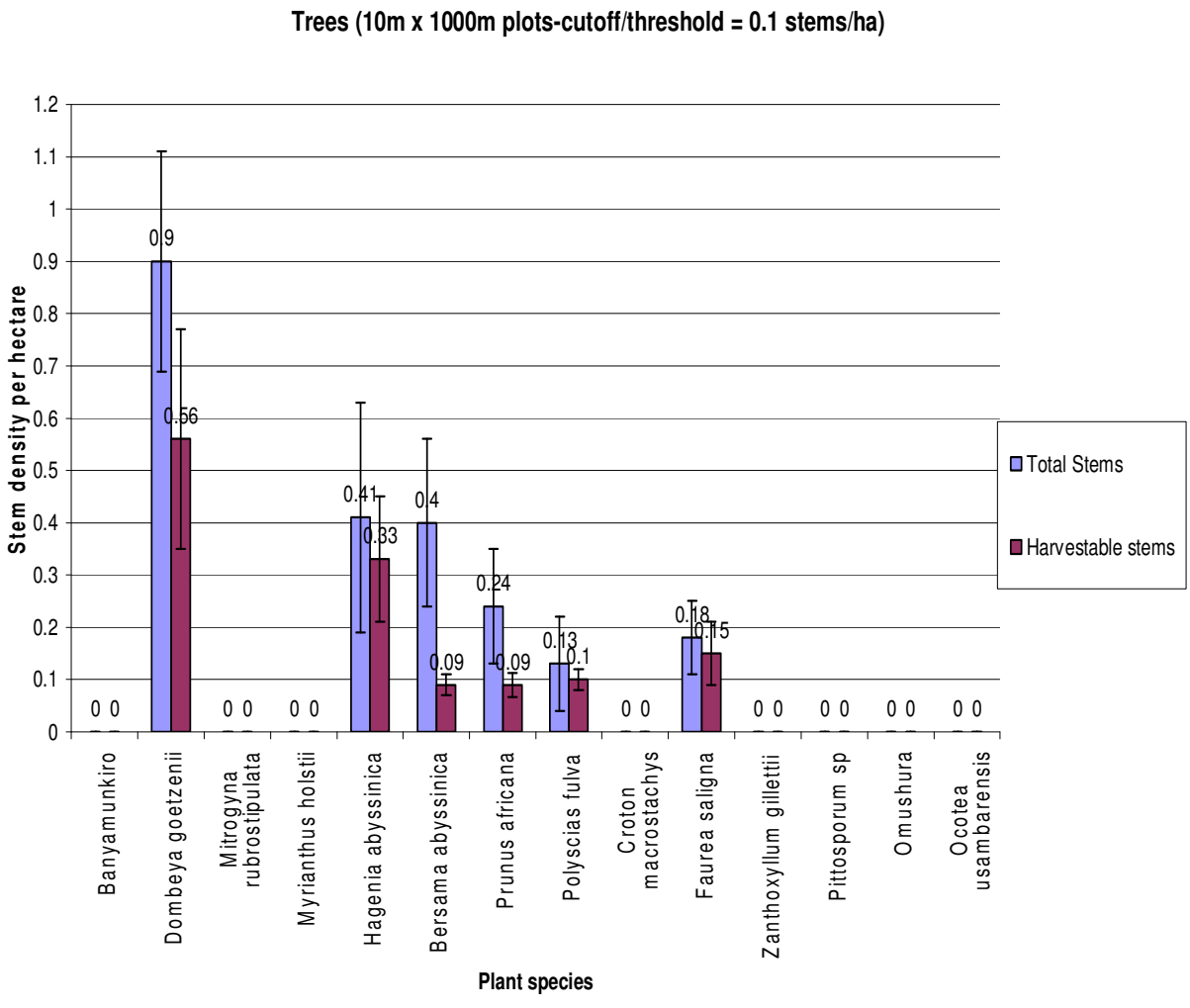


Figure 18 Abundance of requested trees in Mushanje parish



4.3.6 Requested plants from Nyamabare parish

Figures 19, 20, & 21 show the abundance of the requested plants from the forest adjacent Nyamabale parish. From the three figures, only 4 plants had a high stem density of the desirable stems to be harvested. These were; *Rytigynia kigeziensis* (Nyakibazi), *Dombeya goetzenii* (Omukore), *Bersama abyssinica* (Omukaka) and *Polyscias fulva* (Omungo). Like observed in the three parishes above, Mushanje parish did not have enough harvestable vines (figure 18). We further included *Sericostachys scandens* (Omuna) as a plant with high stem density to be harvested from the forest adjacent Nyamabale parish for reasons

already mentioned above. Therefore in total Nyamabale parish had 5 plant species with high stem densities enough to be harvested.

Figure 19: Abundance of requested vines in Nyamabale parish

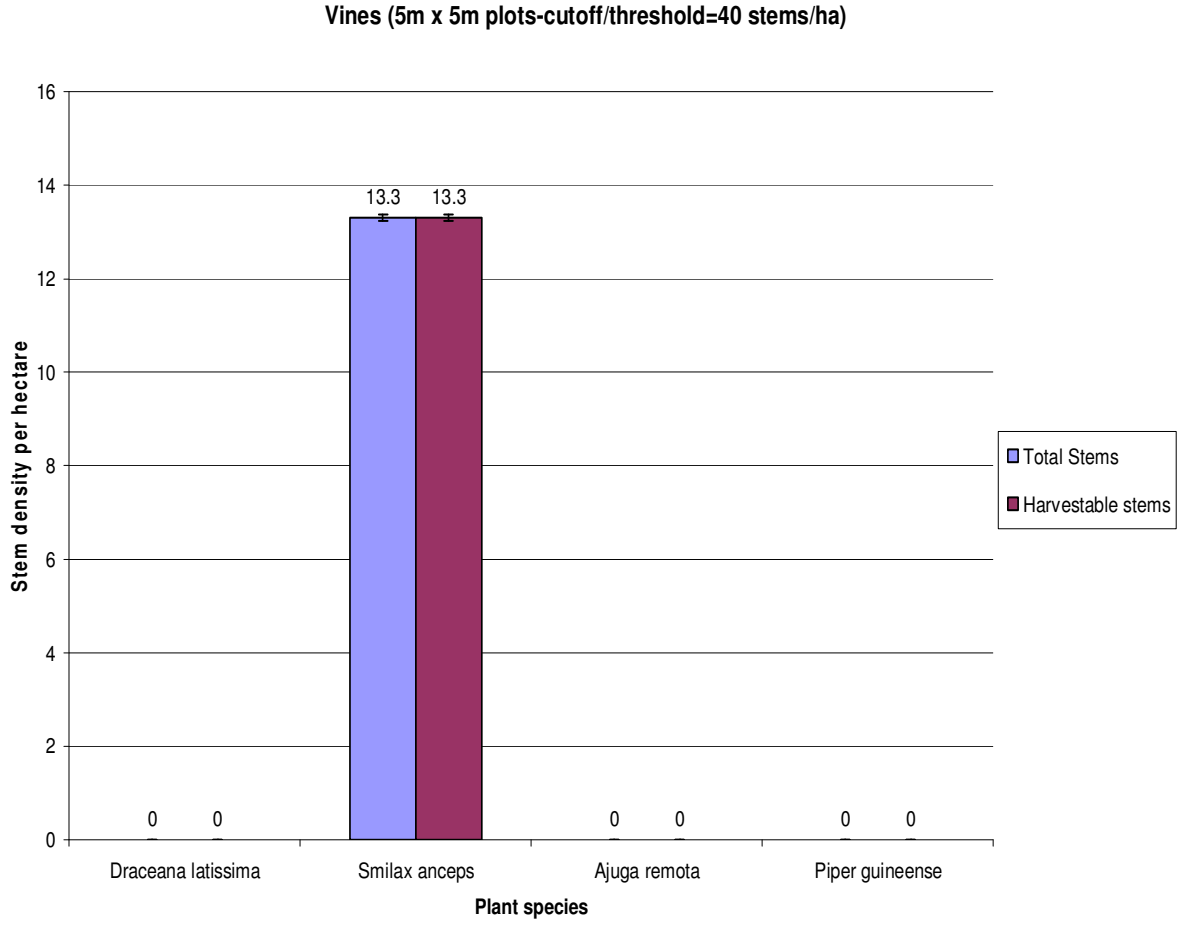


Figure 20: Abundance of requested lianas/shrubs in Nyamabale parish

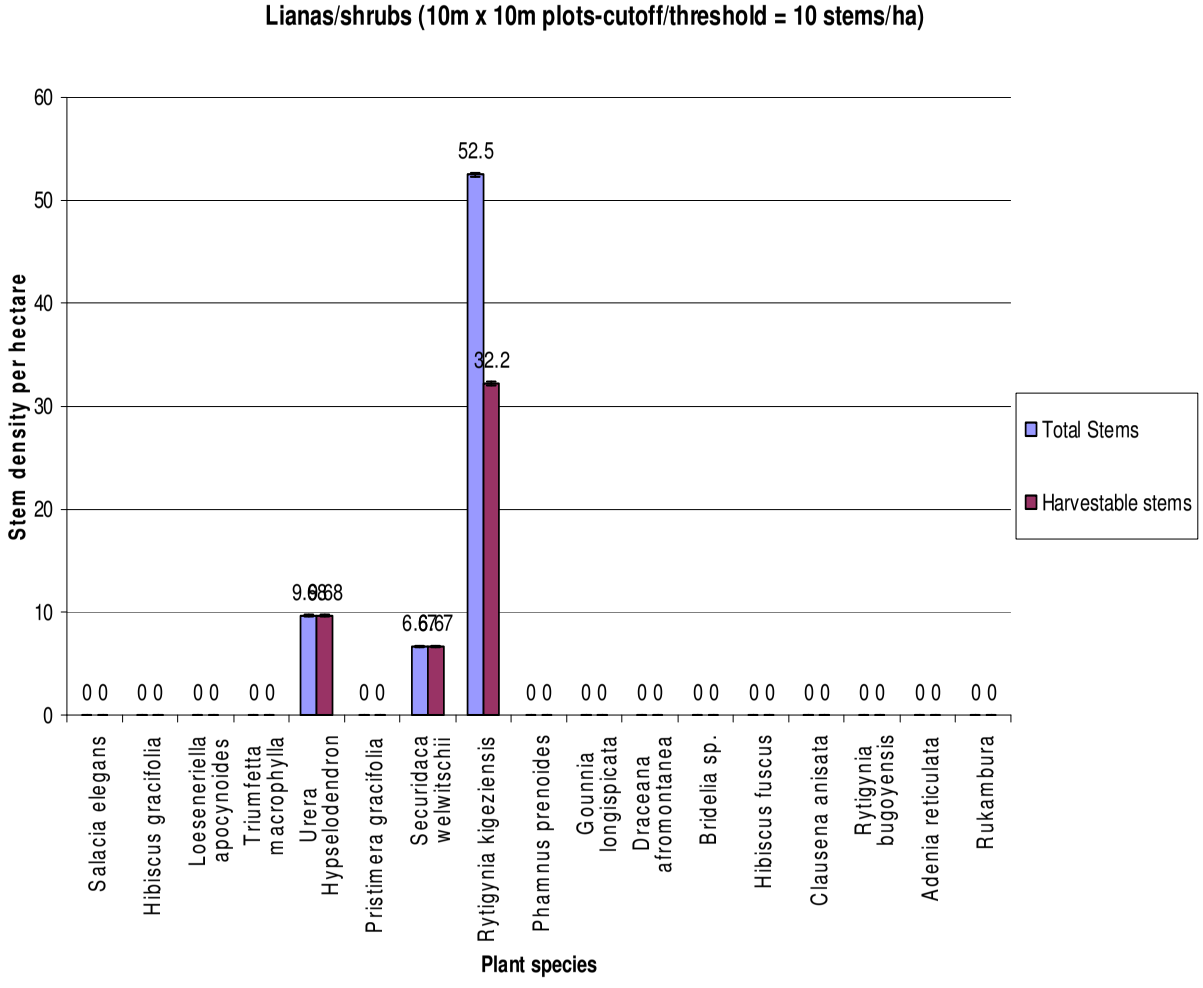
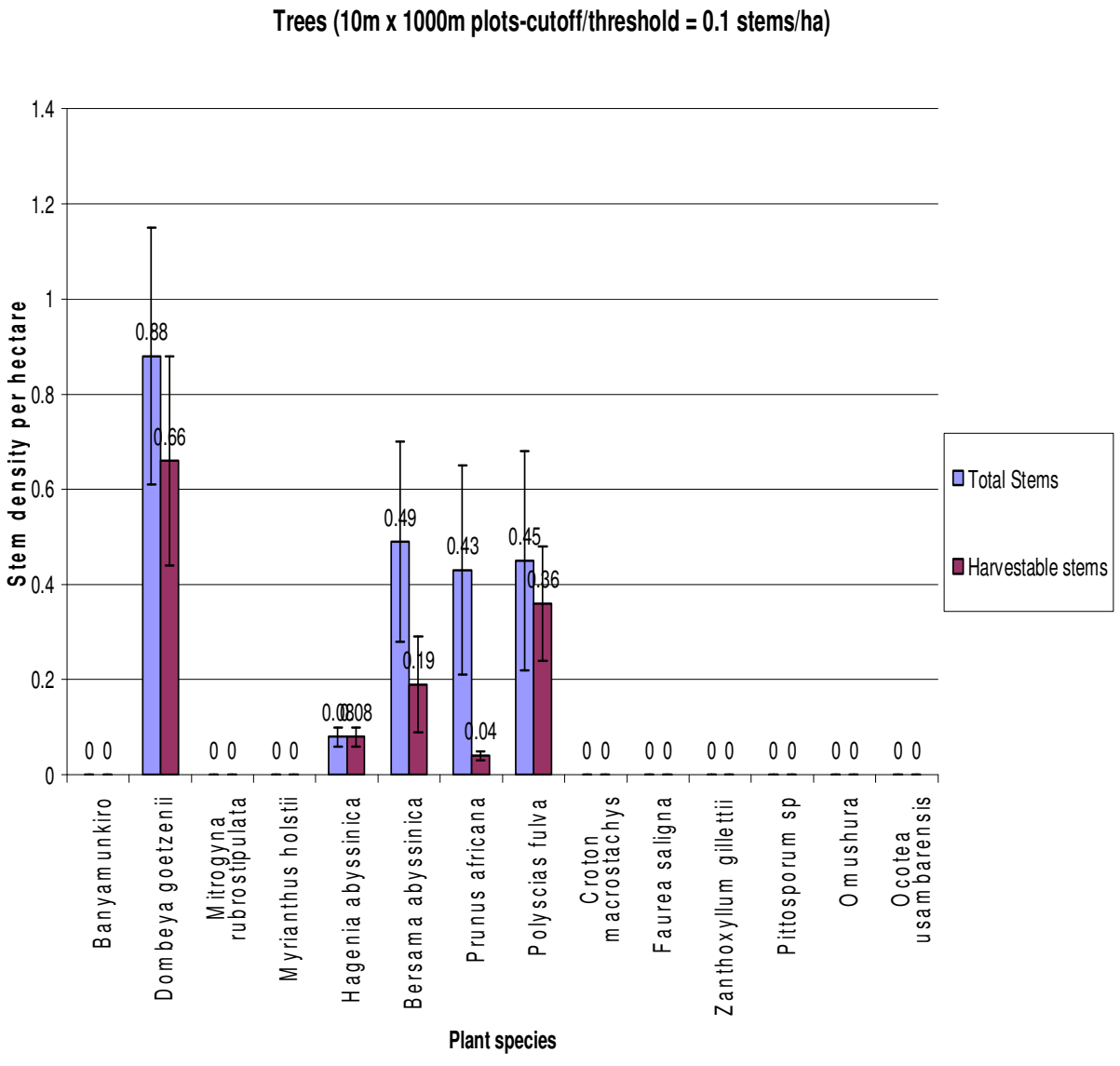


Figure 21: Abundance of requested trees in Nyamabale parish



4.4 Habitat preferences of the most abundant and utilisable plant species

ITFC in previous researches has assessed habitat preference of the most abundant plant species recommended above (ITFC, 1999). For example, *Urera hypselodendron* (Omushe), *Sericostachys scandens* (Omuna), *Setaria plicatilis* (Obutami) are most abundant in lower slopes and valleys while *Dracaena laxissima* (Encheche), Salacia elegans (Bwara), *Pristimera gracifolia* (Endengamatare), *Securidaca welwitschii* (Entaro), *Dombeya goetzenii*

(Omukore), *Bersama abyssinica* (Omukaka) are most abundant in lower and mid slopes and *Smilax anceps* (Enshuri), *Rytigyinia kigeziensis* (Nyakibazi), *Polyscias fulva* (Omungo), *Prunus africana* occur mostly between mid and upper slopes (ITFC, 1999).

4.5 Illegal activities

We encountered illegal activities within the study area as shown in table 2. The Illegal activities observed were snares, bamboo stems harvest, pole cutting and bark harvest from *Rytigyinia kigeziensis* and *Dombeya goetzenii.* An active snare was observed in Kiyebe parish near a beehive just at the park periphery. Bamboo stem harvest was observed in Nyamabare parish while in Kaara, Kashasha, Kitojo and Kiyebe parishes were already harvesting plant resources without agreements with park authorities

Table 2: Illegal activities observed in the study area

Parish	**Illegal activity seen**	**Number of signs seen**
Kaara	Pole cuttings	4
	Rytigynia Bark harvests	1
Kashasha	*Dombeya* sapling harvests	6
Kitojo	*Dombeya* sapling harvests	2
Kiyebe	Active snare	1
	Dombeya saplng harvests	2
Mushanje	Nil	NA
Nyamabare	Bamboo stem harvests	8

4.6 Harvest offtake quotas

Tables 3 to 14 show the recommended plant harvest offtakes for the six beekeeping parishes. From the tables, local people from Kaara and Kashasha parishes were recommended to harvest 10 plants species each, those of Kitojo to harvest 7 plant species, Kiyebe 5 plant species while those of Mushanje and Nyamabare were recommended to harvest 4 plant species each (tables 3 to 14).

Recommendation of the harvest quotas depended on the stem density and type of plant species, growth form and plant part to be harvested. Although Kaara parish had 11 plant

species with reasonably high stem densities, only 10 were recommended for harvest. We did not recommend the harvest of fruits from *Myrianthus holstii* since Uganda Wildlife Authority has no policy on fruit harvest from BINP. The tree fruits are also eaten by Chimpanzees (*Pan trogladytes*) and allowing their harvest could lead to potential competitions with humans.

Plant species of tree life form such as *Polycius fulva* and *Faurea saligna* that are harvested for whole tree stems have not been recommended for harvest either. The *Polycius fulva* and *Faurea saligna* trees are used for wood carvings and beehive making and their harvest could cause a negative harvest impact on the tree populations and is not sustainable (Cunningham, 2001; Peters, 1994). As such for Kashasha parish, although 12 plants had reasonably high stem densities, only 10 were recommended and this was also true for Mushanje and Nyamabare parishes. UWA policy does not allow whole tree stem harvest from BINP. In some parishes such as Kitojo, Nyamabare and Kiyebe, the harvest offtake quotas of *Dombeya goetzenii* saplings were too low (2 to 4 saplings per year) to be harvested annually and therefore we did not recommend their harvest. The harvest of the *Dombeya goetzenii* saplings in the three parishes could lead to their over-exploitation.

The harvest of plant species such as *Sericostachys scandens, Setaria plicatilis* and *Hagenia abyssinica* were not limited because the plants have very high stem densities, grow vigorously within the forest and are harvested for leaves. According to Cunningham (2001); Peters (1994) and Bitariho *et al* (2006) leaf harvest from such plants causes very minimal harvest impacts and as long as harvest is done at a subsistence level, the leaf harvest is sustainable.

Plant resource users harvest bark from trees and shrubs in forms of handfuls scrubbed from tree or shrub trunks. While interviewing the resource users, it was found out that 1 handful of *Rytigynia kigeziensis* bark is approximately $1/8^{th}$ of a kilogram, while for other tree species such as *Ocotea usambarensis* and *Prunus africana*, 1 handful of bark is approximately $1/4^{th}$ of a kilogram. Each handful of bark sample can treat about 8 people (depends on the degree of

sickness) and the bark scrubs can be stored/kept for a year when not in use. The bark scrubs are normally crushed into juice after mixing with other herbs and water for the treatment of diseases and ailments. The recommended bark harvest quotas when carried out at a subsistence level will be adequately used by herbalists for treatment of diseases and ailments.

5.0 Discussions and Conclusions

Density, or the number of individuals per unit area (plant abundance), is probably the ecological parameter of greatest interest to ethnobotanists as it has direct effect on the potential supply of the harvestable plants (Hall and Bawa, 1993; Peters, 1996; Tuxil and Nabhan, 1998; Cunningham, 2001; Bitariho *et al* 2006). We used plant density as a basis for determining which plant species could or could not be harvested. There is a positive relationship between stem density and the quantity of plant material available for harvest (Cunningham, 2001: Peters, 1994: Godoy and Bawa, 1993; Bitariho *et al* 2006). While more sophisticated evaluations could provide greater precision and reliability, they would all require much more time data and expense. Our rapid assessment method has therefore used stem density as the simple low-cost basic criteria for determining which plants can be harvested and to what extent.

It is well known that most tropical forest plant species occur at low densities and are susceptible to over-harvesting (Peters, 1994; Cunningham, 2001; Godoy and Bawa, 1993; Bitariho *et al* 2006). As BINP is primarily intended for conservation, it has been considered important to verge on the side of caution in determining acceptable plant harvests. For more than ten years we have used a cutoff harvest quota of 1% of available plant stock as a basis of determining annual harvest offtakes. This 1 % level has been widely discussed and is the basis of all past MUZs agreements between UWA and local people. Studies elsewhere have recommended a cutoff harvest quota of ≤1% for plants harvested for bark and stems (Zuidema, 2000; Stewart, 2001). The conservative 1% harvest offtake quota could be revised

after subsequent studies of biomass production, mortality and recruitment rates have been carried out.

Plant harvest sustainability is influenced by species ecology, life history, harvested plant parts and management practices (Peters, 1994; Cunningham, 1996; Ticktin, 2004). It is generally claimed that sustainable harvest of plant resources can be determined with reference to the plant's annual biomass production, recruitment and mortality rates (Godoy and Bawa, 1993; Hall and Bawa, 1993; Peters, 1994; Bitariho *et al* 2006). Sustainable harvests can be determined through Permanent Sample Plots (PSPs) and comparing the productivity and status of harvested with un-harvested populations (Hall & Bawa, 1993; Peters, 1994; Feinsinger, P. 1997).

ITFC has set up PSPs in the MUZs and non-MUZs in which three plants of *Rytigyina kigeziensis*, *Ocotea Usambarensis* and *Loeseneriella apocynoides* have been studied for the past 6 years (Bitariho *et al* 2006; Ndangalasi *et al* 2007). Critics of the PSPs have noted that resource users will always avoid them if they are recognised. This criticism may not be of concern if indeed the plots are readily recognised and avoided. The ITFC PSPs have been set up using Global Positioning System (GPS) coordinates, compass bearings and concrete blocks with metal spikes embedded in them buried at start and end of transects. These plots cannot readily be identified unless one was involved in their set up.

Results from the ITFC PSPs show that unlike the weaving plant *Loeseneriella apocynoides* that has been heavily over-exploited, medicinal plant use of the other two species (*Rytigyina kigeziensis* and *Ocotea Usambarensis)* in Bwindi is still at a subsistence level and is sustainable (Bitariho *et al* 2006; Ndangalasi *et al* 2007). There is need to observe other harvested plant species such as *Prunus africana* and *Smilax anceps* and possibly study harvested plants under different treatments through experimental harvests using alternative approaches (Douglas Sheil *personal communication*). Boot & Gullison (1995) also note that comparing harvested and un-harvestested plant populations is not enough to determine plant

harvest sustainability as this assumes a static environment which is seldom the case. They recommend studying the plots for at least 10 years to be able to determine sustainable harvest of plants satisfactorily using transition models.

This study was limited by time, labor and funds, and could not determine the annual biomass production of the requested plants. Rather the emphasis was to give quick but reasonable answers to immediate questions from park managers. We therefore used the rapid assessment method. This study provides an initial basis of plant harvest offtakes for park managers and it safely assumed that the recommended offtake quotas are below the maximum sustainable yields.

Illegal activities such as harvest of non-timber forest products mentioned above will no longer be illegal after the new multiple use MoUs have been completed but of concern are the snares, tree pole cuttings and bamboo stems harvest in the parishes of Kiyebe, Kaara and Nyamabare. There were no illegal activities observed in Mushanje parish. Bamboo stem harvest in Bwindi is not permitted although bamboo rhizome harvest for on-farm planting is allowed by UWA and has been ongoing for the past 14 years.

The fact that the southeastern part of BINP has a very low potential of plant resources has been highlighted in this study. The high altitude may affect the abundance and distribution of the plant species. For example, Obua *et al* (1998) noted that the abundance of *Smilax anceps* vines decreased with increasing altitude in Bwindi. In the southeastern part of Bwindi the most abundant plant species are high altitude plants such as *Arundinaria alpina* (bamboo) and *Hagenia abyssinica* (Butynski, 1984; Bitariho & Mosango, 2005). Mpungu and Rutugunda MUZs in contrast cover a range of altitudes and have many more (57) plant species recommended for harvest in previous assessments (Wild, 2001).

This study recommends the following:

I) Before any plant harvest begins, forest resource user groups like those in Mpungu should be formed with the help of UWA, ITFC and CARE-EEEGL. The societies could be evolved from the already existing beekeeping societies. The aim of forming these societies is to help in: recording annual plant harvest offtakes, monitoring and managing the plant harvests to mitigate their over-harvesting, registering plant resource users and reporting any illegal activities within the multiple use zones.

II) Like mentioned above, ITFC needs to establish more Permanent Sample Plots in these new plant harvest zones to help investigate and determine sustainable plant harvest offtakes.

III) We discourage the commercial use of medicinal plants such as *Prunus africana* and others that are used for bark. This study noted the potential of these bark harvested plants to be commercially harvested with evidences of commercial herbal clinics springing up in Kanungu, Kihihi, Kabale and Kisoro towns. The recommended harvest offtakes when used at a subsistence level can satisfy the local people herbal medicine requirements and are sustainable.

IV) The program of supplying bamboo rhizomes for onfarm planting by UWA should be continued as there seems to be a high demand of bamboo stems from the local communities seen through illegal cutting of bamboo stems from the forest

Table 3 Recommended annual harvest offtake quotas of weaving plants from Kaara parish

Plants Species	Local name	Life form	Part Used	Harvestable stem density/ha	Estimate harvestable stems in whole zone ($7km^2$)-available stock	**Recommended maximum stems to be harvested/year (1% of available plant stock)**
Draceana laxissima	Enchenche	Shrub	Stem	387	270,900	**2,709 stems**
Smilax anceps	Enshuri	Vine	Stem	40	28,000	**280 stems**
Salacia elegans	Bwara	Liana	Stem	37	25,900	**259 stems**
Pristimera Gracifolia	Endengamatare	Liana	Stem	47	32,900	**329 stems**
Securidaca welwitschii	Entaro	Liana	Stem	33	23,100	**231 stems**

Table 4 Recommended annual harvest offtake quotas of medicinal/food plants from Kaara parish

Plant Species	Local name	Life form	Part Used	Harvestable stem density/ha	Estimate harvestable stems in whole zone (7km^2)	Average bark mass/ plant (Kg)	Estimate bark mass available in whole zone (Kg)	**Recommended maximum annual harvest (1% of available stock)**
Rytigynia kigeziensis	Nyakibazi	Shrub	Bark	70	49,000	0.45	22,050	**221kg =1768 handfuls**
Prunus africana	Omumba	Tree	Bark	0.6	420	0.45	189	**2kg = 8 handfuls**
Bersama abyssinica	Omukaka	Tree	Bark	0.7	490	0.45	220.5	**2.2 kg = 9 handfuls**
Croton macrostachys	Omurangara	Tree	Bark	0.7	490	0.45	220.5	**2.2kg = 9 handfuls**
Myrianthus holstii	Omufa	Tree	Fruit	3	2,100	???	????	***(needs UWA policy on fruit harvest)***
Sericostachys scandens	Omuna	Liana	Leaf	---	----	-----	-----	**No Limit**

Note: Average bark mass for all trees and shrubs were assumed to be equal to 0.45kg (Bitariho *et al* 2006).
1 handful of *Rytigyinia* = 1/8kg, other tree species (*Prunus, Bersama* etc) 1 handful = 1/4kg

Table 5 Recommended annual harvest offtake quotas of weaving/craft plants from Kashasha parish

Plants Species	Local name	Life form	Part Used	Harvestable stem density /ha	Estimate harvestable stems in whole zone (5.3km^2)-available stock	**Recommended maximum stems to be harvested/year (1% of available plant stock)**
Draceana laxissima	Enchenche	Shrub	Stem	343	181,790	**1,818 stems**
Salacia elegans	Bwara	Liana	Stem	121	64,130	**641 stems**
Urera hypselodendron	Emishe	Liana	stem	14	7,420	**74 stems**
Pristimera gracifolia	Endengamatare	Liana	Stem	52	27,560	**276 stems**
Securidaca welwitschii	Entaro	Liana	Stem	300	159,000	**1,590 stems**
Dombeya goetzenii	Omukore	Tree	Bark (from saplings	21	11,130	**111 saplings**
Faurea saligna	Omurengyere	Tree	Whole tree stem	5	2,650	***Not recommended***
Polyscias fulva	Omungo	Tree	Whole tree stem	7	3,710	***Not recommended***

Table 6 Recommended annual harvest offtake quotas of medicinal plants from Kashasha parish

Plant Species	Local name	Life form	Part Used	Harvestable Stem density/ha	Estimate harvestable stems in whole zone (5.3km^2)	Average bark mass/plant (Kg)	Estimate bark mass available in whole zone (Kg)	**Recommended maximum annual harvest (1% of available stock)**
Rytigynia kigeziensis	Nyakibazi	Shrub	Bark	36	19,080	0.45	8,586	**86kg =688 handfuls**
Prunus africana	Omumba	Tree	Bark	7	3,710	0.45	1,670	**17kg=68 handfuls**
Bersama abyssinica	Omukaka	Tree	Bark	5	2,650	0.45	1,193	**12kg=48 handfuls**
Sericostachys scandens	Omuna	Liana	Leaf	---	----	-----	-----	**No Limit**

Note: Average bark mass for all trees and shrubs were assumed to be equal to 0.45kg (Bitariho *et al* 2006).
1 handful of *Rytigyinia* = 1/8kg, other tree species (*Prunus, Bersama* etc) 1 handful = 1/4kg

Table 7 Recommended annual harvest offtake quotas of weaving plants from Kitojo parish

Plants Species	Local name	Life form	Part Used	Harvestable stem density/ha	Estimate harvestable stems in whole zone ($4.5km^2$)- available stock	**Recommended maximum stems to be harvested/year (1% of available plant stock)**
Salacia elegans	Bwara	Liana	Stem	45	20,250	**203 stems**
Setaria plicatilis	Obutami	Grass	Leaf/flower stalks	-----	----	**No Limit**
Securidaca welwitschii	Entaro	Liana	Stem	75	33,750	**338 stems**
Dombeya goetzenii	Omukore	Tree	Bark (from saplings)	0.5	225	**2 saplings (*Not recommended*)**

Table 8 Recommended annual harvest offtake quotas of medicinal plants from Kitojo parish

Plant Species	Local name	Life form	Part Used	Stem density/ha	Estimate stems in whole zone ($4.5km^2$)	Average bark mass/ plant (Kg)	Estimate bark mass available in whole zone (Kg)	**Recommended maximum harvest (1% of available stock)**
Rytigynia kigeziensis	Nyakibazi	Shrub	Bark	29	13,050	0.45	5,873	**59kg=472handfuls**
Prunus africana	Omumba	Tree	Bark	0.3	135	0.45	61	**0.6kg=3 handfuls**
Ocotea usambarensis	Omwiha	Tree	Bark	0.2	90	0.45	40.5	**0.4kg =2handfuls**
Sericostachys scandens	Omuna	Liana	Leaf	---	----	-----	-----	**No Limit**

Note: Average bark mass for all trees and shrubs were assumed to be equal to 0.45kg (Bitariho *et al* 2006).

1 handful of *Rytigyinia* = 1/8kg, other tree species (*Prunus, Bersama* etc) 1 handful = 1/4kg

Table 9 Recommended annual harvest offtake quotas of weaving plants from Kiyebe parish

Plants Species	Local name	Life form	Part Used	Harvestable stem density/ha	Estimated harvestable stems in whole zone (4 km^2)-available stock	**Recommended maximum stems to be harvested/year (1% of available plant stock)**
Securidaca welwitschii	Entaro	Liana	Stem	46	18,400	**184 stems**
Setaria plicatilis	Obutami	Grass	Flower stalks	-----	----	**No Limit**
Dombeya goetzenii	Omukore	Tree	Bark (from saplings)	0.64	256	**3 saplings (*Not recommended*)**

Table 10 Recommended annual harvest offtake quotas of medicinal plants from Kiyebe parish

Plant Species	Local name	Life form	Part Used	Harvestable Stem density/ha	Estimate harvestable stems in whole zone (4km^2)	Average bark mass/ plant (Kg)	Estimate harvestable bark mass available in whole zone (Kg)	**Recommended maximum annual harvest (1% of available stock)**
Rytigynia kigeziensis	Nyakibazi	Shrub	Bark	46	18,400	0.45	8,280	**83kg=664 handfuls**
Prunus africana	Omumba	Tree	Bark	0.3	120	0.45	54	**0.54kg =2 handfuls**
Sericostachys scandens	Omuna	Liana	Leaf	---	----	-----	-----	**No Limit**

Note: Average bark mass for all trees and shrubs were assumed to be equal to 0.45kg (Bitariho *et al* 2006).
1 handful of *Rytigyinia* = 1/8kg, other tree species (*Prunus, Bersama* etc) 1 handful = 1/4kg

Table 11 Recommended annual harvest offtake quotas of weaving/craft plants from Mushanje parish

Plants Species	Local name	Life form	Part Used	Harvestable stem density/ha	Estimated harvestable stems in whole zone (1.4km^2)-available stock	**Recommended maximum stems to be harvested/year (1% of available plant stock)**
Urera hypselodendron	Emishe	Liana	stem	38	5,320	**53 stems**
Setaria plicatilis	Obutami	Grass	Flower Stalks	-----	----	**No Limit**
Polyscias fulva	Omungo	Tree	Whole stem	0.1	14	**Not recommended**

Table 12 Recommended annual harvest offtake quotas of medicinal plants from Mushanje parish

Plant Species	Local name	Life form	Part Used	Harvestable Stem density/ha	Estimate harvestable stems in whole zone (5.3km^2)	Average bark mass/ plant (Kg)	Estimate bark mass available in whole zone (Kg)	**Recommended maximum annual harvest (1% of available stock)**
Hagenia abyssinica	Omugyesi	Tree	Leaf	0.3	42	-----	-----	**No Limit**
Sericostachys scandens	Omuna	Liana	Leaf	---	----	-----	-----	**No Limit**

Table 13 Recommended annual harvest offtake quotas of weaving/craft plants from Nyamabare parish

Plants Species	Local name	Life form	Part Used	Harvestable stem density/ha	Estimated harvestable stems in whole zone (5.5km^2)-available stock	**Recommended maximum stems to be harvested/year (1% of available plant stock)**
Urera hypselodendron	Emishe	Liana	Stem	10	5,500	**55 stems**
Dombeya goetzenii	Omukore	Tree	Bark (from saplings)	0.7	385	**4 saplings (*Not recommended*)**
Polyscias fulva	Omungo	Tree	Whole tree stem	0.4	220	***Not recommended***

Table 14 Recommended annual harvest offtake quotas of medicinal plants from Nyamabare parish

Plant Species	Local name	Life form	Part Used	Harvestable Stem density/ha	Estimate harvestable stems in whole zone (5.5km^2)	Average bark mass/plant (Kg)	Estimate bark mass available in whole zone (Kg)	**Recommended maximum annual harvest (1% of available stock)**
Rytigynia kigeziensis	Nyakibazi	Shrub	Bark	32	17,600	0.45	7,920	**79kg =632 handfuls**
Bersama abyssinica	Omukaka	Tree	Bark	0.2	110	0.45	49.5	**0.5kg =2handfuls**
Sericostachys scandens	Omuna	Liana	Leaf	---	----	-----	-----	**No Limit**

Note: Average bark mass for all trees and shrubs were assumed to be equal to 0.45kg (Bitariho *et al* 2006).
1 handful of *Rytigyinia* = 1/8kg, other tree species (*Prunus, Bersama* etc) 1 handful = 1/4kg

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7.0 Appendix

7.1 Requested plant species by local communities adjacent Bwindi

Local name	Scientific name	Life form	Part harvested	Use
Banyamunkiro		Tree	Bark	Medicinal
Bwara	*Salacia elegans*	Liana	Stem	Weaving
Emigushagusha	*Hibiscus gracifolia*	Liana	Stem	Weaving
Emijega	*Loeseneriella apocynoides*	Liana	Stem	Weaving
Emikore	*Dombeya goetzenii*	Tree	Bark	Medicinal
Eminaba	*Triumfetta macrophylla*	Liana	Stem	Weaving
Emishe	*Urera Hypselodendron*	Liana	Stem	Weaving
Enchenche	*Draceana latissima*	Vine	Stem	Weaving
Endengamatare	*Pristimera gracifolia*	Liana	Stem	Weaving
Engomera	*Mitrogyna rubrostipulata*	Tree	Bark	Medicinal
Enshuri	*Smilax anceps*	Vine	Stem	Weaving
Entaro	*Securidaca welwitschii*	Liana	Stem	Weaving
Kitinwa	*Ajuga remota*	Herb	Stem	Medicinal
Nyakibazi	*Rytigynia kigeziensis*	Shrub	Bark	Medicinal
Obunyurasaka	*Phamnus prenoides*	Liana	Fruit	Medicinal
Obutami	*Setaria plicatilis*	Grass	Flower stalk	Weaving
Omufa	*Myrianthus holstii*	Tree	Fruit	Food
Omufururа	*Gounnia longispicata*	Liana	Stem	Medicinal
Omugesi	*Hagenia abyssinica*	Tree	Leaf	Medicinal
Omugorora	*Draceana afromontanea*	Shrub	Bark	Medicinal
Omugyi	*Bridelia sp.*	Shrub	Bark	Medicinal
Omukaka	*Bersama abyssinica*	Tree	Bark	Medicinal
Omumba	*Prunus africana*	Tree	Bark	Medicinal
Omuna	*Sericostachys scandens*	Liana	Leaf	Medicinal
Omungo	*Polyscias fulva*	Tree	Stem	Wood carvings
Omurangara	*Croton macrostachys*	Tree	Bark	Medicinal
Omurengyere	*Faurea saligna*	Tree	Stem	Beehives
Omushaga	*Fagara macrophylla*	Tree	Bark	Medicinal
Omushekyera	*Pittosporum sp*	Tree	Bark	Medicinal
Omushura		Tree	Bark	Medicinal
Omusinga	*Hibiscus fuscus*	Shrub	Bark	Medicinal
Omutana	*Clausena anisata*	Shrub	Bark	Medicinal
Omwatamabare	*Rytigynia bugoyensis*	Shrub	Bark	Medicinal
Omwiha	*Ocotea usambarensis*	Tree	Bark	Medicinal
Orubogore	*Adenia reticulata*	Liana	Leaf	Medicinal
Rukambura		Liana	Root/stem	Medicinal
Rukokota	*Piper guineense*	Vine	Root/stem	Medicinal

7.2 CONSULTANT AGREEMENT FOR A CORPORATION

This Agreement is made as of the date set forth below between **Institute of Tropical Forest Conservation, Mbarara University of Science & Technology** (the "Company"), a corporation doing business at **P.O. Box 1410**, Mbarara Tel: 0392709753, Email: douglassheil@itfc.org and CARE International in Uganda, an international NGO doing business at Plot 17, Mackinnon Road, Nakasero, P.O. Box 7280, Kampala, hereby agree to the following:

1. **Consultant. The Company shall assign** Bitariho Robert & Douglas Sheil**, and the Consultant agrees to be assigned to complete the work set forth in Schedule A, incorporated herein, within the time frame specified in the schedule. In the event a Consultant is to be assigned and the Company fails to assign these duties to this Consultant will automatically constitute a breach of this Agreement, unless CARE, by written approval, agrees to accept a substitute Consultant furnished by the Company. Neither the Company nor the assigned Consultant may subcontract or sublicense their duties hereunder.**

2. **Compensation. The Company shall be compensated according to the terms specified in Schedule A, and no payments shall be made to the assigned Consultant directly, if a Consultant is assigned by the Company. Nor shall the Company or assigned Consultant receive vacations; sick pay, insurance or other benefits usually afforded the employees of CARE.**

3. **CARE Name. The Company and the assigned Consultant shall use the CARE name or marks only for activities authorized by CARE in writing. All other uses will be deemed infringements of the CARE trademark.**

4. Taxes. The Company and assigned Consultant each shall pay all personal taxes, social security, and other taxes or fines that it may incur as a result of the performance of obligations hereunder. Where applicable, CARE may withhold the taxes and remit to the appropriate tax authority.

5. **Indemnity. The Company and assigned Consultant shall indemnify and hold harmless CARE, and its officers, directors, employees, agents and its and their respective heirs, legal representatives, successors and assigns, from and against any and all claims, demands, liabilities, expenses (including reasonable attorney's fees and disbursements, court costs, judgments, settlements and fines), whether of omission or commission, that may be committed or suffered in connections with the performance of this Agreement by the Company, its affiliate, partner or agent of the Company or the assigned Consultant's general business operations. This paragraph shall survive termination or expiration of this Agreement.**

6. Safety & Security: In connection with your consultation work for CARE, and travel relating to your work, you may encounter difficult conditions and hazards. Although CARE will take appropriate measures to reduce related risks to a minimum in line with its safety and security policies, CARE does not provide insurance coverage for your safety or that of your property. It is your obligation to understand in advance all the risks inherent in your travel and work because, in accepting this consulting contract, you accept those risks.

7. Ownership of Work. The Company and assigned Consultant each represents and warrants that all work created pursuant to this Agreement shall be original work and that no third party will hold any rights in or to such work. The Company and assigned Consultant each agrees that CARE shall, solely and exclusively, own all rights in and to any work created by the Company and assigned Consultant in connection with this Agreement, including all data, documents, information, copyrights, patents, trademarks, trade secrets, or other proprietary rights in and to the work. By entering into this Agreement, the Company and assigned Consultant hereby expressly transfers all such rights to CARE. Any work created by the Company and assigned Consultant hereunder shall be a work for hire as defined in as defined in Uganda Trademark Laws.

8. Disclosure. Neither the Company nor the assigned Consultant shall disclose any matters of a confidential nature to which the Company and/or assigned Consultant, its employees or other agents may be or become privy as a result of the Agreement. Upon the expiration or termination of this Agreement, the Company and assigned Consultant shall each surrender to CARE all

confidential material relating to CARE in the possession of the Company and assigned Consultant, their employees or other agents of whatever origin and including, without limitation, duplicates, facsimiles, models, prototypes and notes relating thereto. The Consultant and assigned Consultant shall promptly direct all inquiries relating to confidential and proprietary information from the public (whether from an individual, a government agency or official, the media or other sources) to your supervisor, except as CARE may otherwise provide by written instructions to the Company and assigned Consultant. This Article shall survive any termination or expiration of the Agreement.

9. Business and Office Policies. During the term of this Agreement, the Company and assigned Consultant shall not engage in any activities that may interfere with its and/or the assigned Consultant's performance of the duties set forth herein and the Company and assigned Consultant shall comply with the business and office policies of CARE.

10. Inability to Complete. If the Company or assigned Consultant are unable to complete the described activities and duties described for any reason, then CARE shall have the option to terminate this Agreement on fine (5) business days written notice unless the Company furnishes another individual as Consultant satisfactory to CARE. Otherwise, the non-performance by the Company or assigned Consultant of the duties described in Schedule A will constitute a breach of this Agreement. CARE may withhold fees and compensation due to the Company or assigned Consultant until a settlement of any dispute between the parties has been reached.

11. Termination. This Agreement shall automatically terminate 30 days after the date set forth on Schedule A for the completion of the described duties. It may be terminated by CARE at any time for any reason, upon five (5) days written notice to the Company. Provision which are intended to survive termination or expiration of this Agreement include, without limitation, to paragraphs 3, 4, 5, 6, and 7 hereof.

12. Information. CARE shall furnish the Consultant and/or assigned Consultant with such information as the Company deems necessary to perform agree upon services, and CARE warrants that such information will be true and correct.

13. No Joint Venture. Nothing herein shall be deemed to create a joint venture, agency or partnership between CARE and the Company and/or the assigned Consultant, and neither the assigned Consultant nor the Company shall have the power to obligate or bind CARE in any manner whatsoever, except as provided herein. The Company and assigned Consultant are independent contractors with respect to CARE.

14. By signing this contract, the consultant hereby certifies that it has not provided and will not provide material support or resources to any individual or organization that it knows, or has reason to know, is an individual or organization that advocates, plans, sponsors, engages in, or has engaged in an act of terrorism.

15. Governing Law; Disputes. This Agreement shall be construed and enforced in accordance with, and governed by the laws of the laws of Uganda.

16. Notices. Any notice or other communication required or permitted hereunder shall be delivered in person or sent by first-class (certified mail return receipt requested) to the address set forth above. Such notice or communication shall be deemed to have been given as of the date so delivered, sent or mailed.

17. Entire Agreement. This Agreement contains the entire understanding of the parties hereto with respect to the subject matter contained herein. This Agreement supersedes all prior agreements and understandings between the parties with respect to such subject matter and may only be modified or discharged by a written document executed by the parties hereto. No terms hereof may be waived or modified except by written amendment.

18. Representations. By his or her signature below, each signatory hereto represents and warrants that he or she is duly authorized to enter this Agreement on their behalf and he or she purports to represent such that, upon execution and delivery, this Agreement shall be a binding obligation of such party. This Agreement shall be binding upon and inure to the benefit of each party's legal representatives, successors and permitted assigns.

19. Headings. Article headings herein are included for convenience of reference only and shall not affect the construction or interpretation of this Agreement**.**

20. For none Resident Consultants, CARE will withhold tax at a rate of 15% as stipulated by section 85 and 120 of the Income Tax ACT on all the Consultant's payments (including both professional fees and expenses). CARE will also in addition pay VAT on Consultants payments at 18% (this tax will be borne by CARE and not the consultant and therefore should not be pegged into the Consultant's fee).

21. CARE will not withhold any amounts in lieu of tax from Resident consultants' payments, and the Consultant is entirely responsible for meeting all his tax obligations. CARE will accept a VAT charge within the Consultants invoice (the invoice must be a proper VAT tax invoice) from VAT registered resident Consultants.

22. The consultant will be paid 50% of the total cost of the assignment on signing of the contract , 30% upon submission of draft report and 20% upon successful completion of the scope of work to CARE Uganda's satisfaction and submission of an invoice detailing the number of days worked. If the consultant requires an extension of time, a request for an extension with concrete justification must be submitted in writing to CARE management. Late submission of the agreed upon scope of work beyond agreed upon date will result in a 5 % loss of the fee per each week late, up to a maximum of 50 % loss. For specific time bound scope of work e.g. proposal development, late submission of the agreed upon scope of work beyond the agreed upon date will result in none payment as such assignments are time bound and have no room for extension.

23. Payment shall be within 21 days after receipt of invoice and consultants shall be paid in the currency agreed upon at the time of signing the contract.

24. CARE will refund for consultant's subsistence costs (Perdiems & Lodging) and transport expenses at the prevailing CARE rates and as agreed upon and documented at the time of signing this agreement.

25. By signing this agreement the Consultant confirms that there are no legal restrictions on his undertaking this assignment within Uganda and that all representations he has made to this effect are true to the best of his Knowledge. "

26. **Time is of the essence of the Agreement.**

IN WITNESS WHEREOF, the parties have duly executed this Agreement as of the _____day of _____, 2008.

CARE INTERNATIONAL IN UGANDA

_____ _____

Name: Shameem Siddiqi
Title: Program Director

_____

COMPANY: **Institute of Tropical Forest Conservation, Mbarara University of Science & Technology**

_____ _____

Name: Dr Douglas Sheil
Director of ITFC

Dr C.K. Kibirige
University Secretary, Mbarara University of Science & Technology

_____

Tax Identification No.:

Terms of reference for resource assessment in integrated resource use zones of Bwindi Impenetrable national park

1.0. Background

The Uganda Wildlife Authority (UWA) initiated resource access and harvesting (multiple use) programme in 1994 with an objective of promoting sustainable resource harvesting through collaborative mechanisms involving local resource user groups and protected area management. The program has since created a sense of ownership of the parks by communities, enabled dialogue between communities and park management and pioneered a formal process of developing and implementing resource use agreements in national parks (BMCA - GMP, 2001).

The UWA Community Conservation policy (2004) highlights a commitment to promote collaborative arrangements and partnerships with local communities, local Governments, private sector and other stakeholders for sustainable management of wildlife resources. The strategies to attain the collaboration include the following:

i. Promote participation by the local community and other stakeholders in planning and management of wildlife resources.
ii. Develop mechanisms for promoting genuine collaboration including development of collaborative management agreements and memoranda of understanding (MoUs) defining rights, roles and obligations.
iii. Identify and promote viable partnerships and alternative resources with the surrounding communities to reduce pressure on wildlife.
iv. Building the capacity of local communities and other partners to engage in collaborative management

In the past, CARE Development Through Conservation project supported formation of resource user groups, facilitated the negotiation and formalising agreements between groups and UWA and implementing the collaboration. The CARE REPA project also funded the process of resource assessment in the northern side of Bwindi but this did not extend to bee-keeping zones in the southern side (Bitariho *et al*, 2006). Another study on local peoples' attitudes and demands since the inception of multiple use program showed that people in the southern side wanted to harvest plant resources besides bee-keeping in the protected area (Bitariho et al., 2004). The parishes of Kaara, Kashasha, Mushanje, Nyamabale, Kitojo and Kiyebe therefore cannot formally harvest plant resources from the integrated resource use zones. Resource assessment is provided for in EEEGL Main Activity 2.3 'to facilitate development and implementation of collaborative management arrangements for protected areas and cbnrm based on participatory principles' and is a conflict sensitive procedure benefiting all stakeholders involved in the collaborative process. EEEGL is therefore keen to support the resource assessment exercise in the six parishes to ensure that communities get more benefits from the integrated resource use zone and strengthen the collaboration between the resource users and UWA.

1.1 Rationale for resource assessment

The EEEGL program is intended to achieve the following objective *"Increased livelihood opportunities based on sustainable use of natural resources, and improved governance of these resources, have made substantial contribution to poverty reduction and environmental conservation in the Virunga landscape of the trans-boundary region of Uganda, Rwanda and DRC in particular benefiting the more marginalised and vulnerable groups in the population of this region."*
The EEEGL' participatory natural resource management theme is intended to get a result 'Local communities are participating in the management of natural resources within and

around the protected areas, and the sharing of associated benefits in a way that promotes equity and reduces the potential for conflict.'

Mugiri and Rwansigazi (2006) and Worah *et al*, (2000) pointed out that resource users want more resources in addition to what is already being offered. An evaluation of the integrated resource use (formerly multiple use) programme recommended that plant resources can be harvested in the bee-keeping zones, Bitariho *et al*, (2005) adding that moreover it was being done illegally so it should be formalised. Local communities in the beekeeping zones of BINP would like to harvest plant resources for medicinal values and basketry. Apart from beekeeping, the demand for plant resources changes over time therefore the local communities need other resources apart from those known to PA managers at present (Bitariho *et al* 2004). It is also expected that the plant density and distribution have changed since there has not been any disturbance through formal harvesting since 1991. The communities believe there is enough of the plant resources required for harvesting.

Resource assessment is a necessary step before any harvesting of such resources can be allowed. The resource assessment exercise is done with resource users' participation in guided searches and in ecological methods of sampling with lead agencies (UWA and ITFC). This strengthens EEEGL theme on community empowerment that 'Marginalised and vulnerable groups have increased rights of access and control over natural resources and are included in local governance structures, and CSOs working with them are actively engaged in NRM, and conflict management.' In principle plant resource harvesting was accepted in the parishes of Kaara, Kashasha, Nyamabale, Mushanje, Kiyebe and Kitojo but the assessment must be done in order to define which resources are available in sufficient quantities for harvesting and formalising the collaboration on resource management by signing an agreement (MoU) outlining the conditions of collaboration: rights, benefits and responsibilities. The assessment will be implemented by the ITFC on behalf of UWA in the six parishes where bee keeping has been done without harvesting plant resources. The resource assessment will lead into formalising a memorandum of understanding between the resource user groups and Uganda Wildlife Authority.

2.0 The objectives of resource assessment

The main objective of this resource assessment is reflected in the community conservation strategy to ensure the communities involved in collaborative process have increased rights and access to natural resources in the protected area.
Specific objectives include:-

(iv) Determine the presence or absence of the plant resources requested by communities
(v) Assess the abundance, distribution and patterns of habitat preference of the requested plants in the gazetted resource use zone;
(vi) Determine together with key resource users sustainable harvest methods of the requested plants
(vii) Recommend to BINP management the plants that can be harvested and their initial allowable annual off-takes

3.0 Methodology

The resource assessment will be carried out in Six Parishes that constitute the bee keeping multiple use zones (i.e. Kashasha, Nyamabale, Kitojo, Kiyebe, Kaara and Mshanje).

The ITFC will use both qualitative and quantitative approaches in resource assessment; using focused searches and subjective assessment of the availability of the resources. This will be followed by systematic mapping using transects and nested quadrats and this supplemented by selective resource user assessment. Resource users will be involved in the assessment for them to guide the process and identify useable materials. The assumption is that resource users know where such resources can be located and they will be willing to share information on resource use.

The EEEGL is entering a contract arrangement with ITFC because of their long experience in the collaborative process and ecological monitoring in Bwindi Mgahinga Conservation Area. In addition the ITFC is mandated to do such work in Bwindi national park on behalf of Uganda Wildlife Authority.

4.0 Output

The main output from this assessment will be a detailed report with clear recommendations on:

- Which harvestable plant species are found in the integrated resource use zone and where such resources are found
- What amounts of the plant resources are found in the zone as requested by forest resource user groups
- What are the sustainable harvesting off-takes that can be harvested from the zone
- Which other plant resources may substitute 'species of high conservation importance' for harvesting in the zone
- A map showing the zone where plant resources will be harvested
- A description of the state of illegal activity and disturbance in the resource use zone
- Which probable animal species are known to forage in the resource use zones
- Any other important caution and precautions that ITFC finds relevant for upholding forest integrity in the resource use zones

5.0 Requirements

Inputs: The ITFC shall use its resources (time, machinery and personnel) to do the work at an agreed cost of Shs19,034,000 (nineteen million thirty four thousand shillings only)

The study shall be done and report submitted within a period of six months (refer to work plan below) from the day of accepting the contract. It is expected that the ITFC will share their draft reports with UWA and EEEGL teams for comments before submitting a final report.

The ITFC shall get 50% upfront payment on signing of the contract in order for them to start and carry out the assessment, 30% on submission of draft report and 20% on submission of final report.

6.0 Work Plan

Task No.	Description	Responsibility of:	July 08	Nov 08	Dec 08	Jan 08	Feb 08	Mar 08	Apr 08
1	Write Interim proposal	Senior Field Officer (SFO)	XX	1					
2	Submit Proposal to EEEGL for funding	Director ITFC	XX						
3	Plant resource assessment (forest inventories)	ITFC & UWA		XX	XX				
4	Debrief to EEEGL on findings from resource assessment	SFO/ Director				xx			
5.	Data entry, analysis and report writing:	SFO/ Director				XX	xx	xx	
6.	Integration of Assessment results into draft Resource use MoUs	ITFC, UWA, CARE					XX	xx	
7	Submission of report to EEEGL	SFO/ Director							Xx
8	Presentation of results to local communities (forest user societies)	ITFC/ UWA							xx
9	Stakeholders meeting for Integrated resource use MoU review completion	UWA, ITFC, CARE							XX

7. 0 Budget

Budget for entire multiple – use zone (six parishes on southern boundary of Bwindi Impenetrable Forest).

	Budget Item	Quantity	Units	Cost (Ug Shs)	Total Expenses (Ug Shs)
1	ITFC staff time senior field officer	50	days	250,000	12,500,000
2	ITFC staff time director	6	days	480,000	2,880,000
3	Field rations and supplies	4	weeks	600,000	2,400,000
4	Local Assistants (porters, trail cutters)	180	days	3500	630,000
5	Vehicle running costs (3 round trips including off-road to the field)	480	km	1,300	624,000
	Total				19,034,000

Notes

ITFC staff time charges include direct employment costs as well as indirect support costs. Calculations of rates are available on request.

Fieldwork would be carried out by Senior Field officer -SFO (Robert Bitariho)
Director's time is for supervision, final editing of reports, etc.

Field rations, supplies (Food, GPS batteries, etc.)

Three return trips from Ruhija to Ndego, Nshanjare and Kiyebe at standard ITFC rates

CARE INTERNATIONAL IN UGANDA

_____ _____

Name: Shameem Siddiqi
Title: Program Director

COMPANY**: Institute of Tropical Forest Conservation, Mbarara University of Science & Technology**

_____ _____

Name: Dr Douglas Sheil
Director of ITFC

Dr C.K. Kibirige
University Secretary, Mbarara University of Science & Technology

_____

Tax Identification No.: