

Small-scale woodland-based enterprises with outstanding economic potential

The case of honey in Zambia

G. Mickels-Kokwe

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Table of Contents

Acronyms iv
Acknowledgements vi
1. Introduction 1
1.2. Methodology 3
2. Beekeeping and forest management in Zambia 5
2.1. Bio-physical conditions for beekeeping in Zambia 5
2.1.1. Honey producing insects 5
2.1.2. Vegetation types 6
2.1.3. The miombo woodland 8
2.2. Traditional beekeeping in Zambia 11
2.2.1. Bark hive technology 12
2.2.2. Impact of bark hive harvesting on the forest resource in North-Western Province 13
2.2.3. Beekeeping and deforestation 18
2.3. Beekeeping and woodland management 19
2.3.1. Beekeeping and conventional forest protection 20
2.3.2. Beekeeping and Joint Forest Management (JFM) 22
2.4. Case-study scenarios from four provinces 25
3. Institutional support to beekeeping in Zambia 31
3.1. Development potential of beekeeping in Zambia 31
3.2. History of government support to beekeeping in Zambia 32
3.3. Policy, legislation and institutional issues 36
3.4. Stakeholders in the beekeeping industry in 2004 40
4. The beekeeping industry 43
4.1. Production and domestic sales of bee-products in Zambia 43
4.2. Zambian export of bee-products 45
4.3. Organisation of the honey industry in Zambia 46
4.4. The honey marketing chain 48
4.4.1. Producers 49
4.4.2. Processors, traders and packers 52
4.4.3. Exporters 54

5. **Discussion** 59
6. **Recommendations** 67
7. **Endnotes** 71
8. **References** 77

Acronyms

BD	Beekeeping Division (of Forestry Department)
CBNRM	Community Base Natural Resource Management
CBO	Community Based Organization
CC	Commodity chain
CIFOR	Center for International Forestry Research
CLUSA	Cooperative League of the USA
COMESA	Common Market for Eastern and Southern Africa
CSO	Central Statistics Office
DDCC	District Development Coordinating Committee
EU	European Union
FAO	Food and Agriculture Organisation
FFZ	Forest Fruits Zambia Ltd.
FINWDP	Forest Industry and Non-wood Forest Products Development
FMC	Forest Management Committee
FRA	Forest Resources Assessment
FRMP	Forest Resource Management Project
GDS	German Development Service (formerly German volunteers)
GMA	Game Management Area
GRZ	Government of the Republic of Zambia
GTZ	German Technical Cooperation
HIPC	Highly Indebted Poor Country
HIV	Human Immune Deficiency Virus
ICRAF	International Center for Research in Agroforestry
IFAD	International Fund for Agricultural Development
IRDP	Integrated Rural Development Programme
IUCN	World Conservation Union
JFM	Joint Forest Management
KFZ	Keepers Foundation Zambia
MACO	Ministry of Agriculture and Cooperatives
MS-Zambia	Mellemfolkeligt Samvirke (formerly Danish volunteers)
MT	Metric Tonne

MTENR	Ministry of Tourism, Environment and Natural Resources
NGOs	Non Government Organisation
NISIR	National Institute for Scientific and Industrial Research
NRM	National Resource Management
NTFP	Non Timber Forest Product
NWBKA	North Western Beekeepers Association
NWBP	North Western Bee Products Ltd.
NWP	North-Western Province
OIE	World Organisation for Animal Health
OPPAZ	Organic Producers and Processors Association of Zambia
PCS	Production to Consumption
PECO	Philadelphia Electric Company
PELUM	Participatory Ecological Land-Use Management Association
PRSP	Poverty Reduction Strategy Paper
PSCP	Public Sector Capacity Building Programme
PTA	Preferential Trade Area for Eastern and Southern Africa
SADC	Southern African Development Cooperation
SIDA	Swedish International Development Authority
SNV	Netherlands Development Organization
TFP	Tropical Forest Products
UMT	Uchi Mukula Trust
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VRMAC	Village Resource Management Committee
WTO	World Trade Organisation
ZAFCOM	Zambia Forestry Commission
ZAPE	Zambia Alliance for People and Environment
ZESCO	Zambia Electricity Supply Company
ZFAP	Zambia Forestry Action Plan

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Introduction

The study on small-scale woodland-based enterprises with outstanding economic potential is a case study into honey production and beekeeping potential in Zambia. The study has been commissioned by the Center for International Forestry Research (CIFOR), and contributes to the Sida-funded project on Africa's Dry Forests initiative in Zambia

The key aim of the study is to generate sufficient information and discussion on the bee-keeping or honey and beeswax industry to support efforts by government to develop a beekeeping policy. The specific tasks of the case study were to:

1. Characterize or put into context the beekeeping industries in selected Provinces in terms of (but not limited to) social, cultural, economic and institutional parameters. The factors considered include the geographical distribution of relevant forest resources, population and infrastructure to support economic development, governance structures, key players and markets.
2. Examine trends in production, processing, demand, and trade.
3. Describe organisational aspects in terms of production, marketing, investments, government support, policy, legislation and benefit sharing.
4. Explore opportunities, challenges/constraints, at all levels, from production to final sale or points of consumption.
5. Discuss the potential and organizational pre-requisites for collective production/cooperatives versus individual/private production, processing and marketing.
6. Identify the enabling environment for production, processing, marketing and consumer development.

The report presents initial findings from the beekeeping sector review. The report is structured in the following way. Section 1 provides a general introduction, briefly describes the methodology used in the study, and outlines the critical questions, hypotheses and methodology. Section 2 discusses the bio-physical conditions for beekeeping and its relation to forest management. Section 3 provides an overview of the history of beekeeping, the commodity system, sector stakeholders and summarises the characteristics of the beekeeping industry in four case study Provinces, North-Western, Luapula, Central and Eastern Provinces. Section 4 gives insights into the honey marketing chain, from the primary producer to the exporter. Conclusions and recommendations are discussed in Section 5 and 6 respectively.

The study consists of two main components: the identification and characterisation of the beekeeping sector; and the description and analysis of the honey commodity chain. Some critical questions have been formulated to support the government's desire to intervene in the beekeeping industry through policy intervention. Therefore, this study also aims to specifically answer the following diagnostic and prescriptive issues:

Sector assessment:

1. How is the *beekeeping industry organised* in Zambia? Does it conform with Non Timber Forest Products (NTFPs) markets in general, or does it resemble the more established agro- and food industry? What can we say about beekeeping sector performance? What are the sector constraints and opportunities and what are their implications?

2. What is the *realistic resource base* for beekeeping in Zambia? Most sector overviews tend to focus on the inherent potential of the Zambian natural resource base for bee-keeping glossing over or ignoring present serious threats to sustainable forest use and management in Zambia, e.g. agricultural extensification; deforestation, loss of access and user rights, and drought.

3. What is the *realistic potential for sector growth* for the beekeeping industry in Zambia? How has demand changed over time? What are the prospects for honey exports? Many sector overviews tend to see the "sky as the limit" for the beekeeping industry in Zambia, with multiple benefits in economic development, poverty reduction and increased foreign exchange earners.

4. How *conducive are present policies and institutional arrangements for sector growth*? In what ways do policies support / constrain the growth of the bee-keeping sector in Zambia. Which policy areas need attention for the beekeeping industry to succeed?

Honey commodity chain:

5. What are *the structures and the activities* along the honey commodity chain? Is it a specialised industry? Is there vertical integration? How does the chain operate vertically and horizontally? What is the interaction between local and export industries?

6. Who are *the actors*? What are the characteristics and abilities of the actors? Who benefits from honey, how do they benefit, and how might existing negative patterns of benefit distribution be changed?

7. What are *the incentives, the driving forces for actors along the honey chain*? What are the profits? Where do market agents find financing? What are the major constraints to developing sustained honey and beeswax businesses? What opportunities are there?

8. What are *the costs* to actors along the honey chain? How profitable is bee-keeping and honey trading? What is the opportunity cost involved? What are the alternative sources of income? How does the overall livelihood context affect actor behaviour?

9. What are *the conflicts and unresolved issues* along the honey chain that may hamper actor performance, sector organisation and growth? How do negative social relations in production, processing and at market places influence actors along the chain?
10. What are the *best institutional arrangements* to support an efficient honey commodity chain? What should the government do, what should the support agencies do?

1.2. Methodology

The first phase of this study largely relied on conventional methods for data generation. The data generation methods employed were: i) literature reviews conducted to gather, analyse reports and assess the bee-keeping industry. The

majority of recent reports are consultancy reports, providing assessments of the industry for various developmental interventions[1] ii) stakeholder surveys of key players in the honey industry, ranging from producer organisations to processors, support agencies, financiers, manufacturers and regulatory authorities. A total of 25 stakeholder profiles were prepared**,** iii) in-depth interviews and focus group discussions were held with key informants along the honey commodity chain, from producers to processors and buyers., iv) four stakeholder workshops were held in Chipata (Eastern Province), Kabwe (Central Province), Mansa (Luapula Province) and Solwezi (North-Western Province). The workshops were facilitated in a participatory manner, involving a significant amount of group work, with the aim of gauging the width and depth of issues surrounding the industry. The four workshops were quite successful and the reports show the scope and variation in issues and problem recorded[2], v) a price survey was initiated to gauge the range in products and prices available in Lusaka supermarkets.

2

Beekeeping and forest management in Zambia

Zambia has thousands of hectares of Brachystegia woodlands, which provide an excellent source of nectar for bees, so that in most seasons bees can be depended upon to give a surplus of honey.[3]

The prevailing assumption is that Zambia has suitable environmental conditions for beekeeping and that the industry therefore has great future potential to contribute to economic growth and poverty reduction across the nation. How firm is the ground on which these visions rest? To what extent have recent rampant trends of forest degradation affected this potential? This chapter sets the scene by examining the bio-physical conditions for beekeeping and the relationship between beekeepers and the forests.

2.1. Bio-physical conditions for beekeeping in Zambia

2.1.1. Honey producing insects

Two different types of "honey" producing insects occur in Zambia. There appears to be little ecological competition between the two, although the two groups at least partially, feed on the same floral and extra-floral nectars. The bees inhabit different ecological niches in the forest.[4]

The indigenous African honey-bee (*Apis mellifera ssp.*)[5] is the insect that produces honey and wax for the commercial beekeeping industry. The basic natural conditions for honeybees are present in most parts of Zambia. Bees need forage, water throughout the year, desire an equitable temperature and prefer a relatively undisturbed environment. In general, the African honeybee race is more alert than its European counterpart, reacting rapidly to disturbances such as noise and movement[6]. These characteristics have important implications for bee management. Colonies are prone to absconding from hives when disturbed. Heavy harvesting often leads to the colony deserting the hive. The average size of the colony is also smaller, which has implications for optimal hive size, cropping volumes and frequency.

In addition to the honeybee, there are several insect species that produce sweet, honey-like substances in small quantities. These are commonly categorised as "stingless bees". A 1998 survey in Lubumbashi (Democratic Republic of Congo), identified a total of six species of stingless bees, one belonging to the genera of *Meliponula* and five belonging to the genera *Trigona*.[7] Clauss (1992) mentions a third species from the genera *Meliplebeja*. Stingless bees store "honey" in cracks in trees, crevices in the ground, termite mounds, etc. "Honey" from stingless bees has no commercial use and is harvested from the wild only for local consumption.

This report is confined to a review of *Apis mellifera ssp.* beekeeping only. This does not imply that stingless bees are not of ecological and socio-economic importance in Zambia. Indeed, some stakeholders have advocated for the inclusion of stingless bees in the forthcoming national beekeeping policy in the context of biodiversity and ecosystem conservation and protection[8].

2.1.2. Vegetation types

The Zambian flora belongs to the Zambezi phyto-region and has regional significance in Central Southern Africa. The vegetation is classified in four main categories: closed forests, woodlands, anthill vegetation and grasslands (Table 1).[9]

Closed forests are limited, covering only 3.5% of the country, whilst woodlands in 1971 accounted for 65.5% of the total area. Termitaria (3.23%), have a very different vegetation from the surrounding forest or woodland due to raised elevation, higher clay and mineral content, high pH, higher moisture contents and greater biological activity. The grassland coverage, which in 1971 was about 27.5%, is likely to have increased due to deforestation.

Forests and woodlands are defined as ecosystems with a minimum of tree crown cover of 10% generally associated with wild flora and fauna.[10] The most common type is the *Brachystegia – Julbernardia – Isoberlinia* dominated miombo woodland, which is widespread all over the plateau basement complex covering most of Zambia.

Kalahari woodland occurs on Kalahari sands in western Zambia, composed of *Guibourtia, Baikiaea, Brachystegia, Isoberlinia, Julbernardia* and *Schinziophyton*

spp. The mopane and munga woodlands, common to the Zambezi and Luangwa river valleys, are dominated by *Colosphermum mopane* and *Acacia spp*. respectively.

An analysis of the distribution of vegetation types with presence of beekeeping in Zambia shows that the bulk of beekeeping occurs within the miombo belt, in areas of *Cryptosepalum* closed forest and on the interface between the miombo and Kalahari woodland. Although most of Zambia's woodlands sustain bees and beekeeping, the concentration of activities appears to be the result of socio-cultural factors combined with four critical ecological variables.

Table 1. Zambia's vegetation types (Source: Zambia Forestry Action Programme 1998)

Vegetation type	Estimated area in hectares in 1971	Proportion of total land area – per cent
FOREST		
Parinari	420,000 ha	0.06 %
Marquesia	430,000 ha	0.06 %
Lake Basin	15,560,000 ha	2.07 %
Cryptosepalum	15,210,000 ha	2.00 %
Baikiaea	6,830,000 ha	0.91 %
Itigi thicket	1,900,000 ha	0.25 %
Montane	40,000 ha	0.01 %
Swamp	1,530,000 ha	0.20%
Riparian	810,000 ha	0.11%
WOODLAND		
Miombo	311,460,000 ha	41.41%
Kalahari	85,640,000 ha	11.36%
Mopane	38,700,000 ha	5.15%
Munga	32,600,000 ha	4.34%
TERMITARIA	24,260,000 ha	3.23%
GRASSLAND	206,530,000 ha	27.44%
OPEN WATER	10,500,000 ha	1.40%
TOTAL	752,060,000 ha	98.60 %

The four ecological variables assumed to play an important role for bees and beekeeping activities are:

- Presence of main tree species. The corresponding woodland indicator is at least 60% main flow species and 30% second flow species[11];

- Presence of build-up and gap-filling tree species in adequate numbers to ensure fodder in-between main seasons. The corresponding woodland indicator is 10% early flowering and gap filling species[12];
- Availability of water all year around (a rainfall of 1,000 mm/a is given as an indication for availability of surface water throughout the year and therefore good beekeeping prospects[13]); and
- Presence of a shaded, relatively undisturbed environment.

The geographical and seasonal variations in honey production may be high. For Kabompo – Zambezi district in North-Western Province, variations in production have been attributed to rainfall and the distribution of *Julbernardia paniculata*. There appears to be correspondence between production and rainfall. The Balovale-Kabompo District Management Handbook suggests that the most productive areas are north of the 44" (1,178 mm) isohyet and within a zone of dense woodland with more than 30% *Julbernardia paniculata*. An examination of these maps showed that there is a very strong correlation with the North West Bees Products' best buying areas, leading to the conclusion that these are indicators of areas of substantial regular honey production.[14]

Naturally, nectar yielding tree species occur in the Kalahari, Mopane and Munga woodlands as well. Indeed, the honey flow from some of the *Acacia spp*. is spectacular. However, where these types of woodlands occur southwards there is more competition over land use, especially from agriculture. The climate is also drier, reducing the availability of all-year round water supplies, and the high temperatures may lead to bees absconding.

In short, the most favourable natural conditions for bees occur in the wetter miombo, but beekeeping is possible in other forest types provided adequate forage and water is made available all year round and attention is paid to hive management to ensure bee comfort.

2.1.3. The miombo woodland

The miombo woodland is dominated by species of the genera *Brachystegia*, *Julbernardia* and *Isoberlinia*. The first two are of particular importance to the beekeeping industry in Zambia, however, in some patches, they are substituted by species of other genera. Table 2 lists some of the important tree species of the miombo belt.

There are two main bee seasons in the miombo, defined as the two honey flows. The main honey flow occurs in October-November (with some variation in dates due to climatic differences between regions). The main source of nectar[15] for the first honey flow is the *Brachystegia* species flowering between August and October. *Brachystegia* species occur all over Zambia, implying that beekeepers across Zambia harvest honey towards the end of the calendar year, often during the rainy season.

Important build-up species to the main honey flow are *Parinari*, *Cryptosepalum, Marquesia* and *Syzygium,* which flower up to two months before the main honey flow allowing bees to build up their numbers with early rapid breeding so that the colonies are at peak strength when the main flow starts. Mango trees are also an important additional source of fodder in the vicinity of homesteads.

The second honey flow occurs in May-June, when the *Julbernardia* species burst into flower after the rains. *J. paniculata* and *J. globiflora* are the most important nectar species. In general, these genera are found predominantly in the Northern parts of the country. *J. paniculata* is common in the whole of Northern, Luapula and Copperbelt Provinces, the southern parts of North-Western Province (excluding Mwinilunga and Solwezi), the northern parts of Central Province and parts of Eastern Province. Therefore, the distribution of *J. paniculata* largely corresponds with the geographical distribution of second honey flow supply areas.

The volume of the second honey flow is affected by the presence of build-up species. On Kalahari sands (e.g. in Kabompo district) *Guibourtia coleosperma* is a major build-up species. A range of agricultural crops (e.g. maize, sunflower, beans, pumpkin and sweet potatoes) and fruit trees (e.g. guavas, oranges and lemons) also provide bee forage during the agricultural season. Towards the end of the second honey flow, *Marquesia spp.* provide gap-filler bee forage between June and October.

The composition of the forest is important to ensure bee forage throughout the year. In a national perspective, abundant nectar producing main species in combination with off-season flowering, will give the best natural comparative advantage.

Table 2. Common bee trees of the Zambian miombo woodland

Common miombo species	Local name	English name	Competing uses
Brachystegia spp. (16), e.g. *B. longifolia, B. spiciformis, B. boehmii, B.floribunda*	Muombo (B), Musamba (Luv, Lun) Muputu (B), Mupuchi (Luv) Nganza (B), Mubombo (Lun) Musompa (B), Musubu (K)	n.a. n.a.	Fibre, construction timber, charcoal, bark hives, dye,
Combretum spp. (>24), e.g. *C. zeyheri*	Mukenge (Lo, Luv)	n.a.	Roots for basketry, dye
Cryptosepalum spp. (2), e.g. C. exfoliatum ssp. pseudotaxus	Mukuve (Luv), Mukungu (Lun), Musambangalati(B)	n.a.	Medicine, bark hive construction
Isoberlinia spp. (2) e.g. I. angolensis	Mutobo (B, K, Lun, Luv).	n.a.	Caterpillars, mining timber, firewood, carpentry, fibre, medicine
Julbernardia spp. (2), i.e. *J. paniculata, J. globiflora*	Mutondo (B), Lunyumbe (Luv), Mwanda (Lun) Mupasa (B), Mutete (Luv)	n.a. n.a.	Caterpillars, mining timber, dye, bark hives, rope, dye, c/coal
Marquesia spp. (2), i.e. *M. macroura, M. acuminata*	Museshi (B), Muvuka (Luv), Mulunga (Lun)	n.a.	Construction timber, charcoal, end plate in hive construction
Parinari spp. (>3), e.g. *P. curatellifolia*	Mpundu (B), Mubula (Lo), Mucha (Luv,Lun)	Mobola plum	Poles for construction; charcoal, fruits
Syzygium spp. (>3), e.g. *S. cordatum, S. guineense*	Mufinsa (B), Musombo (Luv, Lun)	Water berry	Carpentry, dye, medicinal use, fruits, canoes, poles
Uapaca spp. (7), e.g. U. kirkiana, U. nitida	Masuku (B), Mupopolo (Luv) Musokolobe (B), Muleñu (Lun)	Wild loquat	Termite resistant wood, fruit, construction timber, medicine

B= Bemba, Luv = Luvale, Lun = Lunda, K = Kaonde, Lo = Lozi

2.2. Traditional beekeeping in Zambia

Since time immemorial, honey has been collected and consumed all across Zambia. Honey was first collected from the wild. Honey hunters were finding feral hives by observing bees or following the greater honey guide (*Indicator indicator*) in the forest. Bees were subdued by the use of fire and smoke when cutting open holes or felling trees when collecting the honey.

The trapping or keeping of bees emerged in selected areas within the miombo zone of Angola, the Congo and Zambia. Malaisse identified twelve clusters of beekeeping areas in Central Africa, among them a cluster comprising present day Zambezi, Kabompo and Mwinlunga districts.[16] Trapping and keeping of bees in hives was first recorded in the Angolan part of the miombo belt, among the Mbunda in Eastern Angola, in 1594.

The first Zambian written records of bee-hives date back to 1854, when David Livingstone described the log and bark hives used by the Southern Lunda on the upper Zambezi in North-Western Province. All hives mentioned were suspended from tree branches.[17] Even today, beekeeping is more common among the Lunda and Luvale of Mwinilunga and Kabompo districts, whilst honey hunting is still prevalent among the Kaonde in Kasempa area.

In his 1949 agro-ecological survey, Trapnell notes that bee-keeping was customary also in parts of Northern and Eastern Provinces. The Lungu, Mambwe, Iwa, Tambo, Nyika, Fungwe, Yombe and Bisa in Northern Province used log hives and preferred this method "to the more recently introduced bark-hive". The Tumbuka, Chewa, Senga and Kunda of Eastern Province were reported to prefer the calabash and pot hives, but rapidly exchanged them for the new bark hive technology.[18]

North-Western Province has remained the major honey and beeswax producing area in Zambia. The Province accounts for at least 90-95% of commercial domestic production and 100% of honey exports. The honey is produced from a total area of 9 million hectares of forest and woodland. The NWP woodland has been estimated to have a growing stock of about 1,157 million cubic metres (27.5% of national total) and a stocking rate of 154 m^3/ha, the highest in the country.[19]

2.2.1. Bark hive technology

Historical records provide us with the interesting observation that "traditional" bee-keeping was not confined to a single hive type. Indeed, records mention the use of logs, calabashes and pots as hive material suggesting that "traditional" bee-keeping was not confined to bark hives. Indeed, more recent observations from North-Western Province suggest that bee-keepers experiment with several materials – logs, wood cuttings, reeds, grasses, mats, calabashes. [20] The main determinants of what "a traditional hive" is appear to be the cylindrical shape and its ability to be hung or placed on branches in a tree. High placement is a means of making it easier to attract bees at their usual flying height and to protect hives against fire, honey badgers, red ants and other pests.

Over the years, maybe because of superior technological features and profitable economics of operation, bark hives have gained prominence. The colonial government promoted bark-hive beekeeping in the traditional beekeeping areas: North-Western Province, Kaoma, Ndola Rural[21] and Lundazi[22]. At independence in 1964, the whole production of honey and bees-wax came from traditional hives. In 1964, a total of 65 tonnes of beeswax was purchased, giving an estimated production of at least 650 metric tonnes of honey.[23]

At the time of the 1989 bee-keeping survey in North-Western Province, the majority of hives were bark-hives. On average bee-keepers had between 23 and 118 hives, the provincial average being 73 hives per beekeeper. The lowest value was from Kasempa district, known locally as a honey-hunting district. On average, the seasonal yield ranged from 61 to 208 kg. The average amount of honey cropped per bark hive was 7.4 kg.[24]

Bark hives are made in the rainy season when the inner bark is soft and supple. The six species mainly used for hive construction in North-Western Province are shown in Table 3. It is significant to note that many preferred hive species are important sources of nectar. *Julbernardia paniculata* appears to be the most popular species for making hives, accounting for the majority of hives.

A survey in three districts in North-Western Province in 1987 found that beekeepers on average made 29 new hives per year.[25] During a field visit in September 2004, beekeepers interviewed across the Province expressed a need to rapidly increase their number of hives in response to the perceived improved market for honey (for the reasons for this, see section 6.1.). It was indicated that beekeepers "went flat out to increase the number of hives, even making

Table 3. Common tree species used for bark hives in North-Western Province in 1987 (Source: Clauss 1992)

Tree species	Source of nectar	Durability of hive
Burkea africana	No	2-5 years, av. 2.5 years
Brachystegia boehmii	Yes	4-9 years, av. 4.3 years
B. longifolia	Yes	2-10 years, av. 4.4 years
B. spiciformis	Yes	2-10 years, av. 4.5 years
Cryptosepalum exfoliatum ssp pseudotaxus	Yes	2-30 years, av. 9.1 years
Julbernardia paniculata	Yes	2-20 years, av. 5.5 years

150 new hives in a season". Evidently, with commercialisation, increasing numbers of bee-keepers and a growing human population, the pressure on the forest resource has been rapidly mounting.

2.2.2. Impact of bark hive harvesting on the forest resource in North-Western Province

In 1992, Clauss expressed concern of the impact of commercialisation of the honey and beeswax industry on bark harvesting in North-Western Province. His concern was on the overall impact of utilisation on the forest, bark-hive making being only one activity. In his estimation, a total of 273,000 trees were destroyed by bark-hive making annually, to which trees destroyed for other uses (e.g. hive doors, pigeon cots, construction materials, medicinal as well as felling for sawing of planks) must also be added. In his calculation, trees destroyed to make bark-hives amounted to 3.1 trees per km^2, whilst he estimated the number of suitable specimens at 224 trees per km^2 (Table 4). IFAD (1999) estimated that this allowed for a turnover period of 72 years and concluded that "the overall number of trees remain in a range that implies relatively low levels of damage, which are likely to be within the limits of replacement." [26]

According to Central Statistics Office (CSO), population growth in North-Western Province averaged 2.9% per annum over the period 1990-2000. From a population of about 400,000 people in 1992, there were more than 650,000 people in 2004.[27] The growth rate is not uniform. Population growth is very high in Kasempa (5.8%) and Solwezi districts (4.0%), whilst Chavuma (0.7%) and Mufumbwe (1.7%) have the lowest growth rates. The three

prominent beekeeping districts: Kabompo (2.1%), Mwinilunga (2.3%) and Zambezi (2.4%) had close to average growth rates.

In view of the average provincial population growth rate of 2.9%, the 1997 estimate of a total of 14,400 beekeepers would translate to a beekeeper population of 17,640 at the close of 2004.[28] This estimate may be considered moderate. During the 1990s, smallholder maize farmers lost access to subsidised input and output markets and had to develop alternative strategies to fend for themselves. Few alternative economic opportunities were developed during the same period.

The accessible woodland appears significantly less than that estimated by Clauss. In 1996, the total forest and tree cover area of North-Western Province was estimated 9,000,000 ha.[29] Of this 19% was under national park or forest reserve and 35% under game management area (GMA) where cutting trees for bark hives is either legally prohibited or only allowed under license (see Figure 1). Many of these areas are extremely far from settlements and are likely to be less significant sources of hive material. The category "trees outside forest" is effectively secondary forest, agricultural land and settlements with little capacity to produce trees with adequate girth for bark-hive making. Only 24% of the area is forested open area, where adequate tree resources may be found and bark hive harvesting would be legally feasible. This amounts to only 1,700,000 hectares.[30]

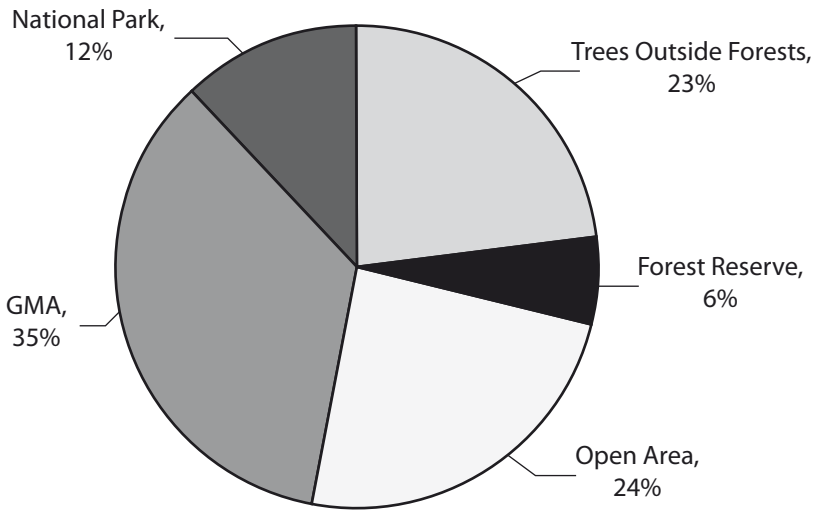


Figure 1. North-Western Province forest and tree cover in 1996

In summary, considering the human population trends, lack of alternative source of income, effective access to woodland and spatially differentiated impact of processes such as deforestation and agricultural expansion, this report finds more cause for worry about the sustainability of bark harvesting. Table 5 updates Clauss' formula for assessing impact of bark hive harvesting on forest resources to a likely situation in 2004 to indicate some of the major changes that are occurring.

The modest estimation of 17,640 beekeepers in the Province has been used in the calculations. However, it is assumed that the number of new hives produced by each beekeeper every year has increased, as a result of a higher relative proportion of young beekeepers (who are building up hive stocks) and commercialisation. During field visits in September 2004, beekeepers unanimously confirmed the relative profitability of beekeeping to farming, saying that more resources were now allocated to expanding beekeeping rather than farming.

The outcome of the updated calculations is disturbing. Table 5 shows that the average number of trees destroyed in the making of beehives has increased with population growth from 3.1 to 4.9 per km^2, depending on the estimate of available woodland resources and the assumption that the expansion parallels human growth. This level of out-take is beyond the gross regeneration level of the resource – estimated at 50 years.[31]

It is important to put this finding in context and not to jump to the conclusion that this will lead to complete deforestation of North-Western Province or the destruction of the base of the beekeeping industry. The implications of the forest degradation described in Table 5 are serious, they need to be put in context and properly understood.

Beekeepers harvest-bark hives from only a portion of the total stand. Clauss estimates the proportion of specimens with a bark structure suitable for debarking at 34% of the total stand of preferred species – hence 224 specimens of 11,000 trees in the right age class! It is this particular portion of the forest, which is under heavy pressure. However, the implications are still serious enough for the long-term sustainability of the beekeeping industry and support agencies need to begin to take note of and start addressing problems as soon as possible. Below are some possible effects of back harvesting for hive construction:

1. The availability of hive material is evidently very short in some locations, which is likely to increase pressure on younger trees. A general trend towards harvesting bark from younger trees has already been recorded. [32] At some point in time, beekeepers will be constrained from expanding production because of lack of hive material.
2. Heavy harvesting of specific species may lead to biodiversity loss. One may assume that the 34% of miombo species with an interwoven fibre pattern used for making hives constitute an important genetic resource. When harvesting exceeds the regeneration rate of these species as shown in Table 4 below, we may effectively be facing a situation of loss of biodiversity as recent forest inventories show a regeneration problem for some of the *Brachystegia* species (e.g *B. spiciformis*).[33] It is not known if the same regeneration problem affects the other preferred hive species as well.
3. It is suggested that one third of the nectar-bearing species are under immense pressure from making of bark hives and that this may affect beekeeping in the long run. The trees in the age category of 30-40 years are the ones that produce the highest volume of nectar.[34] These are the same trees heavily harvested for bark hives, which could lead to a gross loss of up to 30% of forage.
4. The impact of bark harvesting is likely to affect woodland composition and the availability of key species. A characteristic example is *Cryptosepalum exfoliatum,* (mukungu in Lunda), a tree species confined to parts of Northern, North-Western and Western Provinces of Zambia. Together with *Guibourtia coleosperma* (muzauli), they are the dominant tree species in a closed forest type called mavunda: a three-storey forest with a closed evergreen canopy between 10 and 20 m high, occurring over a wide area of Kalahari sand with a high water table in parts of Mwinilunga, Zambezi, Kabompo, Kaoma and Mongu districts. *C. exfoliatum* is an important build-up species to the main honey flow, flowering from July to September. It provides the most desired and durable hive material, although a large number of specimens are not straight enough for bark harvesting. *Cryptosepalum* is very sensitive to fire. Uncontrolled wild fires will destroy this closed forest type (muvunda), which commonly is replaced by miombo species. The disappearance of mukungu from the woodland will therefore affect not only the availability of hive material, but also the output of honey by reducing the available volume of bee fodder, both in total volume and during critical build-up.

Table 4. Impact of bark hive making on forest resource in North-Western Province (Source: Clauss 1992, IFAD 1999 and the author)

1992 estimation[35]		2004 estimation	
Parameter	**Estimates**	**Parameter**	**Estimates**
Accessible woodland and forest containing trees suitable for debarking (70% of total area)	88,800 km^2	Accessible woodland and forest containing trees suitable for debarking – 1996 data (ZFAP 1998, p. 30)	70,100 km^2
Total population	408,025	Total population 2000 census 583,350 + annual growth of 2.9 per cent	654,019
Estimated total number of beekeepers (3.7% of population)	15,000	Estimated total number at 2.9% growth from 1997 provincial figure of 14,400 beekeepers	17,640
No. of bark hives per beekeeper	73	Number of bark hives per beekeeper	73
Average number of new hives per beekeeper/year	29	Conservative increase by 15% (see text)	33
Average number of bark hives from a tree	1.7	As in Clauss' report	1.7
Estimated total number of new hives prepared per year	435,000	Estimated total number of new hives prepared per year	582,120
Total number of trees destroyed by bark hive making each year	272,900	Total number of trees destroyed by bark hive making each year	342,423
Average number of trees destroyed per square km	3.1	Average number of trees destroyed per square km	4.9
Number of tree specimens normally used for hive making and with bark structure suitable for debarking	224 /km^2	Number of tree specimens normally used for hive making and with bark structure suitable for debarking	224 /km^2
Turnover rate (as calculated by IFAD 1999)	72 years	Turnover rate (calculated using same formula as IFAD 1999)	45.7 years

These observations will warrant action from the research community, support agencies, commercial players and beekeepers themselves. Tentative recommendations are presented in (section 6).

2.2.3. Beekeeping and deforestation

In a national perspective, the biggest single threat to beekeeping is deforestation. Deforestation is defined as loss of most of the tree cover in a forest (> 90%), whilst a lesser degree of disturbance is referred to as forest degradation. The major causes of deforestation are clearing of woodland for crop production, fires, wood-fuel harvesting for urban consumption and various economic uses (Table 5). The annual rate of deforestation in Zambia is high, estimated at around 900,000 ha or an annual rate of 1.5%.[36]

Four case studies on beekeeping prospects in Central, Eastern, Luapula and North-Western provinces sheds some further light on the relationship between population growth, agriculture and beekeeping (section 3.4.). The case study shows that 50% of districts perceived to be of good beekeeping potential are under heavy pressure from agricultural expansion and/or wood fuel harvesting, and only 30% of case districts have characteristics that indicate low external pressure on the woodland resource.

Table 5. Causes of forest deforestation and degradation in Zambia

Activity	Impact on woodland
Cutting of forest for agriculture (slash-and-burn)	Loss of mature and secondary forest, in particular across the northern part of the country;
Clearing of forest for agriculture (stumping)	Loss of mature and secondary forest, in particular in central and southern parts of the country;
Anthropogenic fires (caused by hunters, agriculturalists and careless handling of fire)	Regeneration (young seedlings are destroyed); Change in forest composition (reduction in fire sensitive species, fire-hardy species more common); Loss of fire-sensitive habitat (e.g. mateshi, mushitu and riverine forest)
Wood fuel harvesting: Charcoal burning	Selective loss of species and of mature forest in areas of moderate burning; Severe loss of forest in areas of intensive burning, e.g. along charcoal supply routes to urban areas (Lusaka and Copperbelt);
Wood fuel harvesting: Firewood for specific economic activities (e.g. tobacco curing, brick kilns, smoke-drying of fish)	Loss of mature and secondary forest in areas surrounding tobacco farming areas, fishing grounds, peri-urban areas;
Wood fuel harvesting: Firewood for domestic use	Selective loss of forest in sparsely populated areas, localised loss of mature and secondary forest where population pressure is high (e.g. peri-urban areas).

The consequences of deforestation on beekeeping potential in Zambia are far more serious than those of bark-hive harvesting. The case studies suggest that half of the areas perceived to have potential for beekeeping are under heavy pressure from agriculture and wood fuel harvesting. In such areas it will be unwise to invest in beekeeping without proper assessments of bee forage, its annual distribution, present and future availability. Indeed, the commonly held assumption that beekeeping may provide rural income and economic growth will not be valid in these areas if present trends continue unabated. Furthermore, bee farmers will have to accommodate environmental constraints in the form of new hive management practices, e.g. supplementary feeding during periods of low fodder availability.

In 30% of districts where beekeeping may still be considered viable, i.e. the sparsely populated areas in NWP with little pressure from agriculture and/or wood fuel harvesting, a concerted effort will be needed to demonstrate the economic viability of beekeeping and to quickly put in place protective policies to safeguard bee-keeping efforts in the future.

2.3. Beekeeping and woodland management

In the Zambian forest sector, the linkage between *beekeeping and forest management* has been considered to be strong. Table 6 shows the various positive and negative linkages between beekeeping and forest management.

The precise nature of this relationship, however, appears not to have been researched explicitly. From 1959 to 1991, beekeeping was essentially perceived as a benevolent income generating activity intended to reduce rural poverty without harming the environment. Meanwhile, the situation changed as deforestation rates began picking up in the 1980s. After 1991, there has been no consolidated effort to clarify the relationship between beekeeping and forest management, e.g. in terms of trade offs and conflict management. One may argue that this has compromised woodland management strategies in several ways. Without pre-empting the discussion on policy and legislation (section 4), two examples of how beekeeping concerns have been integrated in woodland management approaches in Zambia will suffice.

Table 6. Perceived linkages between beekeeping and forest management in Zambia (Source: author)

Scale	Perceived positive linkages	Perceived negative linkages
Miombo woodland (ecosystem) level	Bees as pollinators contribute to miombo woodland regeneration and well-being	Aggregate effect of bark and fibre harvesting changes woodland composition and reduces species regeneration
Forest	Improved forest and woodland management arising from beekeeping concerns will improve bee forage availability	Localised forest degradation and loss of bee forage due to bark and fibre harvesting, and fires during honey collection
Village / community	Economic benefits from beekeeping encourage community to look after forest.	Competition between bee-keeping and other forms of land use (e.g. agriculture)
Household	Economic benefit from honey production translates into better natural resource management practices at basic management unit level (household)	Poor households strive to increase number of bark hives beyond sustainable levels of out-take (off-take) in order to reap short-term benefits
Individual	Beekeepers aware of importance of fire management, forest conservation and other sustainable woodland management practices	Beekeepers not aware of aggregate effect of bark-hive harvesting

2.3.1. Beekeeping and conventional forest protection

The 1973 Forest Act discusses beekeeping in the context of *licensing* and *restrictions in forest use*, with little modification in the 1999 Forest Bill.

Licensing

Bee products are identified as forest produce for which fees and prices are chargeable. The first Schedule of Regulation 2, however, does not specify any such fees or prices[37]. The schedule provides for a fee for "other forest produce collected" at a rate of 6 ngwee per day, but this fee appears never to have been applied to beekeeping. Hence, beekeeping activities have in practice been considered free of fees and charges[38].

The law, however, specifies the license fee for cutting or otherwise dealing with a tree and specifies the classes of licenses available. The law does not recognise the beekeepers' specific requirements namely debarking, hence, the general principle of licensing when cutting trees applies. Therefore, a beekeeper has to obtain a casual license for each tree cut. The license fees were dramatically increased during the 1990s, from 120 K/tree in 1992 and 4,000 K/tree in 1995 to 81,000 K/tree in 2003.[39] In practice, very few beekeepers have obtained licenses to collect hive material due to the high fees.

Restrictions on forest use

The law prescribes that beekeeping is not to be allowed in a National Forest without a license: "*No person shall without a license do the following acts in a National Forest /…/ collect any bees, comb, honey or beeswax or hang or place on any tree or elsewhere any beehive or other receptacle for the purpose of obtaining any comb, honey or beeswax or be in or upon any National Forest for the purpose of collecting any bees, comb, honey or beeswax*". The same provision applies to a Local Forest "*as they apply to a National Forest, as if a Local Forest were a National Forest*".[40] Whether a license has ever been issued for the purpose of hanging beehives in a National or Local Forest, remains to be verified. It appears though that the Forest Department in practice did not grant beekeepers licenses to hang hives in the forest reserves, because of the fear that the beekeepers would take advantage of the situation and harvest hive material from the forest. This was also compounded by the concern that the FD staff may not be able to monitor the activities of the bee-keepers.[41]

In principle, the law treats beekeeping the same way as all users of all other forest products– focusing on licensing of off-take and restrictions to activities in protected areas. In practice, these prescriptions were not implemented on bee-keeping simply because beekeeping has been perceived as a relatively harmless activity, at times one which is actually beneficial to the regeneration of the forest. Indeed, the only damage that would be done is from harvesting of bark for hives and this activity is in principle regulated through timber licensing. The potential revenue from hanging of hives and harvesting of hive material has been perceived to be marginal resulting in the Forest Department giving priority to controlling licensing of timber logging.

Whilst the lack of enforcement of licensing fees has given beekeepers short-term economic gains, the indirect and long-term implications for the industry are more serious. Firstly, it has contributed to the lack of data on beekeeping

and on the intensity of and trends in bark hive harvesting. The Forestry Department is therefore unable to estimate the number of beekeepers, honey production and to quantify the impact of bark harvesting on the woodland.

Second, the absence of licensing has reduced the recognition of beekeepers rights, indirectly weakening the tenure and user rights of beekeepers. As of now, the law has no provision for controlling interactions between forest users. Usually, the beekeeper rights are considered less important than timber rights.

> An example was cited from Eastern Province where beekeepers hung hives in the forest. A concession license was given to a prominent businessman, who proceeded to cut down a significant number of big, flowering trees. The beekeepers were found to have no means of influencing the allocation of licenses or the behaviour of the concessionaire. Production levels reportedly decreased and the beekeepers incomes were affected. They had no alternative forest areas to hang their hives.[42]

Although implementation of the licensing as prescribed in the 1973 Act would have given some recognition of beekeepers rights in the forest, it is doubtful that it would effectively have addressed the question of tenure. The debate on pit-sawyer tenure rights under the Muzama scheme highlights the weak legal status of casual licenses[43], suggesting that there is need to up-date and harmonise the legislation to accommodate multiple use forest resources.

2.3.2. Beekeeping and Joint Forest Management (JFM)

The 1999 Forest Bill allows for co-management of forests between communities and the government and prescribes to quite some detail the set up for Joint Forest Management (JFM) schemes. The JFM Guidelines describe the process and procedures for establishing a JFM area and preparing a management plan. The management plan is the main tool for forest management and is where prescriptions for beekeeping are spelled out.[44]

For the purpose of assessing how beekeeping features in JFM, two plans were studied in detail. In Eastern Province, the Chiulukire Joint Forest Management Plan (2001) addresses honey and bark-hive production as one of

the major activities to be regulated in the forest reserve. In Luapula Province, the Lukangaba Joint Forest Management Plan (2004) identifies beekeeping as a very important source of food and income to local communities and proceeds to identify management objectives and prescriptions for beekeeping in the context of the overall JFM plan.

The comparison yielded the following findings:

- Both JFM plans assign importance to beekeeping as an activity to be undertaken in the forest reserve.
- Beekeeping is seen as having two objectives: (1) to contribute to forest management, protection and conservation; and (2) to promote income generation through the sale of bee products.
- Strategies to achieve the objectives include organisation of beekeepers into groups, training, linking groups to markets, prescribing the ways in which beekeeping and hive making are to be conducted in the forest reserves, and, in the case of Chiulukire prescribing the ways in which beekeeping links up with other users in the reserve.
- Both plans prescribe that licenses will be needed to make hives from trees in the reserve. The plans set a limit to the number of hives that can be made per beekeeper over a specified time period. In the Lukangaba case, licenses will be issued by the Forest Department. In the Chiulukire case the Village Resource Management Committee (VRMAC) will issue permits.
- Permission is needed to hang hives in the forest. In Lukangaba, it appears that residents are free to hang as many hives in the forest as they like (and provided they cause no destruction in so doing), whilst outsiders are to pay for a permit, which specifies the location and the number of hives they may hang. In Chiulukire, the plan distinguishes between home use (six hives or less, free permit) and commercial use (maximum of 10 per beekeeper for the first two years, to be reviewed).
- Harvesting periods are defined and no harvesting is allowed outside these periods.
- The Chiulukire plan specifies that honey hunting is not allowed.
- Both plans specify certain conditions for movement in the reserve, e.g. when hanging hives or harvesting. The Lukangaba plan restricts vehicle movements to the public road and the Chiulukire plan specifies that fire and chemicals will not be allowed when cropping and that cotton chemicals are not to be allowed within the vicinity of hives.

- Fire management features strongly as a way of protecting bees and forest regeneration. Both plans have a section on fire management, to which the beekeeper groups must adhere.
- The low regeneration and exaggerated mortality of tree species of importance to beekeeping is noted in the Chiulukire plan and two measures are proposed: coordination of use and monitoring of these species regeneration and mortality
- In Chiulukire, coordination of utilisation involves specific species (*Julbernardia* and *Brachystegia*), several different uses (bark for hives and medicine, timber for charcoal and firewood). The plan prescribes a mechanism for sharing of licensing costs (75% charcoal burner, 25% beekeeper) as an incentive for coordination of forest use.
- Both plans prescribe monitoring and reporting to be done by the village resource committees. The Chiulukire plan has a more comprehensive set of indicators including number of beekeepers and beekeeping groups, quantity and quality of honey, revenue raised, number of offenders (honey hunters) and fines collected, regeneration of bee forage species and training activities. The Lukangaba plan focuses on indicators such as number of hives per households, occupancy rate, and pest attacks.
- In Chiulukire, the VRMAC and beekeeping groups report annually. In Lukangaba, the plan prescribes that the district based Forest Management Committee (FMC) receives quarterly reports and forwards them to the Forest Department.

In summary we note that a serious effort has been made under JFM to conceptualise the link between beekeeping and other forms of forest use. However, there is need to further streamline the mechanisms for regulating interaction between different user groups to avoid conflicts and allow people to work together towards the overall goal of sustainable forest management.

Although the JFM approach heralds a significant improvement in defining the relation between beekeeping and forest management, it is not enough. Present trends in forestry – deforestation, forest degradation and encroachment on protected areas – are serious problems, which interact with the practice of beekeeping. For a long time, beekeeping has been considered a benevolent forest activity, with a significant potential for poverty reduction and economic growth. Rhetoric is no longer enough – these claims must be substantiated, defined to different geographical contexts and made explicit to have an impact. Indeed, the recent growth of the honey exports may be jeopardised if the rights

of the beekeepers are not strengthened. The recent initiative by the Forestry Department to formulate a beekeeping policy should be done in this broader context – providing tools and means for sustainable woodland management.

2.4. Case-study scenarios from four provinces

Four provinces were chosen for detailed studies: Central, Eastern, Luapula and North-Western Provinces. The Provinces were selected by the Forest Department for stakeholder workshops as part of the beekeeping policy consultative process.[45] Critical indicator data was collected and compiled in Table 7.

Historically, the North-Western Province is a traditional beekeeping area. Indeed, the data on current production shows that North-Western Province accounts for 90-95% of production of honey and beeswax in Zambia. Bark-hive is the common method used in honey production in the province.

Traditional honey hunting (illegal production) is common in the other three provinces, although pre-independence forest management agencies considered two of them to have pockets of areas with high potential for beekeeping (e.g. Lundazi in Eastern Province and Lunsemfwa in Central Province). Efforts to introduce "modern" bee-keeping in these potential areas involved the use of box hives.

The basic ecological conditions for beekeeping are fair in all provinces. Two of the provinces fall within agro-ecological region I with rainfall above 1,000 mm/annum (Luapula, NWP) and the other two are within agro-ecological region II, with a medium rainfall of 800-1,000 mm/annum (Eastern, Central). The natural vegetation is miombo woodland, with an occurrence of both *Brachystegia* and *Julbernardia* species, i.e. two honey flows per year.

Bee fodder availability varies. In North-Western Province, availability is generally good with a few pockets of scarcity near major settlements. In Luapula, fodder availability has dramatically declined over the 1990s, as farmers reverted back to slash-and-burn cultivation in the wake of increasing fertilizer prices and loss of market outlet for the main cash crop (maize) after liberalisation in 1991. Pockets of good forage availability still occur – some 24 areas of major production potential have been identified within the more sparsely populated

Table 7. Bee-keeping indicators for Central, Eastern, Luapula and North-Western Provinces.

Indicator	Central	Eastern	Luapula	North-Western Province
Total area	95,000 km^2	69,100 km^2	30,600 km^2	125,800 km^2
Area under forest cover (ha)[46]	7,540,000 ha	5,830,000 ha	4,520,000 ha	9,000,000 ha
Perceived continuous availability of bee fodder	Variable and partially inadequate fodder due to deforestation	Variable and partially inadequate fodder due to agriculture	Variable fodder, some areas abundant, others scarce due to agriculture	Adequate fodder in main beekeeping districts, elsewhere variable
Agro-ecological region and average rainfall	Region II	Region II 980 mm/a	Region III 1,000-1,500 mm/a	Region III 1,000- 1,500 mm/a
Name of districts (prominent beekeeping districts underlined)	Chibombo, Kabwe, Kapiri Mposhi, Mkushi, Mumbwa, Serenje	Chadiza, Chama, Chipata, Katete, Lundazi, Mambwe, Nyimba, Petauke	Chiengi, Kawambwa, Mansa, Milenge, Mwense, Nchelenge, Samfya	Chavuma, Mufumbwe, Kabompo, Kasempa, Mwinilunga, Solwezi, Zambezi
Total population (2000)[47]	1,012,257 persons	1,306,173 persons	775,353 persons	583,350 persons
Range in population growth (lowest – highest by district)[2]	5.8% in Kapiri Mposhi 0.7% in Mumbwa	3.5% in Chipata 1.6% in Nyimba	5.9% in Chiengi 1.9% in Kawambwa	5.8% in Kasempa 0.7% in Chavuma
Key economic activities	• Commercial and subsistence farming • Wood fuel harvesting • Trading	• Commercial (e.g. tobacco, cotton) and subsistence farming • Small-scale mining	• Subsistence farming (inland) • Fishing (lakes)	• Subsistence farming • Large-scale mining • Logging, hunting, beekeeping
Pressure on land for agriculture	High	High	Medium	Medium
Pressure on land from wood fuel harvesting	High	Medium	Medium	Low
Market infrastructure	Reasonable road network, close to main urban outlets, road-side selling, taking to market	Poor feeder roads, some buyers in Chipata, remote parts no buyers	Remote area, poor feeder roads, very few buyers	Remote area, poor feeder roads, many buyers
Estimated number of beekeepers[48]	Ca. 500-800	Ca. 1,600-1,800	1,000 (FRMP) 169 (MAMBEKA)	14,400
Estimated number of honey hunters	n.a.	n.a.	"Every farmer is a honey hunter"	3,000 (mostly Kasempa)
Estimated honey production per annum	n.a.	20 metric tonnes	9.9 metric tonnes (Mansa & Milenge only)	1,000 metric tonnes
Estimated beeswax production per annum	Very little	Negligible	Negligible	117 metric tonnes
Commercialisation of honey & beeswax	Some	Some	Very low	High

parts of the seven districts.[49] In the Eastern and Central Province, there is serious competition from other forms of land use, for example, commercial farming in Eastern Province (cotton, tobacco) and wood fuel harvesting (charcoal) in Central Province. It is worrying that Kapiri Mposhi, which is the major beekeeping district, also is one of the major suppliers of charcoal for the Lusaka urban markets.

The data on beekeepers, honey hunters and production are informed guesstimates as no reliable statistics are available. Markets are available in North-Western Province and drive the demand for honey and beeswax. Despite the poor rural feeder roads, the honey reaches the market. In Eastern and Central Province, a market outlet exists, although it quickly gets saturated. Buyers in Chipata and in Lusaka absorb the produced honey for domestic consumption. Luapula Province lacks a market and the honey that has been sold from there over the last few years has been done through NGO and project support.

Population density varies significantly between provinces and within provinces. Traditionally, beekeeping has been more common in sparsely populated areas. Chidumayo[50] has shown that agriculture and wood fuel harvesting are the major causes of deforestation in Zambia and that rural population density can be considered a reasonable indicator of the pressure on forest land for agriculture. A comparison between district population density and growth on one hand and pressure on the forest base (agriculture and wood fuel harvesting) on the other yields the result shown in Table 8.

Table 8. Threat from forest degradation to beekeeping in selected districts in Zambia (Source: author)

	HIGH competing land use pressure	**LOW competing land use pressure**
HIGH population density and/or growth	Chipata Kabwe Kapiri Mposhi Lundazi Mansa Mkushi Petauke Solwezi	Kasempa Milenge
LOW population density and growth	Mufumbwe	Chavuma Kabompo Mwinilunga Zambezi

In the upper left-hand corner of the quadrant (see Table 8), population density and/or population growth are high and the intensity of agriculture and/or wood-fuel harvesting activities is also high. Districts in this category are perceived to be under great threat from forest degradation and deforestation. This category comprises commercial farming districts (e.g. Petauke, Lundazi), districts of substantial urban populations (e.g. Chipata, Kabwe, Mansa), districts with high or rapidly growing populations due to other economic activities (mining in Solwezi) and districts of commercial charcoal burning (e.g. Kabwe, Kapiri Mposhi). Due to the presence of competing land use activities in these districts, any investment in the development of the beekeeping industry must take into account the risk of potential rapid loss of natural bee forage due to deforestation.

In the opposite corner, the lower right corner of the quadrant, the negative impact from deforestation on beekeeping is deemed to be the least. These are districts of low population density, low population growth and low intensity of agriculture and fuel-wood harvesting. In these districts beekeeping appears to have a reasonably secure natural forest resource base. These are traditionally the most productive districts in terms of beekeeping: Mwinilunga, Kabompo, Zambezi and Chavuma. In these districts, the bee forage base appears to be least under threat, therefore providing a more reliable base for beekeeping activities. However, the on-going asphalting of the main road from Solwezi to Zambezi is likely to open up the area for more intensive use of the forest areas, not least in timber logging.

In the remaining two cells, the situation is mixed, suggesting that there is no significant threat from deforestation to beekeeping as of now, but that the situation is changing. In Mufumbwe, the population density and growth are still low, but the district has been the focus of government efforts to boost agriculture. In Kasempa and Milenge, the population density is low, but population growth is above national average. As of now there are no major indicators of commercial pressure on agriculture or wood fuel harvesting. Mining activities in Kasempa account for the increase in population. In Milenge, growth is attributed to the opening up of more land for smallholder agriculture. In these districts, population increase will lead to the clearing of more land, which if done indiscriminately may compromise bee forage areas.

In summary, we note that the threat from deforestation to the beekeeping sector is significant. In more than half of the districts (53%) commonly

perceived to have a good potential for beekeeping, the loss of natural forest cover from agriculture and wood fuel harvesting is high, seriously jeopardising the long-term potential of beekeeping. In 20% of the districts, the situation is reasonable, but there are indicators of change – of more people moving in or new economic opportunities opening up, which may lead to a change and increasing land use competition. Only in a quarter (27%) of the districts, there appears to be little threat from forest degradation and deforestation to beekeeping.

3

Institutional support to beekeeping in Zambia

3.1. Development potential of beekeeping in Zambia

Most authors on beekeeping in Zambia have stressed its potential significance to and compatibility with most national development goals. ZFAP (1997, p.106-107) wrote

> "Zambia is a traditional beekeeping country. It has immense potential to increase production. Presently, the national domestic demand alone is between 100-150 tonnes per annum, which has never been met. It is therefore imperative that the beekeeping industry be developed to levels where the domestic demand is met and surplus produced for export. The domestic demand for beeswax is large though most wax is exported, thus serving as an important source of foreign exchange for the nation."

Since that time the relative contribution of honey and beeswax production to economic growth has increased, in particular in the well-endowed areas of North-Western Province.

Exports of honey and beeswax bring in much needed foreign currency. More interestingly, it is one of the few foreign exchange earning activities that requires very little capital investment and has an almost direct link to the impoverished communities at rural levels. Most other export activities have high investment requirements and are confined to commercial farmers or specialised professions (e.g. mining). Beekeeping may have a very direct impact on poverty reduction. Poverty is one of the most persistent problems in Zambia. In North-Western Province, which accounts for the bulk of the commercial honey production, income from honey sales has a direct impact on rural households and an economic multiplier effect. Estimates show that

honey sales account for as much as 25% of average household income in parts of NWP and contribute to household food security.

Beekeeping has a significant potential also for environmental conservation. The main argument is that it is in the interest of the beekeepers to keep the trees as bee fodder. The ramifications of realising the potential for environmental conservation are however far more complex. Three examples will suffice: (i) beekeepers although aware of the need to conserve forests are not the only forest users and have little control over others, e.g. pit-sawyers; (ii) there is little institutional support to back environmental conservation. The demand for land for agriculture to sustain a growing population overrides the woodland conservation objectives; (iii) the failure to control the wood-fuel harvesting is a good indicator of the government's lack of ability to enforce conservation policies. Hence, beekeepers, who want to invest in woodland conservation, will have to do so with very little backing from the government.

Organic certification is another dimension of the same complex situation. Certification is a private sector driven initiative that provides a means for increasing export earnings through accessing significant price premiums on the international honey market. Certification is based on industrial and environmental management practices that are in line with policies of sustainable natural resource use and management. However, at present certification receives extremely limited recognition and support from the government. Private companies who have invested in organic certification of vast tracts of woodland may easily find themselves in competition with other government-supported investors in non-compatible industries, e.g. commercial farming or mining.

In summary, beekeeping has a significant potential to contribute to national development goals, but it cannot do so unless supported by other policies and strategies. There is urgent need to raise the awareness among both the general public and policy-makers on the real socio-economic potential of honey production in order for this potential to become a reality.

3.2. History of government support to beekeeping in Zambia

The trapping or keeping of bees emerged a few hundred years ago in selected areas within the miombo zone (see chapter 2.1.). Traditional beekeeping

became a commercial activity as trading in beeswax commenced in the 1890s with Portuguese traders from Angola.

Early extension work under the Department of Agriculture from 1931 onwards concentrated on the promotion of bark hive making and beeswax production. Trapnell notes that the colonial government attempted to extend bee-keeping to several districts in Northern Province in the 1940s. Beeswax instructors were retained in Mbala, Chinsali, Mporokoso and Kawambwa districts for the purpose of developing the industry. The Lunsemfwa-Lukusashi valleys and Mkushi (in present day Central Province) and Petauke (in Eastern Province) were also mentioned as promising areas for bee-keeping.[51]

Extension efforts produced a good response, in particular in the beekeeping and honey hunting areas of Mwinilunga, Solwezi and Kasempa.[52] A network of (mostly foreign) private traders and buying agents provided the initiative for villagers to enter into bee-keeping. The Suzmann brothers and Portuguese traders would arrive at the beginning of the honey season, set up a shop and start buying. Beeswax was the most important product exchanged on barter for clothing, salt and other commodities. Beeswax was mainly sold to South Africa.

From 1959, the colonial administration and later the independent Zambian government developed a more comprehensive extension message, contributing to the further growth of the industry. Feasibility studies were carried out to ascertain the best areas for bee-keeping. North-Western and Copperbelt Province were selected for intensive bee-keeping activities.[53] The mandate for bee-keeping was transferred from Agriculture to the Forestry Department and a bee-keeping division was established in 1959.

With independence in 1964, however, the private honey and beeswax buying network operating in the whole of North-Western and parts of Western Province was closed down as part of nationalist economic policies.[54] The loss of market compromised the impact of the extension effort. The Forestry Department entered into the marketing of honey and beeswax to compensate for the absence of a marketing network and promote trade.

National honey processing factories were established at Mwekera, Kabompo and Mwinilunga with a total capacity of 500 tonnes.[55] The Beekeeping

Division (BD) started buying honey providing a market for more than 10,000 beekeepers.

Between 1970 and 1996, BD bought an average of 14,000 to 18,000 kg of beeswax and 17,000 to 114,000 kg of honey annually thereafter. Purchases peaked in 1990 with 57,000 kg of beeswax and 205,000 kg honey bought from village bee-keepers.[56] Even the National Marketing Board (NAMBoard) at one time engaged in buying of beeswax. Government involvement in the honey came to an end with the advent of economic liberalisation.

GRZ investments in beekeeping related activities as capital projects are shown for the period 1980-1993 in Table 9. The percentages refer to the share of the total budgets. The three first rows show expenditure at HQ level, whilst the fourth row shows unspecified expenditure at provincial level. Beekeeping received between 12 and 30% of national capital funding annually.

From Table 9 we note that the relative share of provincial control over expenditures in beekeeping reduced over the period, from more than half of the budget to about one tenth. Processing activities received a significant

Table 9. Capital projects in beekeeping financed by the government of Zambia 1980-1993. National Headquarters and Provinces. (K' 000). (Source: ZFAP 1998, annex 2.9.1).

Project title	1980-84	% of budget	1985-89	% of budget	1990-93	% of budget
Beekeeping development (national HQ)	116,565	17% of beekeeping budget	13,214	0.3% of beekeeping budget	122,582	0.8% of beekeeping budget
Beekeeping training (national HQ)	96,770	14% of beekeeping budget	3,348	0.06% of beekeeping budget	5,560,604	36% of beekeeping budget
Honey and beeswax processing (national HQ)	70,418	11% of beekeeping budget	4,760,610	92% of beekeeping budget	8,005,671	51% of beekeeping budget
Beekeeping activities (provincial budgets)	388,494	58% of beekeeping budget	424,582	8% of beekeeping budget	1,897,035	12% of beekeeping budget
Total	**672,247**	13% of total FD capital project budget	**5,201,754**	33% of total FD capital project budget	**15,585,982**	12% of total FD capital project budget

portion of the funds during the latter half of the 1980s, when Beekeeping Division bought significant amounts of honey and beeswax from smallholder producers (see section 4). The allocation to beekeeping training increased in the early 1990s, at the same time when, BD began reducing its activities as a buyer.

After 1970, donor funding was significant in setting up the infrastructure and training of bee-keepers in North-Western Province (Table 10). Unfortunately, it is not possible to estimate the gross investment into bee-keeping in Zambia

Table 10. Development interventions in the beekeeping sector in Zambia (Source: ZFAP 1998, Kambeu 2003 and author)

Agency	Approximate year	Type of intervention
GRZ/OXFAM	1970	Bee-keeper training school, Kabompo
GRZ	1975	Construction of national honey processing factory at Mwekera
IRDP (GTZ)	1978	Bee-keeping support and honey-buying in three districts commence in NW Province
IRDP (GTZ)	1980s	Honey factory established in Kabompo
Africare	1983	Promotion of beekeeping
GDS	1989-1995	Technical advise to Forest Department on beekeeping in NWP
UNDP/Oxfam	1990s	Honey factory established in Mwinilunga
IFAD / MACO	1990s	Support to bee-keeping training and extension in Kasempa, Solwezi and Mwinilunga
EU	1990s	Support to bee-keeping in Mpongwe district, establishment of Mpongwe Bee-keeping Enterprise
Oxfam	1992-1996	Support to Beekeepers Association in North-Western Province
Africare	1994-1997	Small livestock production project / beekeeping in selected NWP districts
Africare	1995	Honey factory established in Kaoma
IFAD /FRMP	2001-2007	Support to Beekeeping in Luapula and North-Western Provinces
MS-Zambia	2001-2003	Honey buying and support to Mansa and Milenge Beekeepers Association in Luapula Province.
HIPC	2002	Beekeeper training and provision of hives
PRSP	2003	Rehabilitation of honey processing factories, beekeeper training
PSCP	2003	Beekeeper training and provision of hives in Central Province

due to lack of reliable statistical records. In recent years, the effort has spread to the non-traditional beekeeping provinces.

3.3. Policy, legislation and institutional issues

In the Zambian forest policy, beekeeping appears to have played a dual role. Since colonial days, beekeeping has been seen as a way for rural people to earn income. Holmes wrote in 1964, about beekeeping "*extension work as having one main object, namely to bring more cash into the pockets of the people living in rural areas in order to enable them to improve their standards of living and hence help to stimulate the whole rural economy*".[57]

A secondary objective has been the perceived positive link between beekeeping and forest conservation. Bees have been seen to assist with the regeneration of the forest[58], bee-keeping is seen to support the objectives of forest protection and management[59] and beekeepers are perceived to have a better understanding of detrimental practices (e.g. wild fires) and therefore be more perceptive to the need for improved forest management practices[60]. (See Table 6).

The 1965 forest policy defined the role of the bee-keeping division as a provider of extension service in bee-keeping and in production of bees-wax and honey, based on research and development work under Zambian conditions. The short-term objectives focus on modernisation (from honey hunting and bark hives to frame hives), improved production and processing methods at farm level supported by construction of a processing plant, training and extension, setting up demonstration apiaries, organising markets, and forming bee-keepers cooperatives or groups.

Production-oriented activities were to be supported with research (e.g. in bee ecology, bee forage, bee breeding, beeswax processing and storage); economic feasibility studies and project monitoring and evaluation. [61]

The consequent 1973 Forest Act is parsimonious on beekeeping. The Act classifies bee products as minor forest produce and proceeds to prescribe restrictions on beekeeping (e.g. that beekeeping is not allowed in a National Forest) and prescribes the licenses to be applied for harvesting of minor forest produce.

The 1999 Forest Act is equally silent on beekeeping. At the same time, the yet to be activated Forest Act has two other significant provisions that are of importance for the beekeeping sector. The Act allows for forest resource co-management between communities and government through JFM. Under this formal approach, communities, including beekeepers, may gain formally recognised user rights to forest areas and increase incomes from forest products through controlled harvesting. Second, the Forest Act provides for institutional restructuring, the conversion of the present Forest Department to an autonomous Forestry Commission. This provides an opportunity to revisit and strengthen the institutional support to the beekeeping sector.

In the 1998 Forest Policy, beekeeping appears indirectly as part of the strategies that support policy objectives. For example, the objective of managing forest resources and ecosystems sustainably is supported by a strategy to establish value-adding forest based enterprises, among them beekeeping enterprises. Table 11 shows the context in which beekeeping appears in the policy. It is evident that beekeeping is seen as a means to achieve overall goals and objectives and not discussed comprehensively in its own right.

Despite its shortcomings, the 1998 Forest Policy does give important food for thought for the formulation of a beekeeping policy for the country. Stakeholder consultations will bring in valuable experiences across the sector and the country, and bring new issues and additional important perspectives to the policy process.

The Zambia Forestry Action Plan (ZFAP) of 1997 is more elaborate on the potential for beekeeping in Zambia. Beekeeping falls under the core development programme called FINWDP: the Forest Industry and Non-wood Forest Products Development Sub-programme. Proposed relevant key action areas include the creation of a forest industry investment fund, preparation of codes and standards for major forest products, development of appropriate technologies, design and publication of manuals and handbooks, the provision of incentives and institutional mechanisms for private sector participation in forestry industry development. ZFAP further outlines two profiles for investment packages – on apiculture development and on the rehabilitation of beekeeping training centre and factories.

The Zambian situation is in stark contrast to its neighbouring countries, which have put in place significantly stronger tools to manage bees and beekeeping.

For example, Zimbabwe laws include a Bees Act, which prescribes procedures for bee disease control, conservation of wild bees, beekeeping, bee management and regulatory procedures. Tanzania adopted a beekeeping policy in 1998, which looks at the potential for the sector, the sector constraints and opportunities, the objectives for the sector and prescribes policy statements for key areas such as bee management, apiary management, beekeeping-based industries and products, beekeeping in relation to other sectors, ecosystem conservation and management and critically assesses the institutional and human resources and roles of main stakeholders.

Institutionally, the mandate for the beekeeping industry is shared by a number of government departments. Whereas the Forest Department carries the responsibility for promoting beekeeping as one of the activities to be conducted in forests, there are several other critical functions that are undertaken by other departments and agencies. Table 12 shows the key public sector regulatory authorities overseeing beekeeping in Zambia. It is important to note that regulations are divided over four categories: beekeeping as a commercial activity; bees as live animals; honey as a food item; and honey as an export item.

A most notable authority regulating the keeping of bees is the Veterinary department. Bees are classified as livestock and by international standards, the mandate for bee disease, hive inspection and other sanitary measures are those of the Veterinary department. According to the Terrestial Animal Health Code, and since its adoption in Zambia in 2002, veterinarians are mandated to issue sanitary certificates for exports as well as develop a system for bee health monitoring.

Honey is a food item and is therefore subjected to all food related regulations in Zambia. These involve a number of agencies from the Zambia Bureau of Standards to the Ministry of Health and local councils. The revised Codex Alimentarium, to which Zambia is a signatory, sets the standard for honey as a food item for consumption.

When exporting organic honey, a number of new players enter the scene – authorities that grant organic certification status, export permits and so on. In addition to local authorities, international conventions and standards also apply and a number of international institutions have to be taken into consideration. Due to the lack of capacity within government to monitor

Table 11. Beekeeping in the Zambian National Forestry Policy (1998)

Overall objective of the National Forestry Policy: *Enhance the quantitative and qualitative contributions of the sector towards the nation's socio-economic development in a sustainable manner.* (p. 3)		
Policy area:	**Relevant strategy:**	
Sustainable forest resource and ecosystem management	1.a.iii	assessing and consolidating the productivity of Forest Reserves through stakeholders' participation in management, utilisation, cost and benefit sharing (p. 7)
	1.a.iv	protecting forest resources against damage by fires, pests, diseases and against destructive harvesting (p. 7)
	1.c.ii	facilitating the establishment of forest based enterprises with focus on value added products, whose economic value is captured within the country (p. 9)
Forest based industries and non-wood forest products management	2.a.i	creating a stable and confident environment for forest industry… (p. 10).
	2.a.ii	*assessing and encouraging the improvement of capacity utilisation and capitalization of existing and emerging forest based industries (p. 10).*
	2.a.iii	providing training in aspects of sustainable forest management… (p. 10)
	2.a.iv	*providing training in marketing, harvesting and preservation skills to non-wood forest product entrepreneurs (p. 10)*
	2.c.i	*encouraging and facilitating private sector involvement in the production and marketing of non-wood forest products; (p. 12)*
	2.c.ii.	developing and encouraging harvesting techniques that ensure optimal regeneration of non-wood forest products; (p.12)
	2.c.iii.	*promoting and encouraging small scale enterprises dealing in non-wood forest products such as mushrooms, honey and bees wax processing; (p. 12)*
	2.c.iv.	establishing a comprehensive understanding of the resource base by carrying out inventories of non-wood forest products; (p. 12).)
Forestry research, extension and training	*3.a.xi*	*promoting and broadening research in beekeeping and other non-wood forest products. (p. 13)*
Forest licenses	4.a.ii	ensuring transparency and decentralization of licensing procedures to appropriate local authorities involved in Joint Forest Management; (p. 16)
	4.a.v.	ensuring the prices of forest products take into account economic, social and environmental costs; (p. 16)
Export of forest products	*5.a.i*	*encouraging the export of value added forest and non-wood forest products; (p.17)*
	5.a.ii	*establishing international export codes and standards for forest products; (p.17)*
	5.a.iii	in line with the national liberalisation policy simplify the export process; (p.17)
Gender considerations in sustainable management of forest resources	6a.ii	ensuring that women receive equitable benefits from forestry programmes; (p.18)
	6.a.iii.	*deliberately encouraging women to develop their small non-wood forest products enterprises into viable and income-generating enterprise*.

all international changes, the onus is often on the private sector exporter to ensure that compliance to all international regulations is adhered to. The EU food standards and trade regulations are the most important among these.

Table 12. Public sector regulatory authorities in beekeeping in Zambia

Institution	Mandate
Forest department - ZAFCOM	Forest protection, forest management, promotion of bee-keeping in forest areas, extension & training services
MTENR	International conventions, government funding, donor projects
Ministry of Finance	National development plans, central government funding, some international funding (e.g. PRSP)
MACO / Veterinary department	Bee diseases, hive inspections, sanitary certificates, export requirements, regional disease control
Ministry of Health	Honey quality (local food), food safety inspections, sanitary and health inspections of processing facilities, honey imports, GMO regulations
Ministry of Commerce	Trade conventions, WTO regulations, COMESA, export approvals, domestic trade regulations.
MACO / Dept of marketing	Export licenses for honey
Zambia Bureau of Standards	Honey standards for domestic consumption
Drugs & poisons board	Honey standards for medicinal use
Local councils	Health inspections, trading licenses, honey levies.
MACO	Accreditation (recognition, licensing) of organic or fair trade certifier (usually international, e.g. WoodMark, Soil Association, EcoCert), GMO regulations, extension & training services
Ministry of Justice	Legislation

3.4. Stakeholders in the beekeeping industry in 2004

In addition to government regulatory authorities, there are a number of stakeholders to the beekeeping industry in Zambia (Table 13). The long list of stakeholders was used as a tool in the beekeeping policy stakeholder consultation workshops.

The stakeholders include the actors along the **honey marketing chain**, from the producer to the exporter. The **regulators** mentioned above constitute an important set of stakeholders by virtue of their mandates. In addition, there is a substantial number of **other support agencies** within Zambia, ranging from

Table 13. Stakeholders in the honey & beeswax industry in Zambia

Honey supply chain
Producers, processors, packers, distributors, middlemen, traders, exporters, wholesale buyers, retailers
Regulatory agencies
Policy makers
Regulators – bee-keeping, forestry and land use (e.g. forestry, agriculture)
Regulators – environmental standards (e.g. ECZ)
Regulators – product safety, standards, quality (e.g. health, council, bureau of standards)
Regulators – trade and marketing (e.g. commerce, council)
Regulators – movement of bees and bee-products (e.g. phyto-sanitary, veterinary)
SADC, PTA and COMESA
International conventions on bee-products (OIE)
International trade regulations and conventions (e.g. EU and FDA)
International health and food safety regulations and conventions (Codex)
Support agencies
Trade promoting agencies (export board)
Interest organisations (national beekeeping association, chambers of commerce)
Trainers and extension providers
NGOs
Project implementers (forestry, agriculture, community development)
Rural development agencies
Grant and soft credit providers (e.g. ZAMSIF, ADB)
Public and private laboratory facilities for bee-product testing
Certifying agencies (Fair Trade, Organic)
Other service providers
Ministry of Works and Supply, Roads department, ZESCO
Private sector
Competing industries (cotton, tobacco, timber logging)
Complementary industries (sunflower, vegetables)
Food and baking industry (buyers)
Honey importers
Cosmetics industry
Grocery stores and supermarkets
Bee-keeping equipment suppliers
Commercial lending facilities
Research and training institutions
National research institutions (e.g. forest research, NISIR)
Regional research and training institutions (e.g. Arusha)
International institutions
Donors and funding institutions
International research institutions

small NGOs that support beekeeping in rural communities in remote areas of Zambia to the National Beekeeping Association, Export Board, Chambers of Commerce, credit providers and certification agencies, donor-funded projects and so on. Other **service providers** include the Roads department and ZESCO who provide essential services to the sector.

An important, often overlooked category of stakeholders is the **private sector** that makes use of honey and beeswax as a raw material, e.g. the cosmetics and polish manufacturers and the food and baking industry. Furthermore, there are suppliers of beekeeping equipment and other inputs to the honey and beeswax industry. Indirectly, also the industries that have an impact on or conflict with beekeeping, e.g. the cotton industry in Eastern Province, are important stakeholders to bring on board in a policy process. Lastly, are the various **national, regional and international research and training institutions** as well as international donors and support agencies.

The range of stakeholders emphasises the need to view the on-going beekeeping policy formulation process holistically. The Forestry Department will require a policy that defines and supports its mandate in the beekeeping sector that takes into account the much broader set of stakeholders. The FD beekeeping policy must acknowledge the important role played by the private sectors; it must further comply with international conventions and agreements; take cognisance of and institute collaboration with other key stakeholders (e.g. regulators); and give recognition to the important contribution to sector development by various support agencies.

4

The beekeeping industry

The market for honey is much more specialised than wax, because the product is eaten and has to be clean. In addition, it is much more difficult to handle.[62]

4.1. Production and domestic sales of bee-products in Zambia

At present, the commercial bee products in Zambia are honey and beeswax. There is no trade in other bee products, e.g. royal jelly, bee venom and propolis. In 2003, the total estimated production of honey in Zambia was at 1,500 metric tonnes of which 200 MT was traded within the country and some 250 MT exported to Europe.[63] For 2004, the estimate was more than 400 MT exported.

Existing data[64] shows that honey and beeswax production in Zambia has been substantial, but fluctuating. Figure 2 shows an estimation of smallholder honey production and sales over the period 1964-1996. Production estimates have been calculated from available data on beeswax sales.[65] The sales data is derived from the Forest Department Beekeeping Division, and hence only reflects the honey that beekeepers sold to the government buyer. All the same, the graph shows that the country is capable of producing well beyond 1,000-1,500 MT of honey annually and that only a small portion of the honey produced reaches the market.

The great fluctuation in production has been a cause of worry. Between 1987 and 1991, the Beekeeping Survey of the Forest Department attempted at establishing the causes of the fluctuations without much success.[66] At least partially, fluctuations are related to variations in the flowering of one of the main nectar species, the mutondo tree, *Julbernardia paniculata*.

There are no reliable figures on local consumption and sales. It has often been assumed that the bulk of the honey (even 90%) is used for brewing beer, *mbote*.[67] There is a market for honey beer both in local communities and in urban areas. Mulenga and Chizhuka (2003) estimate that 600-700

metric tonnes of honey are converted into honey beer annually.[68] Only a small portion of the honey reaches the market as table honey. The estimates of annual urban domestic demand for table honey differ considerably from 100 to 300 metric tonnes![69]

The demand for table honey is mostly urban. Considering the relatively high retail price (1.6 – 2.2 USD /kg[70]), honey is mostly a food for the middle class. Over the years, honey has gained a reputation as a health food – it has been purported to be effective in bringing down high blood pressure, in managing early stages of adult diabetes, in enhancing male sexual potency and in boosting immunity. It appears that honey is one of the commonly used foods recommended for HIV-positive people.

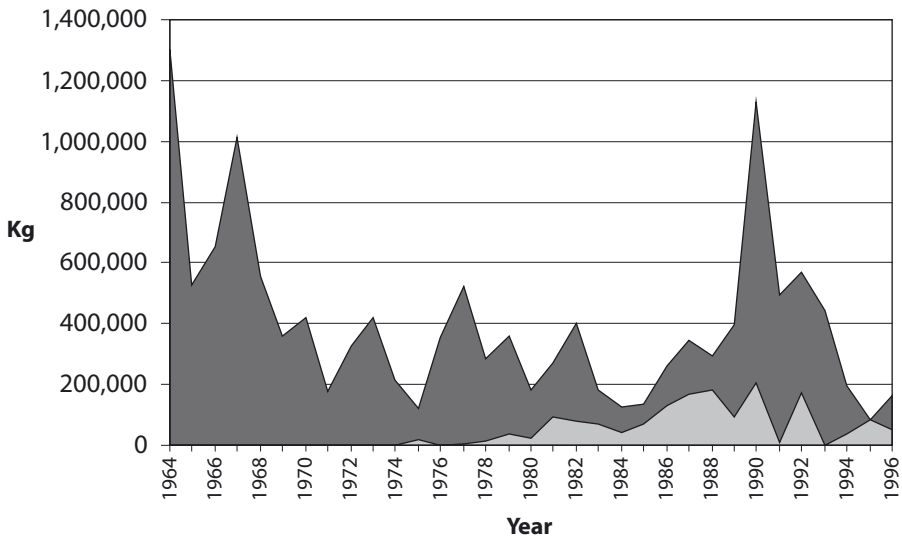


Figure 2. Smallholder honey production (dark shading) and sales to government (light shading), 1964-1996. (Source: Calculated by author[9] from figures in Kambeu 2003).

Beeswax

Figure 3 shows smallholder beeswax sales to the Forest Department Beekeeping Division over the period 1964-1996. A comparison between Figures 2 and 3 shows how beeswax was the traditional commercial product and how honey sales gained in significance only in the late 1970s.

Beeswax is sold locally as a floor polish and for making candles. A significant proportion of beeswax is picked up by Tanzanian traders for sale to the cosmetics industry in Eastern Africa.

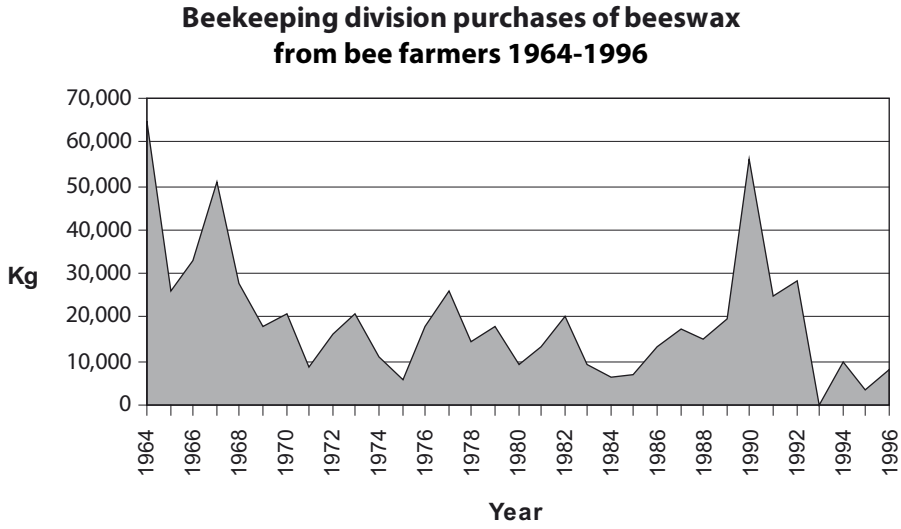


Figure 3. Smallholder beeswax production and sales to government, 1964-1966. (Adapted from Kambeu 2003).

4.2. Zambian export of bee-products

Zambia has been exporting bee products since the 1890s. No statistics on exports prior to 1964 have been available for this study. According to FAO statistics, Zambia exported an average of 7.3 tonnes of beeswax annually over the period 1964 to 2002. As the graph in Figure 4 shows, the variations in exports were tremendous, ranging from 0 to 46 tonnes. The cause of the fluctuations has not been established, it may simply be attributed to poor record keeping.

Honey exports only began in earnest after 1990. Figure 5 shows overall honey exports as reported by FAO compared against the main exporting company, North-Western Bee Products' (NWBP) own records of exports. Although, the figures do not tally[71], they do shows beyond doubt that NWBP exports have accounted for the bulk of exports until 2001 when exports from other players, first and foremost Forest Fruits Zambia, began to affect statistics.



Figure 4. Beeswax exports from Zambia 1964-2002. (Source: FAOSTAT 2004).

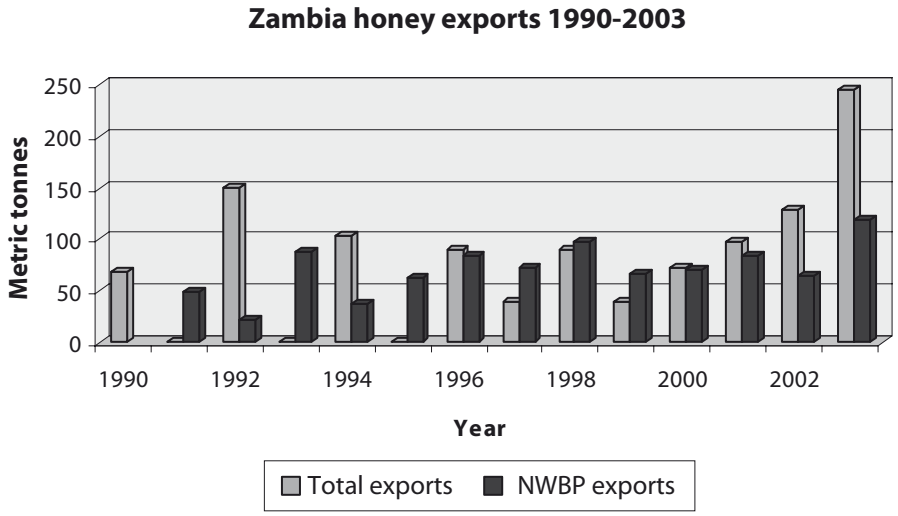


Figure 5. Zambian honey exports 1990-2003 (Source: FAOSTAT 2004, Export Board 2003, NWBP 2004).

4.3. Organisation of the honey industry in Zambia

The bulk of the Zambian honey and beeswax production takes place in four districts in North-Western Province: Kabompo, Zambezi, Mwinilunga and

Mufumbwe. The exported honey in its totality comes from this area. The other NWP districts, Solwezi, Kasempa and Chavuma account for lesser, but significant amounts of honey.

Other major supply areas are Kaoma (Western Province), Lufwanyama, Mpongwe and Masaiti districts (Copperbelt Province). Together with NWP, these were the areas selected by the government in 1965 for intensive promotion of beekeeping.

Outside the main honey zone, localised honey production is significant in Kapiri Mposhi, Kabwe and Mkushi (Central Province), Lundazi and Petauke (Eastern), Mansa and Milenge (Luapula) and Mbala district (Northern). However, none of the districts in the latter category can compete in terms of supply with the traditional honey producing areas in the north-western corner of the country.

It has been estimated that there are some 20,000 beekeepers and 6,000 honey hunters in Zambia.[72] At least half of the beekeepers are found in North-Western Province. Traditional bark-hive beekeeping is dominantly a male activity. Women beekeepers are few and have mostly emerged through various project interventions, e.g. to promote the use of top bar hives. Honey hunters are mostly found in Kasempa district, Luapula and some areas of the Northern Province.

As much as statistical data is lacking on producers, there is even less data on honey buyers, processors, packers and distributors. There are several categories of honey buyers, ranging from beer brewers, to informal wholesale traders, to urban employees who trade in honey as a supplementary source of income during vacations and work trips; to small registered businesses which process, pack and retail the honey for local markets; to international traders and the Zambian exporters.

It has been estimated that the economic impact of the honey industry is most significant in creating income among rural beekeeping households. In the more productive districts of North-Western Province, beekeepers are estimated to produce some 100 kg of honey in a year.[73] At present prices, this yields an income of some 330,000 Kwacha (100 USD).

In a rural economy, where three quarters of the population survives on an income of less than 1 USD per day, honey is an important source of income, which accounts for 20-25% of total annual income. At an aggregate level, ten thousand beekeepers (on average producing 80 kg of honey in a year) have the potential to earn some 2.4 billion Kwacha in a year (490,000 USD), a substantial amount of money in an impoverished rural economy.

Evidently, the honey industry also creates self-employment for informal honey traders as well as formal employment in registered companies. Consequently tax income is generated for the government. North Western Bee Products (NWBP) is on record as being the second largest employer in Kabompo after the government.[74] The local councils, e.g. Mwinilunga gains income from a honey levy applied to large quantities of honey taken to market outside the district. Gross export earnings from honey and beeswax may be estimated at 0.77 million USD in 2003.[75]

4.4. The honey marketing chain

Zambia's honey marketing chain is shown in Figure 6. The white boxes refer to the domestic actors along the honey chain, whilst the yellow (shaded) boxes in the lower right-hand corner are European players. The structure of the chain is relatively simple. One may note a certain level of vertical integration among Zambian honey buyers. The buyers often try to take on processing, packing and distribution as well to increase on the profits.

The value addition along the chain is remarkable. A producer usually earns around 3,000 K/kg (1 USD) for liquid honey[76]. Prices vary significantly across the nation – in remote areas the prices may be as low as 1,000 K/kg (0.30 USD). The highest farm gate prices are obtained by producers selling honey along the roadside in Central Province (Luanshimba area), where honey fetches an income of about 8,750 K/kg (1.79 USD). This market is, however, very small and unpredictable as it depends on the purchasing powers and whims of passing motorists.

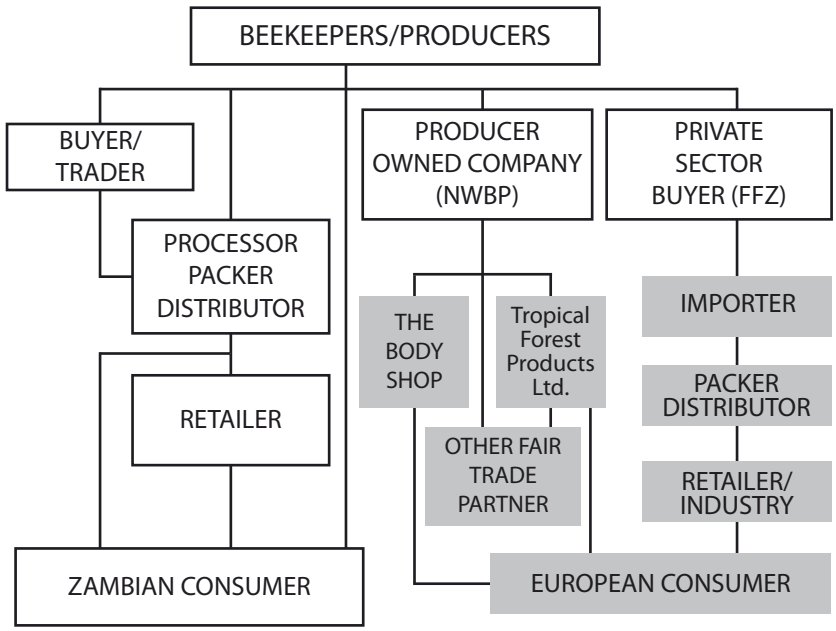
Honey is retailed in Lusaka at around 1.6-2.2 USD/kg. A few bigger food-processing companies, e.g. Speciality Foods and Rivonia supply the big supermarket outlets. Smaller companies specialised in honey trading, e.g. Munati Agro-forestry, Lunga Bee Products, Mwame Enterprises and PECO

buy, process and/or pack honey for distribution to shops and smaller supermarkets in urban areas. Retail prices are quite uniform.

Export prices for organic honey have fluctuated between 1,500 and 4,000 USD/tonne. The present export price is in the range of 2.5-3.5 USD/kg depending on the quality. Zambian honey is sold as table honey, as industrial honey (e.g. for coating of cereals) and as an ingredient in cosmetics (lip balm, shampoo, skin lotion).

4.4.1. Producers

The beekeepers of North-Western Province have been estimated at approximately 15,000 persons, nearly all of them men.[77] The bulk of the honey production is from bark hives hung in the natural forest. On average each beekeeper has 73 bark hives, not all of which are occupied by bees at any given time.[78] The distance between the homestead and the hives may be up to 40 km.



Source: Mickels-Kokwe, G (2004). Small-scale woodland based enterprises with outstanding economic potential: the case of honey in Zambia. ZAPE, Lusaka

Figure 6. The honey marketing chain in Zambia

Honey production is essentially one of several forest activities: villagers practice pit-sawing, farming, hunting, beekeeping, collection of minor forest produce, etc.[79] Hive inspection is therefore often combined with other forest activities. The labour requirements in beekeeping are minimal. Hive construction is fast – a beekeeper may construct several hives in a day.[80] Most labour time is spent in the forest – walking to hang, inspect or crop the hives.

The heaviest work is transporting cropped honey in buckets, each weighing around 30 kg, from the forest to the homestead as head-load. Transporting cropped produce is also the production stage that requires cash input – hiring helpers and bicycles to carry and transport the product

There is no restriction on female beekeeping *per se*. Men perceive women as being constrained by the fact that hives need to be hung in trees in remote places in the forest.[81] Women in general are not comfortable about climbing trees. It was also considered impossible for them to leave the homestead chores to go and camp in the forest. Male beekeepers suggested that women should be owners of hives and hire men to manage forest hives on their behalf. Male beekeepers did not consider the Forest Departments advocacy for "modern hives" for women a feasible option due to technical reasons.[82] Women's participation is further dependent on the husband's permission. The role of the husband in decision-making is quite pronounced in rural households in North-Western Province. It will therefore be very difficult for a woman to decide to take up beekeeping and start employing labourers to tend to the hives without the active support from the husband.

The average beekeeper produces about 100 kg of honey in a year.[83] Most of the honey is sold and only a little is retained for home consumption. Beekeepers often mentioned that of twenty buckets of honey sold maybe only one is retained "for the children to eat".[84] In addition, beekeepers, both men and women, will prepare honey beer from the left over honey rinsed from combs in the process of making wax.

Honey income is a significant source of income. Three quarters of the population was estimated to be living in poverty (and 63% in extreme poverty) in North-Western Province in 1998.[85] Beekeepers commonly indicated that beekeeping was the second most important source of income to the household, after farming.[86] It appears that farming provides the mainstay of the family – the food and sustenance for the household. Farming is arduous work, clearing land,

tilling the soil, planting, weeding and harvesting, but the production secures the family food security. Beekeeping is unpredictable. Yields vary depending on the rains and the flowering of the forest trees, and yet beekeeping provides much desired cash income at very good returns to labour time.

When posed with the question of whether honey is profitable, most beekeepers said yes. A common comparison was between honey and maize. A bucket of liquid honey, if filled to the brim, was selling at 90,000 Kwacha. This compared well with the income from sales of two 50 kg bags of maize.[87] However, although honey was considered relatively profitable, most beekeepers felt it did not really address poverty. The chairman of Njidi beekeeping group said: "I have been keeping bees for 35 years. But if you look at my house, you can see that there are no riches in my household".[88]

The beekeepers complain of the low prices and the lack of competition among buyers.[89] The main buyers are criticised for low prices – indeed, the question met with a lot of animosity from the beekeepers interviewed. The beekeepers compare prices paid by the two major buyers to those of other minor buyers – asking how it is possible that the smaller buyers pay better prices. The beekeepers also argue that they should be the ones setting the price, not for the buying companies to determine what is to be gained. Beekeepers were wishing for more buyers to come, so that competition would drive up the prices. When asked what a "fair price" for the honey would be, the beekeepers proposed a thirty per cent price hike – from the present level of 3.350-3.450 K/kg (0.67 – 0.70 USD/kg) the beekeepers wanted a price of 4,500 K/kg (0.98-1.00 USD/kg) and above.

The beekeepers see honey and beeswax production as one of the few available means to gain a living. A fair price in their view is justified by their poverty. They envisage to reduce on their poverty by "going flat out" – working harder, increasing the number of hives, producing more honey for sale. If only the price would be better, they say, one could make a real impact on poverty.[90] The key factor for a beekeeper to enter into or expand honey production is labour – more labour-time to make more hives, to hang, inspect and crop the hives.

Table 14 shows the critical concerns as perceived by beekeepers in four Provinces of the country. These views were solicited during group work in stakeholder workshops in preparation of a national beekeeping policy for Zambia. The table shows that equipment, marketing and finance are among

the main concerns. Equipment and finance are particularly important in areas where modern (and expensive) hive technology is being promoted.

Table 14. The top six critical concerns among beekeepers in Zambia (Source: Mickels-Kokwe 2004b,c,d.e)

Eastern Province	Central Province	Luapula Province	North-Western Province
Beekeeping equipment	Lack of land	Lack of protective clothing during cropping season (equipment)	Transport and transportation transport from apiary to village
Market	Deforestation	Lack of cooperation / coordination between beekeepers and stakeholders	Protective clothing
Training groups	Lack of bee-keeping equipment	Absconding of bees due to tree problems	Equipment (honey presses, buckets, drums)
Finance	Lack of finance	Absconding of bees due to pests	Marketing
Forage reserve (trees)	Poor marketing system	Absconding of bees due to bad hive construction	Training
Vandalism and pests	Poor quality of honey	Lack of financial support leading to poor production and lack of prosperity	Women beekeeping

4.4.2. Processors, traders and packers

Five different categories of domestic honey buyers, honey processors and/or traders are found in Zambia today. The following are brief summary characteristics for of each category:

The first category is the ***beer brewer***, often an individual female entrepreneur in an urban area, who buys honey to brew beer and resell to town customers. The beer brewers often buy second grade honey, e.g. with a high pollen content, which is considered to speed up and enrich the process of fermentation. Beer brewers commonly take advantage of producer predicaments by offering very low purchasing price to desperate sellers. The Solwezi beer brewers are said to scoop up much of the lesser quality honey on the market.

The second category of honey buyers comprises the ***informal traders***. These are men and women who reside in urban areas in Lusaka and on the Copperbelt. They may be full or part-time traders, who travel by public transport to supply areas and buy honey from the producers, hire transport to take it to town and resell to processors. One of the main constraints in this trade is capital for buying honey and packaging – the most commonly used vessel is the 20 litre cooking oil container, which is washed and used for transporting. The traders are rarely specialised, but also buy and sell other produce (beans, cassava, fish) when available. Some of the informal traders are in gainful employment, e.g. teachers who trade during school holidays to supplement household incomes.

The ***formal honey buyers are mostly small enterprises***, comprising of an owner and a few members of staff, usually less than ten. These companies are based in urban areas and buy honey from producers and traders who bring honey to their premises (at a higher price), or travel to rural areas to buy honey from producers (at a lower price). Transport is one of their main constraints. To maximise profits these companies attempt vertical integration – they process comb honey / clean up liquid honey through filtering, grade, pack in jars and retail direct to end-users when possible. Most of these companies have a small outlet in a central part of the town business district and have built up a clientele that buys direct from the "factory shop". In addition, these companies supply small supermarkets, shops and pharmacies within the same, and in other, urban areas.

Among the formal honey buyers are also the ***NGOs that buy honey*** from producers in their operational areas, e.g. Kaloko Trust in Masaiti, Mpongwe Beekeeping Enterprise in Mpongwe and Environment & Development in Kitwe. These NGOs have started as projects or service providers to community projects and have evolved into semi-private enterprises. Most of them obtain a subsidy for their operations, mostly indirect through free premises, subsidised transport and/or work force. These NGOs attempt to establish partnerships with community-based organisations and donor agencies to develop their business, often a form of "contract bee-farming". The NGOs operate on a principle of introducing "modern beekeeping" using the frame or top bar hives.

There are a few ***bigger private sector honey buyers*** who mostly deal on the domestic market**.** Speciality Foods in Kitwe buys honey from groups and

individual beekeepers in various parts of Zambia, bottles and distributes its jars to supermarket chains, e.g. ShopRite. Rivonia, another major food processing company based in Lusaka, launched a squeeze honey-bottle in 2003. Rivonia has arranged for its supplies to come from a commercial apiary located in Chisamba, which again supplements its supply with an out-grower scheme.

Table 15 summarises some of the critical parameters affecting the honey buyers, processors, packers and distributors in Zambia as presented at stakeholder workshops in three Provinces. It is evident from the table that honey and beeswax buyers, processors, packers and distributors are negatively affected by high interests rates, poor road networks, high costs of transport, and to a lesser extent lack of regulation of the industry.

Table 15. The top six critical concerns among honey and beeswax buyers, processors, packers and distributors in Zambia. (Source: Mickels-Kokwe 2004b,c,d.e)

Eastern Province	Luapula Province	North-Western Province
Processing equipment	Honey quality & quantity	Quality
Quality of honey/other bee products	Sustainability of supply	Communication and market information
Testing equipment	Transport (vehicles)	Organisation
Financing	Road network	Marketing
Transport	Financing (capital, interest rates)	Technology
Marketing systems	Lack of proper premises and equipment/tools	Finances

4.4.3. Exporters

Two local companies ***export honey*** and beeswax from Zambia to EU and a few local exporters take occasional consignments to countries in Southern Africa, mostly South Africa. International buyers sometimes visit North Western Province to buy honey. In particular South Africans are known to come from time to time. The beeswax has for long attracted Tanzanian traders to come and buy and export to Eastern Africa.

North Western Bee Products (NWBP) was set up in 1989 to take over the honey-buying functions of IRDP, a Germany-funded development programme, which had established a system for buying honey across four districts in North Western Province. NWBP was registered as a "community-owned company",

where the beekeepers, through the North-Western Beekeepers Association (NWBKA) held shares in the company. In 1990, the company obtained organic certification and has been exporting certified honey and beeswax ever since. NWBP has a major fair trade partner in the U.K., Tropical Forest Products Ltd., which has shown itself to be a dependable long term trade partner.[91] TFP is a processor, packer and distributor. The company grades, filters and bottles the honey and distributes it under the trade name of Zambian Forest Honey to retail outlets in the U.K. In 1994, NWBP passed the Body Shop "Trade Not Aid" assessment, which opened a market for organic honey and beeswax in the fair traded cosmetics industry globally. Recently, NWBP obtained fair trade status also in Germany (May 2003).

Beekeepers are organised at village levels into groups. At present, the total number of beekeepers supplying NWBP is about 4,672 of whom 2,700 are very active.[92] In addition to factory staff, the company employs 13 extension officers, who are based at village level and support the groups with marketing (e.g. handling of buckets, setting of collection schedules). The basic work of the extension officers is to visit each group once a month and report to NWBP. The system enables the beekeepers and the company to communicate on matters such as crop forecast, dates and areas of collection, dates of meetings, etc. It also provides NWBP with a venue to quickly communicate any new or altered requirements arising from Soil Association inspections.[93]

The beekeepers meet annually in the NWBKA annual general meeting, where elections are held and honey prices discussed. Profit drives the beekeepers to organise themselves: the "beekeepers main concern is to maximise their earnings".[94] Although the NWBKA executive in principle is elected annually, the Board has remained unchanged for the last ten years.[95] It has been observed that the NWBKA which was considered "well established and sustainable" in 1996[96], now "is limping on one leg"[97].

Ironically, some observes have attributed this to the close, perhaps too close, connection with NWBP. It has been argued that NWBKA has lost its independence and autonomy. NWBKA executive members on the NWBP board find it difficult to manage the double responsibility: to look after the beekeeper's interests as suppliers and company-owners simultaneously. The failure of the executive to effectively negotiate for fair prices for the suppliers has resulted in quite some frustration among some beekeepers with respect to NWBP.[98] Recently, an initiative was taken by FRMP/IFAD, SNV, FD, NWBP

and the present executive of NWBKA to start a process of strengthening the beekeepers' organisation.

NWBP is effectively buying honey from three districts only: Kabompbo, Mufumbwe and Zambezi. The company attempts to buy only first grade village processed honey and a price disincentive is given on comb honey. Honey is bought on credit – beekeepers are paid some 3-4 months later – when payment from overseas has arrived. Although this makes sense from the point of view of the company (avoiding expensive lending rates), the beekeepers are very unhappy with the arrangement and would like to be paid cash on delivery. Very little further processing is undertaken – only grading and filtering of consignments that are found to have too much dirt, mostly of honey intended for the domestic market. Export honey is packed in drums and exported through Ndola.

Forest Fruits Zambia Ltd. (FFZ) is a private company, based in Mwinilunga. The company started buying honey in Eastern Mwinilunga in 1996 and gradually spread its purchasing network. FFZ has obtained organic certification for an area covering most of Mwinilunga district. Certification is done by a locally-based certifier, who represents ECO-Cert, a Germany-based company.

By 2004, FFZ had established a "contract-beekeeper" network with some 3,000 beekeepers organised over 35 depots. The supply organisation is still increasing – the present plan is to expand to 5,000 beekeepers.[99] The company employs two full-time extension officers whose job is to train farmers in quality control. The main concern is on quality, in particular to reduce on the smoke taint and obtain a lighter coloured honey.

Company agents handle local purchasing arrangements. The agents are given bicycles and are paid commission on sales. It is the agent's duty to organise the supply and to inform the company of adequate quantities of honey ready for collection, e.g. 80 – 150 buckets at a time. FFZ buys comb honey only and processes it into liquid honey using centrifugal honey separators at the factory premises. The liquid honey is drummed and exported through Lusaka. Beeswax is also processed and sold.

FFZ pays beekeepers cash on delivery. The company is able to do this because of access to low interest rate pre-financing. The immediate payment system

is much appreciated by the producers. However, the price is considered too low by the beekeepers. In the 2003/2004 main season, the purchasing price was 2,000 K/kg of comb honey. For the 2004 *Julbernardia paniculata* season (May-June), the price was increased to 2,500 K/kg. The company only buys first grade comb honey.

FFZ estimates that they are able to buy all first grade honey being produced in the district. During the last *Brachystegia* season, the company targeted to buy 300 tonnes, of which 50 tonnes were from *J. paniculata*. Both estimates were exceeded. Side-selling is a problem in some areas, in particular if collection delays. However, most beekeepers know that if the honey quality is not good enough they may just as well sell elsewhere since FFZ will not buy.

In summary, the exports of organic honey and beeswax to Europe has created a market outlet for a substantial amount of honey from North-Western Province, with positive economic multiplier effects within the province and nationally. There is no doubt that NWP is the hub of the organic honey industry and will remain so for the time being. The description of the actors along the marketing chain shows that the conditions for production, processing and trading are far from ideal. Given a more conducive policy support environment at all levels, there is potential for the sector to grow significantly and contribute more effectively to national development goals. It is highly recommended to the Forest Department, that the proposed beekeeping policy takes cognisance of the conditions under which the private sector operates and institutes dialogue with relevant sister Ministries in order to provide effective backstopping for the sector.

Discussion

This report has shown that the honey and beeswax industry in Zambia has an outstanding economic potential, but that this potential comes with challenges and constraints. This chapter will address some of the fundamental questions regarding the realistic potential for beekeeping in Zambia.

1. How is the *beekeeping industry organised* in Zambia? Does it conform with the NWFP markets in general, or does it resemble the more established agro- and food industry? What can we say about beekeeping sector performance? What are the sector constraints and opportunities and what are their implications?

The beekeeping industry in Zambia comprises two marketing chains, the honey chain and the beeswax chain. The nature of the products – a food and a wax – is quite different and there is little overlap in terms of actors after the production and initial processing stage. Honey production is a discrete industry in Zambia. There are linkages to the food industry, but there is no immediate integration. The bulk of the domestic industry comprises producers (20,000 beekeepers nationwide), informal traders and small enterprises. Two companies dominate the export market.

Beeswax has been traded abroad since the 1890s and honey since 1990. Over the first fifteen years, honey performance has been variable, partly due to fluctuations in production. Over the last five years the trend has rapidly been increasing – exports are growing and beekeeping is expanding into other non-traditional beekeeping areas. The honey industry holds a lot of promise, but faces a number of constraints.

Whilst the honey industry is bringing in much needed export earnings and direct cash benefits to poverty-stricken rural households, fundamental

constraints include poor road infrastructure, lack of capital/credit, poor market information and variability in supply, which cast doubts on the long-term viability of the sector. There is need for the government and other stakeholders to seriously examine the constraints affecting the sector to see which ones may be alleviated by a change in policy and investment.

2. What is the *realistic resource base* for beekeeping in Zambia? Most sector overviews tend to focus on the inherent potential of the Zambian natural resource base for bee-keeping glossing over or ignoring present serious threats to sustainable forest use and management in Zambia, e.g. agricultural extensification; deforestation, loss of access and user rights, drought.

This report demonstrates that beekeeping is possible all over Zambia, where adequate fodder, water and shaded conditions prevail. However, in view of basic ecological conditions and present trends in forest degradation, it appears that four districts in North-Western Province – Mwinilunga, Kabompo, Zambezi, Chavuma – have an outstanding potential compared to others.

The report shows that competing land use, agricultural expansion and wood-fuel harvesting set limits to the long-term beekeeping potential in more than half of the areas considered favourable for beekeeping.

There is a significant development potential to be harnessed by protecting and safe-guarding the beekeeping industry in the four highly productive districts. It is ironic, that most of the recent investment in the beekeeping sector has not been directed to North-Western Province, but to other non-traditional Provinces. Redirecting investment into this area of comparative advantage, the beekeeping sector of NWP, would yield high immediate returns in terms of poverty alleviation and economic growth. Investment is needed for feeder road network, bridges, market infrastructure, market information and soft credits to honey buyers.

What about the potential threat from diseases such as *Vorroa* mites from across borders?

Second, whilst beekeeping may be promoted in other parts of the country, the stakeholders must take note that the producer costs of managing bees

will be higher and the returns to labour-time lower. Nowhere else will honey production be as profitable as in Kabompo and Mwinlunga. Promotion of beekeeping will require a different strategy from the one adopted in North-Western Province. It is also important to note, that producer credits on accessible terms will be a prerequisite to enable them enter into the industry.

3. What is the *realistic potential for sector growth* for the beekeeping industry in Zambia? How has demand changed over time? What are the prospects for honey exports? Many sector overviews tend to see the "sky as the limit" for the beekeeping industry in Zambia, with multiple benefits in economic development, poverty reduction and increased foreign exchange earners.

Clearly, there is potential for the beekeeping industry in Zambia to grow further. Domestic and international demand is growing. Price premiums on organic honey remain significant. New market opportunities have opened up in the form of cosmetics and so-called fair trade products. However, the summarised discussion above under items 1 and 2, show that sector constraints are significant. The comparative advantage and potential return to investment appear high if consolidated efforts are made to overcome the constraints.

(might want to mention something on the threats from cheap imports (from China) into potential markets (such as in south Africa)

4. How *conducive are present policies and institutional arrangements for sector growth*? In what ways do policies support / constrain the growth of the bee-keeping sector in Zambia. Which policy areas need attention for the beekeeping industry to succeed.

Present policies and institutional arrangement are not conducive to sector growth. The achievements in the honey export sector over the past 15 years have been private sector / NGO driven with very little support from the government. Several key areas of concern need to be addressed by government: certification, beekeeper tenure rights, infrastructure, credit support, export regulations, hive inspection and sanitary standards, honey quality issues, to mention a few. A huge potential may be realised from intervening with favourable policies in support of the beekeeping industry at the moment.

5. What are the *best institutional arrangements* to support an efficient honey commodity chain? What should the government do? What should the support agencies do?

The present success of the honey industry is based on past government and donor investment in the sector. The Beekeeping Division, the GTZ funded Integrated Rural Development Programme (IRDP) and various NGOs laid the foundation for the production, processing and export of honey from North-Western Province to the world market. However, the continued exports and recent increases have mainly been due through the initiative and persistence of two exporting companies, North-Western Bee Products Ltd. and Forest Fruits of Zambia Ltd. Both companies are socially, responsible buyers, with a long-term commitment to the communities and a willingness to invest in beekeeper training, supply chain management and infrastructure.[100]

The private sector operates under difficult circumstances and cannot address all the sector constraints. At the same time, the private sector companies have intricate, specialised knowledge in the trade, e.g. pertaining to certification requirements and honey import regulations in Europe.

Meanwhile, the private sector alone cannot make the beekeeping sector realise its full potential. It is the mandate of the government to regulate the industry and it is the role of support agencies to provide facilitation, technical advice, financial and material support and to mobilise the actors along the market chain.

The recognition of the different and complementary roles of the public and private sector leads to the recommendation that government must work closely in collaboration with the private sector in seeking the optimal solutions to the problems affecting the beekeeping sector. A good private-public partnership in the honey industry is likely to yield good results quickly and effectively. The role of the support agencies would therefore be to support the forging of such a partnership.

6. What are the potential and organizational pre-requisites for collective production/cooperatives versus individual/private production, processing and marketing?

The study shows that a combination of a group and an individual approach has emerged as Best Practice in the commercial beekeeping sector in North-Western Province.[101] The modalities are as follows:

Producer organisation

Producer organisation is a pre-requisite for successful honey marketing as it addresses issues of supply chain management, communication, training and extension.

- The success of honey exports from North-Western Province rests on a foundation of producers' organisation. The beekeeping division together with IRDP/GTZ organised beekeepers in groups of 20-30 members all across the three districts of Kabompo, Mufumbwe and Zambezi. Communication with groups was ensured through the establishment of routes and route chairmen. The groups were brought together under the auspices of the North-Western Beekeepers Association (NWBKA) in 1988, also under substantial support from external donors and local organisations. The IFAD-funded Area Development Programme later funded the organisation of producers in Kasempa, Solwezi and Mwinilunga districts into groups and routes.

- The very foundation of North-Western Bee Products relies on the organisation of producers. The NWBKA owns 33% shares in the company and beekeepers have further shares through the Uchi Trust. The relationship between NWBP and NWBKA is very close. Forest Fruits Zambia has equally built its supply network on existing producer groups and further invested in strengthening the organisation of the producers. FFZ has sourced funds from USAID and is in the process of re-organising the groups into depots under guidance from CLUSA. To comply with certification requirements, records of producers and all their hives have been entered into a database.

- Without the substantial donor and government investment in producer organisation there would be beekeepers scattered in the forest over a wide area. The fact that producers are organised has facilitated the buyers' entrance into the communities, training extension efforts, communication, crop forecasting, collection and marketing.

- Producer organisation is a pre-requisite for effective supply chain management. The scattered beekeepers have no means of gaining overview of how the selling is proceeding, nor communicating to the buyer in this environment void of telephones and regular public transport. Hence, the producer groups working with extension staff and agents are crucial in providing crop forecasts and communicating information between the producers and the buyers[102].

- The managers of the successful honey buying companies testify to the importance of continuous training and capacity-building of producers.[103] Whilst honey is a known resource, the requirements for honey harvesting for home use are very different from the requirements of a globally competitive, clean and attractive product.

- IRDP and IFAD funded the Beekeeping Division and other extension staff to train farmers in proper hive management, improved processing, grading quality assurance, etc. With the demise of donor funding and continuous poor funding of Forest Department Extension Branch, the private sector is carrying more of the costs of extension.

Individual processing, production and selling

Whilst producer organisation is crucial for companies wishing to arrange the honey supply chain, groups are shunned by beekeepers when it comes to actual production and selling, the exchange of honey and beeswax for cash. Some of the factors contributing to this situation are:

- Production is highly individualistic in many Zambian households. It is not uncommon to find that households work together as a production unit, drawing upon the labour of many members of the household. However, when it comes to marketing sales these are individualistic, with the husband and wife managing the sales from their individual fields.[104] A beekeeper who cannot consider sharing financial responsibility with his spouse, is not likely to do so with any other person,

- Producers do not trust fellow group members to act impartially and justly and to look out for the interest of all members. Producers prefer to

handle commercial transactions themselves to avoid common situations of misunderstandings.

- Poverty levels are high and households are perpetually short of cash. When the time for selling comes, the beekeeper is keen to sell his produce quickly to access much needed cash. The producer's cash predicament implies that he is not able and/or willing to wait very long. Producers will prefer to sell quickly than to wait for a group to get together to sell.

- Processing (cleaning, grading, sieving, filtering) is done on an individual basis. The price varies with the grade of the honey. Individual producers to not want to risk having a good product contaminated by poor handling by others. In honey marketing, individual sales are marked for traceability. It is in the interest of both the buyer and the producer that a straight link is maintained, which guarantees the producer the best price and the buyer the best quality.

Interestingly, many projects promoting modern beekeeping have insisted on a group approach not only to hive demonstration training and extension, but also to hive ownership, hive management and selling. This is often justified by the high capital costs of acquiring box hives. The results from these experiments are not encouraging and it is recommended that more well-defined individualistic approaches are developed.

Recommendations

The above discussion has identified a number of recommendations to the FD of Zambia and CIFOR on researchable issues and interventions that would further enhance not only the honey and beeswax sector but small-scale woodland based enterprises more generally, in Zambia and the region. Furthermore, the report draws conclusions and makes recommendations on a number of issues pertaining to the beekeeping sector in Zambia. This section summarises the recommendations in their order of appearance in the main report.

- There is need to conclusively identify the African honey bee race (*Apis mellifera adansonii* or *scutellata*) present in Zambia;
- The incorporation of stingless bees (*Meliponula*, *Trigona spp*) in the beekeeping policy should be considered;
- There is need to comprehensively determine the implications of ecological variables (rainfall, woodland composition, annual fodder availability and shade) for beekeeping in Zambia, in order to determine which areas will have the greatest returns to an optimal investment;
- The management costs of keeping bees in less than ideal ecological conditions should be calculated to provide potential beekeepers with a fair idea of returns to capital investment;
- Key tree species – *Cryptosepalum, Guibourtia, Marquesia* – provide gap-filling and/or build-up functions in terms of nectar supply. Their relative importance should be assessed and implications for woodland management determined;
- Adaptive research to find a replacement for the bark hive should be continued and reasons for non-adoption of log hives, calabashes and other alternative hives be firmly established;
- The constraints to adoption of modern beekeeping (box hive) should be comprehensively studied (pests, diseases, absconding, capital costs,

management requirements, etc.) and the pro-active measures needed to overcome these constraints identified and costed;

- An update of key variables covered in the 1992 beekeeping survey (Clauss 1992) should be undertaken to determine changes in productivity, yield levels, hive sizes, average number of hives per beekeeper, etc;
- The constraints to effective participation of women in beekeeping should be identified, pro-active measures to overcome these constraints should be identified and costed;
- The impact of bark harvesting on the miombo woodland should be studied to determine the implications for sustainable woodland management;
- The impact of deforestation and agricultural activities on beekeeping should be assessed on a nation-wide basis to identify areas of comparative advantage where investment in beekeeping should be concentrated;
- GRZ/FD should develop a beekeeping policy that is sensitive to the variable potential for beekeeping in different parts of the country. This could be supported by a study dividing the country into four zones in terms of realistic beekeeping potential, from high, medium and low to none;
- The relationship between beekeeping and woodland management should be studied, made explicit and incorporated in revised FD policy and legislation;
- The tenure and ownership rights of beekeepers should be studied, made explicit and incorporated in revised FD policy and legislation;
- The research agendas on sustainable beekeeping pursued under the JFM arrangements should be followed up and supported;
- FD should clarify its mandate in beekeeping and establish relations with other key stakeholders, in particular regulatory authorities;
- The status of organic certification of woodlands should be studied, made explicit and recommendations made for how it should be incorporated in revised FD policy and legislation;
- FD should lobby for a more comprehensive approach to the beekeeping sector, taking the lead in bringing the wide range of stakeholders together;
- FD needs to clarify the institutional arrangement for beekeeping under the revised organisational structure (ZAFCOM);
- A broad and comprehensive consultative process needs to be initiated with all beekeeping sector stakeholders which will result not only in the formulation of a beekeeping policy, but also a revision of the national Forest Policy and Forest Act;

- GRZ/FD will benefit from building a partnership with the private sector in further developing the beekeeping sector;
- FD needs to take cognisance of recent international developments in the beekeeping industry by appointing and internal task force to study these;
- Authorities mandated to generate statistical data (CSO, FD provincial offices) should be encouraged to improve the coverage of vital data on the beekeeping sector;
- All stakeholders in the beekeeping sector should make an effort to take note of the concerns expressed by producers, buyers, processors, packers and distributors;
- The beekeeping policy formulation process should be made public to involve a broader section of the industry stakeholders.

Endnotes

1 Cf. ECAZ 2003, Mulenga & Chizhuka 2003, Ball 2003.
2 Mickels-Kokwe 2004b, 2004c.
3 Holmes 1964, p. 2.
4 Clauss 1992, p. 31; Malaisse 1997, p. 96-97.
5 There are two main bee races in Africa, *A. mellifera scutellata*, said to be native to Central and Eastern Africa, and *A. mellifera adansonii* native to coastal West Africa. Information is conflicting which species is predominant in Zambia. Malaisse (1997) states that the dominant sub-species in Lubumbashi (less than 120 km from Solwezi as the crow flies) is *A. mellifera adansonii*; Zulu (n.d., p. 3) describes the "bad tempered" Apis mellifera, var. adansonii as the African honey bee, south of the Sahara. On the other hand, MACO (2002) and ZFAP (1998 p. 105) state that *A. mellifera scutellata* is the predominant race in Zambia.
6 Zulu n.d., p. 3.
7 Malaisse 1997, p. 96.
8 See stakeholder consultation workshops, Mickels-Kokwe 2004b,c, d and e.
9 ZFAP 1998, Storrs 1995.
10 ZFAP 1998,p. 28.
11 Holmes 1964, p. 4.
12 Holmes 1964, p. 4.
13 Holmes 1964, p. 2.
14 Muzama 1996a, p. 31.
15 In addition to nectar from flowering plants, there are extra-floral sources of bee fodder. These include damaged fruit (e.g. *Syzygium and Parinari spp*.), saps, nectar from parasitic plants (e.g. *Pilostyles spp*. on *J. paniculata*) and honey-dew produced by leaf-eating insects (e.g. *Psyllidae* and aphids). Clauss (1992, p.24) points out that these extra-floral sources of fodder have implications for quality. He attributes the deeper colour

(dark amber) and more pronounced flavour of "Brachystegia honey" to a considerable presence of honey dew in the main season flow.

16 Malaisse 1997, p.102.
17 Clauss 1992, p. 4.
18 Trapnell 1951, p. 120-121.
19 ZFAP 1998, p. 35.
20 Clauss 1992, p. 120-124.
21 Ndola Rural was later split into three districts: Lufwanyama, Mpongwe and Masaiti districts.
22 Holmes 1964, p. 1.
23 Kambeu 2003, p. 4. Holmes (1964, p. 24) gives a standard conversion rate of 1:10 for beeswax and honey. Beekeepers give a conversion rate of 1:20 for village processing.
24 Clauss 1992, p. 68-69.
25 Wendorf cited in Clauss 1992, p. xx.
26 IFAD 1999, p. 36. Muzama (1996a) refuted Clauss' estimate of 3.1 trees destroyed per km^2 as too high. In their view his estimation of the beekeeper population was too high. According to Clauss there were 11,800 beekeepers in the three main honey producing districts: Kabompo, Mufumbwe and Zambezi. Based on production figures for beeswax and honey, Muzama estimates the number of beekeepers as low as 2,900! Muzama's estimate, however, appears very low. According to IFAD (1999, p. 8) there were 14,400 beekeepers in the Province in 1997.
27 CSO 2003
28 Assuming that Clauss' estimate of the number of beekeepers was correct and that the relative proportion of beekeepers to the total population has remained the same, estimated at 3.7% of the total population - the number of beekeepers would have reached 20,960 by 2004.
29 ZFAP 1998, p. 30.
30 Forest in open area 1,7 million ha, in GMAs 2,4 million ha and forest reserves 0.41 ha = 4.51 million ha. Excluded have been National parks (where cutting is totally prohibited) 0.87 million ha and trees outside forest 1.63 million ha. (ZFAP 1998, p. 30).
31 Stromgaard (1985) cited in IFAD 1999.
32 Ngonomo, E. personal communication.
33 Muzama 2000, p. 26.
34 Holmes 1964.
35 Clauss' (1992, p. 110-111) formula is based on the following assumptions: The miombo has a mean number of 73,500 trees per square km

(Chidumayo 1986) of which 11,000 trees are in the required size class (adequate girth to make a hive). Of these 660 belong to the preferred tree species (see figure 3 above), and about 34% have a suitable cross grain bark structure, which gives us 224 usable trees per square km. The regeneration period for the miombo is assumed at 50 years (Stromgaard 1985).

36 Chidumayo 1996 cited in ZFAP 1998, FAO 2001.

37 GRZ 1973, subsidiary legislation, section 68 The Forest Regulations.

38 Mwape, Mercy, personal communication during eekeeping policy stakeholder workshop held in Solwezi, 9-10 September 2004.

39 Kokwe 2004; FSP 2004; Muzama 1996a,b; GRZ 2003, Lukangaba 2004.

40 GRZ 1973, Cap 311, sections 16 and 24.

41 Henry Chilufya and Jeremiah Mbewe, personal communication, 2002.

42 Issue raised at Beekeeping Policy Stakeholder Workshop in Chipata, 7-8 May 2004. See Mickels-Kokwe 2004b.

43 Muzama 1996b, Kokwe 2004.

44 For an assessment of JFM as a woodland management approach, see Kokwe 2004.

45 Two provinces, Central and Eastern, were selected by the Ag. Director of Forestry on the basis of being non-traditional honey producing and are seen as having a reasonable potential for beekeeping. The two provinces were also selected as being the operational areas for the Forest Resource Management Project (FRMP), which is supporting beekeeping activities in the provinces.

46 Alajärvi 1996 cited in ZFAP 1998.

47 CSO 2003, p. 12-13.

48 Chomba 2004, p. 7-8; Chendauka 2004; Mbewe 2004; Faergemand 2004, IFAD 1999, p. 8

49 Mbewe 2004.

50 Chidumayo 1996 cited in ZFAP 1998, p. 71.

51 Trapnell 1951, p. 120-121.

52 Njovu 1996, p. 9.

53 ECAZ 2003, p. 1.

54 Njovu 1996, p. 9, ECAZ 2003, p. 1.

55 ZFAP 1998, p. 106.

56 Kambeu 2003, p. 2.

57 Holmes 1964, p. 23.

58 Zulu n.d., p. 2.

59 Lukangaba 2004, p. 6.
60 Clauss 1992, p. 115-116.
61 ECAZ 2003, p. 2.
62 Holmes 1964, p. 24.
63 Mulenga & Kaitisha 2003, Ball 2003.
64 Unfortunately, there are no precise statistics or records of honey and beeswax production in Zambia. CSO, which is tasked with compiling national statistics, does not include beekeeping on its agricultural or livelihood surveys. Forest Department, who carries the mandate for government to support beekeeping, is effectively incapable of collecting data due to financial and human resource constraints. Available data therefore is piecemeal and incomplete.
65 The conversion rate used is 20:1. As reported by beekeepers, under village processing, ten buckets of honey yield 14 kg of honey. As a bucket of comb honey weighs 26-28 kg, the above ratio prevails. Under improved conditions using clean comb the conversion rate may be as good as 10:1 (Holmes 1984, p. 24).
66 Clauss 1992.
67 Wendorf 1993, Muzama 1996, p. 30, IFAD 1999, p. 10.
68 Mulenga & Chizhuka 2003, p. 12.
69 ZFAP 1998, p. Mulenga & Chizhuka 2003, p. 12, IFAD 1999, p. 10-11, ECAZ 2003, p.6-10.
70 ECAZ 2003, p. 8.
71 Partly the mis-match may be attributed to the difficulty of recording exports of honey when the main season starts in November and finishes in January, completely not corresponding with the calendar year. For example, honey bought in 1992 may easily be recorded as exported in 1993.
72 Mulenga & Kaitisha 2003, p. 12.
73 Clauss (1992, p. 6 8) states that the average seasonal yield ranges from 61 to 208 kg, hence a total yield of 269 kg of comb honey in a year. This amounts to about 179 kg of liquid honey. Mulenga & Phiri (1993, cited in IFAD 1999, p. 7) estimated a range in average production between 55 kg in Kasempa and 313 kg in Mwinilunga. The average of 100 kg is therefore derived at to accommodate such variations between districts in North-Western Province.
74 The Post 7 June 2004.
75 From figure 14 above we note that 245 tonnes of organic honey was exported in 2003, which sold @ approximately 2.500 USD yielding a gross

earning of 612,500 USD. To this we add 23 tonnes of beeswax (NWBP) and 12 tonnes of organic beeswax (FFZ), which sold @ approximately 4,500 USD yielding a gross income of 157,500 USD. This brings the total to 770,000 USD, excluding other minor exporters of honey and wax.

76 Comb honey prices have been converted to equivalent price for liquid honey at a village level extraction rate for ease of comparison.

77 IFAD 1999, p. 8.

78 Clauss 1992, p. 105.

79 Muzama 1996b, p. 43-44.

80 IFAD (1999, p. 4) states that a beekeeper can construct up to 7 hives in a day, spending on average 45 minutes on one hive.

81 Beekeeper interviews: Njidi beekeeping group, Kanongesha, 14 September 2004 and Nkulwashi Nkulwashi beekeeping group, Kabompo 16 September 2004.

82 Such reasons included the difficulty of managing top bar hives, their susceptibility to red ants, termites, honey badgers and other pests.

83 Clauss (1992) and Phiri and Mulenga (1995) observe that average yield varies significantly between producer areas within and between districts (55-313 kg/a). The average yield of 100 kg is used for the more productive areas of Kabompo and Mwinilunga, while a lower average of 80 kg is used for the Province as a whole.

84 Beekeeper interviews: Nkulwashi beekeeping group, Kabompo 16 September 2004.

85 CSO 2003, p. 2.

86 Beekeeper interviews: Njidi beekeeping group, Kanongesha, 14 September 2004 and Nkulwashi Nkulwashi beekeeping group, Kabompo 16 September 2004.

87 Two bags of maize, if sold at the FRA floor price of 36,000 K each would fetch 82,000 Kwacha. In parts of Zambia, however, maize has been selling at as little as 18,000 K/50 kg bag.

88 Mr. Lupenga, chairperson of Njidi Beekeeping Group, Chichilanga village, Kanongesha, Mwinilunga, 14.9.2004.

89 Beekeeper interviews: Njidi beekeeping group, Kanongesha, 14 September 2004 and Nkulwashi Nkulwashi beekeeping group, Kabompo 16 September 2004.

90 Beekeeper interviews: Njidi beekeeping group, Kanongesha, 14 September 2004 and Nkulwashi Nkulwashi beekeeping group, Kabompo 16 September 2004.

91 Muzama 1996a, p. 44.
92 Malichi, B., personal communication, 16 September 2004.
93 Muzama 1996b, p.46.
94 Muzama 1996a, p. 41.
95 The chairman is Chief Chibwika from Mwinilunga district, his vice is also the district chairman for Mufumbwe, the secretary is the district chairman for Kabompo, based at Manyinga, and the fourth members is the somewhat inactive district chairman for Zambezi.
96 Muzama 1996a, p. 41.
97 Lukanga, B, NWBKA secretary in the Beekeeping Stakeholder Workshop held in Solwezi 10 September 2004.
98 IFAD 1999, p. 12-14.
99 Kabongo, C. personal communication, Mwinilunga, 13 September 2004.
100 Mickels-Kokwe 2004f.
101 Mickels-Kokwe 2004f.
102 Muzama 1996b, p. 44.
103 Kabongo, C. personal communication, 13 September 2004.
104 Mickels-Kokwe 1998.

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In some countries, honey and beeswax are so important the term '*beekeeping*' appears in the titles of some government ministries. The significance of honey and beeswax in local livelihoods is nowhere more apparent than in the Miombo woodlands of southern Africa. Bee-keeping is a vital source of income for many poor and remote rural producers throughout the Miombo, often because it is highly suited to small scale farming. This detailed Non-Timber Forest Product study from Zambia examines beekeeping's livelihood role from a range of perspectives, including market factors, production methods and measures for harnessing beekeeping to help reduce poverty.

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