INCLUSIVE BEEKEEPING: INVESTIGATING THE BARRIERS THAT SLOW WOMEN'S PARTICIPATION IN APICULTURE DEVELOPMENT IN KENYA

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ABSTRACT

Beekeeping is a potential activity for supplemental income and economic development, contributing towards improvement for livelihoods and food security. It is a practice which can promote natural resource and forestry conservation for biodiversity by pollinating important flora and crops in surrounding landscapes. As in many parts of the world, in Kenya, this practice has been predominantly controlled by men. Due to movements steering away from using traditional hives by incorporating modern adaptations, women are able to participate, making it more inclusive. Improved synchronous extension and advisory services within Kenya are needed to support rural beekeepers and the growing apiculture sector within the country. This capstone is focused on promoting inclusive beekeeping practices for women in Kenya. In addition, it seeks to identify barriers and challenges to women's participation within apiculture development through a literature review and field visits conducted over three weeks in Central and Eastern Kenya. Further, this capstone contributes to the literature on apiculture development, adding extension and training strategies for moving forward towards adoption and promotion of the participation of women in beekeeping in rural Kenya.

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LIST OF ABBREVIATIONS

ABRC	African Beekeeping Resource Centre
ACDI/VOCA	Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance
ASALs	Arid and Semi-Arid Lands
CRF	Coffee Research Foundation
CBOs	Community Based Organizations
EAS	Extension and Advisory Service
FBOs	Faith Based Organizations
FFS	Farmer Field Schools
FSR	Farming Systems Research
FPEAK	Fresh Produce Exporters Association of Kenya
GDP	Gross Domestic Product
ILO	International Labour Organization
KALRO	Kenya Agricultural & Livestock Research Organization
KARI	Kenya Agricultural Research Institute
KENAFF	Kenya National Farmers Federation
KNFAP	Kenya National Federation of Agricultural Producers
KESREF	Kenya Sugar Research Foundation
KTB	Kenyan Top Bar
NGOs	Non-governmental Organization
NRT	Northern Rangeland Trust
R&D	Research and Development
RPF	Resource-Poor Farmers
RRF	Resource-Rich Farmers
SEI	Stockholm Environment Institute
TRFK	Tea Research Foundation of Kenya
icipe	The International Centre of Insect Physiology and Ecology (icipe)
T&V	Training and Visit

TOT	Transfer of Technology
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WFP	World Food Programme

INTRODUCTION

"With beehives they can change their lives"

- *Benson, Chairperson of Dupoto Beekeeping Group*

Apiculture is an agricultural subsector, involving the management of domesticated and wild honeybees in order to produce honey, wax and other products. This sector is growing worldwide, where global honey production is expected to yield more than 1.4 million tons annually (Gikunda et al, 2021). Kenya's environment is suitable for beekeeping, although various impediments block the potential for progressive apiculture development.

Beekeeping or apiculture has been a longtime practice within many African countries. Traditionally, the practice was male-dominated, where hollowed out log hives were placed in trees and honey was harvested for household consumption, used for medicinal purposes and for cultural traditions. In recent years, apiculture has been recognized as an important sector for economic development, supporting biodiversity and conservation of natural resources, a contributing factor in climate-smart agriculture and foundational for food security to improve livelihoods and well-being.

Women play a vital role in the agricultural sector across the continent of Africa, which is an important source of employment, crucial for both local and national economies. Agriculture in Africa cannot be talked about without considering how gender roles have been defined by the historical repercussions of intersecting political, social, cultural and other factors that have evolved over time. In many Kenyan communities, these well-defined roles assume women will perform household duties along with certain agricultural tasks while leaving other, more specialized agricultural work to men. This includes apiculture production (Gikunda et al, 2021).

Gender norms in agriculture have changed over time, causing structural shifts that have influenced extension education and advisory services (EAS) within the sector and hold true to Kenya. There remains large gaps across genders in agriculture, especially in regard to resources, productivity, market access and extension and advisory services, but more specifically training, where women tend to face the brunt of challenges.

Although improvements in apiary management and techniques, such as placing hives on the ground, are capable of mitigating some of the taboos associated with beekeeping, little is still understood of what types of socio-economic barriers or networks might promote access to formal training. The transfer of knowledge is a powerful concept, which is not embraced to its capacity, especially within apiculture development. Therefore, this capstone seeks to identify some of the barriers Kenyan women face in apicultural participation, with a specific focus on extension and advisory services.

KENYA'S SOCIO-ECONOMIC CONTEXT

Demographics

Kenya is described as a lower middle income country located in East Africa. According to the World Bank Data Bank, as of 2021 Kenya's total population was around 54 million. Females account for a little over 27 million or roughly 50% of the total population (Population, Total - Kenya, 2021). Of the Kenyan population, 53 percent is considered poor by international standards, most are women, living in rural areas. There has been substantial progress towards advancing gender equality and women's and girl's empowerment within Kenya, but they still face discrimination, exclusion and inequality (Advancing Gender Equality, 2021).

Gender Dynamics

Across the following four dimensions of Economic Participation and Opportunity, Educational Attainment, Health and Survival and Political Empowerment, the Global Gender Gap Index benchmarks 146 countries on the evolution of gender parity since 2006. In the 2022 Global Gender Gap Report, Kenya ranks overall 57th out of 146 countries. The score is based on a zero to one scale, with one achieving maximum gender parity. Kenya is one of the most improved countries in closing the gender gap among these categories in the 2022 report with a score of 72.9% which is an increase of 3.7 percentage points from last year's report (Global Gender Gap Report 2022, 2022). In the category of Economic Participation and Opportunity, Kenya is one where the gender parity has increased, especially amongst those countries in Sub-Saharan Africa. Even with the great strides taken towards gender equality achieved this far, there is still room for progress.

Economic

In 2019, the informal sector accounted for 83 percent of the total employment in Kenya, playing an integral role in economic growth, employment creation, income generation and poverty reduction (The Informal Economy in Kenya, 2021). Even though this sector makes up a substantial portion of the workforce, there are several constraints which informal enterprises face: lack of markets, issues with license formalities, inadequate infrastructure, and local competition. The informal sector is another large economic sector in which women participate, but due to the gaps in policies for the informal economy, there are still great strides that need to be taken to fully support this population and sector. Figure 1 showcases how women mostly own micro enterprises that tend to be less productive compared to men who are owners of the better off small and medium enterprises. Therefore the success of an enterprise relates to the gender and education level of the owner within the informal sector.

Figure 1. Distribution of informal enterprises by gender and level of education of owner

(%)

Domain		Micro Enterprises	Small Enterprises	Medium Enterprises
Gender of the owner(s)	Male	34.5	55.6	51.2
	Female	58.5	21.3	25.3
	Both	7.0	23.1	23.5
Level of education	Primary	30.8	14.0	14.8
	Secondary	35.4	28.7	28.7
	College	19.7	30.7	30.7
	University	5.0	22.5	18.0

(The Informal Economy in Kenya, 2021)

These qualities and background of an owner also demonstrate gender gaps in productivity, which is described more in Figure 2.

Figure 2. Productivity of informal enterprises (monthly sales per worker in KSh.)

Criteria	Characteristic	Median Sales	Mean sales
Size	Micro	6,667	16,741
	Small	7,645	34,345
	Medium	656	16,540
Sector	Easy to enter	6,700	17,411
	Difficult entry	9,000	17,952
Gender	Female	5,760	12,408
	Both	6,667	17,496
	Male	9,600	24,764

(The Informal Economy in Kenya, 2021)

The formal micro, small and medium enterprises are roughly a third more likely to do trade with the government and export their goods and services, which is a key factor driving informality in Kenya (The Informal Economy in Kenya, 2021). The lack of opportunities makes it extremely difficult for those working in informal sectors and industries still becoming formalized to prosper. This is true in the development of the apiculture sector, which lacks resources and support from the government when it comes to regulations, national market access, and the complete formalization of the apiculture sector. When looking at beekeeping and the honey market, there are similar trends between other aspects of the informal and apiculture sectors. Since many honey producers are smallholder beekeepers, they currently do not pose the ability to meet large market demands like in the Middle East. On the other hand, there is a high demand for honey in Kenya which can be satisfied internally, instead of importing what is estimated to be $224, 604 worth of honey (Jiwaji, 2014).

Gaps between the formal and informal apiculture sector is exacerbated by lack of extension agents trained in beekeeping. Smallholder farmers bear the brunt, especially women who are often left out of educational and training opportunities to improve their beekeeping

practices, resulting in micro enterprises that are less productive and stuck within local contexts. With the improvement of policies and regulations rolled out by the government for the informal sector, those who are mainly employed within, especially women, can be better supported.

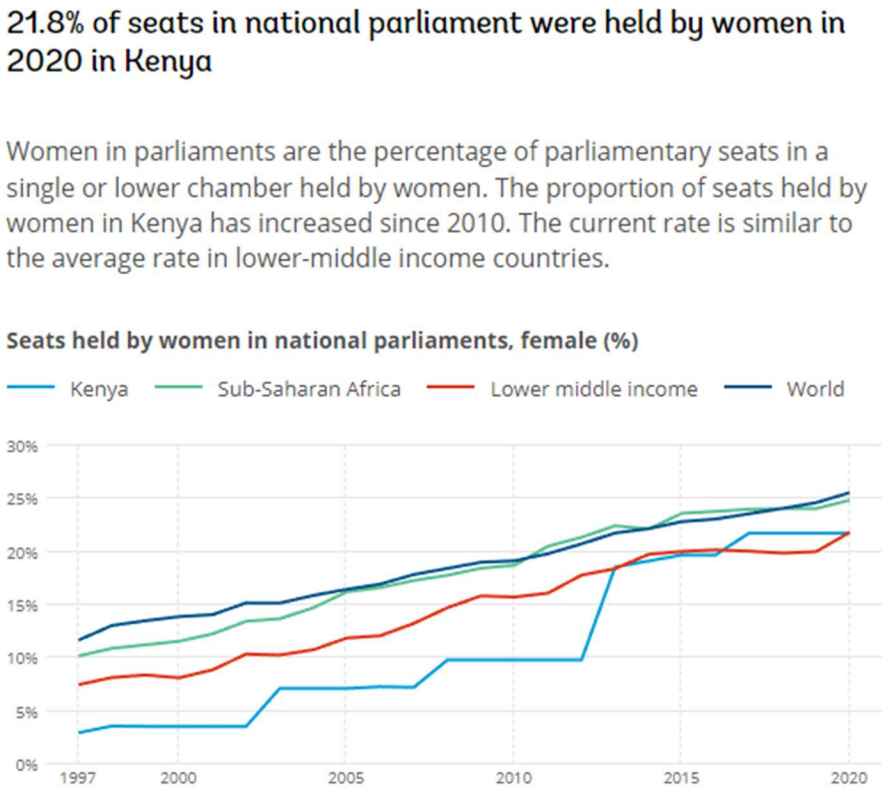
Agriculture remains the backbone of Kenya's economy, employing around 53 percent of workers, especially a large proportion living within the rural areas (Faria, 2022). As the dominant sector, as of early 2022, agriculture accounted for 33 per cent of Gross Domestic Product (GDP) (Agriculture and Food Security | Kenya | U.S. Agency for International Development, 2022). The footprint of women in Kenya's agriculture workforce accounts for approximately 60% of the total agriculture workforce, making up a substantial amount of the labor participation within the sector (Organization, 2021). Therefore, promoting participation of half the population with proper support could exponentially benefit untapped areas in improved economic, human, and social capital.

Agency for Decision-making

Representation of women within governmental positions, even throughout all levels, matters in terms of decision-making powers. Having a seat at the table can evolve the movement towards gender equality throughout the country and showcase a positive push for gender mainstreaming. According to the World Bank Gender Data Portal, in 2020, 21.8% of seats in the national parliament were held by women in Kenya, which is similar to the average rate in other lower-middle income countries. Fortunately, this is an improvement since 2010, but still holds room for increased representation of women taking up space in decision making rooms and tables. Figure 3 showcases how Kenya compares to other countries in Sub-Saharan Africa, with

lower-middle income countries and the world in the percentage of national parliament seats held by females from 1997 to 2020 (Kenya, n.d.).

Figure 3. Percentage of seats in National Parliament held by women in 2020 in Kenya



(Kenya, n.d.)

Having women represented in parliament and throughout all governmental positions showcases that women are on the same level as men and can hold positions of power in order to contribute to decisions being made. It speaks to not only the citizens of Kenya, that women hold equal capability, but also the African continent and beyond. This starts with electing women to hold seats in national parliament and allowing citizens to vote in representatives they want.

EXTENSION EDUCATION AND ADVISORY SERVICES IN KENYA

The use of extension and advisory services (EAS) remains a crucial aspect of agricultural systems and knowledge transfer across many countries today. The history of implementing EAS has evolved over the past few decades and like anything else in the development sector, highly depends on context. Due to the constant changes occurring in extension and advisory services, the stakeholders involved in providing services and the approaches taken, progress has not always been continuous. Despite many actors involved in providing EAS, there still tends to be unequal distribution of services, especially for resource-poor farmers, women, indigenous populations, and other marginalized groups. Unequal access to EAS creates barriers and challenges to obtaining learning resources and technologies.

Throughout history Kenya has seen a change of main actors involved in providing extension and advisory services. Extension services were present as early as the 1900s but did not produce substantial results until later. During the colonial period, there were two legs of services provided, one for the White settlers and the other for indigenous Africans. The services at this time were not executed equitably. It was not until the 1960s to early 1970s when Kenyans became independent that extension started to be more equitable and provide visible outcomes to indigenous Africans, most of them smallholders. Much of the impact was due to the initial goal of prioritizing the dissemination of hybrid maize and adopting new agricultural technologies using knowledge transfer from extension workers to Kenyan farmers (Mukembo & Edwards, 2015). Post-colonial agricultural extension became the main responsibility of the Ministry of Agriculture in the National Government.

Initial approaches to extension through the state were top-down, where information and new technologies was created by researchers within the Ministry of Agriculture then distributed

to extension agents who would in turn disseminate the information and technologies to farmers. This "cookbook" approach left very little room for farmers' inputs and often excluded them in the development of technology, information, or innovative methods. Usually, only the concerns of resource-rich farmers (RRF) were considered, because they had more interactions with research and development (R&D) agents and the means to implement some of the technologies being pushed through the EAS system. As Davis & Place note, most of the trials and demonstrations were piloted on research stations then disseminated by extension agents whose main focus was on large-scale farms or smallholders in high and medium-potential areas, leaving out a large portion of the farming population (Davis & Place, 2003).

This approach became known as the transfer of technology (TOT) model. Long regarded as the dominant paradigm for public research and extension, it embraces an agricultural professionalism where scientists "largely determine research priorities, develop technologies in controlled conditions, and then hand them over to agricultural extension to transfer to farmers" (Chambers & Jiggins, 1987). Despite the TOT model being the main method of extension services, it prioritized scientists' research preferences and funding avenues rather than what might have been more relevant to farmers. Many of the technologies that were pushed out through the TOT model were not successfully adopted by farmers in Kenya. This mismatch between research and application led to extension offices creating the Farming Systems Research (FSR) approach, which modified the TOT.

The FSR approach was more participatory than the TOT. It engaged researchers, extension agents, and farmers in assessing potential new technologies and in working towards agricultural development. It also conducted on-farm trials instead of solely piloting trials in a controlled research environment to better gauge the effectiveness of the technology. A focus

was placed on the needs of resource-poor farmers (RPF) who tended to be excluded from the original TOT model. RPF's needs are highly diverse and characterized by low access to resources and inputs, varying environmental conditions, differing priorities, and complex farming systems demanding a more local research-based approach. Even though farmers had more input under the FSR approach, it was still generally top-down. Even with involvement from farmers on the ground, decisions regarding research focus were still the prerogative of scientists.

Later in the 1980s, with financing from the World Bank, a Training and Visit (T&V) extension system was initiated. T&V incorporated the previously attempted models and tried to address their shortcomings. Under the T&V model, researchers still led the development of new technologies much like in both the TOT and FSR models. The T&V model continued the efforts of the FSR model to reach small-scale farmers. Knowing where the gaps and challenges lay, the T&V model had advocated for extension agents to go to the communities to train "contact farmers" as an improved way of knowledge transfer and to reach more farmers, especially within rural areas. This system was introduced to Kenya, the first African country to try out the model, after T&V had proven to be successful in places such as Turkey and India (Davis & Place, 2003). Like TOT and FSR, T&V still leaned towards a top-down approach. Since the T&V approach had extension agents go to rural areas, which were often difficult to reach, the approach tended to be resource intensive. To cover these expenses, T&V required more funding than the previous two approaches. As the need for funding increased, available budgets were decreasing due to economic hardships across the African continent. This increased pressure on the Kenyan government's fiscal space, and it ultimately had to take a step back in extension work.

This opened an avenue for other stakeholders to help with funding and continue to address the need for extension services that the National Government had to put on the back burner. This resulted in Kenya having a "bifurcated extension system, i.e. an approach focused on food production, or whole farm approach, provided by the government, and a commodity-based model supported by the private sector" (Mukembo & Edwards, 2015). The private sector stepped into the space of EAS, primarily to engage with a number of specific producers growing commercial crops such as tea, coffee, and pyrethrum. Initially, their extension services were focused on increasing production and improving crop quality geared more towards outgrowers. Today, that description of private sector prioritization is still very much true, but they have also started to include value-added activities and output market linkage for farmers.

As Oliveria notes, due to the "flaws in the public extension system, a third type of extension service emerged: the privatized agricultural extension initiatives provided by private companies, non-governmental organizations (NGOs), community-based organizations (CBOs), and faith-based organizations (FBOs)" (Oliveira, n.d.). Unlike the National Government's top-down approach, other stakeholders (e.g., NGOs, CBOs, and FBOs) experimented with more decentralized styles of extension and advisory services. They advocated for farmer-centered approaches and focused on rural development like the model farmer approach or the use of farmer field schools (FFS). These services were geared towards empowering "farmers to make independent decisions that best suit their needs, promote sustainability, and increase the likelihood of commitment and collective responsibility amongst farmers regarding the decisions they make" (Mukembo & Edwards, 2015).

Over time, Kenyan agriculture extension services had moved from more traditional TOT models that implemented a top-down approach to a more farmer-centered and multi-stakeholder

approach. This shift resulted in a pluralistic system that involves both public and private service providers with the potential for reaching a wider array of farmers. High levels of EAS pluralism assures there is no longer a one size fits all approach to agricultural extension in Kenya. Diverse EAS service providers emphasize a wide range of services and approaches across the full range of farmers and rural organization types.

While potential exists for complementarity among diverse EAS actors – each bringing services for which they have a comparative advantage, and as a result improving service access and quality across the value chain, pluralism holds challenges as well as potential benefits. Lack of communication and coordination among EAS actors has resulted in less than effective extension advisory services. This is true not only in the case of Kenya, but across the globe where there is pluralistic EAS.

To provide a glimpse of the many moving parts and the complexities within a pluralistic system of EAS, below is a matrix of some of the actors and their respective sectors within Kenya:

Table 1. Extension and Advisory Service Actors in Kenya

Sector	Institution Type	Actors in Kenya
Public Sector	Public Extension Institutions	Ministry of Agriculture, Livestock, Fisheries, and Co-operatives; County Governments within Kenya
	Public Research and Education Institutions	Kenya Agricultural Research Institute (KARI); Kenya Agricultural & Livestock Research Organization (KALRO) Kenya Sugar Research Foundation (KESREF); Coffee Research Foundation (CRF); Tea Research Foundation of Kenya (TRFK); ASTI Agricultural Research and Development Investments and Capacity in Kenya; Kenyatta University

	International Organizations	International Livestock Research Institute; GIZ – Promotion of Private Sector Development
Private Sector	Commercial production and marketing firms	
	Commercial farmer	
	Agro-marketing and processing firms	
NGOs and Other Donors		CARE-Kenya; Sacred Africa; World Vision; Catholic Relief Services; Winrock International Institute for Agricultural Development
Farmer Based Organizations and Cooperatives	Membership-based entities	
	Community labor-sharing groups	
	Farmer Unions	Kenya National Federation of Agricultural Producers (KNFAP); Kenya National Farmers Federation (KENAFF)
	Others	Fresh Produce Exporters Association of Kenya (FPEAK); Kenya Flower Council; Cereal Growers Association and Co-operative Societies

(Oliveira, n.d.)

Gender Dynamics in EAS

Greater representation of women extensionists in both public and private EAS organizations has proven elusive. So too has the goal of improving service access and relevance for women farmers. "The issue of gender should be brought into the mainstream of research and extension program design and implementation" (Schwartz & Kampen, 1992). Historically, cultural traditions were led by women in agriculture, like performing rituals before new seeds were planted and served as custodians of the Earth. The insertion of new structures and systems

occurred with colonial invasion, resulting in the use of gendered spaces. Men were seen to be in charge and dubbed the role of breadwinner in the family. The idea that men should be in power, reinforced in the African context, resulted in the successful domestication of women and shifted gender roles within agriculture.

Colonial policies neglected women farmers who had initially controlled subsistence production, setting the stage for women's present-day role in agriculture and extension services. Although colonial policies neglected women, they remain a crucial part of the sector and are still involved in agricultural activities in addition to other household duties they hold. Despite their role, they currently face many challenges within the agriculture sector when it comes to representation across all levels and inclusion in decision-making within agricultural policy formation.

The colonial system of pushing women out of the agriculture sector, which resulted in the infringement of their rights to land use persists today. It not only inhibited their land use rights, but also decreased aspects of empowerment like decision-making power, representation and voice in communities, and access to resources and information. Today, this has implications for women's roles in all aspects of civic life from the household to national level. What was dubbed a women's core responsibility of cultivating a collective area of land is now an ongoing battle for granting women equal access and the right to land ownership. Even though it is slow, there is movement towards constitutional reform to grant women access to land tenure that should not only be re-written within laws, but strictly implemented at all levels - especially at the grassroots.

The implications of colonial practices of neglecting women in the agriculture sector, including their rights to land ownership, continue in EAS today. Korieh explains, "the extension and educational services in particular were based on the philosophy that men were the "genuine"

farmers. Thus, men and boys became the primary targets of agricultural education and extension work" (Korieh, 2001). Also, the structures of education that were placed within society during and after colonial invasion took its toll on agricultural extension education and advisory services and increased the gap in access between men and women. This type of education and social structure are leaving women behind as they are being barred access to acquiring new and innovative technological knowledge, which could have increased their productivity and allowed them to compete in the market.

Men having access to better forms of education and reaching higher levels of education is one of the factors that led to this disparity within extension agent representation. For example, the first school for agriculture and extension set up in colonial era Africa based in Katibougou, Mali brought together candidates from all the colonies, where not a single woman was invited even though historically, they were the ones who had control over food production and distribution, and the agency to form rules around it. The African woman was and still is currently stripped of her legacy and deprived of new knowledge. Because of the negative legacies of colonization, extension is male-dominated and male-oriented, giving little notice or attention to women's voices and responding to women's aspirations.

Recommendations for Inclusive EAS

Moving towards more equitable inclusion of women in extension services relies on several factors. Building capacity along the entirety of the agricultural value chain is crucial, especially since the growth of urbanization and the movement of men to cities for additional work leaves the women to tend to agricultural activities across the board from production to market access. According to Access Agriculture's video on Women in Extension, women's

involvement in food production could increase by "paying attention to gender when dealing with demand for training and advice, extension methods and content, access to land, inputs and credit and finally access to markets" (Agriculture, 2017).

A start to shifting these norms could begin with changing attitudes and behaviors of male extension agents by including gender modules during training for facilitators. One way of integrating gender can be obtained through partnerships with third party experts who are more creative and proactive when incorporating a gender lens. Being sensitive to the abilities of all and especially women farmers – like using pictures for those who are illiterate, taking learning preference into account, and including participatory approaches to give them a sense of voice and inclusion within feedback loops can be vital for participation. Engaging with women to understand how they want to be included, without making assumptions of specific ways that may be best for them, can also increase inclusion.

Another strategy for increasing gender equality in extension and agriculture could be through the training and inclusion of more female extension agents, which could improve services by making them more applicable to women and their unique needs/context. This representation would improve the importance and relevance of training, and accelerate diversity and equity in the field. For example, attendance in training has great dependence on the timing of when training occurs. Women will only attend when training doesn't conflict with the timing of other household duties and caregiving work. Taking into consideration different forms of information needs, like radio broadcasts during times when women can listen while engaging in other household duties, could help reach a broader audience.

Social Learning

Furthermore, inclusion of women within knowledge transfer and sharing processes, whether formally or informally, is key for progress and for holding onto and passing knowledge to new generations. Acknowledging traditional, indigenous, and alternative/non-conventional forms of knowledge is also important when thinking about curriculum development. Therefore participatory approaches and community-based initiatives of extension and advisory services can be helpful in contributing to curriculum design and facilitation.

One type of participatory approach which has roots embedded in community-based initiatives is social learning. This occurs when an individual's learning happens in social contexts that are usually unintentional. The adaptive behavior change can transpire through observing, modeling, imitation, and other social interactions. Participatory by nature, social learning in an informal setting is spontaneous, naturally occurring and grounded on everyday experiences (Leta, Stellmacher, Kelboro, Assche, & Hornidge, 2018).

The diffusion of ideas, innovations, knowledge, and information can move beyond formal ways of transmission from extension services and occur between farmers on their own time. Learning from those we trust and have strong relationships with is a critical way for material to get dispersed. For example, it has been noted that apiculture knowledge and skills in Kenya have been acquired through both formal and informal learning ways, where the latter mode of dissemination was most prevalent by observation and practice. With the use of social learning, contextualization to local situations can improve adoption and diffusion of innovations by serving as a catalyst to prevalent limitations (Leta, Stellmacher, Kelboro, Assche, & Hornidge, 2018).

With every approach comes challenges and critiques for disseminating information, especially when it comes to new agricultural technologies and information. Like every approach and model of agricultural extension, there comes the chance of non-adopters who decide not to engage or use the innovation for a multitude of reasons that cannot be predicted. Social learning is not always recognized as a form of learning because it does not occur in a formal setting and is viewed as "part of the job". Due to the informal nature of much social learning, there is no guarantee the information being disseminated is up-to-date or even correct in terms of scientific and technological benchmarks, but may be the best information for that certain context and well adapted to local agro-ecological characteristics, livelihood systems, labor availability and cultural traditions.

Applying social learning to agricultural extension and recognition as a type of learning process may help increase the number of farmers reached, especially those who tend to be marginalized in formal learning programs and/or poorly serviced by conventional extension services. Strategies for learning will continue to happen outside of formal settings. Learning environments are set up within communities for the exchange of knowledge and skills that are informally acquired, especially among smallholder farmers who tend to represent the vast majority of farmers within Kenya. "Continuous learning processes can also be described as experiential learning that is based on the motivation and interest of the learner" perpetuating throughout a person's lifetime whether it be in formal or informal spheres (Leta, Stellmacher, Kelboro, Assche, & Hornidge, 2018).

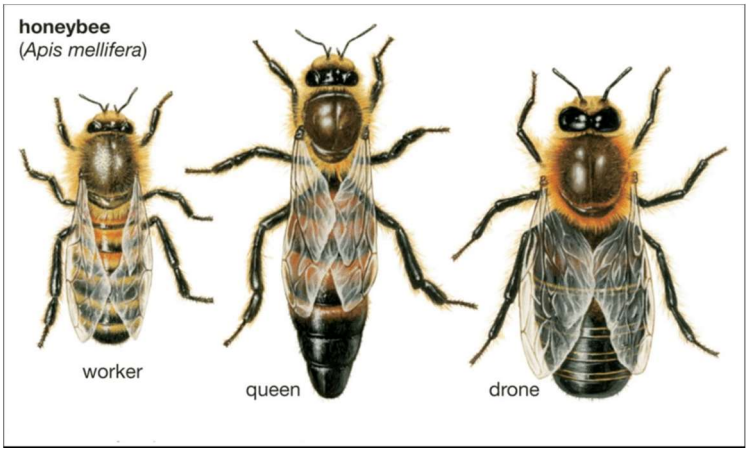
Through various forms of knowledge transfer, "indigenous apicultural knowledge and hives are passed on to adult sons by the fathers at old age" because women were not deemed as suitable (Gikunda et al, 2021). "Failing to mainstream gender issues in development agendas,

especially in political participation and decision-making would further deepen poverty in the next generation and jeopardize democratization processes" (Prah, 2013). When uplifting one gender over the other, it does not mean one is lesser than the other, but one needs more support in getting to an equalized and equitable place. Strategically thinking about this concept when improving inclusive extension and advisory services can be beneficial not only to include women, but for all involved in the implementation of agricultural interventions. In most cases this is empowering women in order to break a cycle of deprivation and marginalization which excludes their participation. There is also a need for critical analysis surrounding gender mainstreaming and the use of conceptual lens when implementing such a process into societies because of backlash that can occur.

BEEKEEPING AS A SECTOR

Apiculture or beekeeping is the art of keeping bees in a domesticated way for easily maintaining healthy colonies of bees in a hive designed for convenience of the beekeeper or apiarist, removal of the products and controlling pests and diseases. There are three types of bees in a colony: the queen, drone and worker.

Figure 4. Bee Types



(ResearchGate, n.d.)

There is only one queen in a colony and she is the mother of the hive. She lays eggs that will develop into new bees, producing up to a thousand eggs every day at certain times of the year. The drones are the male bees whose sole purpose is to mate with the young queen. There can be around 500 drones in a hive when enough food is provided, but drones are driven out during the dearth or winter time when nectar shortage occurs. Lastly, the workers are the female bees, who do not reproduce, making them not capable of laying eggs. They do all the work in the hive, holding many of the responsibilities based on the immediate needs of the colony. Their jobs include housekeeping, feeding the queen, drones and larvae, collecting the pollen and nectar, and

making the wax. Because they work so hard, the worker bees live for only about six weeks during the busy season (Canada Agriculture and Food Museum, n.d.).

Figure 5. Traditional, Kenyan Top Bar, and Langstroth Hives

There are a few hive types that hold both advantages and disadvantages which are used in beekeeping depending upon the apiary site context. Traditional hives are found in more rural areas within developing countries where informal and supplemental beekeeping is intertwined into parts of farming systems. They can be constructed of hollowed out tree trunks, woven bamboo, mud or any local materials to create a hive structure in order to house the bees who attach their comb to the ceiling. Since they are mostly constructed from local material and are simple to build, making the traditional hives less expensive and easily accessible. On the contrary, the traditional beehive is inconvenient to inspect, unsustainable because the entirety of the comb is cut for honey harvest which harms the colony, and is smaller in size compared to others, leading to uncontrollable swarming. The Kenyan Top Bar (KTB) hives are more formally made structures, where the bees are encouraged to construct their comb from the underside of a series of bars, allowing the beekeeper to lift the individual combs (UN Food and Agriculture Organization, n.d.). These hives can also be made out of local materials and easily

open for inspection or harvest, so the colony is not harmed and the bees can continue to gather. Due to the top bars, the bees are guided towards building parallel combs. The width and spacing of the top bars need to be meticulously calculated to fully house the bees properly. Two other downsides of the top bar hive are that the suspended combs are more apt to break than in frames and these structures are more difficult to transport. The third type is the Langstroth hive which is composed of various frame components: the floor with a bee landing platform, hive body, queen excluder, brood chamber, and roof with protective cover. On average, the amount of honey produced is higher when using the Langstroth hive. This hive type helps make swarming control possible since there is more room for bee colonies to grow. Since the frame components are broken up into various sections, it is easier for beekeepers to conduct inspections and harvest honey. In comparison to the other two types of hives, Langstroth hives are relatively more expensive due to meticulous construction and parts needed.

When setting up an apiculture site, huge consideration needs to be given to the flowering of plants and more importantly nectar flow which are influenced by seasonal weather patterns. The honeybee colonies respond to these changes, resulting in maximum honey yield. Beekeepers should understand seasonal colony cycles and manage their colonies in such a way as to obtain a large adult colony population to coincide with the major nectar flow through melliferous plants in the area. When resources of both pollen and nectar are plentiful, the colony is stimulated to raise more broods, thus increasing the population. When resources are low, brood rearing decreases and the colony population decreases. Decreasing populations usually occur during the dearth period when flora growth is low, which is a good opportunity for the use of supplemental feeding. It is also important to maintain the hive properly by keeping the surrounding areas clean, regularly inspecting the hive both internally and externally, and leaving

adequate space between hives. Taking these precautions and management practices will help keep your colony healthy and decrease the intrusion of pests and predators. Mites, ants, and various moths are a few types of threats to a hive, but can vary depending upon the region in which the apiculture site is located. Pesticides, herbicides, certain synthetic fertilizers, and other toxic agriculture practices along with climate change implications are impacting bee populations globally. This poses serious issues for our food systems and environmental health leading to increased campaigns for preventing loss of bee populations. These small insects have a mighty importance and are essential for pollinating plants and crops resulting in food. They are also crucial within efforts towards biodiversity, climate-smart agriculture, and conservation actions due to their large impact within natural ecosystems.

Beekeeping in Kenya

In Kenya, the most prevalent bee species is the Apis Mellifera which is made up of four races surviving various climates found in the country.

Table 2. Apis Mellifera Race Types, Location in Kenya and Climate Conditions

Race Types	Location in Kenya	Climate Conditions
Apis Mellifera Yementicia	Northern Kenya	Dry and drought
Apis Mellifera Littorea	Lowlands of the Kenyan Coast	Available forage to produce broods year around
Apis Mellifera Scutellata	Central and equatorial Kenya	Plains area where massive flowering occurs after rains

Apis Mellifera Monticola	Highlands of Kenya, mountain bee near Mt. Elgon and Meru	Can withstand mist and cloudy weather with less sunshine

(Beekeeping \| Infonet Biovision Home., n.d.)

Over 80% of the land mass is Arid and Semi-Arid Lands (ASALs), which are ideal environments for apiculture (Apiculture.Pdf, n.d.). This is an important economic activity, worth millions of Kenyan Shillings and is particularly crucial for the rural people who live in ASALs areas as an opportunity for poverty alleviation and rural development (Wambua et al., 2016). It is an opportunity to diversify agricultural production due to its relatively low start-up costs, use of little land and time consumption and easily obtainable skill by both men and women. Currently, it is estimated that Kenya produces between 15,000-25,000 tons of honey and 1,000-5,000 tons of beeswax (Apiculture.Pdf, n.d.). This is only around 20% of potential production for both commodities, where it's projected Kenya's apiculture ability is to produce over 100,000 tons of honey and 10,000 tons of beeswax annually (Apiculture in Kenya -, 2021). Usually honey harvests occur three times a year during March/April, July/August and then again in October/November. But due to climate change and changing weather patterns, it has become exponentially more difficult to predict when rainfall will occur, directly affecting the blooming of various florals and bee forage.

Beekeeping in Africa, including Kenya, has been widely practiced as a hobby rather than agricultural entrepreneurial opportunity that provides a supplemental source of income for smallholder farmers interested in diversifying their livelihood. The most prevalent byproducts harvested are honey and wax. Honey is the most popular sold item produced from beekeeping. Due to the need for modern technologies, extracting the wax from the honey is not commonly practiced. The raw wax that is extracted is used to make candles for household use, but has

economic potential if modern techniques become more prevalent to make more diverse wax products.

Most recently, apiculture has been touted as a low-cost sustainable development strategy that contributes towards food security, employment, and biodiversity conservation. It was estimated in 2019 that about 91,000 persons in Kenya were directly employed in beekeeping, translating to a total number of around 547,440 people made up mostly by older men that were supported by the agricultural sub-sector (Bee Bulking and Farmer Capacity Building in Bee Keeping, n.d.). Throughout the apiculture value chain there is still potential for growth, and there is further need to explore participation, advancement and inclusion in beekeeping for women.

The gradual adoption of modern technologies in apiculture can be argued to have created new opportunities for women. For example, contrary to the practice of traditional beekeeping which promoted placing log-hives in trees, the modern technology offsets this practice with Langstroth hives that can be easily placed on the ground (Gikunda et al, 2021). Along with being viable contributor toward biodiversity through preservation of bee populations, women's involvement in apiculture has been recognized as a substantial supplemental income generator. With adequate training on modern beekeeping techniques, a Langstroth hive can produce an average of 10 liters of honey per season, which amounts to around 10,000 Kenyan Shillings (WFP_Africa, 2020). This will increase with the number of hives attained and seasons in which honey is harvested, exponentially contributing toward increase in income.

In recent years, there has been a push by diverse stakeholders (government, NGOs, and conservation enthusiasts) to enhance Kenya's growth potential in apiculture and include it in climate-smart agricultural endeavors. The apiculture industry falls within the jurisdiction of the

Ministry of Agriculture, Livestock, Fisheries, and Co-operatives in Kenya, housed specifically in the State Department for Livestock. Under Kenya Vision 2030, a national long-term development blueprint for the country aimed "to create a globally competitive and prosperous middle-income country with a high quality of life to all its citizens by 2030", are specific projects and research initiatives focused on the creation of new research technology and knowledge, especially within agriculture (About Vision 2030 | Kenya Vision 2030, n.d.). The role of the Kenya Agricultural and Livestock Research Organization (KALRO) coordinates agricultural research within the country, especially since the "value addition of agriculture and livestock serves as a means of raising rural household incomes", a large component of the Vision 2030 (KALRO). Some of the research within the organization is to support the apiculture sector and best practices to promote addition along the value chain. This is being implemented through development of technologies, innovations, marketing strategies, policy advocacy, capacity building and transfer of knowledge and information to strengthen product value chains within apiculture.

KALRO is also implementing The AgriFI Kenya Climate Smart Agricultural Productivity Project, to develop climate smart beekeeping technologies. Their focus will be on: (1) Developing and validating new hive innovations to enhance occupancy and increase yields and (2) Develop strategies for conservation of threatened bee habitats. Along with governmental programs and projects being rolled out to improve and enhance the capacity of the apiculture sector, there are many private sector companies, NGOs, research institutes, universities, conservation organizations and intergovernmental organizations that are taking measures towards apiculture development and supporting smallholder beekeepers within Kenya.

Table 3. Apiculture Actors in Kenya

Institution Type	Actors in Apiculture in Kenya
Public Sector	Ministry of Agriculture, Livestock, Fisheries, and Co-operatives; State Department for Livestock; Kenya Agricultural and Livestock Research Organization; National Beekeeping Institute; County Governments within Kenya;
Research Institutes	The International Centre of Insect Physiology and Ecology (icipe); The Kenya Institute for Public Policy Research and Analysis
Colleges offering Apiculture Certificates	Laikipia University College; Nairobi College of Bread and Confectionery Technology; Karen International College; Baraka Agricultural College
Intergovernmental Organization	International Labour Organization (ILO); World Food Programme (WFP); UNDP;
NGOs and CBOs	World Vision; Church World Services; Save the Elephants; Northern Rangeland Trust (NRT); Saferworld; Conservancies under Kenya Wildlife Service and various groups; African Beekeeping Resource Centre (ABRC)
Private Sector	Honey Care Africa; Private conservancies
Development Agencies	United States Agency for International Development (USAID); Stockholm Environment Institute (SEI); Government of Sweden Agricultural Cooperative Development International/Volunteers in Overseas Cooperative Assistance (ACDI/VOCA);

This pluralistic system of involvement especially towards extension for apiculture development is not very streamlined and still poses challenges and gaps that affect the smallholder farmers. Even though there is presence of actors within apiculture improvement, the industry is still newly forming, which tends to negatively affect marginalized groups who are involved.

Figure 6. Areas in Kenya where fieldwork was conducted

(Nations Online, n.d.)

Over the span of three weeks, I conducted fieldwork, with the support of Cornell Professor Fridah Mubichi-Kut, in order to get a better scope and sense of beekeeping in rural Kenya, the role women play within the sector and what EAS and training are provided for

apiculture development. Through group discussions and face-to-face interviews, information was gathered from five different communities located within Central and Eastern Kenya.

The first community I visited was Osotua, located in Laikipia County, about a three hour drive northwest of Nanyuki, who are members of the pastoralist Maasai tribe. There I met with Francis, our contact and son of the late Tom, who was the previous beekeeping group leader and main trainer supported by World Vision. I facilitated a group discussion with 17 women and 5 men, a portion of the Omom Beekeeping Group, where a wealth of information spanning various topics was shared. One of the male leaders described how beekeeping was traditionally practiced by men, because the hives were placed in far off areas near the river and housed high up in the trees. Not even every man harvested the honey, there were specific "brave" ones who climbed the trees and gathered the sweet treat in buckets made from animal hides.

Figure 7. Traditional buckets made from animal hide to hold harvested honey

He also expressed how honey has always shown great significance; used for medicinal purposes to soothe sore throats or suppress a cough, as an added ingredient in tea or homebrewed

alcoholic beverages and even as one of the main household dietary components when food is scarce. It is also a highly prized asset for traditional ceremonies, for example as a dowry payment at the time of marriage.

It was not until the NGO World Vision visited the community and the late Tom was given opportunities to travel for beekeeping training, which more modern practices of beekeeping came to Osotua. Initially, men received the training, but gradually women were incorporated and included in the accumulation of beekeeping knowledge. As a group they have been keeping bees for six to seven years using modern techniques. Currently, a handful of men conduct the hive inspections, but five of the women proudly harvest the honey from the group hives and induce confidence amongst the others to continue getting comfortable with the practice. Francis, Tom's son, has taken over the role of head contact for the beekeeping group in order to keep his father's love of beekeeping and legacy alive.

Figure 8. Women of the Omom Beekeeping Group in Osotua

World Vision has returned to Osotua one or two more times after the initial visit, providing some modern hives (Langstroth or Kenyan Top Bar), a honey extractor machine to help with processing and a beekeeping guide book which is extensive and written in English. Given the context of the Maasai people, few have education beyond a primary school level, because life's trajectory has other priorities. This has posed challenges for receiving further beekeeping knowledge since Francis is not always available to give training because his main job is a teacher and actors in EAS are not consistent with follow-up visits.

Nonetheless, the Omom Beekeeping Group conveyed future plans to build a stronger fence or encased beekeeping building to keep predators out, invest in wax extraction and divide the work amongst the group so everyone is engaged and the women are even more empowered. The women of the group, expressed with great pride their interests and plans for the future which consist of continuously gaining knowledge in beekeeping, to learn how to make value added products like soap or lotions from the wax and gain skills for better negotiation in the marketplace. The day ended with a tour of their hives area, a coveted take home container of golden honey from the Omom Beekeeping Group and a fondness for this community.

Figure 9. On the Road to Wamba

The second area we ventured to was Wamba. This small town is located within Samburu County, northwest of the Samburu National Reserve and lies at the base of a small mountain range, otherwise referred to as "hills" by Kenyans. The majority of the population are from Samburu, a sub-tribe of the Maasai, who are nomadic pastoralists. It was here we met with Ewan, a local beekeeper and honorary extension agent for apiculture in the surrounding areas. Because we arrived so late in the day to Wamba, we were unable to visit any beekeepers, because they live in communities a distance from the town center. Nonetheless, Ewan has a plethora of knowledge when it comes to beekeeping around the area since he is the one who brings farmers together for training, even from far reaching communities, making him known by many local organizations. Ewan has been beekeeping since he was a child, since the practice

runs in his family and the knowledge continues to be passed down. He attended Baraka Agricultural College, where he learned more about modern apiculture practices.

In early 2021, Ewan held training in six areas, where farmers traveled distances to attend the sessions. With his support of conducting regular visits and keeping in touch with the beekeepers, resulting in the formation of 18 self-help groups. The self-help groups further grew to become formal cooperatives, which currently has 350 members, 270 of which were directly trained by Ewan. The cooperative group and Ewan collect information about the number and type of hives, alongside tracking the assessment of hive health and production of honey and wax. A small group also works towards conserving the forest in the surrounding areas.

When asked about women's role in beekeeping around Wamba, Ewan conveyed that in recent years women were introduced to the idea of keeping bees. From there he explained "the husbands allow the women to keep bees" because it brings in supplemental income for the household through the harvest and process of honey. The practice has brought the women together, assisting cohesive group dynamics.

During our conversation Ewan said not everyone has joined or is aware of the cooperative, a challenge he faces. Ewan also expressed that they do not have a central collection center to process honey. Also, the area is so far from anywhere else and transporting beekeeping products is expensive that they resort to selling items at low prices within close proximity local markets which don't fetch as high a price as in larger towns or cities. An interesting point Ewan posed was about the lack of clear policy surrounding beekeeping and apiculture development within Kenya. There are not many streamline requirements within the sector or if regulations are in place, the government lacks supporting beekeepers to obtain adequate resources and funding.

Even with these challenges brought to surface, the love of beekeeping and extending the information he houses illuminates from Ewan.

It is because of our time spent with Ewan and the great discussion formed from the meet-up that we were able to visit the Dupoto Beekeeping Group located in the Mukogodo Forest Reserve within Laikipia County. The communities that call this 30,000 hectare area home, rely on the resources from the surrounding forests and grasslands for their livelihoods. Formed partnerships between local conservation organizations and the community members help ensure the wildlife and environmental ecosystem remain protected. When we arrived to meet the beekeepers, we were greeted by four members of the community, Benson the Chairperson, a local community ranger, Margaret and an older lady referred to as Mama. All four are beekeepers and members of the newly formed Dupoto Beekeeping Group.

Figure 10. Conversations with group members in Mukogodo

The Mukogodo Forest Reserve is full of beekeepers who have a long history of producing honey using traditional practices. Benson, expressed that with movement towards modern beekeeping practices, brings two advantages, conserving the environment and generating income. He went on to explain beekeeping was not always so accepted. In the past, people were called "dorobo" which is a derogatory word and meaning for 'the ones without cattle' who lived as hunter-gatherers and collected honey and engaged in beekeeping. They were stigmatized and cast away, because the practice was a kind of hobby or income generator that was looked down upon in society and only associated with lower class populations. Perceptions changed when people saw the influx of money those producing honey and keeping bees were gaining due to selling their honey. Benson and the other three members come from family lineage who have been engaged in beekeeping for some time and were once referred to as dorobo. Now, they are prideful about their historical background and the role they play in producing honey not only to benefit their households livelihoods, but the environment as well.

After getting insight from Benson about the historical background of beekeeping in the area, the attention was turned towards the two women represented, Margaret and Mama. Mama has been keeping bees for ten years and currently uses mostly the modern hive types, but has known the ins and outs of apiculture her whole life. She told us she is the first born in her family and was in charge of selling the honey. Like Mama, Margaret began learning about beekeeping from her father, but now also has modern hives of her own. Whenever they have questions or face a challenge, they refer to Benson, which is a perk of being members of the beekeeping group.

Looking to the future, the Dupoto Beekeeping Group is excited about growing the number of members in order to reach more beekeeper and keep the knowledge transfer strong.

They also want to build a central location where they can have meetings, discuss beekeeping and process the honey and other products being produced in order to sell as a group to a larger market. The biggest challenge they face is the marketing aspect of their honey and wax, which they said will improve with time and the growth of their relatively newer formed group. They also want to continue to be advocates for conserving their coveted forest reserve and work with community members to express the importance of protecting their home areas.

After spending a week in Central Kenya within Laikipia and Samburu Counties, I gained deeper, on the ground perspectives. It was now time to venture East by train to visit some communities in Taita Taveta County, located around the city of Voi, to learn from beekeepers in this area of Kenya. The fourth community was Marungu, where I sat down with Bernard and Nixon, two group members. In 2018, the Marungu Beekeepers was established and marked the time they started saving money as a group. They consist of 23 members who are actively beekeeping, five of which are women. They conduct themselves as a self-help group, meeting one time per month to assign a group member to inspect the hives and take the time to talk about beekeeping together. Like many of the groups I interacted with in Central Kenya, Bernard and Nixon expressed they also call themselves conservationists. The group engages in beekeeping not only as a cultural practice, but because it takes very minimal time/effort and due to the transition of using more modern hives there is not forest destruction involved.

Figure 11. Bernard, Nixon and Mama in their Bee Farm Area

Later into the visit we took a little walk to where they keep their bee hives in a communal, fenced in bee farm area. It was there I got to chat with an older lady, also referred to as Mama, who lives on the property where they keep the hives. She has been keeping bees for 20 years and was given some hives by World Vision when they came for a visit. Parallel to Osotua, World Vision did a few visits, but never followed up with training or extension education for practicing with modern hives and technologies. When asked about extension and advisory services in the area, the three members explained that there are not specialized extension officers for apiculture within the County Department of Livestock. If you have any questions, you must call an extension officer and they will come out to the community. Regular

household visits are not conducted. Nonetheless, the Marungu Beekeeping Group is looking forward to building more skills and having a proper action area which is a central location to share ideas, challenges and construct better objectives/goals for their group.

The last and final community I visited was in Kajire, located 15 minutes outside of Voi, where I met with a family. This interview was a little different, because the family has been trained by the NGO Save the Elephants, who is working towards the unification of human-wildlife conflict. They are implementing an Elephant and Bees Project, setting up fencing constructed of beehives to divert elephants away from farm land. I spoke with John and Winnie from the family, who originally used traditional hives, but with the help of Save the Elephants have 12 modern beehives set up around a hectare of farmland to keep the elephants from damaging crops while helping with pollination. Their training in modern beekeeping skills came from the NGO and whenever they have a challenge or question they contact someone from the organization.

Figure 12. Bee Hive Fence in Kajire

Much was learned about the cultural significance of honey, traditional beekeeping practices and who participated in them, extension and advisory services specifically surrounding apiculture and the challenges smallholder farmers face today as movement takes place in the modernization of beekeeping. Beekeeping is not only a way of life in terms of monetary assistance, but also crucial for overall biodiversity and forestry preservation. Many of those

talked to think of themselves not only as beekeepers, but also as conservationists and pride themselves in the work they are doing.

There has been movement towards including women to become more involved in beekeeping, throughout the whole value chain. The onset of women's inclusion has been spurred by NGOs conducting training in modern beekeeping practices and program advancement for apiculture development while implementing forms of gender equality within Kenya. Some women have learned beekeeping from their male family members while others were introduced during training and forms of knowledge sharing. The five communities described above have all formed beekeeping groups where all interested members can join and no age limit exists. This is a space in order to share ideas of practice, as well as the challenges they face. Some of these groups have also decided to form cooperatives. This pushes formalization in order to start saving as a group and begin to start selling their honey to larger markets. But I still found that even though both male and female beekeepers and mixed gendered groups are prevalent, where women have learned some techniques and skills, most of the work is still conducted by men.

The communities expressed that while the initial training was conducted by NGOs several years ago, there was very little to no recurrence of visits by them to keep up with updated knowledge dissemination. If updated information was given, it was through a training of trainer's session where only one, and in most instances, a male representative from the community was given further training to then pass along to the community and/or beekeeping group. Extension agents from County governments are another outlet in which smallholder farmers rely on the diffusion of new agricultural innovations, technologies and practices, but do not conduct regular household visits and instead are called upon when a question or challenge arises. The apiculture capacity of extension agents working under the livestock departments in

the county governments is slim, posing problems for beekeepers. Some community beekeeping groups don't have the luxury of being visited by NGOs or other EAS services. Instead, they just base their beekeeping knowledge on information passed down through generations, informal social learning and material from the internet, specifically about modern practices. Therefore, numerous gaps and challenges were identified during community visits surrounding apiculture development in general and specifically towards the inclusion of women within rural Kenya.

Gaps

- Lack of extension and advisory services along with ongoing training for beekeeping, especially for modern practices that are being pushed due to conservation movements away from the use of traditional hives.
- Equal gendered group numbers - there are still more males present within beekeeping groups than females
- Lack of information and skill-building about producing and selling raw wax and other value added beekeeping products
- Lack of opportunities to build market negotiation skills - the women tend to take the first price that is presented to them, even if it is low.
- Decision-making power and voice within group dynamics - the men still seem to speak and represent women when they are more than capable of speaking their truths

Challenges

- Drought – lack of water for pollinators and feeding the bees due to unpredictable changes in rainfall
- Knowledge surrounding apiculture across the value chain, whole value addition for products, where to obtain finance to purchase equipment, marketing skills
- Financial means to purchase more modern hives, especially start-up capital for women.
- Diverse market access
- Pests and Predators: Honey Badger is the most aggressive and disruptive predator who steals honey, destroys the hives and kills the colony
- Equipment

Benefits

- Additional income generation for the women and their households
- Learning new knowledge and skills

- A time for women to come together to socialize and discuss beekeeping
- Investing their time and efforts on endeavors that are more sustainable during drought due to bees needing little feed or input.
- Income stability: The price of honey still remains the same during times of less rainfall and drought
- Having household honey to sell or for consumption
- Increased decision and choice making for women because they have their own money. They don't have to ask the men for household products as much since they are buying on their own with the earnings they make.
- More independence and sense of self-worth

Many of the community members that were interviewed and who participated in group discussions are fully aware of the gaps and challenges they face within the apiculture sector. With improved systems and policies implemented by the government, the production of honey and other value added beekeeping products could reach their potential. There is disconnect between the desire to roll out a strong apiculture sector within Kenya and the application of doing it which affects rural beekeepers and prevents growth. This is also restricting the inclusion of women and further increasing the gap within apiculture development and the capacity that can be reached. Despite some of these gaps and challenges, all of the communities and beekeepers I had the pleasure of engaging with have high hopes for the apiculture sector and future plans to strengthen their group dynamics and continue the knowledge of beekeeping flowing. Through conversation engagement the expressed love for beekeeping was infectious.

CONCLUSION

My conversations with beekeepers always ended with a closing question "What do you enjoy most about beekeeping?" In return, I was first met with a smile and then a response about why they continue to practice keeping bees. A lady from Marungu, who was simply introduced as Mama gave the most memorable answer, "I love honey, but also watching the bees and how they move." These engrained responses will remain a part of the memories from conducting field work in rural Kenya. Even though I didn't see a single bee due a huge drought during the rainy season, the beekeepers welcomed the sharing of knowledge and the challenges they face because of the multitude of issues within the apiculture sector.

Studies on beekeeping practices among some African communities have shown that women are traditionally excluded from beekeeping practices due to prevailing gender roles, taboos, inheritance practices, and attitudes. Similarly, a recent study examining cultural barriers that slow women's participation in traditional apiculture in Eastern Kenya has suggested that lack of formal training further slows participation in the sector (Gikunda et al, 2021).

This is a twofold problem, (1) large numbers of women tend to be left out of extension services and (2) apiculture is still becoming a formalized sector within the State Department of Livestock and Extension Education with limited up-to-date training guides covering production to market. Since there has been a larger shift from traditional to modern apiculture, "a spirited effort towards the dissemination of apicultural technologies involving extension agents, farmers, and other stakeholders" is necessary (Gikunda et al, 2021). This leaves great room for improvement and expanded opportunities within the field of extension for apiculture and the inclusion of women in this practice. Tapping into learning methods, especially informal modes,

discussed earlier that are more beneficial for women can help these spaces expand the management of beekeeping.

When women are involved in the sharing of resources, this will benefit the family, household, and community by leading to improvements in income, health and nutrition. Contextual circumstances and approaches need to be highly regarded and considered. Gender mainstreaming needs to start at higher levels with certain policies put in place, but also be implemented into grassroots level initiatives to further combat the norms of inequality between men and women across all areas and levels. With creative tactics and systematic interventions, all stages of extension services can be improved for all farmers.

The barriers to apiculture training and development among African rural communities are still not fully understood but are rooted in social norms of patriarchy and gender discrimination by which women are often excluded. Women's exclusion from the key decision-making processes has been shaped and continues to be so because of historical and cultural contexts in most African countries, including Kenya. It includes the "patriarchal nature of state-forming processes that always favour men" (Prah, 2013, pg 4).

Insertion of women and their participation across apiculture can lead to improved socio-economic development while providing numerous livelihood benefits to their immediate household, local community, and national economies (Schouten, 2020). The inputs and time required for beekeeping are relatively low compared to other agricultural commodities which is ideal for women who tend to have multiple household duties and lack access to outside resources. The gains from beekeeping can be a starting point towards growth for rural women in leveraging their access for future endeavors that are supported by the supplemental income generated. There is opportunity to maximize their skillsets by building capacity, increasing

decision-making, contributing to informal knowledge transfer, and optimizing success for the sustainability of project implementation.

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