



**Establishment of institutional frameworks for delivery of reward mechanisms for environmental services in the Rushebeya-Kanyabaha wetland landscape and Wambabya riverine forests systems of the Albertine Rift**

**Value chain analysis for ecosystem products (Honey and Bamboo) and services (carbon and watershed)**

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## Summary

A value chain analysis was carried out to establish the chain activities, functions and linkages within ecosystem products (Honey and bamboo) and services (Carbon and watershed) in Wambabya riverine forests system and Rushebeya-Kanyabaha wetland landscape. The study is part of the on-going project on establishing institutional frameworks to facilitate the delivery of environmental service rewards from beneficiaries to service providers in the two sites within the Albertine Rift associate site under the ICRAF-led PRESA project; and builds on the earlier study where the said ecosystem services and products were identified as key in the two landscapes.

A value chain analysis assesses the existing vertical and horizontal linkages within the sub-sectors as well as functions and roles of actors from input supply to the final consumers. It covers a full range of activities that are required to bring a product or service from its conception to its end use, including all the market channels available to all firms

The specific objectives of the study were to:

- i. Establish the production, processing and consumption patterns in the honey, bamboo, carbon and watershed sub sectors
- ii. Understand the chain functions and actors in the sub sectors
- iii. Identify constraints that hinder effective functioning at each level of the chain in the four sub-sectors
- iv. Establish the potential for increased production, value addition and marketing of ecosystem products and services

Information used for this report was generated through various methods, including key informant interviews, review of secondary documents, web search and opportunistic interviews with stakeholders in production, processing, distribution and end markets for the ecosystem services and products under study.

Bee keeping for honey is one of the activities communities have carried out in Wambabya riverine forests system over a long time and is steadily shifting from subsistence production using traditional bee hives to commercial production using modern bee hives. Honey value chain is therefore one of the most developed in the area among the ecosystem products and services under study. While various functions and actors were identified along the entire value chain right from input supply through processing to end markets, the chain is still limited by low production, to the extent that most of the bulking agents have not considered packaging and branding their honey for external markets because their local market (Hoima district) is considered enough. Honey value chain is generally affected by limited support in terms of funding especially at production and processing as inputs at these stages require a lot of capital.

The value chain for Bamboo is poorly developed in Wambabya riverine forests system. Bamboo growing was introduced in the area by the tea company but no effort was put in mass production. Currently, bamboo exists in small scattered clusters and is mainly used for construction and sometimes weaving baskets for plucking tea. Besides the socio-economic uses, bamboo is widely known for its hydrological and watershed management as well as carbon storage functions; and has been earmarked by the private sector as a key

plant for restoration of degraded river banks in Wambabya riverine forests system. Developing the bamboo value chain needs massive investment in the production in order to benefit from its ecological and socio-economic functions.

Carbon Sequestration is described as one of the most viable ecosystem service in Wambabya riverine forests system. The forests provide an opportunity for REDD, and also afforestation and re-afforestation in the margins of the natural forests, and therefore a potential for carbon trade. The value chain for carbon is relatively well developed in the area with over 1,086 forest/land owners recorded in different forest blocks as potential sellers of carbon stocks. There are also a number of service providers already undertaking various support activities like mobilizing the sellers, designing the PES schemes and linking them markets-both local and international markets.

The value chain analysis for watershed services was done for Wambabya and Rushebeya-Kanyabaha wetland landscape and established that there are no structured watershed service scheme (Payments for Watershed Services) in place, but great potential exists based on current developments along the river courses, coupled with the environmental challenges which affect the quality and quantities of water flow. Watershed management services could be secured once all landowners adjacent to the streams and small rivers that form tributaries of rivers Wambabya (Wambabya watershed) and Rushoma (Rushebeya-Kanyabaha wetland landscape) have been recruited into PES schemes. Potential service providers and markets for watershed services were identified. Buyers are showing interest in contributing to management of the upstream to improve the flow of watershed services to sustain their businesses.

Overall, the value chains for ecosystem products and services in Wambabya and Rushebeya-Kanyabaha landscapes are in their infant stages but are steadily developing. Great support in production and processing (of ecosystem products-honey and bamboo) and scheme design (ecosystem services-carbon and watershed) is still required for healthy ecosystems that can supply good quantity and quality ecosystem products and services.

## List of Acronyms

BATU:	British American Tobacco Uganda
CDM:	Clean Development Mechanism
CSWCT:	Chimpanzee Sanctuary and Wildlife Conservation Trust
ECOTRUST:	Environmental Conservation Trust of Uganda
FIEFOC:	Farm Income Enhancement and Forest Conservation
GEF:	Global Environmental facility
GHG:	Greenhouse Gases
ICRAF:	World Agroforestry Centre
MAAIF:	Ministry of Agriculture, Animal Industry and Fisheries
NAADS:	National Agricultural Advisory Services
NAHI:	Nature Harness Initiatives
NEMA:	National Environmental Management Authority
NFA:	National Forestry Authority
NGO:	Non-Governmental Organizations
PEAP:	Poverty Eradication Action Plan
PES:	Payments for Ecosystem Services
PRESA:	Pro-poor Rewards for Environmental Services in Africa
REDD:	Reduced Emissions from Deforestation and Forest Degradation
TBA:	Tropical Biology Association
UNBS:	Uganda National Bureau of Standards

## **1.0 Introduction**

A Value Chain Analysis was carried out to inform NAHI and partners about the current structure of ecosystem products (Honey and bamboo) and services (carbon and watershed) in Wambabya riverine forests system (Hoima district) and Rushebeya-Kanyabaha wetland landscape (Kabale district).

The study is part of the on-going project on establishing institutional frameworks to facilitate the delivery of environmental service rewards from beneficiaries to service providers in the Rushebeya-Kanyabaha wetland landscape (Kabale District) and the Wambabya riverine forests system (Hoima District) within the Albertine Rift associate site under the ICRAF-led PRESA project. It builds on the earlier project activities where carbon and watershed services were identified as key ecosystem services; while Honey and bamboo as the key ecosystem products in both landscapes.

### **1.1 Understanding value chain**

A value chain is a full range of activities that are required to bring a product or service from its conception to its end use, including all the market channels available to all firms. The chain (depending on a commodity), starts from input suppliers, to producers, processors, distribution and marketing (involving retailers and wholesalers at the national level as well as exporters to international markets). The value chain analysis therefore assesses the existing vertical and horizontal linkages within the sub-sectors as well as functions and roles of actors from input supply to the final consumers. The Value chain analysis was done for honey, bamboo and carbon in Wambabya riverine forests system and watershed services in both Rushebeya-Kanyabaha wetland landscape and Wambabya riverine forests system.

### **1.2 Objectives**

The main objective of the value chain analysis was to establish the chain activities, functions and linkages within ecosystem products (honey and bamboo) and services (carbon and watershed) sub sectors.

Specific objectives were to:

- i. Establish the production, processing and consumption patterns in the honey, bamboo, carbon and watershed sub sectors
- ii. Understand the chain functions and actors in the sub sectors
- iii. Identify constraints that hinder effective functioning at each level of the chain in the four sub-sectors
- iv. Establish the potential for increased production, value addition and marketing of ecosystem products and services

### **1.3 Methods**

Various methods were used to collect information that formed this study. These include key informant interviews, review of secondary documents, web search and opportunistic interviews with stakeholders in production, processing, distribution and end markets for the ecosystem services and products under study.

## **Value chain analysis of the Beekeeping enterprise**

### **2.1 Introduction and background to beekeeping in Uganda**

Bee keeping has been carried out across generations in Uganda and plays a significant role in improving the lives of people, not only for local communities but also for urban dwellers. It is a low-investment and low-input business enterprise that directly generates economic gains for the participating members and integrates well with agriculture that forms the main economic activity for communities living in the rural areas. Its advantages are numerous also bearing in mind that it can be practiced by men, women, and youth and it is a crucial avenue towards poverty reduction and enhancing the quality of life. The sub-sector harbors a great potential for increasing incomes and supportive sustainable development, especially considering the varied players and activities along the broader chain, thus, contributing immensely to the national economy.

Bee keeping in Uganda is mostly carried out using traditional methods, accounting for 87.3% of the total hives. Traditional beehives are made out of logs, bark, reeds, gourds and pots among other materials and due to their topology, background and design characteristics, they are universally low yielding in terms of honey production. Other methods of production include the improved hives called Kenya Top Bar (KTB) and Langstroth (Frame) hives which are adapted for commercial bee keeping. These are however not very common as they are expensive to acquire by most bee keeping communities. The bee keeping enterprise is quite adaptable to various environments and circumstances although farmers are unable to access better markets due to the poor quality and low quantity of honey produced.

According to the 2008 National Livestock Census, about 1.2 million beekeepers are actively involved in bee keeping with 750,000 total beehives and approximately 65.5% hives colonized countrywide. Beekeeping is mainly carried out in the districts of Bushenyi, Soroti, Gulu, Nakasongola, Kabarole and the West Nile region, with total annual production estimated at 2,600 Million Tons (UNBS, 2008).

### **2.2. Beekeeping in Wambabya riverine forests system**

Wambabya riverine forests system is a hub for bee keeping in Hoima district and provides a conducive environment for expansion of the enterprise. An enterprise survey conducted in 2010 in the landscape established bee keeping as one of the key forest based enterprises that can potentially be tapped into to supplement household incomes and enhance people's livelihoods.

#### **2.2.1 Honey production, markets and market dynamics**

##### ***Honey production***

Bee keeping for honey production in the Wambabya riverine forests system is carried out using various methods / types of bee hives ranging from traditional to commercially oriented modern bee hives (1a, 1b & 1c).



Figure 1(a): Sited traditional bee      Figure 1(b): Sited Kenya Top Bar (KTB)      Figure 1(c): Langstroth bee hives in Bulindi

Honey production depends on the type of hives used as different bee hive types have different production capacities. The traditional bee hives produce the least amounts of honey per year followed by KTB and then Langstroth hives. Table 1 illustrates production capacities of the three types of bee hives used in Wambabya forests riverine system.

**Table 1: Types of bee hives and production capacities**

Types of bee hives	Average ownership	Average production (Kg/hive/season)	Number of seasons/year	Optimum production/hive/season (Kg)
Traditional	1.5	4.7	1	15
KTB	2	2.5	2	20
Langstroth	2	24.8	4	30

Langstroth hives have the highest production capacity with optimum production per season of 30kgs per season, compared to KTB (20kgs) and traditional hives (15kgs). However, average production per season is so low in Wambabya forests riverine system as seen in the Table 1. According to Mr. Kitarihara of Kitara bee keepers and processors, low production in the area is mainly attributed to changing seasons and poor apiary management practices. Honey production was analysed at the group/farmer level to further ascertain the levels of different bee keepers in Wambabya forests riverine system. Table 2 shows detailed production figures of major groups operating in the landscape, with their estimated incomes.

**Table 2: Honey production in Wambabya forests riverine system**

Producer groups	Gender		Bee hive types			Production (Kg/season)	Estimated <sup>1</sup> income/ Season (Shs)	Estimated Income in US\$
	Males	Females	Local	KTB	Langstroth			
Kiraira Tree Planting and Bee Keeping Project	10	3	13	25	-	83	249,000	104.84
Balyejukya Bee Keepers Association	9	2	11	21	-	92	276,000	116.21
Abakitehimbwa Women Integrated Bee Keepers Association	15	10	-	-	25	35	105,000	44.21
Wambabya Bee Keepers Association	2	7	-	-	9	20	60,000	25.26
Wambabya C.O.U Bee Keepers Project	-	-	-	30	60	1500	4,500,000	1,894.74
Nyakabingo Twekambe bee keeping Group	24	1	34	80	-	20	60,000	25.26
Kyabisagazi Bee Keeping Group	11	3	26	-	-	96	288,000	121.26
Ndalagi Bee Keepers Group	22	6	-	-	11	30	90,000	37.89
Kyangwali Catholic Parish	31	14	60	-	-	130	390,000	164.21
Kagezi Bee Keepers	10	7	-	28	13	100	300,000	126.32
Buswekera Bee Keepers Group	12	9	13	18	-	56	168,000	70.74
Kitari Bee keepers and Processors	1	0	0	40	0	800	2,400,000	1,010.53
Hoima Bee Keepers Association	78	30	50	120	30	990	2,970,000	1,250.53
<b>Total</b>	225	92	207	362	148	3952	11,856,000	4,992.00

Source: Field data

<sup>1</sup> Honey from bee keepers is sold in combs and each kilogram is sold at 3,000 Uganda Shillings. Figures are based on the assumption that all honey that was produced was sold.

## **Honey markets and marketing dynamics**

Communities involved in bee keeping are increasingly taking up commercially-oriented production, steadily replacing subsistence-led production which was mainly due to the way communities regarded beekeeping as a side activity. Honey market comprises of three main nodes namely the local market (friends, neighbours and surrounding villages) and local and external bulking agents (middlemen/ traders) and farmer organisations. The main market for the bulked honey is Hoima municipality, the main urban centre for Hoima district where the public including people from the neighboring towns and Kampala city buy it from. The bulking agents and farmer based organizations in turn process, sometimes pack and sell the honey to supermarkets, retail stores and individuals. Hoima District Bee keepers Association is one of the key bulking agents for honey from Wambabya riverine forests system. The Association operates in conjunction with Hoima District Local Government and National Agricultural Advisory Services (NAADS) with its offices at Bulindi Zonal Agricultural Research and Development Centre



Figure 2: Hoima District Beekeepers Association Centre at

The honey market is relatively stable, dominated by two main buyer categories that comprise the middlemen /bulking agents and farmer organisations. Beekeepers mainly sell their honey when still in combs, with a kilogram costing an average of 3000 Uganda shillings. Quoting one of the largest bulk buyers and processors based in Hoima town;

*“This season [April-May, 2011], we were able to get least 2 tons of unprocessed honey [in combs] from individual farmers from within Hoima and as far as Kiboga, Kyankwanzi and Masindi districts”* said Mr. Kitaribara Lenard, the Proprietor of Kitali bee keepers and honey processors.

Mr. Kitaribara further informed this study that he gets 1litre of processed honey from 1.5 kgs of comb honey. With each litre of honey currently costing 15,000 Uganda shillings, he gets in profit more than three times the cost of each litre, an indication that middlemen benefit a lot compared to local individual bee keepers.

### **2.2.2 Beekeeping value chain functions and actors**

The beekeeping/honey value chain map and actors and functions can be broadly categorized into three main tiers; the bottom, middle and top tiers. Categorization is based on their role/s which range from production, handling, processing, and distribution all through to the end markets.

### 2.2.2.1 Bottom tier functions and actors

This is the first level of the bee keeping/honey value chain and includes the functions and actors within the first stages of the value chain. It covers inputs supply, production, farm level semi-processing and primary transportation.

#### **Inputs supply:**

Input suppliers constitute the initial node of the value chain and they comprise organizations and or individual entrepreneurs involved in the construction of beekeeping gear for sale to interested producers. They mostly focus on producing modern hives (KTBH and the langstroth) as well as other hive equipment. They mostly work in collaboration or under contracts from technical institutions to procure hives and associated gear and thereafter market these inputs to the beekeepers.

Community members in most areas were also aware of local artisans who can be contracted to construct high quality hives. Despite the high level of awareness about the potential of using modern hives many beekeeping entrepreneurs are still using traditional hives. This is mainly due to the high costs of acquisition associated with the modern hives which puts them out of reach for many entrepreneurs. This may be the biggest hindrance to sustainable honey production in the landscape. A modern KTB hive costs UGSH 60,000-80,000 ( US\$ 26-34) while a langstroth hive complete with a brood-box, queen excluder and super chamber costs UGSH 100,000-120,000 (US\$ 43 –51).



Figure 3: A local artisan delivering KTB hives to Twekambe

In addition to high cost of acquiring the modern hives, the quality of construction is sometimes poor and some hives have not colonized for over a 2 years because of this. This forces willing farmers to depend largely on traditional hives which have lower production and capacity as well as low acquisition costs. Information from some bee keepers indicated that some local hive artisans use poor quality timber which does not attract bees and are therefore responsible for low colonization rates of modern bee hives.

#### **Production**

Honey production is currently a male-dominated activity (Figure 4) although records show that women are increasingly taking it up as an emerging Income Generating Activity (IGA). Production is mainly through three ownership and tenure systems; individually owned apiaries at the farm level; community group/association hives but located in individual member farms and collectively owned apiaries mainly found in the adjacent forests for example in Bujawe central forest reserve. Individual beekeeping entrepreneurs were found to be in two categories; i) those owning less than 10 traditional hives and they carry out beekeeping using inherited indigenous knowledge and skills and ii), those owning over 20 modern bee hives for pure commercial production.

While women are taking up beekeeping as an income generating activity, their involvement remains limited despite their strategic positioning as farm managers and more active laborers, factors that puts them at an advantage over their male counterparts

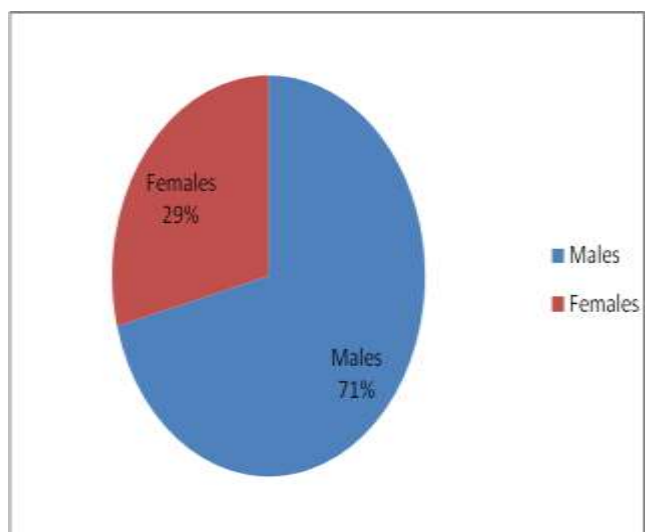


Figure 4: Bee keeping by gender

Figure 4 shows that only 29% of beekeepers are women, compared to 71% men. This limits women with chances to enhance their incomes through the bee keeping enterprise.

#### ***Farm level semi-processing***

This is considerably common for honey from indigenous and KTB hives. For the log hives and KTB hives, producers carry out semi-processing when extracting honey from the combs. This is done using the double cooking pan or self-drip. For Langstroth, the producers or honey bulking agents use simple tools such as spoons to squeeze honey from combs even though this method has a negative effective on the comb foundation. Overall, nearly all the beekeepers except those having langstroth hives and are selling honey to their co-operatives are involved in some form of semi-processing. However, at this stage, the quality of honey is highly compromised mainly through inclusion of foreign substances and impurities and unhygienic handling techniques.

#### ***Primary transportation:***

Some honey is bought at the farm gate especially by middlemen /bulking agents who purchase directly from the beekeeping entrepreneurs. According to Mr. Kitaribara of Kitari bee keepers and honey processors, *“honey is bought from producers in the villages and transported in bulk to avoid loss or contamination on the way [to his processing centre]”*.

However, some beekeepers transport raw honey from the farm to Hoima Bee keepers Association processing centre, a bulking centre where most of the honey produced in the district and surrounding areas is brought for processing and packaging. Others take their honey to local retailers (but this is usually in very

small quantities), where bulking agents buy it from and some of it sold to customers within the village or trading centres. Primary transportation mostly involves packing the raw honey in plastic containers for those with traditional /KTB hives or carrying the entire super chamber for farmers using the langstroth. The most common form of transportation is by means of motorcycles. Honey from these collection points-refining and packaging centers based in Hoima town is transported to the end markets which comprises of domestic consumers mainly based in Hoima and other larger towns in the region.

### **2.2.2.2 Middle tier functions and actors**

This is the second level of the value chain where relatively more value is added to honey. It is at this level where secondary bulking, refining, packing and distribution are done.

#### ***Secondary Bulking, Refining and Packaging***

This involves further refining and packaging by medium and large honey processing centres. The processing at this stage is advanced unlike in the primary processing function. There are 3 main centres where honey from Wambabya riverine forests system is collected and refined. These include the following;

- i. Bulindi zonal agricultural research and development institute, a National Agricultural Research Organization-funded centre for purposes of research and training in agricultural enterprises development. The centre, in conjunction with National Agricultural Advisory services (NAADS) and Hoima District Beekeepers Association operates a honey processing plant and has been assisting bee keepers in processing and marketing their honey. The centre also provides harvesting kits and packaging materials for honey to members of the association.
- ii. Kitari Bee keeping and Processing centre: This is operated by a bulking agent who buys honey directly from bee keepers in the villages (still in combs). No packaging is done here because the proprietors of the centre claim ready market in its form when not packed. Honey is processed and packed in Jerricans (Figure 5) where customers buy from depending on the amount they want.



Figure 5: Kitari processed honey in store ready for sale

- iii. The other honey processing plant is owned and operated by Tullow oil, the main oil company in Uganda. The company supports local bee keeping groups in training, harvesting, processing and marketing of their honey as an enterprise. All honey produced by the supported groups is bought by the company and the market is said to be insufficiently supplied

### ***Distribution***

This is the wholesale/retail level within the value chain and it comprises large retail stores/supermarkets in the district like Lucky7 supermarket. The stores purchase processed and packaged honey from secondary processing agents and sell to end users/consumers. Honey distribution in Hoima is not only limited to that from the district. Honey from other towns like Masindi, Kibaale and Bushenyi find their way in Hoima supermarkets for sale. This is because Hoima does not have enough honey to sustain the local market, yet it has the potential to produce for a large market.



Figure 6: Packed honey from Kibaale & Buliisa districts on display in a supermarket in Hoima

### **2.2.2.3 Top Tier Functions and Actors**

This is the last level of the value chain where the functions target standardization and quality control of the honey before final consumption. It covers certification and end markets.

### ***Certification***

Certification is a function of the Uganda National Bureau of Standards (UNBS), a public institution established by Uganda Government to undertake all activities pertaining to the development of Standards and quality assurance in the country. UNBS is currently developing The Standard Operating Procedures and Code of Practice for the bee keeping sub-sector which, once completed and approved, will provide the guiding principles for undertaking bee keeping throughout the value chain. Uganda also benefits from the services of Chemiphar Laboratory, a privately owned and managed laboratory accredited by European Union and World Food Program. Chemiphar Laboratory is accredited for honey, among other food and beverage stuffs in the country. This study established that none of the processors and packaging centres in Hoima has UBOS or Chemiphar Laboratory certification, a situation that compromises quality of honey sold.

### ***End markets***

The end markets comprise the eventual consumers of honey. In Hoima, consumers at this stage of the market chain include people from within and around town and those from different areas like Kampala working in different organizations who buy for home as table food.

### **2.2.3 The support function of the value chain actors**

The bee keeping enterprise in Wambabya riverine forests system operates under various support services throughout the value chain. The functions of these value chain actors are critical to the growth and development of the beekeeping sub-sector especially in the production and processing stages. Main actors

include government institutions, non-governmental organizations, private sector, and religious institutions. Support is mainly offered in form of inputs (usually bee hives and harvesting gear), training, processing and bulk marketing (Table 3).

**Table 3: Institutions supporting the bee-keeping enterprise in Wambabya riverine forests system**

Name of institution	Type of institution	Groups/associations supported	Type of support
Hives Save Lives Africa	NGO	<ul style="list-style-type: none"> <li>Abakitehimbwa women integrated bee keepers Association</li> <li>Wambabya bee keepers Association</li> <li>Kyambara united bee keepers Association</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> <li>Training</li> </ul>
Nature Harness Initiatives	NGO	<ul style="list-style-type: none"> <li>Nyakabing Twekambe Group</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> <li>Harvesting gear</li> <li>Training</li> </ul>
Hoima District Local Government	Government	<ul style="list-style-type: none"> <li>Kagezi bee keepers group</li> <li>Buswekera bee keepers group</li> <li>Ndalagi bee keepers group</li> <li>Kiraira tree planting and bee keeping project</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> <li>Training</li> </ul>
Hoima Catholic Diocese	Religious institution	<ul style="list-style-type: none"> <li>Kyangwali catholic parish</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> </ul>
Bunyoro Kitara Diocese (Church of Uganda)	Religious institution	<ul style="list-style-type: none"> <li>Carpentry workshop</li> <li>Wambabya C.O.U bee keeping project</li> <li>Balyejukya bee keepers Association</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> <li>Carpentry workshop for making hives</li> </ul>
Hoima District Bee keepers Association	Umbrella group of beekeepers	<ul style="list-style-type: none"> <li>All bee keeping associations in Hoima</li> </ul>	<ul style="list-style-type: none"> <li>Training</li> <li>Processing</li> <li>Marketing</li> </ul>
World Wide Fund for Nature (WWF)		<ul style="list-style-type: none"> <li>Kiraira tree planting and bee keeping project</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> </ul>
Navigators of Development Association (NAVODA)	CBO	<ul style="list-style-type: none"> <li>Kiraira tree planting and bee keeping project</li> <li>Kyambara united bee keepers Association</li> </ul>	<ul style="list-style-type: none"> <li>Bee hives</li> <li>Training</li> <li>Harvesting</li> </ul>
National Agricultural Advisory Services (NAADS)	Government	<ul style="list-style-type: none"> <li>Hoima District Bee keepers Association</li> </ul>	<ul style="list-style-type: none"> <li>Technical advisory services</li> </ul>

#### **2.2.4 Policy and institutional framework**

This section assesses the regulatory and institutional framework for the bee keeping/honey value chain. This is under the backdrop that for the value chain to function effectively, a conducive and enabling environment should be in place.

The Government of Uganda has created an enabling policy for the growth the bee keeping sub sector. The sub-sector benefits from Poverty Eradication Action Plan (PEAP), the central policy framework of Government through which all sectoral policies and programs are built. PEAP's goal is to eradicate poverty by 2017 and it places emphasis on developing sectors and programs that may have great impact on poverty eradication. Under PEAP, the visible policy that can be taken advantage of in developing the sector is Plan for Modernization of Agriculture (PMA) which has put in place the National Agricultural Advisory Services (NAADS) to act as a decentralized extension service delivery mechanism. The bee keeping sub - sector is one of the priority areas NAADS is undertaking to contribute to poverty eradication among communities in Wambabya forests riverine system which are dominated by forests that provide forage for bees.

Through the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), the Government of Uganda has developed the Apiculture Policy and is awaiting parliament for discussion and passing. The department of Livestock Health and Entomology in MAAIF is designated as the competent authority to handle all apiculture related activities. With the policy in place, the sector will widely benefit from government plans and this will strengthen the sector right from production, processing and marketing.

Uganda, under the Uganda Export Promotion Board (UEPB), has put in place a well elaborate Apiculture Export Promotion Strategy. This strategy is key in guiding the private sector in the export of apiculture products. Coupled with the services of Chemiphar Laboratory which is accredited by EU, Uganda stands a better chance of exporting Apiculture products to the European market. The private sector can however benefit from this only if the potential for bee keeping in Uganda is exploited maximally.

Further to note also is that Government provided the enabling environment for the formation of the Uganda National Apiculture Development Organization (TUNADO) in 2003 as the Umbrella body for all stakeholders in the Apiculture sector. TUNADO was formed following government realisation that private sector involvement in apiculture development was not given sufficient attention, partly due to the absence of an appropriate policy to guide apiculture activities in the country. TUNADO is a membership NGO governed by a Board of Directors, with the day-to-day activities overseen by the Executive Director. The vision is to transform the apiculture industry into a vibrant economic enterprise that will contribute to increased income for both rural communities and the nation. TUNADO serves the interests of members through the provision of information and advice, by playing a liaison and advocacy role and by providing strategic guidance to the sector. TUNADO works with public sector, civil society and farmer associations

### **2.2.5 Bee keeping value chain financing**

This study established that there are enormous finance needs throughout the beekeeping value chain in Wambabya riverine forests system. These range from inputs, production, transportation and processing of honey. This section assesses the financial institutions, organizations, development partners, government institutions, private entrepreneurs currently providing or that have potential to provide financial services to the beekeeping value chain.

#### ***Ministry of Agriculture and animal industry and Fisheries (MAAIF)***

MAAIF is the Ministry responsible for the Apiculture sector, under the Department of Livestock Health and Entomology. The mandate of MAAIF is to support, promote and guide the production of crops; livestock and fish, in order to ensure improved quality and increased quantity of agricultural produce and products for local consumption, food security and export. The Ministry works towards promoting and regulating livestock and fisheries activities including aquaculture and sustainable utilization of natural resources for agricultural production. It also acts as the advisory body in the areas of agricultural advisory services for crop, livestock, fisheries and entomology and provides training and capacity building in the fields of agricultural extension, and vector and vermin control, as may be required by the local governments. Through the Entomology office at the district level, the bee keeping enterprise has received a lot of attention as an enterprise that can greatly contribute to poverty reduction among rural communities.

#### ***Micro finance institutions***

Microfinance institutions (MFI) in Uganda have been influential in helping mobilizing rural communities into co-operative societies to access financial services for supporting various income generating activities. MFIs are popular due to their deep philosophy, commitment and willingness to bank with the poor. Cooperative societies have bank accounts with MFIs and mostly enjoy credit facilities from them. Bee keeping associations have the capacity to mobilize themselves to access financial services from MFIs and boost their bee keeping enterprise.

#### ***Commercial Banks***

Most commercial banks, especially those with branches in the rural areas such as Post Bank Uganda, are providing financial services to actors within the beekeeping value chain. The scope of these financing arrangements is mainly institutional i.e. support of microfinance institutions and cooperatives through provision of savings and credit facilities. Their influence in the beekeeping value chain is likely to be felt mostly at the middle and upper bottom tier.

#### ***Private sector***

Private companies in Uganda are playing a crucial role in enhancing the household incomes of rural communities in Uganda. The following have been identified in this field as part of their Corporate Social Responsibility (CSR) and also their desire to improve the standards of living within their areas of operation.

British American Tobacco Uganda (BATU) is the leading tobacco company in Uganda, operating in West Nile, Bunyoro and North Kigezi regions. BATU is supporting communities in Beekeeping in Hoima in form

of inputs-bee hives and harvesting gear, training in bee keeping practices right from bee hive siting, management to processing. Support is expected to be extended to other growing areas with the overall aim to improve community livelihoods and also her relationship with tobacco growing communities. The company is keen to support the communities in processing, branding, packaging and marketing of honey produced.

Tullow oil, the largest company undertaking oil exploration and production in the Albertine rift, is promoting bee keeping among the communities in the oil landscape as part of its CSR. The service package includes input supplies like bee hives, training in beekeeping, honey processing and marketing. The company owns a honey collecting centre and processing plant where bee keepers pool their honey for processing. The study established that honey produced is marketed within the company staff and is even not enough. A lot of support should be given to the bee keepers to ensure optimum supply to satisfy the existing market.

### **2.2.6 Summary of capacity gaps in the bee keeping value chain**

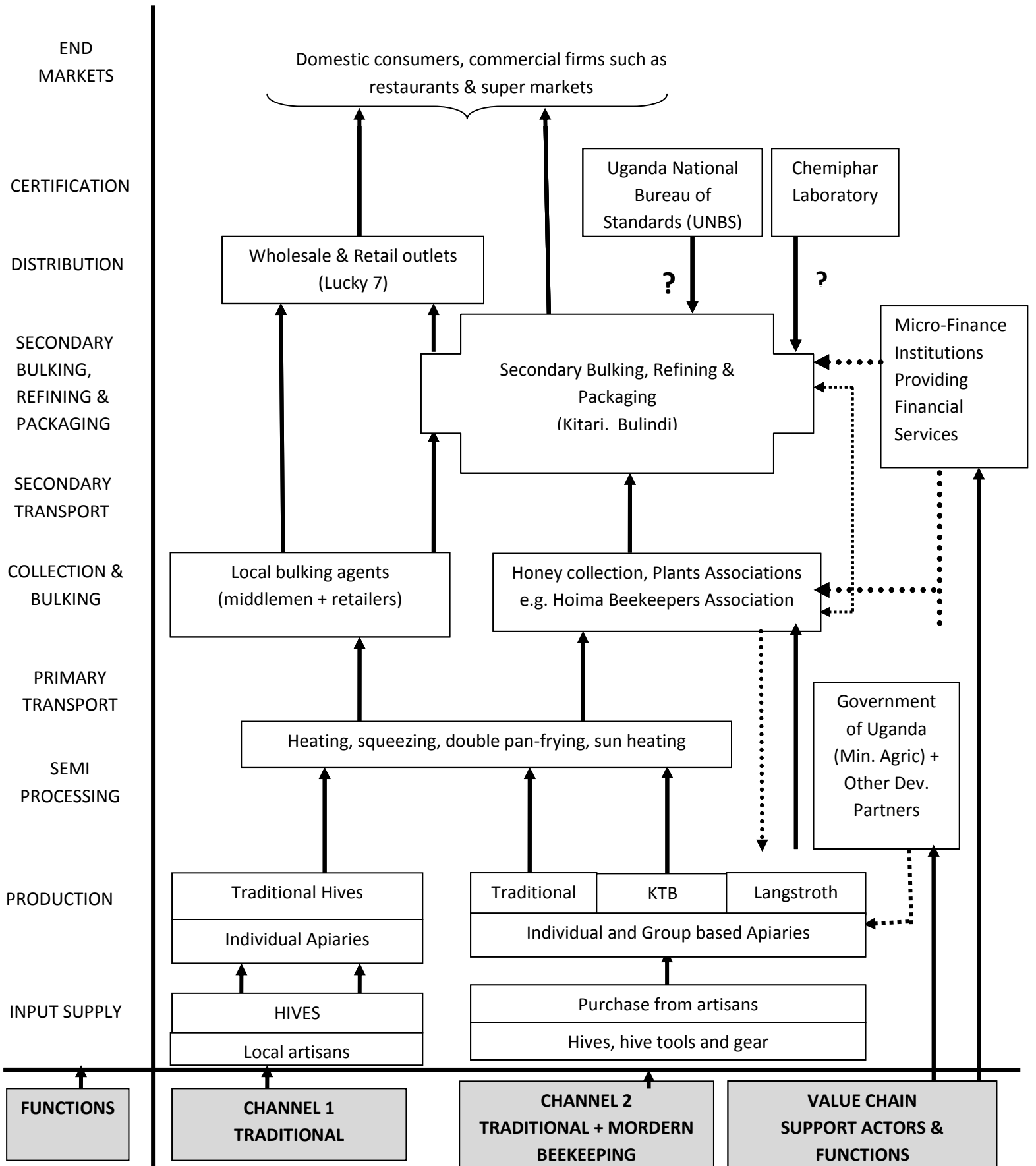
A number of capacity gaps/challenges are identified along the bee keeping value chain. These include the following:

- Lack of enough inputs especially improved/modern bee hives
- Inadequate harvesting equipment which compel some bee keepers to use traditional methods which compromise the quality of the honey
- Inadequate apiary management skills which largely explains low hive colonization rates
- Use of local honey processing methods
- Limited involvement of women
- Lack of appropriate training and extension services as most local bee keepers depend on their traditional knowledge for keeping
- Weak financial capacity of bee keeping associations for financing the bee keeping enterprise activities
- Missing link between finance institutions and bee keeping associations
- Limited government support to the sector.
- No legislation in place to guide and protect the sector (This is still in making)

### **2.2.7 Opportunities**

- The demand and use of honey and other apiculture products is on the increase
- Bee keeping is increasingly getting recognized as an enterprise that can quickly supplement household incomes and enhance the livelihoods of the rural poor communities
- Conditions for bee keeping such as habitat for bees and fresh water resources in place, though being threatened by human activities

# The Beekeeping Value Chain Map



**Key:**

- ↑ Indicates flow of honey
- .....➤ Indicates flow of support services
- .....➤ Indicates critical missing linkage
- ↓ ? Indicates lack of service

### **3.0 Value chain analysis for Bamboo**

#### **3.1 Introduction**

Bamboo belongs to the grass family *Poaceae*; also commonly called “giant grass”. Globally, there are over 1,200 bamboo species in more than 90 genera. Bamboo species grow naturally in tropical regions all around the globe, but also extend into temperate climates. Bamboo is adapted to a wide variety of ecosystems and climatic conditions (Banana *et al.* 2001). It is estimated that bamboo covers between 1-3% of the tropical and subtropical forest area - over 22 million ha worldwide. For Africa, a total of over 2.7 million ha of bamboo forest is reported by six countries (Ethiopia, Kenya, Nigeria, Uganda, Tanzania and Zimbabwe). Uganda is therefore recognized as one of the main bamboo producing countries in Africa

Bamboo is characterized by the special structure of its stems (also “culms “or “canes”) and its rapid growth rate. Like most grasses, bamboo has underground rhizome buds that re-sprout and produce new shoots when the above-ground stems are harvested. Growth rates of up to three feet/day have been reported in mature stands. When the culm has reached full height, branches start to appear. Depending on the species, new shoots can be fully developed within less than three months. During the shooting stage, new culms consist of approximately 85% water. Bamboo is therefore often found along watercourses. With increasing age, the water content in stems diminishes and tensile strength increases. Mature bamboo has a cellulose content of about 48% when air dried.

#### **3.2 Bamboo production in Uganda**

Bamboo in Uganda occurs in high altitude areas (2,400-3,000 metres above sea level), with deep volcanic soils and high rainfall areas 1200-1800 mm and in low lands of 1060-1800 m above sea level in drier areas. Generally the information about bamboo distribution in Uganda is still largely missing (National Biomass study 2002). Esegu *et al.*, 2001 noted that the extent and coverage is not known though the location is known. However, according to research carried out by FORI under NARO in 2,000, indicate that bamboo is unevenly distributed in Uganda with most of it found in south western part of the country in Echuya central forest reserve (estimated at 90% of the forest area), Mhahinga and Bwindi Impenetrable National Park, Rwenzori covering about 11,000 ha and Eastern part of the country with most found in Mbale district especially on Mt. Elgon covering about 7,000 ha. Some bamboo is also found in Kadam ranges in south Karamoja, Kotido and Kitgum districts. There are also other small pockets of bamboo vegetation scattered in various parts of Uganda in areas like Bbajo (Mukono district), Metu and Otzi in Moyo district. Both NFA and FORI agree that there is still little more known on the distribution and coverage of bamboo in Uganda. Most of the bamboo resources are located in protected areas under government control. Due to restrictions on these areas, not all the bamboo forest is accessible to the harvesters.

Bamboo is a highly versatile plant with over 1,500 documented uses. In principle, it can be used to produce anything that can be made from timber, competing directly with wood products in price, performance, and product diversity. Important bamboo product categories include furniture and handicrafts; housing,

scaffolding and flooring; mats, boards and veneer; pulp and paper; charcoal (fuel, absorption); fiber and textiles; food and beverage (shoots); fodder (leaves and culms); medicine; composite materials; etc.

Bamboo is widely known as the “poor man’s timber” since it is harvested, processed and used mainly by the rural poor. Processing of bamboo is mostly done at household level with low capital input, and offers tremendous employment opportunities. Bamboo thus provides an excellent means of income generation for both men and women. At the same time, bamboo plantations are beneficial for erosion control, land rehabilitation, and wastewater treatment. Their rhizomatous root system helps retain the soil, while the evergreen forest-like stands provide valuable habitat for wildlife.

### **3.3 Bamboo production in Wambabya riverine forests system**

Bamboo occurs in few, small and isolated clusters in Wambabya riverine forests system. Bamboo was introduced in the area for production of baskets used in tea plucking. Currently, there is no planting effort in the landscape, despite various bamboo uses. Bamboo clusters mainly appear in homesteads with few very sparsely distributed in the wild.



Figure 8: One of the bamboo clusters in Kiziranfumbi Sub County

### **3.4 Bamboo value chain functions and actors**

The bamboo value chain in Uganda is relatively short and consists mainly of farmers, weavers, traders and consumers. Value is added to the bamboo right from harvesting. The roles played by the different chain actors in the bamboo value chain include:

#### ***Farmers / collectors:***

- Grow and manage the crop, or harvest it from wild stands
- Sell bamboo planting materials and edible shoots
- Add value, e.g. by weaving
- Market bamboo products locally

#### ***Processors / weavers:***

- Grow bamboo
- Add value to bamboo, e.g. by weaving
- Transport and market bamboo products locally or regionally

#### ***Traders:***

- Collect bamboo products from farmers and weavers in rural areas, transport and market them in urban markets

The value chain for bamboo in Wambabya riverine forests system is poorly developed as it largely stops at the farm level. Various bamboo uses were established and are discussed below

### **3.4.1 Bamboo as a source of raw materials for building/ construction**

From the scattered clusters of bamboo existing in the forests system, bamboo stems are harvested for various construction purposes.

- Tobacco farmers use bamboo stems as rafters in the construction of tobacco curing barns. Bamboo stems are straight and are preferred by farmers because they are more durable than poles from other locally available tree species.
- The tea industry uses bamboo for construction of tea nurseries and weaving tea plucking baskets.
- Bamboo is also used by hotels/recreational areas that are interested in maintaining a traditional aspect in their constructions for interior decorations.
- Bamboo has been earmarked by the private sector especially British American Tobacco Company to be promoted for multiple purposes including construction and watershed management.

### **3.5.2 Ecosystem service provision function of bamboo**

Wambabya riverine forests system is endowed with the potential to grow bamboo and tap into its various ecological functions. This section explores various ecological functions of bamboo and how it can potentially benefit communities and the environment in Wambabya and beyond. Key bamboo ecological functions include:

#### ***Hydrological and watershed management function***

Bamboo is a natural agent for erosion control, because of its widespread root system, and exuberant foliage that creates a dense litter on the forest floor. Bamboo greatly reduces rain run-off, facilitates infiltration, prevents soil erosion, and keeps twice as much water in the watershed (as compared to watersheds without bamboo). Its root system stabilizes slopes and fragile riverbanks, and retains the soil in deforested areas. During the assessment for potential forest based enterprises in Wambabya riverine forests system, farming communities pointed out that bamboo can potentially be used to rehabilitate degraded river banks due to poor farming practices.

Bamboo plays an important role in pollution management due to its dual function of filtration and purification. It helps mitigate water pollution by absorbing nitrogen, phosphorus and heavy metals, and fixing them into its biomass. This ability makes bamboo a powerful agent for ecological wastewater

treatment from agriculture, livestock farming and sewage. Wambabya riverine forests system is dominated by commercial farming-Tobacco, tea, sugarcane, where fertilizers and pesticides are applied for increased crop productivity. These over time, have affected the quality of the fresh water resources, thus, planting bamboo can improve the ecosystem services in such areas. Bamboo has been successful in wastewater treatment at Murchison Bay prison in Luzira to help clean up the heavily polluted Nakivubo swamp near the prison (Kirunda 2005)

### **Carbon storage**

Bamboo is also considered as one of the most promising plants for incorporation into the Clean Development Mechanism (CDM), the main vehicle promoted by the Kyoto Protocol for reducing greenhouse gases (GHG) and combating global warming. This is due to the fact that bamboo is one of the most productive and fastest growing plants on the planet. The fastest-growing species may grow up to 1.2 m a day. This unique capacity makes bamboo a valuable sink for carbon storage, competing easily with the most effective wood species in terms of carbon sequestration capacities. Comparative studies have shown that bamboo biomass and carbon production may be 7-30% higher compared to the fastest growing wood species

### **3.5 Constraints to bamboo production and marketing**

A number of challenges were identified as responsible for low production of bamboo and these include the following

- Limited knowledge among communities regarding bamboo's economic and ecological functions
- Limited knowledge on propagation and planting skills
- Limited source of planting material as very few clusters exist in the entire forests system

### **3.6 Opportunities to bamboo production and marketing**

- Opportunity for restoring degraded river banks in the riverine forests system due to its ecological characteristics
- Opportunity for relieving pressure from natural forests if planted by tobacco farmers for constructing tobacco curing barns. Tobacco is one of the main cash crops in the area and is greatly contributing to degradation of forests

#### **4.0 Value chain for carbon in Wambabya riverine forests system**

Carbon Sequestration is the most viable ecosystem service in Wambabya riverine forests system-one of the areas remaining in Hoima with high riverine natural forests. The forests provide an opportunity for REDD, and also afforestation and re-afforestation in the margins of the natural forests, and therefore a potential for carbon trade. Carbon credits from forests form one of the most traded in PES schemes in Africa and provide potential for high growth (CSWCT, 2008). The forests, however, are rapidly experiencing deforestation and forest degradation mainly due to intense agricultural activities and the need for timber. Local leadership and communities have shown concern over the drastic rate at which these resources are reducing, but continue to expand their agricultural practices into the forests.

#### **4.1 Carbon sequestration value chain functions and actors**

Value chain for carbon is grouped in 3 broad categories, namely; sellers, intermediaries and buyers. Along each category, a large number of actors were mapped with their functions and roles in Wambabya forests riverine system.

##### **4.1.1 Sellers of carbon stocks**

Owners of natural forests (Table 4) form the potential sellers for carbon sequestration services. The key opportunity available in Wambabya is for the forest owners to tap into the Reduced Emissions from Deforestation and forest Degradation (REDD) where demonstration activities/sites can attract carbon credits at present from the voluntary carbon market but also from the Clean Development Mechanism (CDM) compliance market once the United Nations Framework Convention on Climate Change (UNFCCC) Conference of Parties (CoP) approves REDD to be included within the CDM framework.

**Table 4: Forest, land and wetland owners along major rivers in Wambabya catchment**

Name of river	Forest/Land owners	Forests (Ha)	Land* (Ha)	Wetland** (Ha)	No. of Villages	No. of Parishes	Sub county
Wambabya	469	621.7	534.8	29.6	26	5	Bugambe, Kiziranfumbi
Itohya	116	683.6	517.0	3.2	9	3	Kabwoya, Kiziranfumbi
Hohwa	99	191.5	26.3	217.8	5	1	Kabwoya
Nyakabingo	89	176.7	120.6	-	7	2	Kyabigambire
Rwamutonga	101	100.2	254.7	2.8	7	1	Bugambe
Hoimo	211	111.1	616.7	17.0	16	5	Kitoba
Ijumangabo	58	63.9	108.1	21.9	4	2	Kiziranfumbi
<b>Sub Total</b>		1,948.7	2,178.2	292.3	74	19	
Wambabya Central Forest reserve (NFA)	1	3,429					Kiziranfumbi, Bugambe, Buseruka
<b>Grand Total</b>	<b>1,086</b>	<b>5,378</b>	<b>2,178</b>	<b>292</b>	<b>74</b>	<b>19</b>	

Source: NAHI (2010) VAC technical report

\* Land considered in this category refers to individual plots along the rivers mentioned.

\*\*\*"Wetland owners" refer to those individuals neighbouring the wetlands and therefore direct users. Wetlands are by law owned and managed by the government on behalf of the citizens.

A total of 1,086 forest/land owners were recorded in different forest blocks located in 74 villages in Wambabya riverine forests system as potential sellers of carbon stocks.

#### **4.1.2 Intermediaries/service providers**

The main function of this category in the carbon value chain is to bridge the gap between the sellers and buyers. These functions include:

- Mobilising sellers through awareness creation, creation of forest owners associations and training to build their capacities in managing the carbon scheme

- Establishment of socio-economic and ecological baselines which provide the basis for monitoring
- Monitoring, verification and certification
- Development, planning and implementation of interventions to enhance the quality of carbon stocks for each forest owner.
- Administration of the PES fund. This involves delivering payments from Buyers to Sellers. Activities embedded here include designing contracts, determining the nature of payments and structuring the delivering mechanisms for the payments
- Marketing and brokering deals with ecosystem service buyers. This involves clear packaging of the ecosystem services with details of the ecosystem service deals. For the carbon market, the packaging of the ecosystem services is initially through development of Project Idea Note (PIN) and later a Project Idea Document (PDD).

In Wambabya forests riverine system, organizations playing the service provide/intermediary role include Nature Harness Initiatives (NAHI), The Environmental Conservation Trust of Uganda (ECOTRUST), Chimpanzee Sanctuary and Wildlife Conservation Trust (CSWCT), Katoomba group, National Environmental Management Authority (NEMA), Innovation for Poverty Action (IPA), and IIED. Each of these have specified roles ranging from establishing baselines, designing management interventions, monitoring and funds management. Details of their roles are presented in Figure 9.

#### **4.1.3 Buyers**

These are the beneficiaries of the carbon sequestration services which accrue from well managed ecosystems. The delivery of quality ecosystem services depends on the good management practices of the ecosystems by the ecosystem stewards and the supportive function of the service providers/intermediaries. This is the end market of the carbon value chain and completes the cycle for companies offsetting their emissions through ecosystems management. Figure 9 presents the value chain map for the existing project on *“Developing an Experimental Methodology for Testing the Effectiveness of Payments for Ecosystem Services to Enhance Conservation in Productive landscapes in Uganda”*.

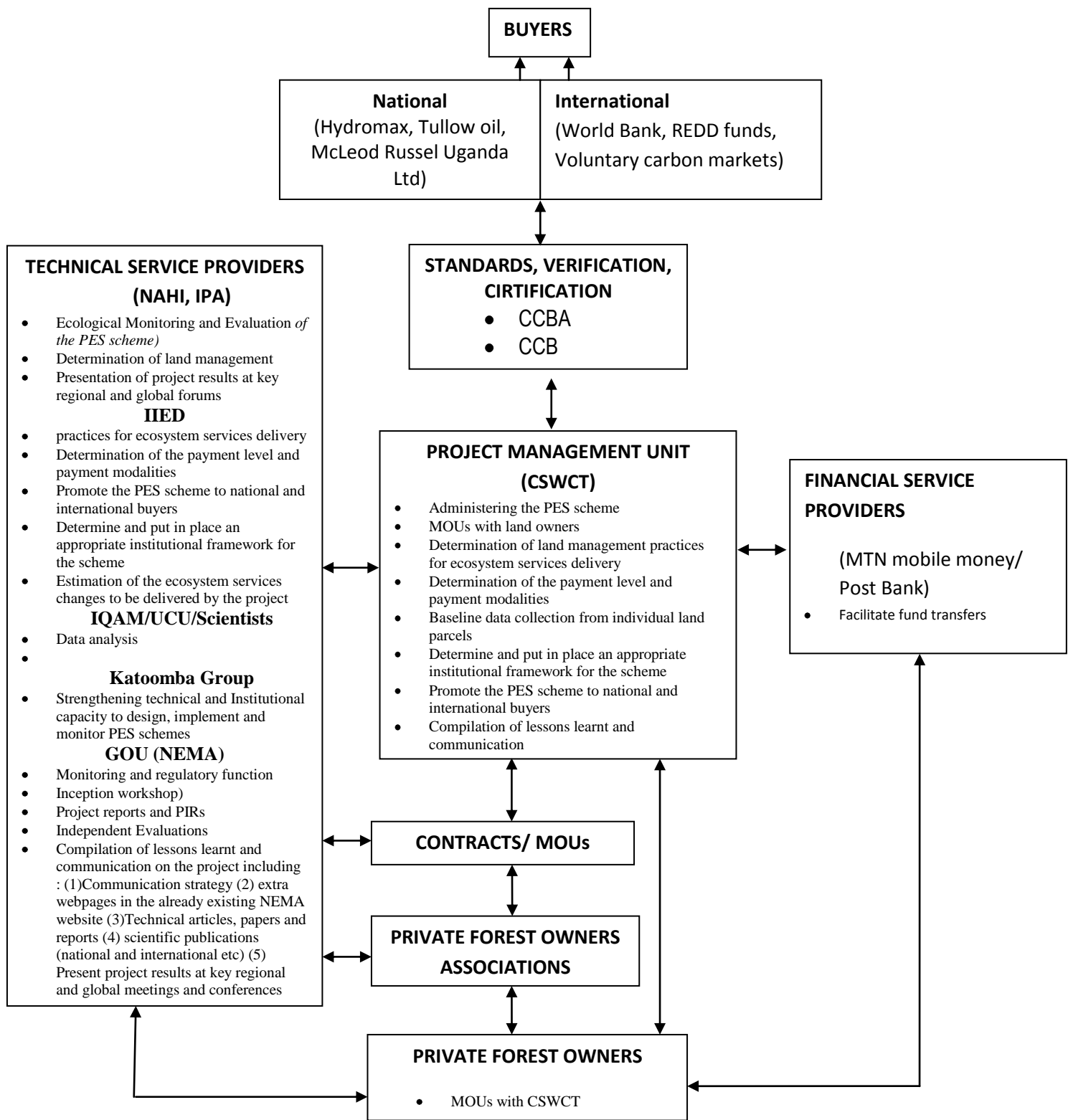


Figure 9: Value chain map for the existing PES scheme in Wambabya riverine forests system

**Key:**

↔ Flow of services, information and/or rewards

## **4.2 Description of existing projects on carbon sequestration**

Though in their infant stages, there are existing PES and PES-related initiatives on carbon sequestration in the Albertine rift. These are either government or NGO led conservation projects that have a long term goal of enhancing the quality of ecosystem services.

### ***4.2.1 Developing an Experimental Methodology for Testing the Effectiveness of Payments for Ecosystem Services to Enhance Conservation in Productive landscapes in Uganda.***

Uganda's National Environmental Management Authority with its local collaborators CSWCT, NAHI and the International Institute for Environment and Development (IIED), together with the East Africa Katoomba Group are implementing a PES scheme to generate additional and sustainable financing for biodiversity conservation that provides incentives to local communities for conserving biodiversity found in remaining forests on private and public lands not gazetted as forest reserves. This project rests on the promise that by making forest conservation a livelihood opportunity for local communities, a payment scheme can provide social benefits as well as meeting environmental objectives. The project aims at developing an experimental methodology for testing the effectiveness of PES as a means of financing and procuring biodiversity conservation outside protected areas focusing on private and community land between Budongo and Bugoma forest reserves in Hoima district. This area forms part of the northern corridor for chimpanzees and is home to 60% of Uganda's chimpanzee population living outside protected areas.

The project uses an approach of randomly selecting treatment and comparison communities by i) identifying areas at risk of deforestation, ii) collecting baseline information on deforestation levels, forest use and local institutions governing forest management and iii) randomising the participants into treatment and comparison groups and initiating the PES scheme. In the group of treatment villages, the option of payment will be given to participating land owners in return to performing contractually agreed activities such as maintaining forest cover while the comparison group will not be offered any payment but will not be expected to undertake conservation either. The project will help government of Uganda to develop a replication strategy to other areas and will also inform Global environmental facility (GEF) the efficacy of PES schemes in conservation investments.

### ***4.2.2 Farm Income Enhancement and Forest Conservation Project (FIEFOC)***

Hoima district is one of the benefiting districts in Uganda implementing the Farm Income Enhancement and Forest Conservation (FIEFOC) Project. FIEFOC is a five-year national project that seeks to improve incomes, rural livelihoods and food security in Uganda through sustainable natural resources management

and agricultural enterprise development, thereby contributing to poverty alleviation. The US\$76.72 million project funded by ADF, NDF and GOU is jointly implemented by the Ministry of Water, and Environment (MWE) and Ministry of Agriculture Animal Industry and Fisheries (MAAIF) in close collaboration with various local government structures.

FIEFOC project has three components, i.e. i) Support to the Forestry Sector; ii) Agricultural Enterprise Development; and iii) Support to Project Coordination and Management. Of particular relevance to PES is the component that provides support to the forestry sector; under which, FIEFOC facilitates tree planting and watershed management in selected pilot communities. In Hoima, FIEFOC project is implemented through the district local administration to strengthen afforestation and riverbank management among upstream communities. This is geared towards protecting rivers Wambabya, (and Waki and Nkusi), the major water sources supplying communities and private businesses up and downstream

The project employs a top-down implementation approach, with all management centered in Kampala, which coordinates all activities at district and lower levels. This has challenges in service delivery especially in the tree seedlings delivery to stations where they can be distributed to farmers. Seedlings are reportedly delayed, not in the required species proportions and stressed or damaged during prolonged transit. Using inexperienced transporters for delivering seedlings was one other big problem identified in this arrangement. At one point, seedlings were poured like sand and they all weathered, with nothing surviving for planting. Such challenges are unlikely to surface under most PES schemes which do not emphasize using local scheme beneficiaries in designing, implementation and monitoring project activities.

#### **4.2.3 Private sector support to conservation of forests and fresh water resources**

British American Tobacco Biodiversity Partnership Program, a Global Biodiversity Partnership between British American Tobacco global and Tropical Biology Association (TBA) is supporting a project “*Sustainable ecosystem (Forests/Freshwater) Restoration and Management in Uganda Project*” through NAHI as a national based organisation. The project has undertaken forest and socio-economic surveys to establish baseline information, water quality tests to establish the quality of fresh water resources, conservation awareness creation, support to forest restoration and forest based enterprises. Plans are underway to introduce forest owners involved in forest restoration to benefit from forest carbon funds and there is potential for such private sector to be part of buyers of ecosystem services.

#### **4.2.4 Trees for Global benefits program**

ECOTRUST is working with communities to participate in voluntary carbon trade arrangements with private buyers under the project dubbed as Trees for Global Benefits Program. The Program, in operation since 2003, supports smallholder farmers in western Uganda to plant trees for carbon sequestration and in return receive payment for the credits. In Hoima district, the program is operational in Kiziranfumbi sub county and has plans of rolling out to the entire district. ECOTRUST<sup>2</sup> is charged with coordination, farmer registration and the marketing of carbon credits from the project. They act as a 'clearing house' and a point of contact between farmers and potential investors in carbon credits, and provide a legal and administrative structure to coordinate and administer the carbon offset project. The stated aim of the program is to develop and operationalize a model for carbon trading which could be replicated in other parts of Uganda. It also aims to enhance the institutional and technical capacity of participating institutions, and to establish an institutional structure for administering Land Use, Land Use Change and Forestry (LULUCF)<sup>3</sup> projects for carbon trading with technical specifications for different forestry systems.

Implementation is largely based on the Plan Vivo approach<sup>4</sup> which is a set of standards, processes and tools to develop and register payments for ecosystem services (PES) projects in developing countries. Plan Vivo provides a framework for managing the supply of verifiable emission reductions from rural communities in a way that is beneficial to rural livelihoods and the environment. Activities covered under the Plan Vivo system include afforestation, agroforestry, forest conservation, forest restoration and avoided deforestation.

#### **4.3 Challenges faced along the carbon value chain**

- Limited land resources in the area due to population growth both within and migrants from other areas.
- Higher returns to individuals from conversion of forest for livestock rearing and crop cultivation than from conservation

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<sup>2</sup> [www.ecotrust.or.ug](http://www.ecotrust.or.ug)

<sup>3</sup> The UNFCCC defines LULUCF as “a greenhouse gas inventory sector that covers emissions and removals of greenhouse gases resulting from direct human-induced land use, land-use change and forestry activities” ([http://unfccc.int/essential\\_background/glossary/items/3666.php#L](http://unfccc.int/essential_background/glossary/items/3666.php#L)).

<sup>4</sup> [www.planvivo.org](http://www.planvivo.org)

- Suspicion that PES agreements may result in land grabbing.

#### **4.4 Opportunities for enhancing carbon value chain**

- Forest owners are interested in conserving the forests since they obtain a number of forest products and services as established during forest surveys and interviews.
- Some forest owners are organized into forest owners associations which will ease mobilising and aggregating them into sellers of ecosystem services.
- A number of conservation organizations are active in the area and have already raised awareness and enhanced forest conservation skills among forest owners.
- There is interest among private companies operating in the area to contribute to conservation of forest for biodiversity and watershed management services. Hydromax power limited that is constructing a mini-hydro power station along river Wambabya has for example shown strong interest in conserving the water catchment that supplies water for power production. The British American Tobacco Uganda (BATU) has embarked on a program to support natural forests biodiversity and fresh water conservation in a bid to manage the impacts of tobacco growing operations on biodiversity. Other companies that depend on water and forestry resources such as the oil companies and those in the tea sector provide opportunities as potential ecosystem service buyers

## 5.0 Value chain for watershed services

Through Wambabya riverine forests system, runs River Wambabya, the biggest river in Hoima which drains into Lake Albert downstream. The forests are a catchment area for the river, along which Hydromax Uganda Ltd is constructing a 9MW hydro power plant to generate electricity to supply communities, towns and businesses around. For Rushebeya-Kanyabaha Wetland landscape, the main river that runs through the wetland landscape is R. Rushoma along which Kisiizi power plant taps water for hydro electricity generation downstream.

### 5.1 Producers/suppliers of watershed services

Those who own or manage upper watershed land often have little incentive to provide watershed services because the benefits occur downstream and most of the time; they do not receive compensation for providing them. Therefore, suppliers of watershed services are the landowners within the river Wambabya (Table 4) and Rushoma catchment areas (Table 5). Watershed management services could be secured once all landowners adjacent to the streams and small rivers that form tributaries of rivers Wambabya and Rushoma have been recruited into PES schemes. Apparently, there is no structured watershed services scheme in place, but great potential exists based on current developments along the river courses, coupled with the environmental challenges which affect the quality and quantities of water flow.

**Table 5: Sellers of watershed services in Rushebeya-Kanyabaha wetland landscape**

Sub-county	Area (km <sup>2</sup> )	# of Households	Male	Female	Total Population	Av. HH Size
Bukinda	57.83	3,863	9,467	9,844	19,311	5.0
Kashambya	130.04	5,006	11,381	12,646	24,027	4.8
Rwamucucu	110.55	4,989	3,724	12,806	16,530	3.3
<b>Total</b>	<b>298.42</b>	<b>13,858</b>	<b>24,572</b>	<b>35,296</b>	<b>59,868</b>	<b>4.3</b>

Watershed management in Rushebeya-Kanyabaha wetland landscape must take a landscape approach, thus, all land owners within the low land and upland areas must be recruited to manage their land properly. The landscape covers 298.42 sq.km with 13,858 land owners who are the potential sellers.

Landowners use poor land management practices like bush burning, disbanding terraces to create fertile areas for crop growing, trash burning, intensive charcoal burning and overgrazing, which affect the quality of ecosystem services

## 5.2 Intermediaries/service providers

There are a number of government and non-governmental organizations that are providing support services in agriculture, social services and wetland conservation within communities in the landscape. Their activities and nature are summarized in Table 5 & 6.

**Table 6: Potential service providers for watershed management (Government)**

Agency	Nature of the organization	Main activities
National Environmental Management Authority (NEMA)	A national agency mandated to co-ordinate, monitor and supervise environmental management in the country	<ul style="list-style-type: none"> <li>Monitoring and regulation of environmental practices and standards</li> </ul>
District Local Government	Local government	<ul style="list-style-type: none"> <li>Agricultural advisory services, livelihood improvement, Bee keeping, piggery, fruit farming</li> <li>Legislation</li> </ul>
Wetland Inspection Division (WID), now Wetlands Department	A National Programme for the inspection of wetland resources	<ul style="list-style-type: none"> <li>Constructed a foot path in the wetland, advisory on wetland management</li> </ul>
National Agricultural Advisory Services (NAADS)	A national agricultural advisory services provider.	<ul style="list-style-type: none"> <li>Providing improved breeds of goats, good potato seed</li> </ul>

**Table 7: Potential service providers for watershed management (NGOs)**

Organisation	Nature of Organisation	Main activities
Nature Harness Initiatives (NAHI)	Ugandan-based organization	<ul style="list-style-type: none"> <li>Scoping for ecoagriculture practices</li> <li>Supporting market based mechanisms through linking communities to markets for nature-based products</li> </ul>
Africa 2000 network	An agricultural-based NGO	<ul style="list-style-type: none"> <li>Provision of seed, good farming practices in cassava, Bananas, passion fruits, Apples, livestock and poultry, fish farming.</li> </ul>
Nature Uganda	National Conservation Organization	<ul style="list-style-type: none"> <li>Biodiversity conservation and fish Farming</li> </ul>
World Vision	International development organization	<ul style="list-style-type: none"> <li>Building schools and health centres, agricultural services</li> </ul>

Tables 5 and 6 show governmental and non governmental institutions that are providing technical services to communities in the watershed. The services are key to improvement of land management if further supported by the benefiting private sector downstream.

### **5.3 Buyers for watershed services**

These are the beneficiaries of the watershed services which accrue from well managed watersheds. Beneficiaries downstream enter into agreements with ecosystem service stewards upstream to engage in better land management by implementing carefully designed interventions upon agreed compensation.

Development of incentives for appropriate land use practices therefore require finding ways for upstream landholders to be compensated for their costs. Ways of compensation include:

- (i) **Paying land owners in the upper water catchment** to maintain existing forest cover or vegetation cover in order to maintain stable stream flows and reduce sedimentation or
- (ii) **Adding a small fee to the monthly water bill** and then setting aside the funds to use towards conservation and watershed protection projects.

This is the end market of watershed services and is attained upon a well coordinated chain of functions and actors. Figure 10 illustrates the functioning of the watershed value chain for both Wambabya and Rushebeya-Kanyabaha wetland landscapes. The value chain shows the conceptual linkage between the buyers and sellers with technical support of both government and non-governmental institutions.

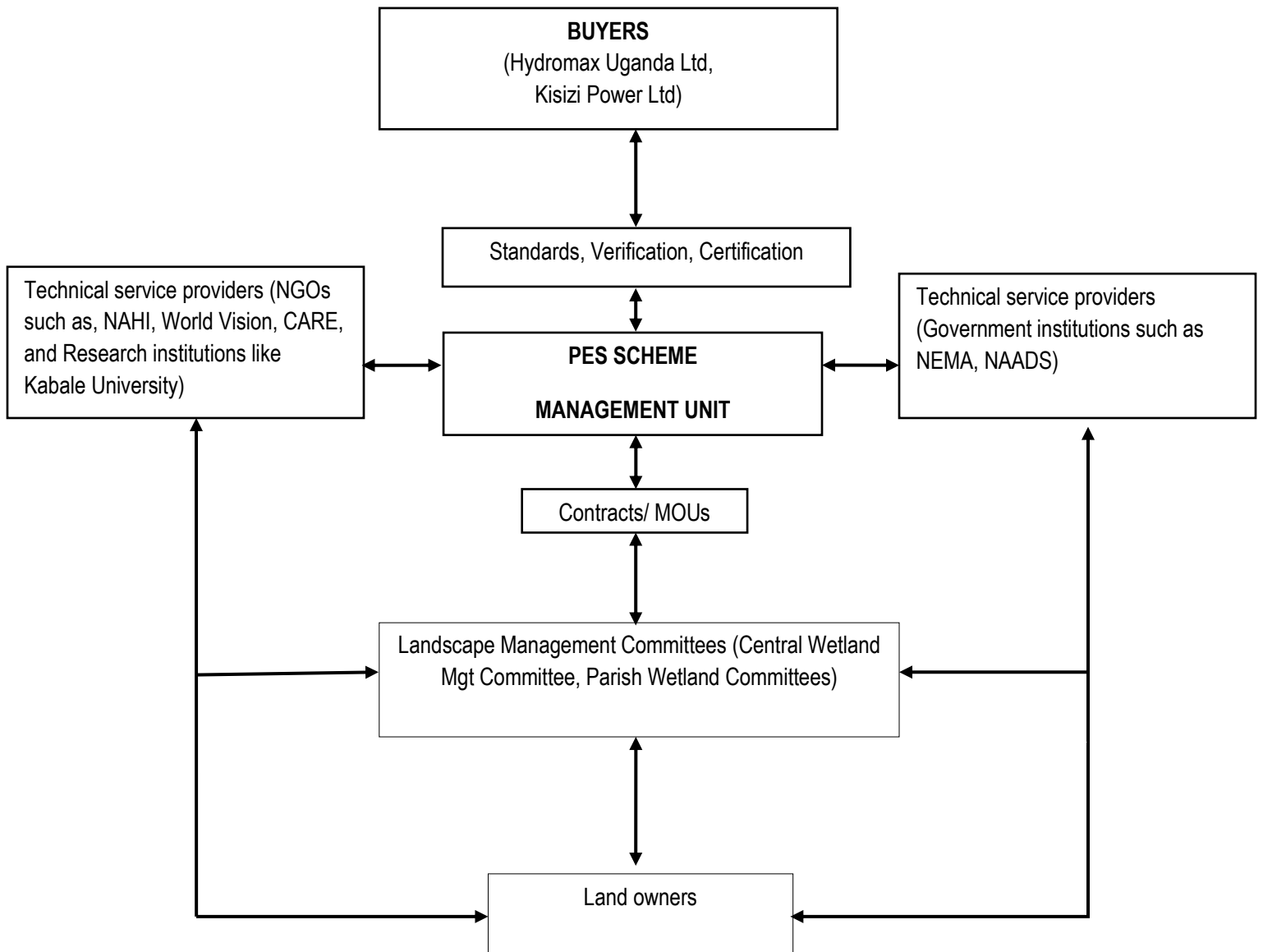


Figure 10: Value chain map for Watershed services in Wambabya and Rushebeya-Kanyabaha landscapes

**Key:**

↔ Flow of services, information and/or rewards

#### **5.4 Existing watershed related schemes in Wambabya riverine forests system**

Hydromax Uganda Limited, a private company building a mini hydro power plant in Buseruka Sub County with an output of 3X3 MW has embarked on management of River Wambabya catchment to ensure that fresh water flowing in the river where its business solely lies, is well conserved. Their activities started with recruiting an environment officer and mapping out all rivers and tributaries in the entire Wambabya catchment, all villages through which the rivers flow and management practices and challenges. This acted as their basic information to inform their intervention strategies. Major interventions on the ground have however not been realised yet, perhaps due to limited guidance or their internal management systems.

Orienting Hydromax using a PES approach and helping them to design the scheme for supporting upstream land owners and users of the water resources to better manage the catchment would secure good quality water and in big quantities.

#### **5.5 Existing watershed related schemes in Rushebeya-Kanyabaha wetland landscape**

Kisiizi Hospital Power Limited is the potential watershed management services buyer. The power generation company owned by Kisizi Hospital, a Church of Uganda missionary founded and privately managed hospital operates a mini-hydro station further downstream currently producing 320kw and are installing systems to increase their production to 500kw. Water for power production largely originates from the Rushebeya-Kanyabaha wetland landscape (that collects into R. Rushoma). The power company managers are aware of the implications of their increase in the total kilowatts produced such as demand for more water and are willing to participate in protection of the source of the water. The company has participated in various discussions held both at the hospital and with other stakeholders in Rushebeya-Kanyabaha landscape and has pledged commitment to providing support in management of the upstream to maintain or increase the water flow in good quality.

Like with Hydromax Uganda Ltd in Wambabya, designing a framework for channeling support to stewards in the watershed is what remains so that sustainable management of the landscape is guaranteed.

#### **5.6 Challenges faced along the watershed management value chain**

- Increased pressure on land for agricultural production. Rushebeya-Kanyabaha wetland landscape is densely populated and most of the land has been ploughed over and over again. The wetland

remains one of the very few areas remaining in the area and part of this wetland has already been converted for agriculture. Riverine forests are steadily disappearing in Wambabya due to this

- There is high level political interference especially in Rushebeya. The latest has been the President promising to handle land management issues and suspending the supervisory and monitoring roles of NEMA to which local communities take advantage of and reclaim more of the wetland.
- Little understanding of the services accruing from the landscape: People in the landscape have little knowledge of the services accruing from the good practices they are carrying out in the landscape. They are only aware of the tangible products they get from the use of wetland materials. Unless intensive training is carried out, the people in the landscape may not comprehend the business case of environment services.

#### **5.7 Opportunities for watershed management**

- Communities are enlightened on the need for conservation and the associated benefits such as supply of craft materials, mud fish and bee keeping among others in both Rushebeya-Kanyabaha wetland and Wambabya landscapes.
- Potential buyers such as Kisiizi Power Company and Hydromax Uganda Ltd have shown concern and interest to support conservation activities. Hydromax Uganda Ltd is already supporting PES initiatives in Wambabya landscape. This is an opportunity to engage them further and design more specific interventions and clear targets to be achieved by landowners through an incentive mechanism.

#### **6.0 Overall conclusions**

The value chains for ecosystem products and services are in their infant stages but are steadily coming up. For bee keeping in Wambabya riverine forests, the value chain function and actors are characterized by weak institutions which make the entire system weak and exploitative to the disadvantage of the producers. Support functions especially from the financial institutions are lacking and this limits large scale production as well as quality processing and packaging of honey.

The value chain for Bamboo is almost non-existent as stakeholders have not realized the benefits of bamboo products and the ecological services it provides. The product has not taken off from the production stage despite the potential for rapid growth, given the supportive stakeholders within the landscape

The state of carbon sequestration is developing in Wambabya riverine forests system. The existing PES and/or PES-related projects are a clear indication of a functioning value chain. The challenge is that there is rapidly increasing pressure on natural forests which is likely to affect the delivery of the ecosystem services by the sellers.

The potential for watershed management in both Wambabya and Rushebeya-Kanyabaha wetland landscapes has not been streamlined to deliver watershed services in terms of good water quality and quantity. There is no clearly operating scheme, although there are indications of willingness from downstream beneficiaries of watershed services.

## **7.0 Recommendations**

The following recommendations are made to improve the value chain function functions and roles of actors for each of the ecosystem products and services considered for this value chain analysis.

### ***Beekeeping/honey value chain***

The bee keeping value chain functions should be improved at all levels right from production, transportation, processing, packaging and marketing. This study recommends for:

- Engaging the private sector to support bee keeping enterprise for improved ecosystems management and livelihoods improvement
- Sensitization of honey producers on importance of using modern hives so as to increase honey production;
- Development and/or strengthening of producer groups to be able to access support from financial and other supporting institutions.
- Strengthening the capacities of farmers in apiary management to ensure high levels of bee hive colonization and honey production
- Improved processing and packaging by the bulking agents to attract better markets

### **Bamboo value chain**

Ecosystem services provided by bamboo such as biodiversity conservation and carbon storage are of global importance and an added value to economic uses for communities. Marketing these ecosystem services in a “bundle” together with the bamboo product, can provide a monetary incentive for farmers to implement more sustainable harvesting and production methods.

The bamboo value chain should be boosted by supporting communities to invest in increasing production so as to tap into a wide range of products and services from bamboo. Development organizations, including the private businesses who are the major actors should play a big role in this.

Community sensitization is also important to raise awareness about the values and importance of bamboo in the landscape.

### **Carbon value chain**

- Establishment of carbon stocks for all natural forests in the landscape is recommended to determine how much carbon they can sequester.
- There is need to develop a strong monitoring framework to ensure that the delivery of management interventions is perfect and ensures improved management of ecosystems and ecosystem services.
- While there is some level of awareness created (arising out of on-going projects) among stakeholders regarding carbon credits, more awareness is required for them to fully understand the concept

### **Watershed value chain**

In order to develop the business case for watershed management, it is recommended to:

- Undertake hydrological surveys to understand the status of watershed in terms of water quality and quantity
- Determine current land use practices and recommend for good land use practices that are important to secure the quality of the watershed.
- Create awareness among stakeholders-especially direct local beneficiaries for them to understand the value of a healthy watershed and how they can contribute to its quality.

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