The Inaugural Report on the Status of Apiculture in Africa 2019: Opportunities and Strategies for Development of the Sector
FOREWORD

The importance of honey bees and beekeeping for food and nutrition security, poverty reduction, agricultural led development and ensuring the health and sustainability of Africa’s environments and biodiversity cannot be over-emphasised.

Studies have shown that in Africa, the presence of bees can increase crop yields of insect pollinated species by more than a third. Bee hive products especially honey attract premium prices making it a valuable commodity for incomes. However, the contribution of the Apiculture subsector to incomes, AGDP and overall GDP in African countries remains low and is not commensurate to the potential of the sector.

At the same time, there are countries such as Ethiopia, Tanzania, and Zambia, where apiculture’s contribution to GDP is significant. This is attributed to good policy frameworks that have seen the subsector elevated to become a key contributor to the economy and not a subsistence, traditional or part time agricultural activity.

In most of Africa though, poor market access, poor infrastructure and inadequate products of sufficient quality and quantity, coupled with the lack of strong organisations representing the interests of beekeepers, means that the potential of the sector is not realized.

While there is a long history of beekeeping in Africa, traditional practices are still largely prevalent. The use of modern hives and other technologies is relatively new. It has been proven that modern beekeeping technologies enables farmers to produce more and earn more revenues. This being the case, it remains imperative that the continent employs regulatory frameworks and strengthens the requisite institutional infrastructure for promoting beekeeping as an economic activity. These structures must also address provision of technical and financial services.

Looking at the Maputo {2003} and Malabo {2014} commitments reflected in the CAADP goals that focus on elimination of extreme hunger, malnutrition, poverty, and increased prosperity, and the prospects of achieving the commitments by 2025, the apiculture sector is well placed to contribute to:

• Eliminating extreme poverty in Africa by 2025;
• Ending hunger and malnutrition in Africa by 2025;
• Making Africa a net food exporter; and,
• Moving Africa to the top exporters’ league through development of honey value chains

I wish to congratulate the Director who has championed AU support to development of Africa’s apiculture sector, the Team at AU-IBAR, and most especially all Member States and Experts and other Stakeholders who have contributed to this Inaugural Report. This is the first comprehensive publication on the status of apiculture in Africa, and as such, it serves as a valuable document and reference tool for ensuring that beekeeping takes its place as an important economic influence. I look forward to the consecutive biennial Reports that will enable tracking of growth of the sector.

H.E Mrs. Josefa Sacko  
Commissioner for Rural Economy and Agriculture, AUC
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ACKNOWLEDGEMENT

This Inaugural Report on the Status of Apiculture in Africa 2019: Opportunities and Strategies for Development of the Sector is the result of numerous collective and concerted efforts of Experts, Member States, Regional Economic Communities, Partner Organizations and other stakeholders, drawing on literature and contributions of data and information. The process of compiling this inaugural report underscores the paucity of data in the sector.

This Report has its genesis in the Bee Health Project (2013 – 2017) a partnership between the African Union – InterAfrican Bureau for Animal Resources (AU-IBAR) and the International Centre of Insect Physiology and Ecology (icipe). The efforts of Dr. Simplice Nouala, former Head of Animal Production Unit, AU-IBAR, Dr. Norber Mbahin and Dr. Sarah Ashanut Ossiya Bee Health Project Staff, who were instrumental in fomenting the concept and outline and guiding the development of this Report, are acknowledged.

Thirty five (35) country reports and fifty one (51) national profiles and ten Strategic Plan under development submitted by Member States, National Apiculture Platforms, and the continental African Apiculture Platform (AAP) provided much needed data, information and insights. Much is therefore owed to Member States, and the above mentioned actors for enthusiastic response and the information provided.

The AU-IBAR undertook Expert facilitated exercises to generate/extract critical information: data was derived from the Standardization process led by African Standardization Organization for which we acknowledge the contribution of Reuben Gisore. Two exercise to map bee diseases and pests and bee health initiatives and systems were undertaken in consecutive years 2017 and 2018, building on a prior disease and pest mapping exercises done before 2015. These provided critical information on the status of bee health on the continent. Many thanks go to Dr. Peter Ithondeka and Kamau Kabochie who undertook the studies. Icipe provided information on the Bee Health Referral Labs at icipe and satellite Labs in Ethiopia, Burkina Faso, and Liberia.

The initial Status report was compiled by Experts Dr. Rachel Masake and Dr. Alice Ruto in 2017. This was presented at the closure of the Bee Health Project for validation by Member States and other stakeholders. It elicited much positive response and a
recommendation for more Member States to submit Country reports and profiles. The Report was thereafter reviewed by Stella Simuyu and Dr. Alice Ruto. The final document received focused input from a number of apiculture sector Experts who gave focused attention to compile, review and edit the report including Dr. Alice Ruto, Bosco Okello, Jacqui Gowe, Joyce Mulama, Dr. Chinyere Ikechukwu-Enah, and Stella Simuyu. Special thanks go to Fahim Kremeier for compilation and graphic work and Patricia Mweene Lumba for guiding editing.

H.E Mrs. Josefa Sacko, Commissioner for Rural Economy and Agriculture, AUC, who from the start of her term in office has strongly supported the development of Africa’s apiculture sector, her support for this initiative is much acknowledged.

Finally, African Union and in a very particular way AU-IBAR appreciates the European Union whose partnership and financial support made this possible.

*Prof. Ahmed Elsawalhy*

*Director, AU-IBAR*
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<tr>
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<tr>
<td>ACTESA</td>
<td>Alliance for Commodity Trade in Eastern and Southern Africa</td>
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<td>AFB</td>
<td>American foulbrood</td>
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<tr>
<td>APA</td>
<td>Agriculture Pest Act</td>
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<td>APSA</td>
<td>Agricultural Product Standards Act</td>
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<td>ASARECA</td>
<td>Association for Strengthening Agricultural Research in Eastern and Central Africa</td>
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<td>ATI</td>
<td>African Trade Insurance</td>
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<td>AUC</td>
<td>African Union Commission</td>
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<td>AU-IBAR</td>
<td>Africa Union Inter-african Bureau for Animal Resources</td>
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<tr>
<td>CAADP</td>
<td>Comprehensive Africa Agriculture Development Programme</td>
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<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
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<td>CARA</td>
<td>Conservation of Agricultural Resources Act</td>
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<td>CBC</td>
<td>COMESA Business Council</td>
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<td>CCARDESA</td>
<td>Agricultural Research and Development for Southern Africa</td>
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<td>CGMP</td>
<td>Current Good Manufacturing Practices</td>
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<td>Centre for International Forestry Research</td>
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<td>COMESA</td>
<td>Common Market for East and Southern Africa</td>
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<td>DC</td>
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<td>DFID</td>
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<td>EAC</td>
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<td>ECOWAS</td>
<td>Economic Community of Western African States</td>
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<td>FDI</td>
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<td>GDP</td>
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<td>Good Distribution Practices</td>
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<td>GMP</td>
<td>Good Manufacturing Practice</td>
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<tr>
<td>GoK</td>
<td>Government of Kenya</td>
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<td>GTZ</td>
<td>Deutsche Gesellschaft fur Technische Zusammenarbeit</td>
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<td>ICIPE</td>
<td>International Centre for Insect Physiology and Ecology</td>
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<td>IGAD</td>
<td>Inter-Governmental Authority and Development</td>
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<td>ILRI</td>
<td>International Livestock Research Institute</td>
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<td>IMF</td>
<td>International Monetary Fund</td>
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<td>INS</td>
<td>National Statistics Institute</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>IT</td>
<td>Information Technology</td>
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<td>ITC</td>
<td>International Trade Centre</td>
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<td>KEPSA</td>
<td>Kenya Private Sector Alliance</td>
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<td>KIPI</td>
<td>Kenya Industrial Property Institute</td>
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<td>KTBH</td>
<td>Kenya Top-bar hives</td>
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<td>MDGs</td>
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<td>NBKP</td>
<td>National Beekeeping Programme</td>
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<td>National Beekeeping Policy</td>
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<td>NEAP</td>
<td>The National Action Plan for the Environment</td>
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<td>NGO</td>
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<td>OIE</td>
<td>World Organisation for Animal Health</td>
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<td>PAGE</td>
<td>Programme for Accelerated Growth and Employment</td>
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<td>PQR</td>
<td>Product Quality Review</td>
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<td>QRM</td>
<td>Quality Risk Management</td>
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<td>RECs</td>
<td>Regional Economic Community</td>
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<td>SABIO</td>
<td>South African Bee Industry Organisation</td>
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<tr>
<td>SADC</td>
<td>Southern African Development Community</td>
</tr>
<tr>
<td>SNPA / DB</td>
<td>National Strategy and Action Plan on Biological Diversity</td>
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<tr>
<td>SOPs</td>
<td>Standard Operating Procedures</td>
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<tr>
<td>SPS</td>
<td>Sanitary and Phytosanitary Standards</td>
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<td>US</td>
<td>United States</td>
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<td>VCA</td>
<td>Value Chain Analysis</td>
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EXECUTIVE SUMMARY

The Bee Health Project implemented by the African Union was established in a landscape of low awareness of bee health issues in Africa, low appreciation of the potential contribution of the apiculture sector to food security, incomes, poverty reduction, and economic growth, poor stakeholder organisation, an inadequate and disarticulated policy, legislative and institutional framework, and low capacities among stakeholders in most of the countries.

The project’s significant contribution included among others policy dialogue, creating awareness of bee health issues, and building capacities for management of bee health, production and value addition. Interventions also promoted identification and coordination of stakeholders, provided platforms for agenda setting, facilitated standards development, and enhanced networking and information access and sharing.

While these were unprecedented achievements for the apiculture sector, it is evident that in many Member States, the sector remains nascent, with subsistence producers who are not linked into the apiculture commodity and services value chains. Without an approach that develops producers and the production function, and links this to full development of all the bee values chains, the bee sector will remain rudimentary, underdeveloped with low realisation of its full potential for food and nutrition security, environmental health, incomes and employment.

Identification of gaps in the sector led to the need for a clear picture of the status of the sector at Member State, regional and continental levels, and an evidence base for its potential contribution to Africa’s development and economic growth objectives. The the Status of Apiculture in Africa is the result of immense contributions provided by Member States, Regional Economic Communities and other stakeholders around apiculture issues.

This document describes the growth of the apiculture sector, highlighting how the age old beekeeping for most countries in Africa remains a fragmented and subsistence focused activity. This means that there is high potential to enter lucrative organic markets in the European Union (EU) and United States (US) among other export destinations but unfortunately, about 20 countries including Zambia, Egypt, Ethiopia, Guinea, South Africa and Central Africa Republic, among others, are able
to export. Majority of the countries are lagging behind due to poor quality and inability to meet required quantities. The role of apiculture in attaining continental development objectives, including addressing food security, nutrition, health benefits, employment and wealth creation, among others is highlighted.

The report examines the policy and regulatory frameworks within the apiculture sector provisions, attributing the low performance of the sector to policy blindness in most of the Africa Union member states except for the four leading producers of two thirds of Africa’s honey - Ethiopia, Tanzania, Angola and Central African Republic. These countries have established specific apiculture policies, strategies and supportive structures including institutional, legal and regulatory in recognition of the sector’s potential in contributing to food security and incomes. A detailed description of Africa’s bee genetic resources, species distribution, resources for foraging and impact of climate change is provided. In addition, the potential of the apiculture sector lies in the untapped area of pollination services by a majority of the countries except for South Africa and Egypt. Managed pollination can increase productivity and quality of agricultural produce and critical ecosystems services for biodiversity and environmental health.

Despite efforts put in the development of the apiculture industry, it faces certain key challenges and constraints among them those related to bee health including pests and diseases, policy and regulatory frameworks, technical capacities as well as marketing, which, will need to be resolved in order to realise full potential.

These notwithstanding, Africa’s natural vegetation, diverse wild honeybee and agro-ecological zones offer great possibilities for the development of organic honey-processing industry and related products, bee-pollination based industries, and, the promotion of lesser-known bee and hive products.

Being in line with the policies of many African governments in environmental conservation and the sustainable use of natural resources, apiculture is set to improve the livelihoods of many Africans largely among the women, youth and the less advantaged.
1.0 INTRODUCTION

World demand for honey and other hive products is in excess of marketed production. This is because hive products have a wide variety of uses and applications but only a few are fully exploited.

Africa’s honey and beeswax production is estimated to be less than 10 and 25% of the world production respectively, a situation that is attributable to the fragmented nature of the beekeeping sector in Africa, which is characterised by low productivity, poor quality, inadequate technical personnel, insufficient research, low adoption of improved technologies, and ineffective control of pests and diseases among others.

Though various efforts have been made to increase the productivity of honey and hive products on the continent, the development of regulatory frameworks and requisite institutional infrastructure for promoting beekeeping as an economic activity and providing technical and financial services remains critical. The development of apiculture as a commercial enterprise and the increase in the output of hive products in Africa require a review of existing agricultural sector policies to address the uniqueness of the bee industry, as a source of pollination services and hive products.

1.1 THE GROWTH OF THE APICULTURE SECTOR IN AFRICA

About 80% of Africans depend directly or indirectly on agriculture for their livelihood. Agriculture provides 70% of Africa’s full-time employment, one third of total GDP, and 40% of total export earnings. Agricultural growth and crop productivity largely depend on bee pollination services that have ecological and agricultural values. But in most of these statistics, the apiculture sector’s real and potential benefits have not been adequately quantified due its fragmented nature.

Africa is home to a variety of honeybees found across all agro-ecological zones. The diverse forage sources present a huge potential for production of diverse hive products and use of pollination services. Harnessing this sector has a significant impact on income generation, poverty reduction and livelihood improvement. Use of pollination services alone is placed at USD 200 billion economic agricultural value in global agriculture.
Africa is gradually embracing the change from highly traditional beekeeping to modern practices, and in some cases, allowing both systems to flourish owing to comparative advantages. Countries are therefore at various stages in the development of the sector, with some already competing in the regional and international markets of honey and other hive products, while others are producing mainly for domestic use. Consequently, advancing Africa’s apiculture sector aims at improving quality, increasing quantities and diversifying the range of product output. This requires a good mix of efforts to enhance appropriate uptake of production and processing technologies, research on various aspects of apiculture, reorganisation and facilitation of value chain actors, establishment of quality assurance standards, and improved coordination of institutional bodies and management of bee health issues. The apex of all these efforts is addressing the inadequate policy direction at national and regional levels. According to Akangaamkum et al. (2010), the absence of a national policy on the development of the honey subsector appears to be a major reason for lack of coherence in the industry.

Granted, these efforts will position African honey and other hive products to niche markets such as those for organic honey. However, because of poor market access, poor infrastructure and inadequate products of sufficient quality and quantity, and lack of strong organisations representing the interests of beekeepers, market opportunities are not fully utilized.

1.1.1 Salient Features of the Apiculture Sector
Beekeeping in Africa is extremely fragmented, making it difficult to quantify accurately the actual production and growth levels (Moinde, 2016). Beekeeping remains a subsistence activity due to several factors that affect production, processing and access to lucrative markets.

For most of Africa, honey production is carried out under natural conditions. This means that there is high potential to enter lucrative organic markets in the European Union (EU) and United States (US) among other export destinations. Unfortunately, slightly over 20 countries such as Zambia, Egypt, Ethiopia, Guinea, South Africa and Central Africa Republic among others, are able to export. A majority are not able to due to poor quality and inability to meet required quantities. Africa produces only 169,000 tons of the total global honey production of nearly 1.7

million tons, translating to only 10% of production potential and 10% of the global total production. Therefore, to date, Africa plays a rather insignificant role in the global honey trade industry.

Though there is a long history of beekeeping in most of Africa, traditional practices are still prevalent as the use of modern hives and other technologies is relatively new. This means the sector is captured as a minor economic sub sector, largely subsistent and positioned alongside livestock, hence limiting it from providing a wide range of products including propolis, pollen, royal jelly and honey bee venom that can be produced given the conducive agro-climatic conditions, to only honey and to some extent, bees wax.

Despite the existing potential to produce high quantities of honey, African countries are net importers of the product. This means that demand for honey surpasses production and therefore presents an opportunity for advancement of the sector to not only capture the internal markets but external ones as well. Most of the honey produced in Africa is consumed locally and regionally as there is a high intra-regional trade.

Though beekeeping increases agricultural output through pollination, most African beekeepers prioritise honey production rather than pollination services, apart from South Africa where pollination services are well developed in the deciduous fruit crops such as apples and pears. Other countries that have embraced the use of pollination services include Egypt, Benin, Senegal, Cameroon and Zimbabwe. Pollination is difficult to quantify, yet it is the most economically significant value of beekeeping. In Africa, crop yields can be increased by more than a third in the presence as opposed to the absence of bees. Bees are also regarded in policy documents as important contributors to the maintenance and enhancement of ecosystem biodiversity. It is considered by many (Bradbear et al 2006, Morse and Calderone 1991; Roubik 1995; 2002) that the largely unquantifiable economic benefits from increased crop yields and maintenance of biodiversity should be valued at many times the value of the physical outputs of just crop yields. A summary of the current situation as highlighted by some key informants is presented in Table 1.1.
### Table 1.1: Salient Features of the Apiculture Sector in Africa

<table>
<thead>
<tr>
<th>General situation</th>
<th>Gaps</th>
<th>Recommendations</th>
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<tbody>
<tr>
<td>• Sub sector is dominated by traditional bee keeping.</td>
<td>• No specific policy and strategy for the sector;</td>
<td>• Kick start the process of formulating a regulatory framework for the apiculture sub sector and Policy actions to address institutional development, sector financing, increased youth and women participation in apiculture industry, scaling up of extension services and forage services, and addressing bee diseases and pests;</td>
</tr>
<tr>
<td>• Existence high political will for promotion of the subsector</td>
<td>• No commercial Pollination services in the country due to knowledge, attitude and perception;</td>
<td>• Focus on productivity, bee’s health management, quality and market growth;</td>
</tr>
<tr>
<td>• Some countries have received accreditation to export to the EU</td>
<td>• Lack of enabling policies, low investment, quality assurance and standard issues;</td>
<td>• Improving sector data collection systems;</td>
</tr>
<tr>
<td>• Some countries are making efforts to address quality of products:</td>
<td>• Lack of a strategic plan and Apiculture not defined as a priority sector.</td>
<td>• Beekeeping curricula at high education level;</td>
</tr>
<tr>
<td>• Low annual production</td>
<td></td>
<td>• Tailor made financing products for the honey value chain actors;</td>
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**Challenges:**
- Bee health, bee diseases and pests;
- Forage resources;
- inadequate extension,
- Low supply compared to the demand; pesticides misuse and destruction of bees’ habitat;
- climate changes;
- data unreliability;
- Equipment supply.

**Source:** Excerpts from the Continental Workshop on Development of Apiculture Sector Policies and Strategies for Sustainable Bee Health, Increased Production of Hive Products and Pollination Services on 17th to 21st Dec 2018.
1.1.2 Consumption and Demand Trends

In Africa, all beekeepers’ use honey as food, and sometimes there are other uses such as medicine, production of alcohol, and as part of sociocultural currency. Honey is occasionally eaten with the comb, but mainly purchased when filtered and eaten with bread, and as a sweetener in drinks.

Looking at several countries, such as Tunisia, Ghana, Zimbabwe, Kenya and Ethiopia, the consumption patterns are similar, denoting more local demand, perhaps only varying in quantity utilised. This confirms that African honey has generally been traded locally and exports into major countries have been low.

Tunisia’s over 265,000 hives produce an average of 3,000 tons of honey per year. Data from the National Statistics Institute (INS) show that consumption per capita is on average 165 grams of honey per year; however, the balance of production and import per capita shows that consumption is 200 grams per inhabitant.

In Ghana, consumption of honey in the local communities is largely for medicinal purposes and to a small extent for nutrition. Development of this market has been constrained by low incomes of consumers, patronage of cheap honey supplied from wild sources and very little appreciation of the value of honey. Analysis of the demand and supply relation indicates an excess demand over supply in the main consuming markets. This demand for honey products is also increasing due to shifts to organic food products by the ever-increasing health conscious consumers.

Zimbabwe is experiencing a high shortage of honey and bee related products such as beeswax. Demand for honey has been on the increase, and this has been attributed to its medicinal properties and the sugar which is directly absorbed into the body system. Zimbabwe has been importing honey to meet its national requirement.

Demand for honey in Kenya is so high that the country is unable to meet. This shortfall is filled by imports. According to the latest statistics from the United Nations Commodity Trade Statistics Database, Kenya imported honey worth about KES 23 million ($228,604) from Egypt, Australia and Tanzania (UN, 2013).

In Namibia, the high demand for honey, especially in the urban markets is much higher than the local supply and most of the honey sold at the local market and consumed in Namibia is imported from South Africa.
1.2 APICULTURE AND CONTINENTAL DEVELOPMENT OBJECTIVES

Africa’s agricultural development focus has been highlighted in various continental commitments, notably, under Vision 2063, the Maputo (2003) and The Malabo (2014) Declarations, articulated in the Comprehensive African Agricultural Development Program (CAADP).

Vision 2063 posits “An Integrated, Prosperous and Peaceful Africa, driven by its own Citizens and representing a Dynamic Force in International Arena” based on inclusive growth and sustainable development; an integrated continent, politically united, based on the ideals of Pan Africanism; good governance, respect for human rights, justice and the rule of law and a peaceful and secure Africa. There is particular reference to people-driven development, especially relying on the potential offered by youth and women; and Africa as a strong, resilient and influential global player and partner. This implementation is anticipated through successive 10-year national action plans. The apiculture sector provides opportunities for part-realisation of these aspirations in various ways including through creation of employment for youth and women, and contribution to nutrition among others.

The Maputo (2003) and Malabo (2014) commitments mirrored in the CAADP goals are focused on elimination of extreme hunger, malnutrition, poverty, and increased prosperity. Looking at the potential to achieve the commitments by 2025, the apiculture sector is far much placed more than any other agricultural sector to contribute to;

- Eliminating extreme poverty in Africa by 2025,
- Ending hunger and malnutrition in Africa by 2025,
- Making Africa a net food exporter; and,
- Moving Africa to the top exporters’ league through development of honey value chains.

A summary of the regional commitments under Malabo and respective potential contribution of the apiculture sector is provided in Table 1.2.
Table 1.2: Fulfilling Malabo Commitments through the Apiculture Sector

<table>
<thead>
<tr>
<th>Critical Target</th>
<th>Malabo Commitments</th>
<th>Apiculture Sector Gaps</th>
</tr>
</thead>
</table>
| Commitment to Enhancing Investment in Agriculture - Financial | • Allocation of at least 10% of public expenditure to agriculture;  
• Necessary appropriate policy and institutional conditions including facilitation of private investment while prioritising local investors;                                                                                                                                                                                                                                                                                                                                 | • Public and private sector investment in apiculture is insignificant;  
• Development of apiculture policies;                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Commitment to Ending Hunger in Africa by 2025        | • Doubling current agricultural productivity levels, by the year 2025;  
• Address small holder constraints, access to inputs, access to appropriate knowledge, information, and skills to users; equipment;  
• To improve nutritional status-addressing child malnutrition;  
• To integrate measures for increased agricultural productivity with social protection initiatives focusing on vulnerable social groups.                                                                                                                                                                                                                                                                                                                                 | • Africa’s production level of honey and other hive products is at 10% potential and only representing roughly 9% of global honey production and 0.4% of USD 2.4 billion in global exports in natural honey in 2017. Doubling the production can change the picture of income from honey;  
• Consideration of pollination services as a key input in crop production alongside seeds, fertilizers, pesticides, financial services;  
• Current total economic value of crop pollination worldwide stands at €153 billion, about {USD 133}, which equals 9.5% of the value of the world agricultural production used for human food in 2005. Insect pollination has a potential to enhance average crop yield between 18 and 71% depending on the crop. Yield quality is also enhanced.                                                                 |
| Commitment to Halving Poverty by the year 2025, through Inclusive Agricultural Growth and Transformation - At least 50% to the overall poverty reduction | • To sustain annual agricultural GDP growth of at least 6%;  
• Job creation for women and 30% of the youth in agric- value chains  
• PPPs for at least (5) priority agricultural commodity value chains with strong linkage to smallholder agriculture;  
• To support and facilitate preferential entry and participation for women and youth in gainful and attractive agri-business opportunities.                                                                                                                                                                                                                                                                                     | • Apiculture sector is a low hanging fruit for involvement of youth and women especially with the use of modern hives and related equipment;  
• Development of honey value chains.                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
<table>
<thead>
<tr>
<th>Critical Target</th>
<th>Malabo Commitments</th>
<th>Apiculture Sector Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commitment to Boosting Intra-African Trade in Agricultural commodities and services</td>
<td>• Target is to triple intra-African trade in agricultural commodities and services by the year 2025; • Create and enhance policies and institutional conditions and support systems; • Increase and facilitate investment in markets and trade infrastructure; • Promote and strengthen platforms for multi-actors’ interactions; • To strengthen and facilitate the promotion of an African common position on agriculture-related international trade negotiations and partnership agreements.</td>
<td>• Elevation of honey and hive products to key trade commodities. Honey currently among top intra-regionally traded commodities in COMESA; • Currently over 20 AU MS have established National Apiculture Platforms that can form the foundation for multi-actors’ interactions.</td>
</tr>
<tr>
<td>Commitment to Enhancing Resilience of Livelihoods and Production Systems to Climate Variability and other related risks</td>
<td>• Reduction of vulnerabilities of populations through building resilience of systems:</td>
<td>• Apiculture sector emphasis has potential to contribute to reforestation and protection of existing natural resources.</td>
</tr>
</tbody>
</table>

**Source:** Authors Adaptation From; [http://www.resakss.org/sites/default/files/Malabo%20Declaration%20on%20Agriculture_2014_11%2026-.pdf](http://www.resakss.org/sites/default/files/Malabo%20Declaration%20on%20Agriculture_2014_11%2026-.pdf)

### 1.2.1 Apiculture Contribution to the Economy: GDP Review

The beekeeping industry provides immense opportunities and advantages including but not limited to comparatively low capital investment, low pressure on human settlement and agricultural land, pollination services, job creation, high demand for hive products in domestic and export markets, large unexploited natural vegetation and production of organic honey.2

Apiculture sub sector contributions to overall GDP in African countries is quite low as compared to other agricultural sub sectors such as livestock and horticulture, among others. Where the GDP contribution is significant in countries such as Ethiopia, Tanzania, and Zambia, there is a link to the policy framework as these countries have made a deliberate effort to elevate the sub sector as a key contributor.

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to the economy and not a subsistence, traditional or part time agricultural activity. In Ethiopia honey contributed 8% of the GDP in 2004 (FAO STATA data, 2004.)

The enacted policies also support pollination. In most countries, because of the insignificant policy focus on the sector, the contribution to GDP is not known or has not been quantified.

### 1.2.2 Apiculture in Addressing Food Insecurity and Nutrition

Analysis of the MDGs established that not much progress on nutrition had been attained through beekeeping. Africa still has the highest prevalence of under-nutrition FAO (2014), and continues to have the challenge of attaining food and nutrition security amidst poverty and increasing population postulated to reach 2 billion by 2050 (IMF, 2013).

The honey bee is still the sole producer of honey and thus contributing this significant nutritional supplement. Honey is a valuable economic commodity and has for thousands of years been used for food and medicinal purposes. It is estimated that about 100g of honey provides equivalent nutrition to 6 litres of milk or 170g of beef. It contains sugars, vitamins and minerals that are easily absorbed by the body. Medically, honey can be used as a sedative, laxative or antiseptic.

For several countries in Africa, beekeeping is aimed at ending hunger and food insecurity especially among the rural people. Honey is consumed and sold, and this has ultimately reduced hunger. Bees are involved in pollination of different crops which increases the yields of agricultural production, thus enhancing food security for the local farming communities.

In Uganda, honey is food and bees are important in pollinating crops, thus contributing to food security, household income and biodiversity conservation. Honey is delicious and nutritious, and can be consumed whole or mixed with other foods as supplement. Among the Langi and Acholi, honey mixed with sesame seeds and groundnut paste is food for the whole family but is fed especially to children, the aged and those recovering from sickness. Bee brood (larvae and pupae) have high nutritional value and are fed to malnourished children. Royal jelly and pollen are consumed for their high protein value.

---

In Tanzania, honey is used at household levels as substitute for sugar in tea or porridge and as supplementary food for lactating mothers, and as an appetizer. Honey is most commonly consumed in its unprocessed state i.e. liquid, crystallised or in comb. In these forms it is eaten as food or incorporated as an ingredient in various food recipes. The traditional use of honey in food preparations has been substituted, in most cases, by sugar and various sugar syrups derived from starches. Honey is also used in baked products, confectionery, candy, marmalades, jams, spreads, breakfast cereals, beverages and milk products.

Natural honey in Nigeria is used in the food and beverage industries for making food, drinks and snacks. It also used in breakfast cereal, bread and as a food preservative.

In South Africa, honey is used in a variety of ways including as a spread on bread and toast, as a natural sweetener in tea and desserts, and as an ingredient in cooking and baking (e.g., in salads, pies, and cakes).

In Cameroon, honey is primarily used as a substitute for sugar. Honey and its derivative product generate incomes that can be used for other purposes. In Benin, honey is considered as a delicacy and is mainly intended for sale to improve cash income. The annual net margins of honey production, for beekeeping, vary from less than 170,800 F to 81,130 F with an average of less than 60 555 ± 47 140 F.

In Central African Republic 10% of the honey produced is consumed by beekeeping households. The remaining 90% is sold for income generation, consumed as table honey. Additionally, beeswax is collected and traded. Honey is a vital factor in job creation and maintaining livelihoods. Honey and other apiculture products (i.e. beeswax, propolis, pollen, royal jelly and bee venom) are among the growing export commodities with good potential for a number of African countries.

1.2.3 Health Benefits of Honey

Honey use can be traced to 8000 years ago where ancient civilisations such as those of the Egyptians, Assyrians, Chinese, Greeks and Romans among others, used honey to treat wounds and diseases of the gut (Ezz El-Arab AM, et al, 2006, Tahereh & Moslem, 2014). Here, some of the beneficial effects of honey which have been utilised by ancient races are summarised. Aside from being a healthy and natural

---

5 Ezz El-Arab AM, Girgis SM, Hegazy EM, Abd El-Khalek AB. 2006. Effect of dietary honey on intestinal microflora and toxicity of mycotoxins in mice
6 Tahereh Eteraf-Oskouei & Moslem Najafi. 2014. Traditional and Modern Uses of Natural Honey in Human Diseases: A Review
sweetener, honey is an antimicrobial, antibacterial, antiseptic, anti-inflammatory and antifungal product.

Natural antibacterial activities of honey first recognised in early 1890s by van Ketel are well known (Dustmann JH. 1979). Usually during the processes of honey making in the comb, some antiseptic hydrogen peroxide is also produced. This is why honey has traditionally served as a topical medication, and is currently used to promote healing and prevent infection in skin wounds, burns, and ulcerations, including surgical wounds, pressure sores, diabetic foot ulcers, and various types of leg ulcers. Figure 1.1 gives a summary of the health benefits of honey and other hive products.

Figure 1.1: Beneficial Effects of Honey

Honey is the subject of ongoing research as a potential ingredient in supplements and medications that could be used to treat a wide range of health issues. They include asthma, gum disease, heart disease, type 2 diabetes, diarrhoea, fungal infections, inflammation, internal and external ulcerations, viruses, and even certain types of cancers. Honey contains flavonoids and antioxidants which help to reduce the risk of some cancers and heart disease.

Honey is known to reduce ulcers and other gastrointestinal disorders. Recent research shows that honey treatment may help disorders such as ulcers and bacterial gastroenteritis. Honey is becoming important in the face of growing concerns of obesity and lifestyle diseases.
Honey increases athletic performance as observed from ancient Olympic athletes, who ate honey and dried figs to enhance their ability to perform well. This has now been verified with modern studies, showing that the commodity is superior in maintaining glycogen levels and improving recovery time compared to other sweeteners.

1.2.4 **Livelihoods, Rural Incomes and Poverty Alleviation**

Rural poor dependent on subsistence agriculture and small farmlands often rely on alternative sources of income for their livelihoods. Under such circumstances, beekeeping is often promoted in the context of rural development because the practice provides monetary, nutritional, and social benefits to poor families, without requiring land ownership or large amounts of capital investment.

Beekeeping can help economically vulnerable communities achieve economic stability. Honey production, pollination services, agriculture, and forestry are but a few of the economic benefits of beekeeping. Beekeeping has become popular among small scale farmers because farmers have resorted to generating income in diverse ways. Honey production is undertaken because it provides social, environmental, economic, and health benefits to rural communities, and has received primary attention from the farmers.

Beekeeping can be practiced as an additional source of income for communities in rural areas, and has been successfully implemented in poverty-alleviating projects as it does not require expensive equipment. Simple hives can be made from locally available materials by local artisans. Joni, (2004) also states that beekeeping plays a key role in the socio-economic development of rural livelihoods. Therefore, beekeeping not only contributes to uplifting the livelihoods of rural communities but protects the trees and ultimately contributes to environmental conservation. It is also argued that beekeeping is ecological friendly, requires few resources to start production, can be quickly revived after a crisis period, and the necessary skills are easily transferred from one generation to the other, making it a sustainable livelihood strategy. Overall, beekeeping is eminently suitable for small-scale agricultural activity in localities where capital and technological resources are low.

For example, the Government of Cameroon has recognised the Bee farming sector and its role in poverty alleviation with the creation in 2006 of a national department in the Ministry of Fisheries and Livestock responsible for bee farming. It provides
income in rural areas for resource dependent communities. An average Oku and Belo beekeeper’s annual income from apiculture was 281,000 FCFA in 2007 with a profit of 29,760 FCFA whereas for Ngaoundal in 2007 was 207,000 FCFA, 43% of their total household income of 436,000 FCFA. For wax, the average price at the local level is 29% and at the international level after certification process is 49%. While for propolis, prices have increased up to 50% in some local market, but the quality and quantity standards need improvement CIFOR, (2010).

In Tanzania’s Miombo woodlands and other rural villages, over 50% of household cash is derived from forest and non-wood products, with honey accounting for highest contribution in rural areas (Monela et al, 2000).

1.2.5 Employment Creation for Youth, Women and Other Disadvantaged Groups

Beekeeping is recognised as a sustainable form of agriculture (Paterson 2006), and contributes to improved food security, poverty reduction and increased household incomes, and overall economic development.

Some studies in West Africa show that beekeeping has proved to be a profitable venture, allowing farmers to have a good return on investment. In Ghana, simple economics and profitability analysis of honey production and sale at the farm-gate was undertaken to determine the profitability and viability of beekeeping in the country, and it pointed to high returns to investment.

Honey bees are the most economically valuable pollinator worldwide, and many high-value crops such as almonds, apples, avocados, blueberries, cherries, and cranberries, are almost entirely reliant upon pollination services of commercial beekeepers. Globally, 9.5% of the total economic value of agricultural production for human consumption comes from insect pollination.

Bees wax is a valuable by-product of beekeeping that serves as a source of income for beekeepers. Beeswax is used to produce light candle particularly in the Orthodox churches. In Ethiopia, production of beeswax is rapidly increasing from an annual average of about 500 tons in 2011–2013 to 5458.3 tons during the years of 2014–2016. This is an important source of jobs for more than 12,000 beekeepers. In Tanzania the sector employs over two million people and generates about USD 1.2 million annually for the economy from sale of honey and beeswax7.

7http://repository.out.ac.tz/1068/1/OUT_MNEMELE2.pdf
While the youth are innovative and interested in contributing to their own employability, they require an enabling environment and market-led skills development in order to unlock their potential and respond to emerging market opportunities. Beekeeping therefore offers huge employment opportunities for youth in Africa.

To farming families, beekeeping is becoming much more than a renewed rural occupation, but an integral part of new and much broader agriculture with diversified income sources. For example, in Madagascar, the Apiculture sector employs men, the youth and women at many stages of the value chain from production to commercialisation. Data to support ground observations is however lacking resulting in absence of statistical information to quantify the involvement of the different categories of people.

In South Africa, it is estimated that the beekeeping industry provides approximately 3,000 direct jobs (some estimates put this at 10,000). According to the South African Bee Industry Organisation (SABIO) the bee industry job multiplier is 2-3. It is estimated that the honeybees are indirectly responsible for between 300 000 and 500 000 jobs. In Nigeria, honey production has been identified as having the potential to provide employment and reduce poverty among rural households, providing employment to youth (Ajao and Oladimeji, 2013).

2.0 POLICY AND REGULATORY FRAMEWORK

2.1 STATUS AND TRENDS

Apiculture is an old art in African countries with centuries and generations where certain communities were known to be either beekeepers or hunters and gatherers. With this rich age-old trade, it is expected that in the 21st century, the sub sector should be vibrant, supported by requisite policies, laws, regulations, standards and guidelines.

Apiculture for most countries remains a traditional, subsistence, non-moneyed, part time activity. This policy environment does not give adequate attention to apiculture development therefore rendering the sector a rather insignificant role in the national economy.

2.1.1 National Apiculture Frameworks

By and large, countries fall in four categories as shown in Table 2.1 and Figure 2.1. The first tier of countries has seen a shift in the last decade, with increasing attention on the sector resulting in establishment of elaborate regulatory frameworks. These include Ethiopia, Tanzania, Angola and Central African Republic. The second tier of countries has apiculture embedded in overall policies for agriculture, livestock, forestry, wildlife and natural resource management and have also gone ahead to focus on the development of specific apiculture policies, strategies and guidelines. These include South Africa, Kenya, Malawi, Uganda, Egypt and Rwanda, among others. The third tier of countries is has mainstream agriculture and livestock policies. In these countries, apiculture is slowly receiving attention. The fourth and last category is those that have mainstream agriculture and livestock policies that are silent on apiculture.
### Table 2.1: Status of Apiculture Policies in Selected Economies

<table>
<thead>
<tr>
<th>Category</th>
<th>Policy framework</th>
<th>Status</th>
<th>Examples of Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tier 1</td>
<td>Developed regulatory framework for apiculture</td>
<td>Fully functional policies</td>
<td>South Africa, Central African Republic, Tanzania, Ethiopia</td>
</tr>
<tr>
<td>Tier 2</td>
<td>National apiculture policy, National Residue plans, legal framework for forest protection, apiculture also referenced in other laws</td>
<td>Work in progress &amp; advancing</td>
<td>Kenya, Uganda, Malawi, Benin, Egypt, Rwanda, Madagascar, Zambia,</td>
</tr>
<tr>
<td>Tier 3</td>
<td>Indirect laws and decrees - Specific standards for beeswax and other regulations</td>
<td>Work in progress- Interim policies</td>
<td>Burkina Faso, The Gambia, Tunisia, Comoros, Ghana, Namibia, Nigeria, Sierra Leone, Eritrea, Chad, Tunisia, Zimbabwe, Cameroon, Senegal, Nigeria, Botswana, Morocco</td>
</tr>
<tr>
<td>Tier 4</td>
<td>No specific policy focus on apiculture/ inadequate information</td>
<td>No specific policy or data</td>
<td>Djibouti, Algeria, Botswana, Burundi, Cabo Verde, Guinea, Conakry, Ivory Coast, Seychelles, South Sudan, Sudan, Liberia</td>
</tr>
</tbody>
</table>

*Source: Authors Compilation*

### Figure 2.1: Regulatory Terrain for Apiculture and Pollination Services
The following compendium in Table 2.2 provides a summary of some of the policy frameworks under implementation in the countries.

**Table 2.2 Compendium of Frameworks of Selected Countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>Apiculture Related Framework details</th>
</tr>
</thead>
</table>
| Ethiopia     | The policy and legal framework for the sector includes:  
A Proclamation on Honeybee Resources Development & Protection  
Regulations on Honeybee Resources Development & Protection  
Draft regulations on Quality Assurance of Honey & Beeswax  
Guidelines for Import & Export of Honeybee Genetic Material  
A National Apiculture Policy & Strategy |
| Tanzania     | National Beekeeping Programme (NBKP, 2001)  
Beekeeping Act enacted in 2002.  
National Forestry Policy, 1998  
Wildlife Policy of Tanzania, 1998  
Village Land Act, 1999  
The National Trade Policy 2003 |
| Uganda       | Rules on Control of Bee Diseases 2004  
Draft Apiculture policy – under consideration  
Honey Standards US18 (UNBS, 2004)  
National honey residue monitoring plan  
Honey included in Uganda’s export strategy (UEPB, 2005) |
Animal Disease Act, 2012  
Apiculture Strategy – under consideration |
| South Africa | Agriculture Pest Act (APA) (No 36 of 1983)  
Agricultural Product Standards Act (APSA) (No 119 of 1990)  
Conservation of Agricultural Resources Act (CARA) (Act No 43 of 1983):  
Bees Control Measure GN R858 15 November 2013:  
Government Notice R918 of 1999: |
| Rwanda       | Beekeeping Law No 25/2013 of 10/05/2013 determining the organisation and functioning of beekeeping in Rwanda has been established.  
Beekeeping under PSTA IV /Agriculture policy  
Ministerial orders regulating beekeeping in Rwanda  
National beekeeping strategy 2018-2022 (at the final approval stage)  
Rwanda Beekeeping standards  
Law N° 54/2008 of 10/09/2008 contagious diseases for domestic animals  
Law No 33/2002 of 06/11/2002 on animal identification;  
Law n° 38/2010 of 25/11/2010 Rwanda Agriculture Board (RAB)  
Law N°56/2013 of 09/08/2013 - Council of Veterinary Doctors  
The land Law - Law N° 25/2013 of 10/05/2013  
Residue monitoring plan for honey |
<table>
<thead>
<tr>
<th>Country</th>
<th>Apiculture Related Framework details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zimbabwe</td>
<td>Bees Act 1972– needs review</td>
</tr>
<tr>
<td>Mauritius</td>
<td>Animal Diseases Act 1925</td>
</tr>
<tr>
<td>Swaziland</td>
<td>Animal Diseases Act 1965</td>
</tr>
<tr>
<td>Cabo Verde</td>
<td>Apiculture Policy – under consideration Apiculture Strategy – under consideration</td>
</tr>
</tbody>
</table>
The challenges countries are facing in the apiculture sector have been variously listed as bee diseases, land degradation through deforestation, human settlement, agricultural intensification and the indiscriminate use of pesticides, low quality of honey and hive products, low capacities including rudimentary equipment currently being used and market access challenges among others. But more importantly, the low performance of the sector has been attributed to policy blindness especially with a closer look at four leading producers of two thirds of Africa’s honey i.e., Ethiopia, Tanzania, Angola and Central African Republic. These four correspondingly have specific apiculture policies and strategies and have established supportive structures including institutional, legal and regulatory in recognition of the sector’s potential in contributing to food security and incomes.

2.1.2 Policy Opportunities and Prospects
How is it that Ethiopia is Africa’s largest producer of honey and also the one that has had an all-embracing shift focusing on the apiculture sector as a major contributor to GDP? Highlighted in figure 2.2 are details of the regulatory frameworks Ethiopia has established and still at “work in progress” as the country is producing at only 10% potential. Optimal production level will mean the country undertaking to enhance up to 10 times the activities currently carried out in the apiculture sector, as highlighted in the policy map.
The African continent as a region, based on the current levels, needs a 10 times boost in its efforts. This will correspond to an estimated production of 1,690,000 tonnes up from 169,000 tonnes in 2017. What countries need to determine is how to make the leap, in what period and with what resources. This calls for commitment towards developing and implementing various actions in the areas as detailed in Table 2.3.

Table 2.3: Subsector Policy Considerations

<table>
<thead>
<tr>
<th>Subsector policy focus</th>
<th>Details of policy considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bee Health</td>
<td>1. Framework for bee diseases surveillance:</td>
</tr>
<tr>
<td></td>
<td>• Need to create strategic policy protocols in bee disease, pests' detection and control procedures throughout Africa. Each disease requires a separate policy protocol that deals with the specific dynamics of that disease/pest.</td>
</tr>
<tr>
<td></td>
<td>• Establish acceptable African-wide baseline disease surveillance to enhance efficacy of disease control</td>
</tr>
<tr>
<td></td>
<td>• Establish and improve bee hive health monitoring plan.</td>
</tr>
<tr>
<td></td>
<td>2. NTB and Legislations</td>
</tr>
<tr>
<td></td>
<td>• Establish regional mechanisms for addressing NTBs – SADC, COMESA, EAC etc</td>
</tr>
<tr>
<td></td>
<td>3. SPS, Standards and TBTs – establish regional mechanisms for SPS, Standards and TBTs</td>
</tr>
<tr>
<td></td>
<td>4. General issues affecting bee health</td>
</tr>
<tr>
<td></td>
<td>• Address threat from human activities such as deforestation and encroachment on protected areas.</td>
</tr>
<tr>
<td></td>
<td>• Address inappropriate use of pesticides and herbicides (residues)</td>
</tr>
<tr>
<td></td>
<td>• Address emerging challenges such as climate change.</td>
</tr>
<tr>
<td>Subsector policy focus</td>
<td>Details of policy considerations</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------</td>
</tr>
</tbody>
</table>
|                        | • Need to mainstream biosecurity and biosafety issues in bee health their apiculture development policies, strategies and plans.  
|                        | • Specific Apiculture policies rare currently generally lacking and calls for urgent remedial action. |
| Agribusiness Development | 1. Taxes and trade barriers  
|                        | 2. Product standards  
|                        | 3. Standardisation of beekeeping tools  
| Enhanced Marketing    | 4. Protection of bees  
| and Trade of Honey    | 5. Sector regulations to address use of pesticides, migration of species, pests and diseases and pollination services  
| and Other Hive        | 6. Adaptive Research  
| Products              |                                                                 |

1. Product and market considerations including production capacities, local vs regional markets, quality vs quantity  
2. Investment and taxation  

1. Commit at a national level to develop commercial pollination services  
2. Promote the development of fixed-frame beekeeping and commercial beekeepers  
3. Develop a national database of commercial crop production requiring pollination services  
4. Develop national support services promoting pollination services - books, manuals and pamphlets  
5. Convince growers, one at a time  
6. Establish a regional approach for enhanced use of pollination services e.g. South Africa has the pollination demand but not enough bees; while neighbouring countries have the bees but not the demand for pollination services

**Source:** Authors adaptation of Excerpts from the Continental Workshop on Development of Apiculture Sector Policies and Strategies for Sustainable Bee Health, Increased Production of Hive Products and Pollination Services on 17th to 21st Dec 2018

### 2.1.3 Regional Frameworks

The African Union is a key platform for representation at all levels, advocating for the commercial interests of the region including the bee gene pool. Thus, the beekeeping sector is regarded as an under banked - low investment sector characterised by an aging population and low levels of education. Some of the highlights at the regional level driven by vision 2063, the Maputo and Malabo declarations and other requisite directives in the Regional Economic Communities and respective African Union Member States point to the advancement of the agriculture sector. There is need for elevation of the bee sector as an important contributor to the economies and livelihoods.
COMESA highlighted the importance of honey as a traded commodity that is ranked among the top ten commodities inter regionally. Recommendations have been made to advocate for a more development-oriented approach to promotion of intra-African trade that links initiatives to food security, malnutrition, livelihood improvement, alternative livelihoods, youth employment and increased incomes.

In addition, this also requires greater inclusion of private sector in the process of harnessing the free trade zone to enhance intra-African trade and implementation of protocols and participation in standard setting processes. Table 2.4 provides a summary of some existing regional frameworks that have an influence on apiculture.

A review of the current situation depicts a lack of policy coherence and coordination in the management of the apiculture resources and pollination services in the AU countries. Transcending these challenges and unlocking the potential of the sector would require major reforms including an overarching regional Policy Framework and Reform Strategy for African Apiculture embedded within the regional agriculture transformation strategy and requisite implementation in the AU Member States. Policy areas of focus have been identified as shown in figure 2.3 below.

![Policy Areas Diagram](image)

*Source: Excerpts from the Continental Workshop on Development of Apiculture Sector Policies and Strategies for Sustainable Bee Health, Increased Production of Hive Products and Pollination Services on 17th to 21st Dec 2018.*

**Figure 2.3:** Critical Apiculture Policy Areas
Table 2.4: Summary of Regional Frameworks

<table>
<thead>
<tr>
<th>Regional Programme, Institutions &amp; RECs</th>
<th>Related Frameworks</th>
</tr>
</thead>
</table>
| African Union                          | Maputo Declaration 2003  
 Comprehensive Africa Agriculture Development Programme (CAADP) 2003  
 Malabo Declaration 2014  
 Vision 2063: “An Integrated, Prosperous And Peaceful Africa, Driven By Its Own Citizens And Representing A Dynamic Force In International Arena”  
 Guidelines for Harmonisation of Regulations to Minimise negative Impact of Pesticides on Pollinator health |
| AU-IAPSC and AU-IBAR                    | Framework for the West African Agricultural Policy 2004  
 Regional action plan for implementation of the ECOWAS agricultural policy and CAADP/ NEPAD, 2005 |
| ECOWAS                                 | Certificate of origin and mechanisms for handling disputes  
 COMES, EAC and SADC Tripartite Agreement, 2008  
 Regional SPS Reference Laboratories  
 Regulations on the Application of Sanitary and Phytosanitary Measures of the Common Market for Eastern and Southern Africa |
| COMESA                                 | SADC Regional Agricultural Policy (RAP) 2010 |
 East African Community Agriculture and Rural Development Policy (ARDP, 2006)  
 EAC Food Security and Nutrition Policy (FSNP)  
 EAC Livestock Development Policy  
 East African Agro-industry and Agro-enterprise Development Programme (E3ADP)  
 EAC Common External Tariff (CET) |
| EAC                                    | WD-ARS 1401:2016, Crude and refined beeswax — Specification  
 WD-ARS 1402:2016, Beehives — Specification  
 WD-ARS 1403:2016, Extracted honey — Specification  
 WD-ARS 1404:2016, Folding and fixed beehive stands — Specifications  
 WD-ARS 1406:2016, Tangential type honey extractor — Specification  
 WD-ARS 1407:2016, Comb foundation sheets — Specification  
 WD-ARS 1408:2016, Layout for honey processing plant  
 WD-ARS 1409:2016, Comb foundation mill — Specification  
 WD-ARS 1410:2016, Traveling bees-box — Specification  
 WD-ARS 1411:2016, Radial type honey extractor — Specification  
 WD-ARS 1412:2016, Conservation and maintenance of honeybees  
 WD-ARS 1414:2016, Fumigant strips for treatment of honeybees  
 WD-ARS 1415:2016, Solar wax extractor — Specification  
 WD-ARS 1416:2016, Beeman’s kit — Specification  
 WD-ARS 1417:2016, Package bee box — Specification |
### Regional Programme, Institutions & RECs Related Frameworks

<table>
<thead>
<tr>
<th>Frameworks</th>
</tr>
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<tbody>
<tr>
<td>WD-ARS 1418:2016, Honey processing unit — Technical requirements</td>
</tr>
<tr>
<td>WD-ARS 1419:2016, Honey — Specification</td>
</tr>
<tr>
<td>WD-ARS 1420:2016, Sustainability criteria for beekeeping and bee products</td>
</tr>
<tr>
<td>WD-ARS 1421:2016, Bee pollination services — Requirements and guidelines</td>
</tr>
<tr>
<td>WD-ARS 1422:2016, Organic honey certification — Requirements and guidelines</td>
</tr>
<tr>
<td>WD-ARS 1423:2016, Propolis, pollen and bee venom — Specifications</td>
</tr>
<tr>
<td>ISO 12824:2016, Royal jelly — Specifications (adoption proposal)</td>
</tr>
</tbody>
</table>

**Source:** Authors Adaptation

### 2.2. BEE GENETIC RESOURCES

#### 2.2.1 Honey Bee Species and Distribution in Africa

Africa is home to a diversity of honeybees and forage plants, presenting a huge potential for honey production and pollination services as shown in figure 2.8. Africa and Madagascar are home to 11 honey bee subspecies, namely *Apis mellifera intermissa*, *Apis mellifera sahariensis*, *Apis mellifera lamarckii*, *Apis mellifera jemenitica* (sometimes called *Apis mellifera nubi*, *Apis mellifera sudanensis* or *Apis mellifera bandasii*), *Apis mellifera monticola* and *Apis mellifera litorea*, *Apis mellifera adansonii*, *Apis mellifera scutellata*, *Apis mellifera capensis* and *Apis mellifera unicolor*. Recently, *Apis mellifera simensis* was proposed as a new sub-species in Ethiopia based on morphometric features. *A. mellifera intermissa*, *A. mellifera sahariensis* and *A. mellifera lamarckii* occur in the northern parts of Africa, while the remaining eight sub-species occupy the rest of the continent, with the exception of *A. mellifera unicolor* which is found in Madagascar.

The conservation of African honeybees is fundamental in maintaining the large wild population and high genetic diversity. They may be less susceptible to various pathogens, parasites, pests and predators, as a result of natural selection occurring and limited human intervention.

#### 2.2.2 Stingless Bee Species in Africa

Stingless bees are social bees, living in permanent colonies, they are a diverse group comprising over 600 species worldwide and of this, 22 species are found in Africa (figure 2.4). Stingless bees belong to the tribe Meliponini.

---


All stingless bees build their nests in safe closed structure/containers\(^{11}\), they live in forested areas, tree cavities, termite nests and other cavities in the ground and buildings. They provide honey, with medicinal value\(^{12,13}\). Stingless bees mostly occur in the tropical and subtropical areas of the world, including the dry savannah between the tropics of Cancer and Capricorn in Africa as shown in figure 2.5.

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\(^{11}\)Nicola Bradbear, 2009. Bees and their role in forest livelihoods A guide to the services provided by bees and the sustainable harvesting, processing and marketing of their products


2.3 HONEY BEE FORAGING RESOURCES

Though honey bees forage on nectar and pollen of flowering plants, they require a large diversity of pollen and nectar from different plant sources to be healthy. Some crops like sunflowers or subtropical fruit are important forage resources for managed honeybee. During the dry season when the forage is low, beekeepers supplement the colony's food with syrup, this is however not a long-term or healthy option since it does not give the bee the balanced diet compared to what they get from foraging on assorted plants.

Habitat degradation has over time formed synergy with other factors to contribute to decreasing populations of both fauna and flora. The disturbance of natural habitats affects the diversity of both bees by altering both feeding and nesting sites for which they are known to depend on for survival\(^\text{14}\).

The Global Forest Resources Assessment found that “the world’s forest area decreased from 31.6% of the global land area to 30.6% between 1990 and 2015. The pace of this loss however has slowed in recent years, meaning that forests are now being managed more sustainably. This progress however, is not the same across regions and continents. The rate of forest loss has decreased, indeed, but still with a huge difference between regions15. Other regions, mainly in developing countries, saw a reduction in forest coverage, including Sub-Saharan Africa, which declined from about 30.6% in the 1990s to about 27.1% in 2015 as shown in figure 2.6. The loss of forests in sub-Saharan Africa, Latin America and Southeast Asia, was mainly due to rising population leading to forested land being converted to cropland as well as logging without replacing the harvested trees. In addition, the risk of impacts associated with natural hazards such as floods, forest fires, drought, landslides and storm surges, increases16, further decimating the forests and hence the valuable bee habitats, resulting in loss of colonies.

African honey bee keepers use a variety of plant species (including indigenous plants, crops and weeds) as forage resources for their bees17. The African honeybee though not officially classified as threatened, are experiencing threats from diminishing forage resources, pests and diseases, as well as problems arising from the misuse of pesticides in the environment.

The decline in honey production (figure 2.7) and bee colonies in some East African countries like Kenya resonates with the decrease in forest cover shown in figure 2.6.

15FAO, 2018, State of the World’s Forests 2018
17Walsh, B, 2013. A World Without Bees. PP 26-31
2.3.1 **Climate Change**

Climate change brings about extremes in weather conditions such as high wind, dampness, frost, drought, humidity, high temperature and flooding. Pollinators are among the ecosystem organisms that are affected as they have specific climatic requirements and are therefore vulnerable to climate changes impacts (Table 2.5). These can induce different responses in pollinators. For instance, increased temperatures may delay vegetation flowering time which subsequently impacts negatively on the ecology of the pollinator hence reducing their productivity. A
major effect of climate change on honey bees is the impact on the distribution of the flower species on which the bees depend for food\textsuperscript{18}.

Temperature also negatively impact on the survival of bee colonies. Above normal temperatures precipitates water shortages hence increasing the distance travelled by worker bees in search of water. Ambient temperature has a great effect on foraging activity by negatively impacting collection of nectar and pollen\textsuperscript{19,20}. In more extreme temperatures bees tend to abscond, and shift to more conducive environments. Moderate temperatures favour more bee productivity and consistency. Very low temperatures below 10 °C on the other hand prevent flight activity\textsuperscript{21}, hence reducing the movement of worker bees hence reduced foraging.

High winds have negative impacts on both bee hives and colonies. Although winds are important in keeping hives cool, strong winds tend to blow away bees from their targets and act as a barrier to bee communication. Bees use dances to communicate to each other on the location and distance to forage, water and pollen and pheromones in cases of emergencies. Heavy winds interfere with this mode of communication. In addition, heavy winds increase physical damage to hives, and endanger the colony especially the queen bee.

Climate change is impacting on the beekeeping sector and is one of the factors that reduce honey production. Beekeepers have developed options to adapt to these impacts, including, moving colonies to pollen source to keep the bees from travelling long distances, providing food and water for bees during drought period. Beekeepers have also used different types of hives, transferring apiary location, increasing the number of beehives and planting trees to provide forage. Beekeepers put the hives in tree shades, use oversized wooden hives to reduce crowding and effect of high temperature as well as changing harvesting methods and time\textsuperscript{22}.

Climate change and variability has direct effect on colony productivity, for in instance prolonged drought, strong wind and heavy rainfall have caused colony starvation and retarded bee forage activities hence low honey production.

\textsuperscript{18}Thullier, W, Lavorel, S, Araújo, M & Sykes, M, & Prentice, I. 2005. Climate change threats to plant diversity in Europe
\textsuperscript{22}Lwenega ET, Masao CA, 2009. The role of beekeeping on poverty alleviation and sustainable management of Miombo woodlands of Tabora, Tanzania. In: Nshubemuki L, Chamshama SÁO, Mbwambo L, Balama C.,(Eds.)
Table 2.5: Climatic Factors and their Influence on Honey Production

<table>
<thead>
<tr>
<th>Climatic Factor</th>
<th>Production Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderate rainfall (350mm - 700mm)</td>
<td>High production</td>
</tr>
<tr>
<td>High Rainfall Low</td>
<td>Low production &gt; 700mm</td>
</tr>
<tr>
<td>High temperature</td>
<td>Low production &gt; 33°C</td>
</tr>
<tr>
<td>Low temperature</td>
<td>Low production &lt; 10°C</td>
</tr>
<tr>
<td>Moderate temperature</td>
<td>High production 22°C – 31°C</td>
</tr>
<tr>
<td>Moderate wind</td>
<td>High production</td>
</tr>
<tr>
<td>Coldness and dampness</td>
<td>Low production</td>
</tr>
</tbody>
</table>


2.3.2 Forest Reserves

The need to protect crucial forage areas for bees remains critical. To ensure the colonies have enough forage some countries have preserved or set aside some forested areas for bee foraging. For example, Tanzania has set aside 506 natural forest reserves for beekeeping. Under this scheme a total of 6,963 ha have been protected as National Bee Reserves and established functional demonstration apiaries for farmers to learn by doing.23 Mauritius Bee Reserve Zones have also been set up in different regions to increase the production of organic honey where farmers are encouraged to adopt environmentally-smart agricultural practices and use organic techniques to generate high-quality products and conserve the environment.

The increasing demand for “organic” products could provide some opportunities for honey from Africa, which is largely free of harmful residues. Much of Africa has an extremely diverse vegetation resource that flowers over different seasons and provides an almost ideal environment for bees. Many plant species of the tropical vegetation are important nectar source for bees. In addition, climatic conditions in some tropical regions allow honey production nearly all year round particularly where seasonal changes have wet and dry periods.24 The special characteristics of certain tropical vegetation such as citrus, coffee offer good nectar supply therefore providing for the development of niche markets for specialty honeys. Honey production in Africa may be enhanced because beekeeping in some temperate climate countries seems to be on the decline.

Even with the deforestation witnessed in the last decade, the island nations and Zanzibar still have a significant portion of their land under forest cover, and

24Moinde, James. 2016. The Status And Future Prospects Of Honeybee Production In Africa
beekeeping continue to be an important source of livelihood for many communities. These island nations and Zanzibar present an excellent environment for the production of branded honey and hive products for extremely profitable niche markets for example clove honey from Pemba and Zanzibar and vanilla honey from Madagascar. In addition, the development of the beekeeping industry, complement efforts towards environmental conservation arising from the bee pollination services, which are important in forest regeneration. This also provide incentive to local communities who will have economic benefits including increased incomes from the sale of honey and other hive products, and higher farm yields arising from improved crop pollination25.

2.4 BEE SERVICES AND PRODUCTS

2.4.1 Pollination Services

Crop pollination is said to be responsible for increased yield and quality of an estimated 35% of crop production worldwide. This ecosystem service, valued at USD 353.6 billion annually, is currently under threat due to the loss of bees and other pollinators caused by degraded habitats26. 86% of all flowering plant species require an animal pollinator to reproduce and about one-third of food production depends on animal pollinators and 75% of all fruits and vegetables increase production when visited by animals27. Despite this importance pollination services have not received adequate recognition within many policy environments in Africa. Pollination depends to a large extent on the symbiosis between species, the pollinated and the pollinator and the loss of either affects the survival of both. Many plants are wind pollinated, while animal pollinators, including bees, and to a lesser extent butterflies, moths, flies, beetles and vertebrates (bats, squirrels, birds and some primates, Figure 2.8).

Bees pollinate about one-sixth of the world’s flowering plant species and some 400 of its agricultural plants. Poorly pollinated plants produce fewer, often misshapen, fruits and lower yields of seed with inevitable consequences on quality, availability and price of food. Without bees, many flowering plants fail to set seeds and conversely, without flowering plants, there is no food for bees28.

25Ellman, Antony Honey Production on Pemba Island, Tanzania
Pollination services are more significant for developing countries because of the dependence on agriculture for livelihoods. Despite this importance, only a few countries have developed this service. A few countries however have seen the value of pollination. In Egypt for example bees are reared for production of honey and other hive products as well as for pollination purposes in the horticultural farms. Crops that are fully dependent on pollinators, such as melons, onions and eggplants, are some of the biggest contributors to the Egyptian agricultural market.

In South Africa, pollination services are used in the Western Cape’s deciduous fruit production. South Africa is a major fruit exporter in global terms and the industry is valued at ZAR 9800 million per year. Up to 77 805 ha of deciduous fruit production is largely dependent on managed honeybees for pollination (specifically for apples, plums, pears and apricots). Approximately 87% of the honeybee hives in the Western Cape are used for pollination services and large commercial beekeepers transport their hives hundreds of kilometres to provide pollination services to the industry.

In Ethiopia, pollination by honeybees had increased the seed yield of Niger (Guizotia abyssinica) by about 43% [46] and Onion (Allume cepa) by two-fold [47]. Other countries with potential to increase income by offering honey bee colonies for

Source: Peter Kapwang, 2016

Figure 2.8: Animal Pollinators

29Brading, Gabbas, Zalat & Gilbert. 2009. Biodiversity Economics: The Value of Pollination Services to Egypt
30Melin, Rouget, Midgley and Donaldson. 2014. Pollination ecosystem services in South African agricultural systems
Pollination are Kenya, Ethiopia, Cameroon, Liberia, Senegal, Madagascar and Burkina Faso.

Some studies have shown that economic vulnerabilities could result from pollinator declines. In North Africa, a loss of pollinators could result in a deficit in production (Gallai et al. 2009). In West Africa's cocoa production, the vulnerability ratio is 90%. The consequences of a total pollinator loss on cocoa and other pollinator dependent crops from the region such as coffee could be considerable not only for the revenues that West Africa derives from these crops, but also on a global scale for the world production and resulting price structure of these stimulants (Gallai et al. 2009 ). In South Africa, it is shown that the estimations of wild and managed pollination services have been grossly undervalued. The contribution of managed honeybee pollination is found to be between US$28.0–122.8 million, for which only US$1.8 million is presently being paid (Allsop et al 2008). Figure 21 provides estimated annual value (US$ millions for 2005) of all insect and managed honeybee pollination to South Africa's Western Cape deciduous fruit industry using traditional and revised factors.

<table>
<thead>
<tr>
<th></th>
<th>Apples</th>
<th>Apricots</th>
<th>Peaches/Nectarines</th>
<th>Pears</th>
<th>Plums/Prunes</th>
<th>Grapes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>208.5</td>
<td>12.0</td>
<td>46.6</td>
<td>113.4</td>
<td>35.3</td>
<td>83.2</td>
<td>501.0</td>
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</table>

**“Traditional”**

<p>| | | | | | | | |</p>
<table>
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<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Insect dependence factor</td>
<td>1.0</td>
<td>0.7</td>
<td>0.6</td>
<td>0.7</td>
<td>0.7</td>
<td>0.1</td>
<td>-</td>
</tr>
<tr>
<td>Total production value derived from insect pollination</td>
<td>208.5</td>
<td>8.4</td>
<td>29.2</td>
<td>79.4</td>
<td>24.7</td>
<td>8.3</td>
<td>358.5</td>
</tr>
<tr>
<td>Proportion of pollinators that are managed honeybees</td>
<td>0.9</td>
<td>0.8</td>
<td>0.8</td>
<td>0.9</td>
<td>0.6</td>
<td>0.1</td>
<td>-</td>
</tr>
<tr>
<td>Proportion of total production value derived from insect pollination attributed to managed honeybees</td>
<td>187.6</td>
<td>6.7</td>
<td>21.3</td>
<td>71.5</td>
<td>22.2</td>
<td>0.8</td>
<td>312.2</td>
</tr>
</tbody>
</table>

**Revised estimates**

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<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Insect dependence factor</td>
<td>0.90</td>
<td>0.45</td>
<td>0.45</td>
<td>0.91</td>
<td>0.56</td>
<td>0</td>
<td>-</td>
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<tr>
<td>Total production value derived from insect pollination</td>
<td>187.6</td>
<td>5.8</td>
<td>21.9</td>
<td>101.2</td>
<td>198</td>
<td>0</td>
<td>330.3</td>
</tr>
<tr>
<td>Number of colonies required</td>
<td>37,746</td>
<td>3,663</td>
<td>7,707</td>
<td>42,572</td>
<td>20,280</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Actual number used</td>
<td>15,762</td>
<td>30</td>
<td>30</td>
<td>8,888</td>
<td>21,243</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Proportion of pollinators that are managed honeybees</td>
<td>0.418</td>
<td>0.008</td>
<td>0.004</td>
<td>0.209</td>
<td>1.0</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>Proportion of total production value derived from insect pollination attributed to managed honeybees</td>
<td>78.4</td>
<td>0.04</td>
<td>0.09</td>
<td>21.5</td>
<td>198</td>
<td>0</td>
<td>119.8</td>
</tr>
</tbody>
</table>

Values were calculated using standard estimates of crop dependence on insect pollination and on the proportion of pollinators that are likely to be managed honeybees [10]; as well as using estimates of crop dependence on insect pollination from previous literature, and proportion of managed honeybee pollination derived from local industry figures.

10Number of managed honeybee colonies that need to be used for each of the deciduous fruit crops (2/ha for apples; 4/ha for pears; 1/ha for apricot cultivars; 1/ha for peaches/nectarines; 6 for plums/prunes; 0 for grapes, adapted from [38] to best reflect current trends in the Western Cape).

11Report of use of honeybee colonies for commercial pollination in the Western Cape deciduous fruit industry [14]; personal communications from the South African Bee Industry Organisation and Deciduous Fruit Producers Trust.


Figure 2.9: Contribution of Bee Pollination (Western Cape Deciduous Fruit)
Several crops that are both commercially important and important for nutrition security in Africa are strongly dependent upon pollinators (such as aubergines, tomatoes, peppers, papaya and passion fruit among others). For many of these crops, honey bees are not considered effective pollinators, yet alternative wild pollinators are not well understood (Rodgers et al. 2004). This represents a potential vulnerability from any threats to pollinators.

### 2.4.2 Investing in Pollination Services

For many crops, pollination may be one of the best ways of improving crop production [45], significant economic contribution in crop production [48] and human nutrition security [49]. Thus, investment in the apiculture sector means diversifying existing sources of income, enhancing agricultural yield of smallholder farmers, and creating employment opportunities.

Some of the critical aspects for consideration include;
- Enhancement of existing knowledge systems (scientific, indigenous and local) to contribute to the understanding of pollinators and pollination.
- Develop capacities to manage pollination services by implementing farming approaches that ensure suitable foraging and nesting habitat within bee flight ranges to crop fields.
- Management of pesticide use to ensure pollinator safety in agriculture including implementation of integrated Pest Management approaches and crops and bee farmer interactions.
- Enhanced education including addressing gaps in respective curricular, use of farmer field schools and public awareness
- Mitigation of climate change and land uses
- Implementation of pollinator friendly policies
- Capacity building for scientists to engage in taxonomy work and regular assessment of pollinators to address data gaps
- Address the health of bees and other pollinators, including research into pests and diseases and management approaches across countries and regions.

### 2.5 Honey Production Systems

Beekeeping is one of the oldest farming practices in Africa, and is suited to a wide range of ecosystems across tropical Africa\(^{32}\). The production systems and type

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of hives used vary from fixed comb hives such as bark or log hives to improved movable frame or top bar hives. The introduction of modern technologies and the improvement of the existing indigenous knowledge in the beekeeping industry have shown improvement in various aspects and beekeeping is an important component of the Agricultural sector in some countries. However, as shown in figure 2.10, the beekeeping practices have remained predominantly traditional characterised by low production, compounded by poor harvesting, processing and storage techniques resulting in poor quality honey. Beekeeping in Africa is practiced under the following systems.

2.5.1 Traditional System of Beekeeping
For thousands of years, beekeeping in Africa has been known for traditionalist practices. Traditional beekeeping includes forest beekeeping where traditional hives are hung on trees, and therefore a virtually male activity with occasional involvement of women in processing. The most universal type of traditional hives used are simple cylindrical type also known as the fixed comb hives because the combs are attached to the top and sides of the hive and the beekeeper cannot easily remove and replace them resulting in destructive harvesting.

Source: Authors Adaptation
Figure 2.10: Production Systems in Selected Countries

James Moinde. 2016. The Status And Future Prospects Of Honeybee Production In Africa
The types of hives vary from region to region based on the available local material used for construction and the environmental conditions. Among the various types found across Africa include the hollowed logs, bark hive, bamboo or reed grass hive, clay hive, animal dung (mixed with ash) hive, woven straw hive, gourd hive, and earthen pot hive as shown in figure 2.11. Honey hunting and traditional beekeeping using bark and log hives have long been part of the subsistence economy of people living in the Miombo forest of South-Central Africa.

2.5.2 Migratory Beekeeping
In migratory beekeeping, bee colonies are transported to locations where flowering plants are present. Hives are systematically migrated for honey production, and also for crop pollination. Migration of hives is often a profitable way of extending the honey flow period. Migratory beekeeping is principally important where there is a succession of flowering seasons that extends over a range of latitudes and altitudes.35

The beekeepers of Amhara and Tigray regions of Ethiopia move their colonies for better forage and also to protect the colonies from seasonal diseases. For maximisation of honey production and efficient utilisation of resources, migratory beekeeping can be exercised in areas where honey forages provide rich honey flows in succession.

2.5.3 Transitional System of Beekeeping
Transitional beekeeping as shown in figure 2.12, is intermediate between traditional and modern beekeeping methods, the transitional hives promoted are the Kenya Top-bar hives (KTBH), Tanzania Top-bar hives and mud block hives. Among these, Kenya Top-bar hives are widely known and commonly used in many parts of the African continent. The advantages associated with KTBH are that it can be easily made from a wooden box or from locally available material such as bamboo, potential for high yield, ease of inspection of colony, and ease in harvesting. Top-bar hive in an ideal condition can yield about 50 kg of honey per year.37 In addition, these hives can be made from locally available materials like twigs.

37
Figure 2.11: Africa’s Common Traditional Hives

Source: Author’s Collation
2.5.4 Modern System of Beekeeping

Modern beekeeping methods aim to obtain maximum honey, each season, without harming bees. Modern movable-frame hive consists of precisely made rectangular box hives (hive bodies) superimposed one above the other in a tier. The number of boxes varies seasonally according to the population of bees/colonies. Different countries have improved these movable frame hives for example in Ethiopia Zander, Dadant and Langstroth types of hives are mostly in use as shown in figure 2.12 and 2.13. Dadant which is preferred by commercial beekeepers is similar to the Langstroth but with deeper frames and slightly wider spacing. In many countries Langstroth hive boxes have proved to be convenient for handling and management. With the advent of the improved and modern hives more Women have made inroads to the male dominated territory, thanks to the placement of the hives at heights which are more accessible to the Women.

Source: Author’s Collation

Figure 2.12: Some transitional and improved hives

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2.6 PRODUCTION AND TRADE IN HONEY AND HIVE PRODUCTS

Global honey production is currently estimated at 1,663,797.73 tonnes. Asia is the leading honey producing continent globally, with China, India, and the Republic of Korea being the highest producing countries followed by Europe where Turkey, Ukraine, Russian Federation and Spain as the highest producing countries in descending order. The Americas come third, continentally, with Argentina, USA and Mexico as the leading producers. Africa, Oceania and Caribbean follow in order of decreasing production as shown in figure 2.14.

Harvested and handled with care, African honey can be of global quality, with unique attributes such as taste and colour. African honey is produced by indigenous honeybees flourishing in natural environments. While apiculture presents an opportunity for producers, for many African beekeepers the potential to create a significant livelihood from selling honey remains out of reach.
The total amount of natural honey produced in Africa in 2013 was 169,306.00 tonnes and the leading producers were Ethiopia at 45,000.00, Tanzania 30,000.00, Angola 23,300.00 and Central African Republic 16,200.00 tones. Regionally, Eastern Africa followed by central Africa registered high production respectively as shown in figure 2.13. In terms of trade, only about 1.55% of Africa’s honey enters international trade. In Africa, in 2012, the leading export countries were Egypt, Ethiopia and Zambia who exported 959.00, 729.00 and 441 tones honey, respectively. 

2.6.1 *Honey Production and Trade in COMESA*

The agro-ecological conditions in most COMESA states are considered to be suitable for the production of honey\(^{40}\). The African honeybee, *Apis mellifera mellifera* and *Apis mellifera adansonii* are better adapted and performing in COMESA. Since the 1980s, there have been campaigns and promotion of beekeeping by governmental and non-governmental organisations. Major improvements have been made in the sector, notable among them are the introduction of modern beekeeping technologies, training and the provision of beekeeping equipment. As a result, the numbers of beekeepers using modern technologies have increased, leading to an improvement in levels of honey production and quality. In spite of these efforts, traditional honey and wild honey hunting from forest are still dominant.

The United Nations Food and Agriculture Organisation revealed that there are about 8,766,458 beehives in COMESA Member States. The largest numbers of hives were in Ethiopia 59.8% followed by Kenya 20.50% and Egypt 11.41% with most of the beekeeping activities taking place on farmlands\(^{41}\).

The total natural honey production in COMESA in 2013 was 81,454 tones, of this, over 80% came from Eastern Africa as compared to Southern African Countries meaning that there are huge gaps as well as potential to improve production. The countries with the highest production were Ethiopia (45,000t), Kenya (23,000t), Egypt (5,100t), and Madagascar (4,400t) as shown in figure 2.15a and b. The beekeeping industry in COMESA is still in its formative stage and requires considerable support to realize its full potential for rural income and employment creation to be exploited for national and regional development. A vibrant honey sector in COMESA would not only contribute to the improvement of livelihoods in rural communities through generation of rural employment and increased household incomes but would also boost export earnings.

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\(^{40}\) Tessema Aynalem Abejew and Zeleke Mekuriaw Zeleke. 2017. Study on the Beekeeping Situation, the Level of Beekeepers Knowledge Concerning Local Honey Bee Subspecies, Their Productive Characteristics, and Behavior in Eastern Amhara Region, Ethiopia. Volume 2017, Article ID 6354250

\(^{41}\) FAOSTAT, 2013
In terms of trade, about 2.74% of COMESA honey enters the international market, the leading export countries are Egypt, Ethiopia and Zambia as shown in Table 2.6, with major export destinations for honey being Middle East Countries and European countries. And with the increasing demand for honey as an ingredient for herbal medicine, pharmaceutical and cosmetic industries, there is a need for the Africa continent to have consistent supplies of organic honey to meet the demand of the niche market. There are also opportunities in specialized flavour such as honeys from Acacia, Eucalyptus, coffee and other flowering plants. COMESA MS do also participate in inter and intra-regional trade and spent USD 7.8 million in 2012 which was close to the amount of export of honey generated revenue. The major importing countries were Libya, Mauritius, Rwanda and Kenya.

In 2013, COMESA states produced about 9,811 tones with the leading producers being Ethiopia, Kenya and Uganda in that order (Figure 2.15b). There is generally low production of beeswax in the African continent largely because there is a low demand in the domestic and the export market is not well developed. The little traded beeswax is used mainly for baiting bees, manufacture of candles and in the cosmetic industry. Some countries like Ethiopia, Egypt and Madagascar exported beeswax amounting to 365 tonnes followed by Egypt 51 and Madagascar 17 tonnes respectively.
Table 2.6: Natural Honey Export from COMESA in 2013

<table>
<thead>
<tr>
<th>Country</th>
<th>Quantity (Tones)</th>
<th>Value (1000 USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egypt</td>
<td>959</td>
<td>3615</td>
</tr>
<tr>
<td>Kenya</td>
<td>70</td>
<td>209</td>
</tr>
<tr>
<td>Madagascar</td>
<td>20</td>
<td>50</td>
</tr>
<tr>
<td>Malawi</td>
<td>10</td>
<td>55</td>
</tr>
<tr>
<td>Mauritius</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Rwanda</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Swaziland</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Uganda</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>729</td>
<td>2718</td>
</tr>
<tr>
<td>Zambia</td>
<td>441</td>
<td>1298</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2234</strong></td>
<td><strong>7968</strong></td>
</tr>
</tbody>
</table>

Source: FAO (www.faostat.fao.org)

2.6.2 Other Hive Products

The markets for other bee-products are still underdeveloped and this provides potential for expanding end-markets for the honey sub-sector. Most of these products which include; Wax, propolis, venom, pollen and royal jelly are under exploited, in spite of available markets and technologies to utilize them.

Beeswax: Beeswax is a wax material produced from the honeybee’s body. Most African beekeepers are not aware of the economic benefits of beeswax and often throw it away after harvesting honey from bee hives. Beeswax has a much wider use than honey, it is used in food processing industries as an additive and a common ingredient in chewing gum. Wax is used in skin care and cosmetic industry as a preferred substitute to petroleum jelly in making products like lip balms, lip gloss, hand creams, moisturizers, eye shadow, blush and eye liners.\(^{42}\)

Beeswax is also used to make shoe and furniture polish and has been used for centuries to make candles. In addition, beeswax never goes bad and can be heated and reused many times. Beeswax has over 100 industrial uses and is known to have a ready market both locally and internationally. Beeswax suppliers in Europe buy processed or bleached beeswax from Ethiopia, Kenya, and Tanzania while other African countries purchase processed wax from Europe. This is an opportunity to be exploited. Figure 2.5c shows beeswax production in the COMESA region.

Propolis: This is a sticky substance collected by bees from leaves, buds and sap of certain trees. Bees use this stuff to fill cracks in their hive, to seal any gaps including the entrance hole if it is too large, and to keep the hive clean and free from diseases and parasites. Propolis has several properties that make it very suitable as an antibiotic and antifungal agent in the pharmaceutical industry. It is also used traditionally to treat various conditions, including inflammations, viral diseases, ulcers, skin burns and scalds.

Pollen: Pollen is essentially food for bees. It is a powder-like material found on flowering plants that is collected, eaten and stored by bees in honeycomb cells. In many developed countries, pollen is used in some expensive dietary supplements, since it is believed to have valuable medicinal properties.

Royal jelly: Also known as bee’s milk is a special substance produced by worker bees and fed to the queen bee. Royal jelly is a good source of Vitamin B. Like pollen, it is thought to have medicinal value and is used in certain expensive dietary preparations. It is consumed more in Asia than any other part of the world. Consumption of royal jelly in China alone is more than 75 tonnes annually. In fact, China makes royal jelly chocolate candy and wine, as well as lotions and tonics for natural healing.

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**Honey bee venom:** Scientifically known as Apitoxin is used by the bees as a defensive weapon to protect the colony from intruders and attackers. This substance is responsible for the bee’s painful sting and is produced in the abdomen of worker bees. Bee venom is used in medicine as a treatment for rheumatism and other joint diseases due to its anti-inflammatory action. It is also used to desensitize people who are allergic to bee stings and insect bites⁴⁴.

### 2.6.3 Honey Value Chain

The honey value chain in most African states is comparatively unstructured with the majority of players being small players at production and trade levels. However, the value chain is relatively integrated, with a number of producers engaged as own processors, supplying to retailers and to the final consumers.⁴⁵,⁴⁶

Despite the increased honey production from the use of modern beekeeping technologies and increased local demand, an organized market is still a major challenge. Most beekeepers sell their honey locally. This is an indication that the honey market is not efficient or well organized and therefore there is a need for the beekeepers to coalesce into cooperatives. Formation of these cooperatives would trigger the involvement of other actors in the value chain. The coming together of beekeepers will allow them to benefit from the economies of scale along collective bargaining, purchase and delivery of inputs and services and a platform for growth of other unrelated enterprises⁴⁷. Examples of country value chains are shown in figures 2.16, 2.17, 2.18 and 2.19.

Major honey value chain actors include but are not limited to the following depending on each country organisation;

**Input suppliers:** These are the producers of hives and other honey harvesting equipment

**Producers:** Producers are the major actors in the value chain, whose main activities include managing the apiary, harvesting the honey, filtering and packing and marketing.

⁴⁴Hossein Zolfagharian, Mohammad Mohajeri, and Mahdi Babaie. 2015. Honey Bee Venom (Apis mellifera) Contains Anticoagulation Factors and Increases the Blood-clotting Time
⁴⁵UNDP, 2013. Value Chain Analysis of the honey sector report
⁴⁷Mbugua, E., Biaou, C., Saeed, K. and Obhai G. 2016. Strengthening the resilience of Women and Youth in Somalia to Economic shocks through beekeeping

African Union – Inter-African Bureau for Animal Resources
Collectors: These are traders who buy honey from the beekeepers at farm gate price to sell to retailers and wholesalers.

Wholesalers: These actors buy honey from either the collectors or producers in large quantities and resell to other traders in a bulk.

Retailers: These are key actors who buy the products from the wholesalers and sell to consumers.

Processors: These actors purchase crude honey directly from farmers or wholesalers process and process to various products.

Cooperatives: The main activity of cooperative is to organize the beekeepers and market the products. The cooperative also support the producers in input acquisition like the purchasing of equipment like filtering machines.

Consumers: Consumers are the final actors in the value chain who purchase the honey for own use.

Source: Glenn & Miklyaev, 2014
Figure 2.16: Ethiopia Honey Value Chain
Development of value chain provides opportunities to better understand the subsector. Increasing productivity will involve upgrading respective value chains by addressing challenges associated with production environment, input supplies, product transformation and diversification, product packing and trade. In terms of systems, the focus should be to improve capacities of producers to meet standards in food safety and SPS standards, traceability and packaging and of chain facilitators [policy makers, financiers, and extension services, marketers] to provide required services.
Figure 2.19: South Africa Honey Value Chain

Source: Du Toit (2007)
3.0 OPPORTUNITIES, CHALLENGES AND THREATS TO THE APICULTURE SECTOR IN AFRICA

Africa has the potential for increased production of honey and other hive products to meet the ever increasing demand. Most of Africa has diverse vegetation resource that flowers over different seasons providing a favourable environment for apiculture. Most tropical plant species are an important source of nectar for bees. This diverse agro-ecological conditions are highly conducive for the apiculture industry and are a great opportunity to leverage on.

In addition, the climatic conditions in certain tropical regions allow for honey production almost all year round especially where seasonal changes have wet and dry periods. Tropical crops such as coffee and mangoes as well as other natural tropical vegetation offer good nectar supply hence providing for the development of niche markets for specialty honeys. Honey production in African may be enhanced because beekeeping in some temperate climate is on the decline. In addition, marginal, Arid and Semi-Arid areas of Africa which make up 60% and normally considered unproductive can be put under beekeeping, the flowers from vegetation can support the bees as well as putting the land into productive and generating income and food in Africa. First the conducive and the rising demands for “organic” products provide opportunities for honey and other hive products from Africa, which is mostly free of harmful residues.

3.1 OPPORTUNITIES FOR GROWTH OF THE APICULTURE SECTOR

3.1.1 Extensive Agricultural Practices
Crop agriculture is extensively practiced in the continent which can be used by forager bees to collect nectar and pollen grain to produce honey. The honeybee in its quest for nectar sources moves between flowers transferring pollen effectively pollinating flowers and increasing crop yields. The farmers can site their beehives near the farms that will not only help them generate additional income from the hive products but also boost in crop production through pollination.

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3.1.2 The Presence of International, Regional and National Organisations
Apiculture attracts the support of various organisations. Among them the African Union Inter African Bureau for Animal Resources (AU-IBAR), who train and oversee the establishment of National Apiculture platforms in the continent. International Centre for Insect Physiology and Ecology (ICIPE), who take the lead in research, Food and Agriculture Organisation (FAO), World Organisation for Animal Health (OIE), International Livestock Research Institute (ILRI), Regional Economic Community (RECs) (including COMESA, IGAD, SADC, EAC), Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Agricultural Research and Development for Southern Africa (CCARDESA), Regional farmers or private organisations and national organisations such as ministries responsible for livestock, national research organisations and Community Based Organisations, and Academia.

3.1.3 The Presence of Supporting Institutions
The presence of Alliance for Commodity Trade in Eastern and Southern Africa (ACTESA), African Trade Insurance (ATI) is Africa’s export credit agency. ACTESA provides insurance against political risk and trade credit risk insurance with the aim of reducing business risk and cost of doing business in Africa. ACTESA also supports two-way trade flows between Africa and the world facilitating exports and foreign direct investment to improve trade flows within the continent. COMESA Business Council (CBC) is a Business Member Organisation which provides three core services i.e., business support services and linkages, policy advocacy and membership development, with the objective of tackling the constraints to business and competitiveness in the region, influencing the policy formulation agenda on behalf of the private sector and increasing private sector participation in the regional integration agenda. In COMESA private sector and regional organisations can make use of those organisations for the improvement of agriculture value chain and in general for the development of the apiculture industry in the region.

The COMESA Livestock Policy Framework with the objective of promoting sustainable livestock production, productivity and competitiveness in the region provides a comprehensive framework for the improvement of the apiculture industry. Developing cosmetics and pharmaceutical industries in the region will be a market for honey and its derivatives which are ingredients for cosmetics and drug manufacturing and formation. Currently almost all the supplies for these industries are derived from imports as the local producers do not meet the quality standard.
required by the industries. Therefore, with improvement of quality there is a huge opportunity for import substitution.

Harnessing of the existing potential requires reorganisation of the sector and coordination among national and regional institutions to:

- Elevate pollination services as a key input for agricultural transformation, food and nutrition security.
- Improve production, processing and product development: emphasise production of other hive products.
- Promote intra-African trade: Trade in honey is currently ranked among the top ten commodities traded in the region.
- Harnessing apiculture for increased employment of disadvantaged groups
- Prudently handle arising disputes

Key challenges for promotion of intra-regional trade are low technical capacity, a constraining policy and financial environment and of significant import, the lack of standardization and quality management systems.

3.2 CHALLENGES, CONSTRAINTS AND THREATS

The apiculture industry faces certain key challenges and constraints which need to be resolved if the full potential of apiculture is to be realised.

3.2.1 Bee Health, Diseases and Pests

The following factors promote the occurrence of bee diseases and pests, especially taking into cognisance the bee life cycle of 21 days:

1. Weather-related seasonality and bee mobility cause stress and can compromise immune response. Bee mobility favouring contact between infected and susceptible colonies.
2. Presence of naïve bee populations within an infected region
3. Malnutrition and water stress
4. Direct transmission of the diseases between different colonies
5. Harvesting which includes wild honey gathering and harvesting at night
6. Crude processing techniques that result in contamination
7. Poor disposal of infected materials
8. Unregulated trade and movement in bees and hive products within countries and across borders
9. Inadequate enforcement of sanitary protocols in movement of bees and hive products
10. Scavenging by birds, wild animals and other vectors
11. Understating bee health issues
12. Inadequate surveillance, diagnostics, prevention, control and treatment protocols
13. Use of contaminated hive tools and equipment’s
14. Inadequate disease reporting

There are six (6) listed diseases of honeybees in the OIE Terrestrial Animal Health Code, including European foulbrood; American foulbrood; Acarapisosis; Small hive beetle infestation (Aethina tumida); Tropilaelaps infestation Varroosis. However, there are other bee diseases that are not listed Terrestrial Animal Health Code such as Wax Moth (Aphomia sociella); Bee Louse; Honey Badgers; Ants (Dorylus fulvus); Chalkbrood; Stonebrood diseases and Nosema that have been reported in Africa.

![Understanding the life cycle of the Varroa mite](image)

Source: Bayer Research, 2016.
**Figure 3.1: Understanding the Life Cycle of Varroa Mite**
<table>
<thead>
<tr>
<th>OIE Listed Bee Diseases</th>
<th>Description and Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>European foulbrood</td>
<td>Dead and dying larvae curled upwards; brown or yellow, melted or deflated with tracheal tubes more apparent, or dried out and rubbery. Infection can be self-healing when good beekeeping management practices are applied.</td>
</tr>
<tr>
<td>American foulbrood</td>
<td>A disease of the larval and pupal stages of honey bees caused by the spore-forming Paenabacillus larvae. The AFB spores are extremely resistant to desiccation and can remain viable for more than 40 years in honey and beekeeping equipment.</td>
</tr>
<tr>
<td>Acarine (Acarapis woodi) (Tracheal) mite</td>
<td>Acarapisosis is an infestation of adult honey bees by tracheal mite (Acarapis woodi). It is spread by direct contact from one adult bee to another. The diagnosis generally involves the dissection and microscopic examination of a sample of bees from the hive.</td>
</tr>
<tr>
<td>Small hive beetle: Aethina tumida</td>
<td>Small hive beetle species Aethina tumida is attracted to bee colonies to reproduce, but can survive independently outside the hive. The adult female beetle are capable of producing up to thousands of eggs over its lifespan, thus being able to colonies almost all hives and bee colonies within a wide radius and can fly up to 6-13 km from its nest site, it is capable of dispersing rapidly and directly invading new hives. Movement of adult bees, honeycomb and other apiculture products and used apicultural equipment are mostly responsible for the spread of the disease.</td>
</tr>
<tr>
<td>Ectoparasite mites</td>
<td>Tropilaelaps clareae and T. mercedesae are species of mites that are ectoparasite. It is difficult for the mite to survive for periods of more than 21 days away from bee brood. The infestation mostly spreads by direct contact from adult honey bee to adult honey bee, and by the movement of infested honey bees and bee brood.</td>
</tr>
<tr>
<td>Varroosis of honey bees</td>
<td>Varroosis is caused by Varroa destructor and Varroa jacobsoni parasitic mites. They feed on the bodily fluids of bees in all its stages and the mites are visible with the naked eye as a small red or brown spot on the bee's thorax. Varroa mites can lead to the virtual elimination of feral bee colonies in many areas. However, the African bee is able to control infestation through its behaviour of self-grooming and resistance.</td>
</tr>
<tr>
<td>Deformed wing virus (DWV)</td>
<td>Deformed Wing Virus is the causative agent of the wing deformities and other body malformations of honeybee colonies that are heavily infested by varroa mite. DWV is part of a complex virus strains that are related and include Kakugo virus, Varroa destructor virus and Egypt bee virus. The deformities on bees are produced almost exclusively due to DWV transmission by V. destructor when it parasitizes the pupae. Those bees infected at adult stage remain symptom-free, although they do display behavioral changes and have reduced life expectancy.</td>
</tr>
<tr>
<td>OIE Listed Bee Diseases</td>
<td>Description and Symptoms</td>
</tr>
<tr>
<td>-------------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Non OIE -listed diseases of bees</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Wax Moth (Aphomia sociella)</strong></td>
<td>There are two species of wax moth, Achroia Grisella and Galleria Mellonella, that cause damage to hives and hive products. The Wax moth will not attack the bees directly, but feed on the wax used by the bees to build their honeycomb. The larvae of wax moth hatch from eggs laid in cracks in the hive and protect themselves with a greyish web. They make tunnels in the combs and contaminate honey with their excreta. Active bees at times are able to reduce the wax moth infestation but the population can build to unmanageable levels if left unchecked.</td>
</tr>
<tr>
<td><strong>Bee Louse (Braula Coeca)</strong></td>
<td>Is a parasite of bees across Africa. The larvae are hatched in the wax and spoil the combs. The adult louse is found on the thorax of bees with several seen on the queen. The braula fly does not damage or parasitize any stage of the honeybee life cycle but the adults do compete for food from bees and larvae</td>
</tr>
<tr>
<td><strong>Honey Badgers and other mammals</strong></td>
<td>Honey Badger is the main mammal that causes considerable damage to hives, honey and other products. They are small strong animals and their damage can be on several apiaries within an area. To control them, hives are kept in cemented houses, hanging or suspended from a tree or posts.</td>
</tr>
<tr>
<td><strong>Ants (Dorylus fulvus)</strong></td>
<td>Ants cause damage in form of eating into comb or scuttling off any comb with the contents of honey, pollen and brood. They kill bees first, rob their products and initiate aggressiveness in bees that lead to absconding of honey bees. The main methods for protection against ants are such as placing inner tube; smooth iron sheet; and tin filled with used engine oils around the wooden or metallic stand supporting hives.</td>
</tr>
<tr>
<td><strong>Fungi diseases of bees: Chalkbrood and Stonebrood</strong></td>
<td>Chalkbrood caused by Ascosphaera apis and Stonebrood caused by a Aspergillus spp of fungi. Ascosphaera apis, are fungal diseases that infest the gut of the larva and it competes with the larvae for food, ultimately causing it to starve. The fungus will then go on to consume the rest of the larva's body, causing it to appear white and 'chalky' or mummies at the entrance of the hive. The mummies later shrink, becoming hard and brittle, turning black in colour.</td>
</tr>
<tr>
<td><strong>Nosema disease</strong></td>
<td>The pathogen for Nosema disease of the bees is a microsporidium in form of spores that invades the intestinal tracts of adult bees and produce symptoms of dysentery. There are two species, Nosema apis and Nosema ceranae that have been implicated as pathogenic to bees. Nosema infection is also associated with black queen cell virus and it is normally only a problem when the bees cannot the hive to eliminate waste such as during an extended cold spell.</td>
</tr>
</tbody>
</table>
Figure 3.2a: Pictures of Diseases and Pests Affecting Bees
Among the viruses so far isolated in some African countries that are transmitted by varroa mites are: Israeli acute paralysis virus (IAPV), acute bee paralysis virus (ABPV), black queen cell virus, (BQCV), chronic bee paralysis virus (CBPV), deformed wing virus (DWV), Kashmir bee virus (KBV), and sacbrood virus (SBV).

Wax moth and hive board damaged showing the galleries and web

Figure 3.2b: Pictures of Diseases and Pests Affecting Bees
Effect of Ants

- Ants inside a hive that bees have absconded from
- Waste spoils due to dysentery caused Nosema on the opening of the hive

Protection of Hives from the Honey Badger

- Hives in a cemented house
- Hives hang out

Honey Badger attacking hives

Figure 3.2c: Pictures of Diseases and Pests Affecting Bees
Figure 3.3: Occurrence of Bee Diseases and Pests in Africa
3.2.2 Other Predisposing Factors

Indiscriminate use of pesticides has been singled out as one of the predisposing factors leading to bee health issues in Africa. This is because pesticides vary in their effects on bees. Contact pesticides are usually sprayed on plants and can kill bees when they crawl over plant surfaces or other areas around it. When a bee comes in contact with pesticides while foraging, the bees may die immediately without returning to the hive. In this case, the queen bee, brood, and nurse bees are not contaminated, and the colony survives. On the other hand, when the worker bees come into contact with an insecticide and transport it back to the colony in contaminated pollen or nectar or on its body, widespread colony death may occur.49

To prevent the exposure of bees to indiscriminate poisoning, countries have put in place legislation on the use pesticides others indirectly and others directly. Indirectly, efforts on a regional basis have involved the drafting on guidelines to minimise potential impacts of pesticides on pollinator health by AU member states representatives and AU Pesticides laws. Directly, some countries have included the measures within their beekeeping policies, like the Tanzanian government, through the National Beekeeping Policy, of 1998, Section 4.5.1 (Management of Pesticides) promotes the use of Integrated Pest Management. This include, among others, the application of pesticides at night when bees are not foraging, the application of selected pesticides which are less toxic to bees, avoiding application of pesticides on flowers at “effective bloom period and the beekeeper confining the bees when pesticides are being applied (beekeeper be notified of the intention, date, time and place of pesticide application). In South Africa, Act 36 of 1947 provide for the protection of pollinators by not applying insecticides by aerial spray, foliar application on fruit trees must be applied only after petal drop, that means after honey bees have lost their foraging interest. The act also prohibits the use of pesticides that are classed as highly toxic for foliar application.

3.2.3 Limited Technical Capacity

A major challenge to the development of the industry is limited technical knowhow including inadequate extension services, poor hive management skills among the beekeepers, weak capacity for monitoring beehives for pests and diseases and management. The presence of predators and the unlimited use of pesticides and herbicides are some of the major challenges that affect the quality and wholesomeness of honey and other hive products50.

49 Fischer, Johannes; Müller, Teresa; Spatz, Anne-Kathrin; Greggers, Uwe; Grünewald, Bernd; Menzel, Randolf (2014). “Neonicotinoids Interfere with Specific Components of Navigation in Honeybees”. PLoS ONE. 9 (3): e91364

50 Girma, M. 2008 Approaches, methods and processes for innovative apiculture ... https://cgspace.cgiar.org/bitstream/handle/10568/480/Apiculture_IPMSWP8.pdf?...
3.2.4 Lack of an Enabling Regulatory and Policy Framework

A fundamental challenge for the honey industry is lack of an enabling policy framework, strategy and regulatory regime to provide the needed directions and guidelines for the development and growth of the industry. The role of private and public sector in planning and implementation of the development of the industry is not well defined. This gap has, among others, contributed to less consideration, fragmentation of efforts and lack of support resulting in the under performance of the industry\textsuperscript{51}. There is need to harmonise policy and supportive structures at the regional and national levels and put in place an effective regulatory framework and enforcement of standards in collaboration with all stakeholders.

3.2.5 Lack of standardisation and quality management system

There is lack of standardisation and quality management systems in the industry contributing to the prevalence of poor production, processing, packaging and proper labelling\textsuperscript{52}. The lack of standardization and quality management is attributed to the lack of proper laboratory and facilities necessary for quality evaluation. This therefore affects access to regional and international markets and also undercuts production and sale of honey on the local market. In addition, the non-tariff barriers on sanitary and phyto-sanitary requirements are impediments to intra-regional trade.

3.2.6 Limitations in Business Management

Most beekeepers take beekeeping as a part-time economic activity. Managing and growing beekeeping as business continue to be a challenge with the producers unable to keep up with the supply demand and quality. As a result, beekeepers cannot participate in competitive markets from which they could fetch premium price for their product. There is a lack of structured business approaches among beekeepers, with poor linkages between smallholder, medium scale and large scale producers and processors\textsuperscript{53}. Beekeepers have limited knowledge on the existence of international, regional and national level support structures for business and entrepreneurship development. Though there has been huge development in Information Technology (IT), the use of IT for market information sharing has remained underdeveloped. The overall impact of these challenges translate to low production, poor yield, limited market access, low incomes and under-utilization of beekeeping for wealth creation.


\textsuperscript{52}Dong, Frimpong, Haile, Liu, Schaffer and alente da Costa 2016, Improving household livelihoods with modern beekeeping and honey production in Ethiopia, Final report on WEEMA, International

Harnessing the apiculture sector has a significant impact on income generation, poverty reduction and livelihood improvement.

The apiculture sector has the potential to meet Africa’s food objectives that seek to end hunger and malnutrition. Africa has a high prevalence of under-nutrition, complicated by the challenge of attaining food and nutrition security.

Apiculture in Africa is chronically under-resourced. Improved investments will move the industry from subsistence to wealth creation and enable Africa’s farmers to play a significant role in the global honey trade. For this to happen, it will be necessary to conserve natural resources including bee flora and water, improve funding and research, and develop extension programmes that are market focused.

Strengthening of policy and institutional frameworks will create an enabling environment for the apiculture industry to significantly contribute to Africa’s economy and provide meaningful employment to youth and women. Through the bee project, a number of countries have established policies for the apiculture sector.

Africa has over 22 species of bees that need to be protected and harnessed in order to diversify honey and bee hive products currently being produced.

Key challenges to apiculture are diseases, pests, indiscriminate use of pesticides, inadequate policy and regulatory frameworks, and lack of standardisation and quality management systems.
4.0 PRIORITIES AND INVESTMENT PROSPECTS

Emerging and Priority Issues
Africa’s natural vegetation with diverse wild honeybee found across its agro-ecological zones ranging from the evergreen equatorial rain-forest to the arid desert zones offer great potential for the development of:

- An organic honey-processing industry and related products;
- Bee-pollination based industries; and
- The promotion of lesser-known bee and hive products such as royal jelly, bee pollen, bee bread, propolis and bee venom whose demand is rising both within the continent and in the developed countries.

4.1 INVESTMENT PROSPECTS
The success of apiculture in Africa depends on

a. Ability to organise and direct the limited resources and make the industry competitive and profitable.
b. Conservation natural resources including bee flora and water resources
c. Tapping and improving the existing indigenous knowledge and skills.
d. Effective and efficient organisation, funding, research and development of extension programmes that are market focused.

4.1.1 Some Strategies to Improve the Apiculture Industry
Future prospects of the apiculture industry in Africa will heavily depend on the following key strategies;

1. **Strengthen an apex body/office for Apiculture development**
   The already existing apiculture platforms should be strengthened and supported. The Office/institution should have regional and county levels in all beekeeping locations. The establishment will be in charge of coordination of apiculture activities as well as giving the sector a voice including the developing of niche market and brands and dissemination of research findings.

2. **Assess the status of the sector**
   There is a need to periodically to undertake a SWOT analysis of the sector so that appropriate strategies are put in place for threats and weaknesses to manage future risks. Data on key stakeholders, present and potential areas
of production, floral patterns, training needs of actors, honey bee colonies, technologies available, market access, prices of various commodities, policies as well as institutional frameworks will help set the status of apiculture.

3. **Carry out value chain analysis**
   Value Chain Analysis (VCA) will highlight the structure of the beekeeping, enabling one to assess the existing vertical and horizontal linkages within sector as well as functions and roles of actors. The analysis will also help identify opportunities, best practices and lessons learned and experiences that can help in developing appropriate products for the beekeeping industry. The analysis will also help identify existing and missing linkages within the chain.

4. **Establish Quality control and assurance.**
   A functional quality assurance system at all levels of the value chain both in terms of products and services will not only ensure product traceability but will also provide for monitoring and inspection.

5. **Capacity building**
   Up scaling technical competence of extension officers and other players along the value chain as well as creating awareness among stakeholders in the agricultural sector on the beekeeping industry, will equip the actors with the relevant skills required to transform the beekeeping industry from subsistence into an agribusiness activity. There is a need also to sensitize financial institutions and other input providers on the business potential of apiculture.

6. **Research and development**
   Research should focus on areas that contribute to higher production, appropriate equipment, bee forage, colony management, product development value addition and utilization. In addition, conservation of indigenous bees, knowledge and natural bee habitats are other significant areas of research that can argument our understanding of beekeeping industry.

7. **Map honey bee areas and establish demonstration apiaries**
   These areas should be mapped and protected to preserve the bees and where necessary establish permanent vegetative cover with bee plants to provide forage for honey bees. Conservation of wetlands and water bodies and vegetation will ensure the safety of bees. Imported bees, bee products and bee equipment
should be regulated, and regular bee disease and pest surveillance be instituted to allow early detection of threats. Use of agro chemicals be regulated to ensure the existence of honey bees.

8. **Improve infrastructure**
   Improved infrastructure such as transport, clean water, roads, communication systems and buildings will make easy delivery of goods and services, hence enabling growth and development of the apiculture industry in Africa.

9. **Eco-tourism**
   Establishment of eco-tourism activities such as observation hives, packed comb honey, bee caves and foraging bees are some of the attractions that should be promoted as a source of income and value addition to the industry.

4.1.2 **Marketing Strategies**
A conscious decision to promote honey and other hive products should focus on:
1. **Developing** a programme for promoting beekeeping- An activity plan for the national information system and floral calendar.
2. **Establish** centres for enterprise operations-Collecting and processing centres assist in increasing volume of bee products.
3. **Improve** packaging material- Good and appropriate cost effective packaging materials that are preferably see through so that customers can view the product.
4. **Labeling** and branding-The label should give information on content, source (type of flower), country, name and address of beekeeper, weight of product, date of packing and expected date of expiry. Information on granulation should be on the label to settle the fear of many customers who believe that crystallization is due to adulteration.
5. **Link** beekeepers to the market chain- Strong linkages between beekeepers, processors, packers, traders and consumers as well as with other service providers in the market chain are important for improved performance of the industry as well as giving them a bargaining power.
6. **Improve** management and dissemination on market information- Improved collection, analysis and dissemination of information require a database for the apiculture value chain.
7. **Enhance** the capacity of marketing of hive products- The industry need to undertake market survey to determine volumes of products sold, value added
products in the market, domestic market share sizes of existing packers, importers, consumer size and preferences, exports as well as other relevant information related to the market. Strong marketing groups tend to have greater cash resource and better access to credit. They may also be able to buy large quantities of processing and packaging materials at a more favourable price.

8. **Promote** value addition of hive products and bi-products-Adding value to hive products play an important role in the enterprise development and employment creation.

9. **Establish** marketing infrastructure-A set of business rules and obligations, communication flows are required to ensure free flow of the products and their efficient marketing.

10. **Improve** access to Finance-Access to affordable credit is a major factor for many who would like to beekeeping business.
5.0 CONCLUSIONS

African honey production is well below its potential and output of hive products can be increased by a gradual shift from traditional production from hunter gathering and fixed bar hives to intermediate technology top bar hives and better processing. The use of top bar hives can lead to 3-fold increases in yields of honey and can be very profitable because of low input costs.

Apiculture is in line with the policies of many African governments in environmental conservation and the sustainable use of natural resources. Apiculture increases household incomes, adds to food security and creates opportunities for the empowerment of women, youth and the less advantaged in the communities.

There are substantial market opportunities for honey, beeswax and other hive products and financial returns can be increased through various methods of adding value and through marketing of minor products.

Africa has an extremely diverse vegetation resource that flowers over different seasons and provides an almost ideal environment for beekeeping and a great opportunity to venture into niche markets and specialized flavours with organic honeys from reserves and sacred forests.
6.0 REFERENCES
