



Cameroon Gender and Environment Watch
CAMGEW



Man & Nature

Feasibility Study Report on Oku White Honey and Bee Wax from Kilum-Ijim Forest in Cameroon

This study is conducted by Cameroon Gender and Environment Watch (CAMGEW) From March to July 2014
with financial support from man & nature - France

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REPORT OF WAX STUDY

FROM MARCH TO JULY 2014

ABBREVIATIONS AND ACRONYMES

CAMGEW- Cameroon Gender and Environment Watch

CBOs - Community Based Organisations

FMIs - Forest Management Institutions

KIWAHA - Kilum Ijim White Honey Association

MINEPIA - Ministry of Livestock, Fisheries and Animal Industry

MINFOF- Ministry of Forestry and Wildlife

OHCS- Oku Honey Cooperative Society

PPI-FFEM – Small Initiative Programme of French Global Fund for Environment

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SECTION I: INTRODUCTION

A- PRESENTATION OF CAMGEW

Cameroon Gender and Environment Watch (CAMGEW) is an association based in Oku, Cameroon with authorization number N°000998/RDA/JO6/BAPP. CAMGEW works locally and thinks globally, integrating gender in solving environmental problems in Cameroon. CAMGEW believes that the future of our mother planet-earth is in our hands and also that the planet can be sustained by putting social and environmental justice at the centre of development. CAMGEW seeks to achieve her objectives by liaising with other likeminded organizations worldwide like Man & Nature - France. She has resolved to function according to core values of engagement and dedication in respect of its constitution. CAMGEW has as mission to fight poverty; promote sound environmental management, gender balance and economic sustainable development.

B- PRESENTATION OF PROJECT

Cameroon Gender and Environment Watch (CAMGEW) an association based in Oku, Cameroon with authorization number N°000998/RDA/JO6/BAPP and Man and Nature an association based in France matriculated 533620399 signed a partnership agreement to carryout feasibility studies on bees wax from Oku White Honey in the Kilum-Ijim forest and test its commercialization in France. Man & Nature has as objective to support communities in the Southern hemisphere in nature protection and sustainable exploitation of natural resources.

Oku White Honey is produced from Kilum-Ijim Mountain forest and is peculiar to this region reason why it has been certified as Geographical Indication Product by African Intellectual Property Right Organization. To carryout studies on the quantity and quality of wax, there is need to know much about Oku White Honey. Bee wax is produced from Oku White Honey in Kilum-Ijim forest. This study also involves quantifying the Oku White Honey produced per hive and generally from the Kilum-Ijim forest for 2012, 2013 and 2014. It will also involve knowing Oku White Honey and bee wax producers, those processing crude honey to honey and wax, and those involved in marketing. This study will also present procedures involved in wax exportation and test this procedure by exporting 200 Kg of wax to France. Statistics on 100 hives will be gotten on beehive colonization, mounting, production of honey and wax, rate in which bees abscond from hives, death rate, etc.

C- PRESENTATION OF KILUM-IJIM FOREST

The Kilum Mountain Range and the Ijim Ridge are covered with a montane forest called Kilum-Ijim forest that is peculiar in producing Oku White Honey. The Kilum-Ijim forest is part of the Western Highlands of Cameroon commonly referred to as the Bamenda Highlands. The Kilum Mountain is found in two tribes- Nso and Oku which are in Bui Administrative Division in the North West Region of Cameroon. The Ijim Ridge is found in the Kom tribe in Boyo Division of the North West Region of Cameroon.



Fig 1: Position of Kilum-Ijim Forest in Cameroon

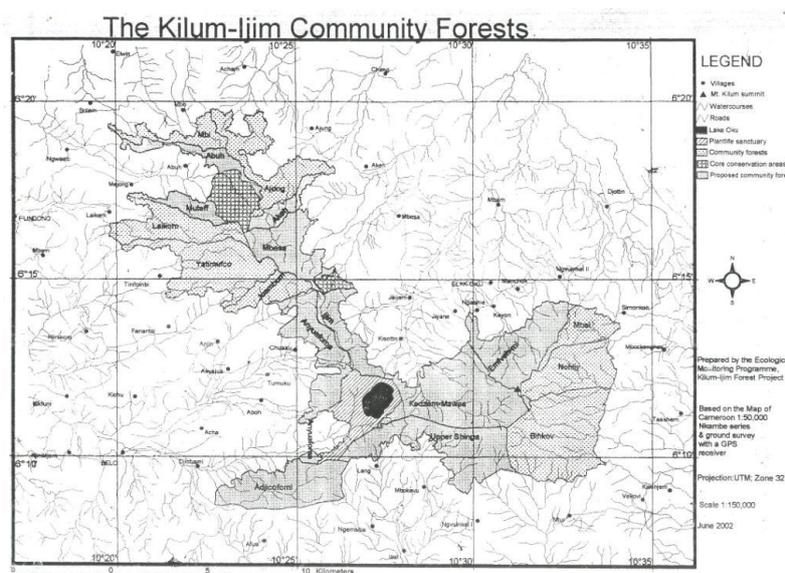


Fig 2: Kilum-Ijim Forest with various community forests

The Kilum-Ijim Community forest covers an area of 20,000 hectares and is located Mount Kilum with its peak at 3,011m and the adjoining Ijim Ridge (2,000-2,500m). BirdLife International created the community forests and divided the Kilum-Ijim forest into 18 community forest. About 44 communities live in the Kilum-Ijim Community Forest. During the period 1987 to 2003 of project execution, there was forest regeneration, environmental education and training on alternative source of livelihoods like agroforestry and bee farming. The contiguous Kilum and Ijim Mountain Forests are located between latitude 6°0'N and 6°1'N and Longitude 10°20'E and 10°35'E. The highest altitude of this mountain forest is at 3,011m with a large crater lake called Lake Oku at 2,500m altitude found along the Cameroon Volcanic line. The Kilum-Ijim forest has a natural setting with about 80% of the population based there made up of natives of Nso, Oku and Kom tribes, some of whom come in from close towns in these tribes to farm. The Kilum-Ijim region is known nationally for its traditional healers due to the many medicinal plants in the bio-diverse Kilum-Ijim forest.

The area around the Kilum-Ijim Forest is one of the most densely populated parts of Cameroon. It is estimated that close to 300,000 people live within a day's walk to the forest. This population is attracted by rich volcanic soils and the near temperate climate that favours the cultivation of crops such as coffee, beans, maize, Irish potatoes and a wide variety of vegetables (onions, tomatoes, cabbages, carrots etc.). Potatoes and beans are exported to other parts of the country as well as to neighbouring countries like Central African Republic, Gabon, Equatorial Guinea, etc. These crops are gradually replacing coffee as the main cash crop of the area because of the dramatic decline in coffee prices in the mid 1980s. Infrastructure in the area is generally poor. Farm-to-market roads are poor and make evacuation of farm produce very difficult. Bee farming is practiced in the forest and Oku White Honey demand has increased after it was certified as a Geographical Indication Product.

Kilum-Ijim forest has a rich ecosystem with non timber forest products like honey, mushrooms, medicinal plants (like *Prunus africana*, *Pittosporum veridiflorum*, *Agauria salicifolia*), alpine bamboos, wood for firewood and carving, spices, additives (colourings, preservatives and flavourings), etc but suffers from forest degradation due to animal encroachment, farming, poaching and unsustainable forest exploitation. Some trees in this forest that produces flowers collected by bees to produce Oku White Honey are *Nuxia congesta*, *prunus africana*, *Schefflera abyssinica*, etc. This forest is predominantly montane, in which trees are too small and inaccessible to be of interest to commercial loggers. These non timber products could better serve the community and fight poverty if forest income generation activities are promoted and a workable benefit sharing mechanism put in place. The forest has a high potential to improve the living standards of local people but this potential is under exploited or unblocked. Many forest people depend on these products for their livelihoods. These

services and products cannot be available if the forest is destroyed. With a good forest ecosystem benefit-sharing mechanism put in place the living standards of the local people will improve and they will see the need to engage in forest ecosystem management. Environmental education is important to tackle forest degradation through behavioural change and to instil in young people the spirit to grow and participate in forest management. Protecting the forest will enable it to generate water, fresh air, serve as carbon sink, source of beneficial insects and protect endangered species like *Bannerman's turaco* (an endemic and endangered bird only found in the Bamenda Highland Forest region with Kilum-Ijim having its largest remaining forest), etc all of which are indirect benefits to village dweller.

The Kilum-Ijim Forest has had a long history of indigenous and traditional management. The population uses the forest heavily to get a wide variety of products and services. Most water courses in the area originate from the forest. In addition, the forest has significant cultural and spiritual values to the local population. Community forest management in the Kilum-Ijim area has been enabled through the support of an institutional three-way partnership among the traditional authorities (represented by the Fon, Kwifon and village heads), the local communities (represented by user groups) and government. Traditional authorities would have the role of coordinating the activities of the user groups and of resolving conflicts between user groups or members of the same user group. The government also plays this 2 coordination and conflict resolution role as well as the other key role of creating the enabling policy environment for community forestry through legislation and technical assistance.

D- COMMUNITY FORESTS IN KILUM- IJIM FOREST

There are 18 community forests in Kilum-Ijim forest with 44 villages divided in table form as follows:

Table 1: Kilum-Ijim Community forest and villages

	Kilum Community forest		Ijim Community forest	
Nº.	<i>Kilum Community forest</i>	<i>Number of villages in each community forest</i>	<i>Ijim Community forest</i>	<i>Number of villages in each community forest</i>
1	Bihkov	4	Juambum	1
2	Nchiiy	1	Laikom	1
3	Mbai	4	Ajung	1
4	Emfvemii	4	Yatimuvco	3
5	Kedjem mawes	3	Mbesa	1
6	Ijim	4	Muteff	1
7	Upper shinga	4	Abuh	1
8			Afua/djichami	1
9			Anyafoma 5	5
10			Akeh 1	1
11			Mbi	3

E- METHODOLOGY USED IN STUDIES

This study started with the identification of members of the study team. This identification and selection of team members was done based on the following criteria: knowledge and experience on Oku White Honey and bee wax; knowledge of the locality of Kilum-Ijim, the level of education and communication power. The first meeting with team members was held on the 4th of April 2014 to present the studies officially and assigned tasks. Items to feature in the questionnaire to gather data from bee farmers and farmers' institutions were discussed. Team members then prepared a list of community members involved in honey and bees wax production. The second meeting took place on the 5th of April 2014. This meeting had as objective to harmonize the list of identified bee farmers and wax producers and get their contacts. The questionnaire was adopted. In the third meeting, presentations of study findings were made on the following topics by team members:

- The techniques of bees wax production
- Oku White Honey production and Honey drink production
- The regulations guiding honey and wax exportation.
- Traceability on certified Oku White Honey and bee wax traceability
- Buyers of Oku White Honey and its wax locally, nationally and internationally

Visits were programmed to meet bee farmers and bee farming stakeholders and institutions around Kilum-Ijim Forest area to arrange meetings with bee farmers and bee farmer organizations. Second visits were made to communities' surroundings the Kilum-Ijim forest to get information on bee wax and Oku White Honey. Consultations were made with various resource persons involved in Oku White Honey and wax production, processing and marketing to get needed information for the studies.

Field visits were done to some beehive colonization sites, Kilum-Ijim forest, offices linked with Oku White Honey, Oku White Honey and wax processing units. Bee farmers with long standing experience were consulted to get more relevant information. More information on Kilum-Ijim Forest was gotten through reading various documents, websites and interview of resource persons.

SECTION II: HONEY AND WAX PRODUCTION

A- OKU WHITE HONEY PRODUCTION

The procedure for Oku White Honey production is as follows:

Hive construction: Firstly, a beehive is constructed. Mostly local materials like bamboos (raphia and alpine) are used and grass tied round it to keep it warm and avoid water penetration.

Colonization: The beehives are then carried by head to a valley some 15 Km or more to trap bees and when the bees enter the beehives, the hive could be transferred closer to the forest before November or kept in the colonization zone in the valley till November when it is transferred directly to the forest still by head. Colonization is low in the forest. Around Ijim Forest, some bee farmers use Kenyan Top Bar (KTB) hives produced from timber. This KTB hives are mounted in the valleys to trap bees and some are mounted on tree tops in the forest to trap bees.

Transportation of beehives to the forest: Colonized beehives are transferred from colonization zones to the Kilum-Ijim forest from November to March when there are flowers in the forest. The period from July to October has little flowers in the forest but there are enough flowers in the valley all year round.

Honey harvesting from the forest: Honey harvesting in the forest is done from May 15th to June ending. There is much flower in the forest from November to June and this permits bees to produce much honey that is harvested in May and June. To harvest honey, necessary equipment must be prepared. The plastic containers (recommended) must be washed and dried. Each harvesting must have two plastic containers with stack lids (one for capped honey – good honey and another for uncapped honey or brood). The smoker must be fueled. Two persons are involved in honey harvesting and must be dressed in bee suits, rain coats and wear gloves to avoid bee sting. Only capped honey is harvested. Uncapped honey and brood must be selected from harvested honey to ensure honey quality. It is advisable not to harvest honey when it is rainy. You must maintain high sanitation values to keep the honey clean. Honey produced by bees is never dirty but could be contaminated during harvesting, processing and packaging.

Honey processing: The processing of Oku White Honey is done within 24 hrs after harvesting to avoid it clotting. The equipment used must be dry and clean. Mostly stainless mesh is good for filtration. The processing room must be dry and free from moisture. Only dry plastic containers with stack lids are used for storage. Honey combs are broken down to smaller particles during harvesting and are filled in portable containers. Before processing, honey is inspected through physical examination for mixture with brood, bee bread or pollen and empty combs. The moisture content of

the honey is determined with a refractometer. If the honey is accepted in the case of Oku Honey Cooperative Society, the plastic bucket of honey is poured into a calibrated micron mesh and is allowed to drop from one micron mesh to the other passing from mesh with large micron holes to that with small micron holes till the finest micron mesh where it passes to the collection basin. From the collection basin, the pure honey is transferred to the storage containers. Honey could also be process using an extractor and in this case the honey could be process after 24 hrs of harvesting but an extractor is expensive and is not used locally. Many bee farmers or bee farmer groups lack the means to get stainless mesh to filter their honey and sometimes the stainless mesh is less available. They use locally made baskets from bamboo to filter honey. Some bee farmers have a modern honey drainer.

Honey Packaging: After honey processing it is stored in large containers and packaged in various sizes to meet customers and buyers request.

B- HONEY DRINK PRODUCTION

After draining honey from the crude honey harvested from the forest, the chaffs are used to obtain honey drink. During honey draining not all the honey leaves the combs. The remaining honey in the chaffs is removed by adding water to the chaffs and steering. The chaffs with water are allowed to stand for a while and then the chaffs are separated from the water with a shift. The honey that remained in the chaffs after draining honey leaves the chaffs and get into water. The water becomes sweet forming honey juice or drink. The more the drink stays, the more it becomes alcoholic. This is the reason why many bee farmers do not produce honey drink from all the chaffs immediately for fear it will turn to alcohol. They produce the honey drink in quantities they consume and this delay the extraction of wax.

C- BEE WAX EXTRACTION FROM OKU WHITE HONEY CHAFFS

Bee wax is extracted from honey combs produced by bees. Honey is stored in honey combs by bees. Wax is a creamy substance secreted in a liquid from the glands of bees. The wax glands are on the side of the bee abdomen. When the wax comes in contact with air it forms scales which can be seen as small flask on the sides of the abdomen of bees. Bees use the stiff hairs on their hind legs to remove the scales of wax and pass them onto their jaws where wax is chewed before it is used in producing honey combs. Bees produce more wax when there is surplus honey to be stored. Bee keeping using traditional and Top Bar hives results in greater yield of bee wax. The honey comb is broken during the extraction of honey. There are many ways of extracting wax. Wax is extracted commonly using 2 methods. The two ways are

- Solar wax extraction
- Hot water bath extraction or submerge sack method

Hot water bath extraction or submerge sack method

In Kilum-Ijim forest area, hot water bath extraction or submerge sack method is used and this requires the following:

- a) 2 cooking pots
- b) A jute bag
- c) A string
- d) 2 pieces of sticks
- e) A plastic bowl and
- f) Soap

Procedure involved in Hot Water Bath Extraction or Submerge Sack Method: A pot is filled with water $\frac{3}{4}$ full and place on fire. The size of the pot determines the quantity of wax to be extracted at a time or the number of times to extract wax. Fire is prepared in the usual way until the water begins to boil. A quantity of broken combs which is obtained after draining honey and producing honey drink is put into a jute bag and tie using the string. A jute bag is used because it is porous; it does not melt at high temperature and has no contaminants. The jute bag and its content are submerge in the boiling water. The wax melts from the bag and flows out to rise to the top of boiling water. Two sticks are used to skim the wax in the bag in boiling water. A plastic bowl is used to remove the oily wax into another container with cold fresh water where it hardens. This procedure is continued until all the oily wax is skim out of the combs in the jute bag. The residue is removed after all wax is out and this is made of pollen which can be dried to prepare either fowl or pig feed using corn. All the unwanted water in the wax flows out and the harden wax remains. The second pot is placed again on fire and the volume of fire is reduced. The harden wax is put again on fire with no water. The wax melts to liquid as steering continuous. A plastic bowl which is a mold that could be of various size and shape depending on needed shape and size of wax is smear with soap. The reason for smearing with soap is to prevent wax from adhering to container walls. The liquid wax is poured into the smeared bowl and placed in a cold place to harden. After putting the liquid wax in a bowl it takes between 1 to 3 hours to have a cake of solid wax. The smeared container with wax after solidifying is shaken to remove the wax from plastic bowl.

SECTION III: QUALITATIVE AND QUANTITATIVE PRESENTATION

A- PRESENTATION OF FINDINGS FROM 100 BEEHIVES

CAMGEW had to get information on the percentage of beehive colonization rate, honey production, death rate of bees in hives, rate of bees leaving (absconding) hives, the quantity of honey produced per hive and duration of local hives. The following information was gathered from experienced bee farmers. This information was gotten from hives in the hot zones (valleys), Kilum-Ijim forest and Kilum-Ijim forest peripheries.

a)- Colonization rate

CAMGEW worked with ten experienced bee farmers to obtain this tabulated statistics on colonization rate in Kilum-Ijim forest area.

Table 2: Rate of colonization in different sites

Sites for beehive colonization	Rate of colonization in %
Hot zones (valleys)	80
Kilum-Ijim forest	15
Forest periphery	30

b) - Honey production in the Kilum-Ijim forest

CAMGEW study team worked with farmers and institutions that produce and process honey to get this statistics. A beehive in the Kilum-Ijim forest can produce averagely the following honey products

Table 3: Quantity of honey and wax produced per beehive

Type of honey	Quantity produced per beehive
Crude honey	6 - 23 Kg
Drained honey	2 – 8 Litres
Wax produced	¼ - 2 Kg

Old combs produce less wax while new combs produce more wax.

c) - Death rate of bees in hives

Death rate of bee colonies in hives can stand at about 2%. This hardly happens. When it happens, it could be as a result of bee mouths, and 40% due to poor harvesting in the absence of honey harvesting equipment like bee suits, smokers, etc. When a bee sting it will have less than 24hrs to live. When many bees stings from a beehive there is a high possibility that the colony will die.

d) - Rate of bees leaving hives (absconding)

This information was obtained from experienced bee farmers who have practiced bee farming for close to 3 decades or more on the rate at which bee colonies leave beehives:

Table 4: Rate of bees leaving hives in different areas

Place of beehive location	Rate of bees leaving beehives in %
Valleys where colonization occurs	5 - 10
Kilum-Ijim forest	40
Around forest periphery	5 - 10

A bee colony could leave a beehive in the forest because of poor honey harvesting, the choice of time of harvesting and the location of beehive. Beehives colonized around forest periphery and carried to the forest have fewer chances to abscond because of fewer differences in climate.

B- NUMBER OF HIVES AND HONEY/WAX PRODUCED IN KILUM-IJIM FOREST

CAMGEW after collecting data on the number of hives, quantity of Oku White Honey and bee wax produced from 2012 to 2014 got the following information.

Table 5: Quantification of Oku White Honey and Bee Wax Produced from Kilum-Ijim Forest

PLACE OF FOREST	NAME OF FOREST	NAME OF TRIBE	NUMBER OF HIVES IN FOREST	HONEY PRODUCED IN 2012 (LITRES)	HONEY PRODUCED IN 2013 (LITRES)	HONEY PRODUCED IN 2014 (LITRES)	WAX PRODUCED IN2012 (Kg)	WAX PRODUCED IN2013 (Kg)
Kilum Mountain Range	Oku Community forest	Oku	3862	12884	12005	12736	769	936,5
Kilum Mountain Range	Bihkov Community Forest	Nso	1565	4641	4559	4762	22	18
Ijim Ridge	Ijim Community forest	Kom	3057	5368	6032	6555	393,5	452
TOTAL			8484	22893	22596	24053	1184,5	1406,5

Table 6: Number of hives, honey and bee wax produced in Ijim forest

NAME	NUMBER OF HIVES IN THE FOREST	HONEY PRODUCED IN 2012 (LITRES)	HONEY PRODUCED IN 2013 (LITRES)	HONEY PRODUCED IN 2014(LITRES)	WAX PRODUCED IN2012(KG)	WAX PRODUCED IN2013(KG)
Afua Ijim	414	810	1011	885	12	15
Tumuku	562	1068	1533	1451	277	342
Aboh	233	226	311	422	0	0
Anjin	184	226	284	275	0	0
Ntum	284	702	502	502	9	10
Elimighon	118	235	249	192	0	1
Djichami	239	167	315	218	0	0
Chuaku	194	195	275	342	0	0
Juabum	38	28	32	66	0	0
Sowi	50	80	30	31	0	0
Anjang	65	82	63	73	0	0
Fundong	414	1022	857	1405	79,5	70
Njinikom	79	153	197	259	5	10
Mbessa	123	329	191	255	11	1
Ajung	60	45	182	179	0	3
Total	3057	5368	6032	6555	393,5	452

Table 7: Number of hives, honey and bee wax produced in Oku forests

NAME	NUMBER OF HIVES IN THE FOREST	HONEY PRODUCED IN 2012 (LITRES)	HONEY PRODUCED IN 2013 (LITRES)	HONEY PRODUCED IN 2014(LITRES)	WAX PRODUCED IN2012(KG)	WAX PRODUCED IN2013(KG)
Kesotin	157	856	817	320	35	49,5
Elak	2159	4877	6173	7307	378	534
Tolon	30	200	260	80	5	10
Mbockejikejem	20	54	67	140	0	0
Jikijem	20	100	250	200	7	10
Tankiy	127	320	293	200	0	0
Manchok	964	3870	2586	2453	199	226
Keyon	225	1392	768	720	113	52
Lang	24	120	167	600	10	40
Ngashie	96	507	372	490	6	5
Mboh	40	588	252	226	16	10
TOTAL	3862	12884	12005	12736	769	936,5

Table 8: Number of hives, honey and bee wax produced in Bihkov forests

NAME	NUMBER OF HIVES IN THE FOREST	HONEY PRODUCED IN 2012 (LITRES)	HONEY PRODUCED IN 2013 (LITRES)	HONEY PRODUCED IN 2014(LITRES)	WAX PRODUCED IN2012(KG)	WAX PRODUCED IN2013(KG)
Vekovi	721	2163	1899	2334	16	10
Mvem	303	770	737	878	6	8
KAI	217	860	520	630	0	0
Tanshem	163	215	208	341	0	0
Ntur	120	333	345	309	0	0
Kecho	41	300	850	270	0	0
TOTAL	1565	4641	4559	4762	22	18

Duration of beehive in the forest

Local beehives have a lifespan of more than 30 years if they are well roofed and taken care. Kenyan Top Bars could last longer because its material is made from plank.

SECTION IV: FIELD OBSERVATION & INTERPRETATION

A) - FIELD OBSERVATION

All bee farmers acknowledged the potential of Oku White Honey and bee wax from Kulum-Ijim forest to be higher than the present production rate. The farmers all saw the need to increase the production of this honey and wax. Oku bee farmers are more organized and are grouped in organizations better than other areas as we discovered in the field. The Ijim bee farmers told our team that they knew and practiced very little of Oku White Honey production. The farmers knew little about Oku White Honey quality norms and its certification process. In Ajung, CAMGEW meet a bee farmer who had much honey harvested from different areas including the Ijim forest at Ajung Community Forest but did not know the characteristics of Oku White Honey. Our team tasted all the honey and discovered the bee farmer had some quantity of Oku White Honey that he did not know. He sold the honey at the same price with the other honey. The price was 2 times cheaper than the present Oku White Honey price. This is the case with some other bee farmers at Ijim forest. CAMGEW discovered that the more bee farmers were organized, the more they produce more honey and wax and the more they got a market for their products with a good price. This was true with Tumuku village in Ijim forest, Oku forest areas and Vekovi in Bihkov forest.

CAMGEW learned from bee farmers in Ijim that they increased their efforts in Oku White Honey production only when the certification process for Oku White Honey started. Those who produced the Oku White Honey earlier in Ijim never had a market for it and many a times mixed it with brown honey. This reduced the quantity of honey that CAMGEW could not include in the statistics. Many farmers in Ijim told our team that many honey buyers never knew much about Oku White Honey and believed they mixed the honey with sugar to be too sweet. The Oku bee farmers have been producing this white honey over the years and were organized in cooperatives with the most popular one being the Oku Honey Cooperative Society that dates back as 1987 and legalized in 1992. Oku Honey Cooperative Society trains bee farmers, buy their honey produce from the Kulum-Ijim forest, process and market it. Oku White Honey has a high demand in Oku and out of Oku. It had become scarce over the years in Oku especially in 2013 when all stock in Oku got finished by October. In this year production was low and this was associated with climatic variation. The same honey in Ijim had no strong market as farmers told us. Ijim has very enclaved terrain. In Ijim forest more farmers drained white honey separately as individuals and sold it individually. Considering the sparsely distributed population of bee farmers and the hilly nature of the terrain it remained difficult for buyers to contact farmers. CAMGEW also learned that Belo Rural Development Association (BERUDA) had done

much bee farming training in Ijim area. CAMGEW learned from bee farmers that Kenyan Top Bar hives permitted for selective harvesting of honey than local beehives. Many bee farmers processed honey using locally made baskets from raphia bamboo. In Oku many groups have modern systems of honey processing and this could be a reason while their honey gained the confidence too of buyer. In all communities around the forest many bee farmers said there was need to have women and youths involved in bee farming to boost honey production. The Ijim bee farmers mix honey chaffs from white and brown honey to produce wax and for this reason CAMGEW could not really get statistics on the wax produced from white honey. Ijim population produces much bee wax but do not separate the wax. Bee farmers producing Oku White Honey placed their beehives in any position in the Kilum-Ijim forest no matter where they live. Farmers told us that after draining the honey the chaffs are eaten or used to prepare medicine to treat various illnesses like stomach ache and headache, cough and some other people use it to lit fire in kitchens and as manure in farms. Some farmers produce honey juice from the chaffs before discarding chaffs. Most of the bee farmers in Bihkov sold their crude honey directly to Oku Honey Cooperative Society. CAMGEW team also observed that bee farmers needed more training in modern methods of bee farming, honey draining and wax production. They also needed bee farming materials and equipment to improve on bee farming.

B) - INTERPRETATION OF DATA

The number of colonized hives present in the Kilum-Ijim forest as per our study is 8484 divided into 3862, 1565 and 3057 for Oku, Bihkov and Ijim forest respectively. This number is that identified by July 2014 to be colonised. The honey production in Kilum-Ijim forest for 2012, 2013 and 2014 was divided as follows 22893 L, 22596 and 24053 L respectively. There was a little reduction in honey production in 2013 that was associated to climatic variation with rains coming earlier than expected and washing the nectar from flowers that was to be harvested by bees. In 2014, honey production increased and this was linked to Oku White Honey certification that pushed many persons to bee farming. CAMGEW and other organization have done much training on bee farming in the Kilum-Ijim forest. CAMGEW has done training on bee farming in Kilum-Ijim forest in partnership with Oku Honey Cooperative Society and introduced more people in forest community into bee farming in 2012, 2013 and the training is still ongoing around Kilum forest area. As of now, CAMGEW has trained about 340 bee farmers as trainers of trainers and shared 370 beehives to them. Oku has remained the heaviest producer of honey and wax from the forest. Oku bee farmers are more organized and are grouped in organizations better than other areas as we discovered in the field. This is justified by the number of Oku White Honey groups present in Oku as compared to other areas where producers are identified more as individuals. In Ijim forest, there are many beehives (3057 beehives) in the forest

almost close to that in Oku (3862 beehives) but they produce just close to half the quantity of honey produced by Oku as seen in the 2012, 2013 and 2014 honey statistics. The Ijim bee farmers told our team that they knew and practiced very little of Oku White Honey production. The farmers told our team that they increase the efforts in Oku White Honey production only when the certification process for Oku White Honey started. Those who produced the Oku White Honey earlier in Ijim never had a market for it and many a times mixed it with brown honey. In Oku many groups have modern systems of honey processing and this could be a reason while their honey gained the confidence too of buyer. The Oku White Honey production could be double or triple if more persons especially if youths and women are trained on bee farming techniques to replace aging bee farmers. There is need for bee farmers have access to bee farming equipment and materials at affordable prices and the Kilum-Ijim forest made accessible. Wax production has remained high in Oku and very low in Bihkov. Ijim produce good quantity of bee wax from white honey but could produce more when trained. CAMGEW on carrying out this study discovered that bee farmers in Ijim produce more brown honey than white honey. The brown honey is produced from the valleys. There is a huge bee wax production potential from Kilum-Ijim forest considering that to get 2.5 Kg of wax is produced from 40 L of crude honey. 40 L of crude honey gives 20 Litres of drained honey. This quantity of wax could be increased if combs are new. This information was obtained from the Manager of Oku Honey Cooperative Society whose institution is the highest wax extracting structure. In 2014, 24053 Litres of Oku White Honey was produced from Kilum-Ijim forest and in 2013, 22596 Litres of honey was produced with 1406,5 Kg of wax obtained. In 2013, the potential of wax production was expected to be 2824 Kg more than doubled that produced in reality. This low wax production is linked to lack of skills and equipment for wax production. Farmers told us they could produce more wax if they are trained. CAMGEW discovered that when bee farmers drain their honey separately the honey chaffs are too small to produce wax by each bee farmer. In Oku and Bihkov, CAMGEW learned from bee farmers that Oku Honey Cooperative Society buys crude honey from farmers as they harvest and transport it immediately to their processing unit for draining, wax extraction, packaging and marketing. It is for this reason that Oku Honey Cooperative Society is a heavy producer of bee wax. Other organized groups collect crude honey from their members drain, package and sell under their cooperative or group while producing wax. Bee farmers in Tumuku are organized and produce their honey as one. Some bee farmers in Ijim and Bihkov who drain honey told CAMGEW team that when they drain honey as individuals the quantity of chaffs is small to produce wax.

SECTION V: MARKETING OF HONEY AND BEE WAX

A- EXISTING MARKETS

The following markets were identified as existing for Oku White Honey and Bee wax from Kilum-Ijim forest.

Table 9: Existing markets for Oku White Honey and wax locally and nationally

Locally in Oku	Nationally (other towns)
Oku Honey Cooperative Society - Oku	Apiculture and Nature Conservation Organisation (ANCO) formerly called NOWEBA - Bamenda
Etablissement Sammy Sammy - Oku	HONCO - Bamenda
Oku Bee farmers - Oku	BERUDA - Belo
Strugglers Mixed Farming Group - Oku	MAHIMA – Yaounde and Douala
Pure Refine Honey - Oku	Promise Enterprise - Kumbo
Oku Cultural and Touristic Centre - Oku	Shiyka Supermarket - Kumbo
Mann Group - Oku	Bamenda Handicraft Centre - Bamenda
Oku forest Honey - Oku	Bamenda Vegetable Cooperative - Bamenda
	North West Cooperative Association (NWCA) - Bamenda
	North West Bee House - Bamenda
	Le Miellerie – Douala
	Mount Oku Organic Honey - Yaounde
	Guiding Hope - Yaounde

All these institutions sell both white honey and wax except Supermarkets that do not sell wax like MAHIMA and SHIYKA Supermarkets.

B- PRICES OF OKU WHITE HONEY FROM 2012 TO 2014

Oku White Honey prices were gotten as follows from 2012 to 2014 in the following localities.

Table 10: Oku White Honey Prices from 2012 to 2014 per Location

Year	Locally in FCFA	Bamenda in FCFA	Yaounde and Douala in FCFA
2014	4000	5000	6000
2013	3500	4000	5000
2012	2500	3000	4000

Oku Honey Cooperative Society buying price of Oku White Honey

The following statistics were gotten from Oku Honey Cooperative Society on the buying price of Oku White Honey for the past 5 years

Table 11: Oku Honey Cooperative Society buying price of Oku White Honey

Year	Crude (undrained) Honey in FCFA/Kg	Drained honey in FCFA/L	Wax in FCFA/Kg
2014	900	4000	3000
2013	700	3500	2500
2012	675	2500	2000
2011	550	2500	1700
2010	500	2500	1500

Two good buckets of crude honey can give one bucket of drained honey.

C- HONEY AND TRACEABILITY

The identification of food sources of prime importance for the protection of consumers. The functioning of international food market can be at risk without food traceability. The ability to trace and follow a food producing animal or substance intended to be incorporated into a food through all stages of production, processing and distribution is necessary. The aim of traceability is to make it possible to trace back from honey source to who produces it or supplied it for example you must be able to identify all producers through their individual records, taking note of the place of harvest, date of harvesting, delivery and control number. When honey is purchase from bee keeper a record needs to be kept showing the name of the farmer, the date, the quantity delivered and amount of money paid. This can be done through a log book and bee keepers' record book

Article 18 on traceability of food states that, "It is legal duty since 1st January 2005 that all business operators are legally obligated to assume traceability". By this regulation general traceability has been fixed for the first time as obligatory requirement in food law. The regulation introduced by traceability requirements is with objective to ensure food safety and assist in enabling on unsafe food to be removed from market. We have understood that the simple traceability at the level of producer is to identify some examples of traceability by quoting

- a) "A charge" This means a production unit
- b) "A lot" means a batch of sells unit of food stuff produced or manufactured or packaged under particularly the same condition.
- c) "Charge Coding System" Coding of dates for example production date, example c2014/14 means the charge was produced 20th day of April 201 where as B could be coded 244/14 meaning 24th April 2014.

D- CAMGEW WAX TRACEABILITY

CAMGEW has delegated one of her male staff (wax Collector) to remain in contact with wax producer and follow-up their production. CAMGEW will have a focal point in each community around the Kilum-Ijim forest that will help to gather wax information and wax from each community. The focal point will be literate and will identify the source of wax by taking note of the name of the producer, the quantity, the source of the wax, the part of the Kilum-Ijim forest where the wax come from, the time of production, the buying date, etc. A form with this information will be produced and handed to focal points. The focal points will be coordinated by CAMGEW's Wax Collector who moves to communities, weigh, and pay wax after verification its source to make sure it is from the Kilum-Ijim forest. All wax will be transported to CAMGEW office and stored in a wax designated space. The wax is stored in jute bags bought by CAMGEW. The CAMGEW team especially project leader will follow-up this process to ensure success. Negotiation with heavy producers of wax will be done by Project leader. All wax will then be transported to Douala (the economic capital of Cameroon) for exportation to France by CAMGEW Project Leader. The exportation of wax to France will be the responsibility of Man & Nature-France.

E- EXPORT AND IMPORT CRITERIA

In order to export Cameroon honey the following needs to be done:

You must pose a phyto-sanitary certificate obtained from Airport or a Plant Health Centre

- 1) Respect honey processing standard
- 2) Poses an origin Certificate issued by Ministry of Commerce
- 3) Appear in the list of recognized importers

List

- a) Information sheet (1000FCFA) obtained from Ministry of Commerce
- b) Stamp application (apply to be an importer and exporter) with 1000FCFA stamp
- c) A certificate proving that you conform to the trade register (Ministry of Commerce)
- d) A certificate conform to tax payers
- e) Certificate proofing that you are in a current list of licensed exporters
- f) A receipt of free payment to MINDIC (15000FCAF)

These documents are renewable every financial year. CAMGEW will test this when she will be exporting wax out of Cameroon to Man & Nature France.

SECTION VI: CHALLENGES AND PROPOSED SOLUTIONS

A- CHALLENGES RELATED TO OKU WHITE HONEY AND WAX PRODUCTION, PROCESSING AND MARKETING

- In Fundong area, Indian bamboos (alpine bamboos) are used to produce ladders to climb up the trees where beehives are colonized but Indian bamboos are not solid enough. This increases the risk of accidents
- Small rats called honey bargers gets into hives, use their scattered tails to send away bees The Fulani population living close to the forest of Ijim set fire on savannah land in the dry season to permit the growth of new vegetation. In the process many beehives are burnt and sometimes the forest is also burnt.
- Honey stealing in the forest is very common in Ijim forest and this discourage many bee farmers from engaging the activity
- Many bees leave the forest after honey is harvested in May and June every year. This affects honey production and make the activity strenuous.
- Sometimes all bees die in the beehive in the forest especially in the rainy season
- There is a lot of forest degradation in Oku by forest users (like firewood fetchers and hunters) and in Ijim forest by Fulani population
- Bee farmers lack skills in white honey and wax extraction
- Many bee farmers are not organized in groups to enable them sell their products
- Bee farmers and their organizations lack bee farming and wax equipment and materials
- The forest is not easily accessible to bee farmers because of lack of roads
- There are many domestic animals inside the forest that eat vegetation that produce flowers and sometimes the animals push down the beehives

B- CAMGEW'S STUDY CHALLENGES

- Some bee farmers prefer measuring their honey using Kilogrammes and others used Litres. Oku White Honey is liquid when drained and become solid after some days. CAMGEW consulted Oku Honey Cooperative Society that is involved in buying, draining and selling of Oku White Honey and was told 1,5 Kg of Oku White Honey = 1 Litre of Oku White Honey. CAMGEW got honey statistics from bee farmers and institutions in Litres and Kilogramme but had to convert all data to Litres.

- Some bee farmers drain crude honey after harvesting before selling and some sell the harvested crude honey immediately. CAMGEW team had to harmonise the data by dealing only with drained honey.
- The terrain at Ijim forest was difficult. Moving from one village to the other entailed cost and more time. This led to CAMGEW spending much money than expected.
- During negotiation of study contract CAMGEW was to do the work at once by visit areas in Kilum-Ijim forest once to collect data but wax statistics was to be collected later in November 2014 through visit to farmers. This was additional cost that was not negotiated.

C- PROPOSED SOLUTIONS ON OKU WHITE HONEY AND WAX PRODUCTION

- Carryout research on what is killing bees in the forest and the reason why bees abscond from hives especially after white honey harvesting
- Encourage more people especially youths and women living around the forest to get involved in bee farming activities
- Help create a market for White Honey and wax produced
- There is need to control the stealing of beehive and white honey in the forest
- Educate farmers on issues related to the Oku White Honey and the Geographic Indication Product (GIP) norms
- Make the forest accessible to bee farmers by constructing roads
- There is need to organise bee farmers into cooperatives or groups to enable them extract more wax and have quality honey
- Train bee farmers and bee farming groups on honey draining and wax processing
- Provide training to bee farmers on how to produce other bee products like Royal jelly, and Propolis
- Train more persons on bee farming and honey production and harvesting and wax extraction.
- Bushfire must be prevented and controlled from occurring in the forest and around the forest
- Encourage participatory forest management by all stakeholders to protect the forest
- Provide material and equipment assistance to bee farmers
- Regenerate the forest with bee loving trees species like *Prunus africana* and *Schefflera*
- Remove domestic animals like goats and cows from the forest because they push down beehives and destroy vegetation that provide flowers for bee to produce honey
- Sensitize the neighbouring Fulani communities that live inside forest ranges on the need for forest conservation and involve them in bee farming

- Carryout environmental education to build the young to be nature lovers
- Carryout environmental education to community members and forest users on how to use the forest sustainable by avoiding deforestation, over hunting, etc
- Pasture improvement for fulani herders living closer to the forest to improve fodder and prevent bushfires
- Replacement of Eucalyptus and use of its wood for hive construction
- Use of swamp catchers