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Production of Beauty and Skin Care Products from Bee-hives in Myagdi District

A Study on Feasibility of Production of Beauty and Skin Care Products and Other Subsidiary Products Produced from Bee-hive Products in Myagdi District of Nepal.



2075

Disclaimer

Trade and Export Promotion Centre (TEPC) endeavor, using its best efforts to provide a thorough research on **Feasibility of Production of Beauty and Skin Care Products and Other Subsidiary Products Produced from Hives Products in Myagdi** and Promoting Beekeeping Products in Myagdi.

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Acknowledgement

This **Feasibility of Production of Beauty and Skin Care Products and Other Subsidiary Products Produced from Hives Products in Myagdi** is the outcome of the thorough work of the staffs of Trade and Export Promotion Centre (TEPC) who have rendered their hard work in accomplishing this final report.

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Mr. Sarad Bickram Rana
Executive Director

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EXECUTIVE SUMMARY

This research work was conducted to analyze the feasibility for the production and value addition of various hive products in Myagdi. Beekeeping practice is widely spread at both personal use and commercial level. In fact, beekeeping is also practiced as a tradition in the region as well as honey hunting community also produce wild honey in Myagdi. Current beekeeping practice only involves production and sales of honey. Other by-product from beekeeping are not utilized and are wasted. Although, production of other subsidiary hive products are not yet explored in Myagdi. Due to availability of diverse foraging flora with medicinal properties in high elevation, the honey and other hive products produced in Myagdi is unique and has high value due to its medicinal properties and unique taste. However, due to lack of awareness, low appetite for product diversification, lack of technical capabilities, no access to niche' market, and lack of business acumen, the beneficiaries (beekeepers/traders) have not been able to effectively capitalize on the competitive and unique properties of these bee-hive products in the market.

Based on the field study, market analysis, and business analysis of beekeeping value chain conducted in Myagdi during this preliminary research project, we have concluded that Myagdi has huge potential to produce diverse products from bee hive products like, honey, beeswax, propolis, pollen, venom, royal jelly, and make it a highly profitable business with low investment and low risk. Step-wise intervention steps have to be implemented to make beekeeping a profitable enterprise in Myagdi. Specific challenges, opportunities, and recommendations for interventions have been highlighted in this report.

1 INTRODUCTION

1.1 Beekeeping (Apiculture)

The word ‘apiculture’ is derived from the Latin word ‘apis’ meaning bee, thus apiculture or beekeeping is the care and management of honey bees for honey and other hive products. Bees and their products are widely known and used worldwide. In fact, many countries, including Nepal, has been practicing beekeeping and wild bee hunting as a tradition generation-to-generation.

Beekeeping is an environment friendly activity to generate food, nutrition, and income. It can be started with locally available equipments and tools using traditional skills and knowledge within the community. It does not require large land ownership and can be incorporated as a complementary practice with other agricultural practices. Beekeeping also supports utilization of unharnessed ecological niche like nectars and pollens of flower. Beekeeping is also associated with purely biological nature of bees’ activities, such as plant pollination and conservation of natural flora, which enhances the yield of the crop so can be beneficial in agriculture sector as well.

Many have capitalized on beekeeping not just as a part of tradition or ‘hobby’, but also as a sustainable source of income or secondary occupation in micro, small or even large scale. This business is specifically lucrative since it requires minimum investment with potential for much larger gains. Beekeeping as a business enterprise offers diverse value added products made from honey, wax, royal jelly, propolis, pollen, and bee venom. These value added products can be sold at good price and can become an important source of income. These products can be used as traditional health care remedies and in alternative medicines (apitherapy) as well. To execute beekeeping as a viable business, it is imperative for beekeepers to have basic understanding of bees’ anatomy, developmental stages, types, and functions. General information on these aspects of beekeeping is covered in the section below.

1.2 Anatomy and functions of Honey bees

Honey bees are true insects with a complex structure because of which they are also known as “Swiss Army knife”. Honey bees store the nectar in their foregut or honey crop. The honey crop can hold upto 85 percent of total bee’s weight. After foraging, the bee returns to the colony and stores it in the hive. The wax is produced by abdominal glands. *Apis cerena* species are found in Myagdi region that have similar anatomy as explained above.

Honey bees have division of labor in their colony. Females do all the work based on their “caste”: Queen bee (fertile bee) or Worker bee (infertile female). The queen bee is responsible for laying eggs and maintaining the cohesion of colony. The worker bees are responsible for tending the brood at young age and foraging when older. Male bees or Drones are mainly responsible to mate with queen and are seasonal.

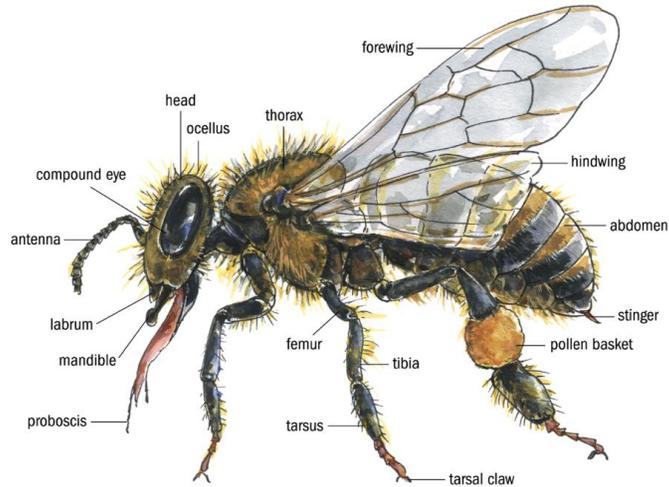


Figure 1.1 Anatomy of Honey Bee

1.3 Different development phases of Honey bees

Egg is the first stage of development of honey bees, which hatches into a small worm called **larva**. At the end of the larval stage, larva capped into a cell with beeswax enters a resting phase called **pupa**. During this stage pupa reorganizes its tissues to change its form from pupa to an adult. The **adult** then chews off the cap of its cell and joins other bees in the colony. Honey bees have different rate of development at each stage, and life span based on it’s type or “caste” (Table 1.1).

Table 1.1 Different developmental stages of Honey bees

Bee	Queen	Worker	Drone
Egg	3 days	3 days	3 days
Larva	5.5 days	6 days	6.5days
Pupa	7 days	12 days	14.5 days
Adult	15.5 days	19-21 days	24 days
Life Span	up to several year	Weeks to months	40-50 days

1.4 Products obtained from beekeeping and their uses:

Beekeepers should take advantage of other hive products as well, which can help generate more income. The hive products such as beeswax, pollen, propolis, royal jelly, and bee venom have both commercial and medicinal values and can be used in varieties of high value products. Types of bee hives and their uses are described below.^[1]

Honey 1.4.1

Honey is a naturally sweet viscous substance produced by honey bees. Honey bees collect the nectars from plants and transform the nectars into honey that are deposited in the bee hives. Honey consists of various nutritional chemical components like protein, carbohydrates, sugars, enzymes,

antioxidants that are beneficial for health and cosmetic purpose. It is also known for its antibacterial, antioxidant and other properties beneficial for human health. Honey has been used since centuries in various cultures in medicinal and beauty products.



Figure 1.2 Image of Beehive (left) and honey (right)

1.4.2 Beeswax

Beeswax (*cera alba*) is an important ingredient produced by the bees of genus *Apis*. Beeswax is a natural wax, light yellow to white in color, secreted by the wax glands present in the abdomen of the bees and are deposited in the hives. It is used by bees to form cells for pupal protection and honey storage. Beeswax mainly consists of esters of fatty acids and long chain alcohols. The extraction process of the beeswax is simple and can have commercial value more than honey. Beeswax can be used in the preparation of various products of cosmetic, pharmaceutical and also food additives. There uses in skin care and beauty products are in alarming rate. Lip balms, lip gloss, moisturizer, eyeliner, hand creams are few of the products of beeswax. ^[2]



Figure 1.3 Image of unprocessed beeswax (left) and processed beeswax (right)

1.4.3 Pollen

Pollen contains sugars, minerals (calcium, iron, potassium, phosphorus, and sodium), vitamins (A,

B1, B2, B6, C, E and H) and amino acids so it is considered as a primary food source for the hives. . It is also effective in treating intestinal disorders. And has powerful, antifungal, antibacterial and antiviral properties that stimulate the immune system and strengthen the capillaries and reduce inflammation. Pollen harvested does not need sophisticated equipments and does not harm the brood if handled properly. Pollen should only be harvested during flow season when more pollen is collected than the bees need.[2]



Figure 1.4 Image of honey bee collecting pollen (left) and separated pollen (right)

1.4.4 Royal jelly

Royal jelly also known as 'bee milk' is produced by the hypo-pharyngeal glands of worker bees to feed young larvae and the queen. Royal jelly is rich in protein, vitamins, amino acids, lipid, mineral salts, and antioxidant enzymes and has a tartaric taste. Its composition can vary depending on geography and climatic variation. It is also a hormone source which can be used for treating convalescence and fatigue, growth problems, aging, stress, and infertility. Royal jelly is a nutritious energy provider, promotes weight gain and growth. It also reduces hair loss, strengthens brittle nails, and is ideal for treating prostate problems. [2]



Figure 1.5 Image of unprocessed royal jelly in the beehive in larval cavity (left) and powdered royal jelly (right)

Propolis 1.4.5

Propolis is a resinous mixture of beeswax and saliva gathered from the buds of trees and balsamic plants by honeybees, mainly *Apis mellifera*, *A. florea*, and stingless bees. It is a sticky substance used as a sealant for unwanted openings in the hives and a defensive material against natural pests and excess. It contains pollen, vitamins, minerals, plant flavonoids, and volatile oils and known to have a spectrum of important antibiotic properties covering a wide range of bacterial groups. Its remarkable healing properties are attributed to its stimulating effect on tissue growth. Propolis is mainly harvested by commercial *Apis mellifera* beekeepers using propolis trap made with steel wire mesh put in place of the inner cover in the hive.



Figure 1.6 Image of bee deposited propolis being extracted (left) and propolis in the hive before extraction (right)

Bee venom 1.4.6

Bee venom is a bitter colorless liquid containing protein (poison) made by poison gland in the last abdominal segment. Venom maximum production is seen when bees are two to three weeks. One sting contains about 100 μg of dry Venom. It is used in defense of the colony. Bee stings (bee acupuncture therapy) have many therapeutic applications, particularly for arthritis, rheumatism, chronic pain, and multiple sclerosis. Directing sting on the point and area of pain or on associated acupuncture points has been known to bring remarkable results. Bee acupuncture therapy is an important part of traditional Chinese medicine and very recently, has been gaining popularity in other Himalayan countries.^[3]



Figure 1.7 Image of bee charging its sting (left) and bee sting (right)

2 RESEARCH METHODOLOGY

2.1 Scope of the research study

The main focus in this research study will be on understanding the current practices in beekeeping in Myagdi, to explore the types of beekeeping products being used, and the possibilities of value addition. There are several successful examples of profitable beekeeping enterprises in the world. However, in order to be profitable, the beekeeping activity must be analyzed properly and the beekeepers should have appetite to diversify their activities based on business essentials and market demand. This study aims to do exactly that by examining the current trends, investments, operating investments, infrastructure needs, technical needs, and other indices to reflect whether value addition in honey and other raw materials by preparing skin care, medicinal and other products can be profitable or not. In addition, strategic recommendations will be provided on step-wise implementation strategies to achieve the project goal and to promote the products of beekeeping in Myagdi region.

2.2 Approach

For the feasibility analysis of the beauty and skin care products from honey and other subsidiary products, we applied a set of research methodology and procedure to come up with impact oriented strategies. Different activities were carried out, mainly with government officials, community people and some with private enterprises. This interdisciplinary relationship helped us gather adequate information, strengthen capacities, and get clear idea about the challenges, weaknesses, strengths and opportunities in Myagdi for honey production and utilizing honey products for value addition.

The project has prioritized beekeeping as a sector having the potential to generate income and create employment opportunities other than farming. Different stakeholders and cooperatives in the community who are involved in beekeeping activities like beekeepers, traders, bee hunters, trade and commerce related governmental and private organizations, and stakeholders in the value chain were the major target groups of the research. Several field group discussions (FGDs), personal interviews, and multi-stakeholder discussions were conducted in Myagdi. The final report was prepared based on the learnings from these consultations, field observation visits, and literature study. From the beginning of the preparation of the report, the project expert team has undertaken the following activities:

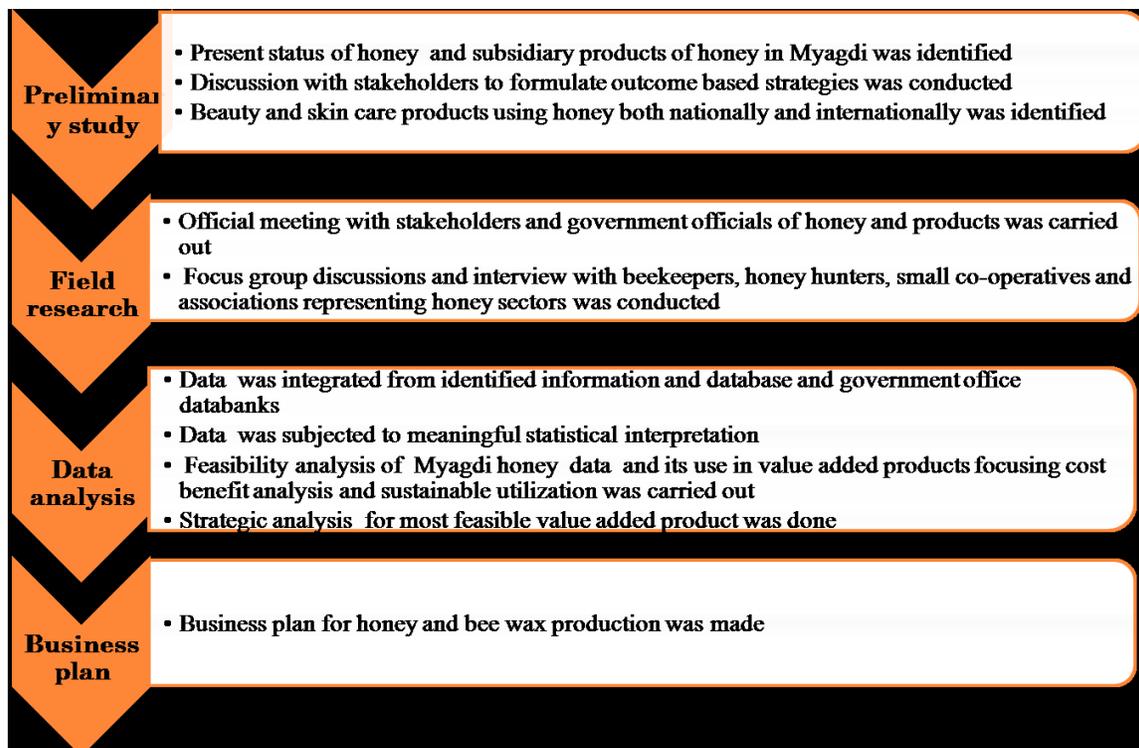


Figure 2.1 Flow of Research Activities

3 Beekeeping in the context of Nepal

Beekeeping is of rich tradition in the remote villages of Nepal and is recognized as an income-generating practice which has the potential to solve the problem of unemployment in Nepali communities. Commercial beekeeping in Nepal is practised mainly for the production of honey which mostly is associated with genetic diversity of the bee-species *Apis cerana*. *Apis mellifera* and *Apis cerana* are the most common honey-producing bees known in Nepal. *A. cerana* is very popular in Nepal not only because of the low cost of its beehive, the log hive, but also because it is much more resistant to cold and predators than *Apis mellifera*.

The local community uses available wild flora and cultivated plants as bee forage and indigenous knowledge in sustainable management of beekeeping in traditional log hives. Selling bee products contributes to cash income for the livelihood of multiple remote and isolated communities in Nepal.^[4] With the increasing trend and demand for bee products, newly introduced improved hives (or purposely made hives) permit quantity and quality honey production and also make it easier to harvest bee products.

3.1 Beekeeping in the context of Myagdi

3.1.1 Beekeeping in Myagdi

Beekeeping in Myagdi is associated with the genetic diversity of *Apis cerana*, availability of bee or for domestic consumption of honey.

In this section suitability and uniqueness of Myagdi for beekeeping is highlighted. The details and advantages of having specific bee species, geographic location, climatic condition, and diverse foraging flora in Myagdi are discussed. Furthermore, details of beekeeping practices with personalized stories from the beekeepers and bee hunters are mentioned in this section. Overall, Myagdi's potential for beekeeping and producing diverse bee hives products is currently minimally utilized, and thus there is huge prospect for growth of Myagdi's beekeeping practices as profitable and sustainable businesses.

3.1.2 Bee species in the region

Apis cerana is commonly used for beekeeping in Myagdi. It is well adapted to the local climate, environment and native flora. It is widespread and can be found between the altitudes of 60-3500m throughout the country. It is gentle in temperament, industrious, mite resistant and can be handled easily. The bees are kept in different types of hives such as hollowed Log Hives (Mude Ghar), Wall Hives (Khope Ghar) and Improved Hives (purposely made hive). No specific forage resources are cultivated for feeding the bees. Bee feeding is supported by the wild flowers and seasonal cultivated crops. It is these plants that provide the mix of diverse nectar and pollen upon which colony health and honey type is dependent (Rhododendron, mustard etc).

3.1.3 Why *A. cerana*?

A. cerana swarms in summer (March to May) and in winter (November to December). They can

survive in temperatures lower than -0.1°C in high hilly regions, while other species like *A. mellifera* completely freeze in such climatic conditions.^[5] Also, *A. cerena* is commonly used by rural people due to low cost of infrastructure for traditional log hives. They use local raw material for the construction of hives. *A. cerena* usually do not feed in dearth season like other species. The problem with *A. cerena* is they require constant brood nest temperature in extreme temperatures ($<-0.1^{\circ}\text{C}$) and proper nest management is required during transferring colonies from traditional to modern beekeeping as there is a chance of bees absconding during the process.

3.2 Geographic condition

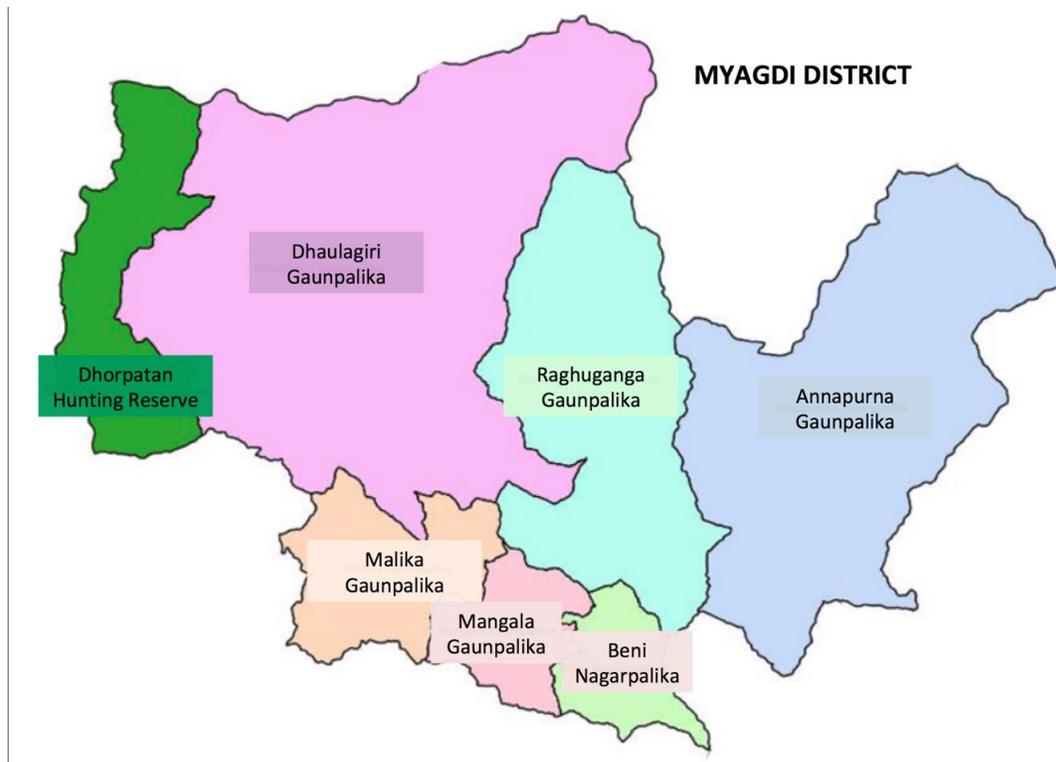


Figure 3.1 Map of Myagdi District

Myagdi District a part of Province No. 4, is one of the seventy-five districts of Nepal. The district, with Beni as its district headquarters, covers an area of 2,297 km², and had a population of 114,447 in 2001 and 113,641 in 2011. It is home to one of the most-valued honey types in the world.^[6]

3.3 Climatic condition

April and March are the most suitable months to gather the best quality honey from the cliffs. The extracted honey is sold to main cities like Kathmandu and Pokhara, and abroad in countries like South Korea and Japan. Foreigners mostly prefer raw and untreated honey in comparison to treated honey. The honey of the Himalayan bee is known for its unique taste, a result of the nectar the bees gather from flowers growing at altitudes higher than 2,000 m. The species *Apis cerena* is the only species that collects this intoxicating nectar, which can be sold by retailers for up to Rs. 1,500 per liter for domestic honey and NPR 2000 for wild honey.

The major factor for the survival of bees in the hilly region is the diverse flora and vegetation blooming almost round the year. The topography of Myagdi shows that, at every 10 km upland, diversity in vegetation is seen. Based on topography, species, hives and flora, honey production rate varies showing the diversity in honey products.^[5]

Table 3.1 Relationship between bee species and climatic variation, hive technology, cost and potential returns.

Climatic variation	Species	Types of Hives	Hive cost (with bees)	Honey Production
Alpine (below 3000m)	<i>A. Cerena</i>	Wall hives	>2500	Low
Cool temperate (above 2000m)	<i>A. Cerena</i>	Wall hives (without frame)	>2500	Fair
		Log hives	>500	Low
Warm Temperate (above 1000m)	<i>A. Cerena</i>	Wall hives (fixed frame)	7000	Good
		Log hives	>500	Low
Subtropical (Below1000m)	<i>A. Cerena</i>	Modern movable hive (fixed comb)	>7000	Good
		Log hives	>500	Low

Source: Himalayan honeybees and beekeeping in Nepal Bee forage

Cultivation, forest multi-flora, flowering medicinal herbs, agro-forestry are all forage for honey bees. Climatic conditions of hilly region favors the growth of diverse medicinal plants which when used as forage for honey bees results in medicinally potent honey. Plants having high nutritional and medicinal values which are being used as bee forage found in Myagdi are listed in Table 3.2 and 3.3.^[7]

Table 3.2 Available cultivable crops as bee forage based on flowering season in Myagdi

Scientific name (Common Name)	Plant Picture	Flowering season
Fagopyrum esculentum (Buckwheat)		July to September
Brassica nigra (Mustard)		June to August
Helianthus (Sunflower)		July to September
Sesamum indicum (Sesame)		July
Citrus × sinensis (Orange)		April-May

*Above table shows the picture of cultivated plants with flower in respective flowering season. The western hilly region has diverse flora with important medicinal properties. Medicinal herbs as a forage for bees can lead to honey of high medicinal values.

Table 3.3 Medicinal herbs as a bee forage based on flowering season found in Myagdi

Scientific name (Common Name)	Plant Picture	Flowering season
Rhododendron arboretum (Laliguras)		March-April
Euphorbia pulcherrima (Lalupate)		December-January
Berberis asiatica (Chutro)		May

Jatropha Curcus L. (Sajiwani)		April-June
Litsea cubeba(Lour.) Pers. (Siltimur)		November -January
Swerti Chirayita (Chiraito)		August-Sept
Rosa Serica (Wild Rose(Jungli Gulab))		June-September
Tithonia diversifolia (Wild Sunflower- Jungli Suryamukhi)		September -November
Diploknema butyracea (Chiuri)		October-December
Rhume austral (Chulthe Amilo)		July-September

*Above table shows the picture of medicinal plants with flower in respective flowering season

Honey production/extraction normally occurs once in autumn from October to November and the honey gathered in this period is known as autumn honey and is considered to be of high medicinal value, while on the other hand, honey extracted in summer between March-April is called summer honey. In the winter season, honey production is very low due to the harsh environmental conditions and low vegetation, so while extracting in winter, the honey quantity deteriorates. The autumn honey having high medicinal properties is considered to me more expensive than summer honey. Despite these variations, the demand for organic honey and other bee product is increasing rapidly.

3.4 Domestic beekeeping:

Beekeeping is a common practice in Myagdi. Every household has at least 1 hive at home. Colonies were traditionally kept in log hives, wall hives, and fixed hives but now people also use modern movable hives (movable frame). Harvesting is generally performed twice a year with the production of almost 6-8 kg per hive. The domestic cultivation nearby as well as wild flora are main source of bee forage. Bee specific cultivation of plants for forage is not performed in Myagdi. During seasons when there is lower availability of natural foraging source, sugar syrup preparations are provided to bees to provide enough food and nutrition.



Figure 3.2 Image of Log hive (left), Bee hive box with movable frames (middle), and Local beekeeper holding an isolated frame (right)

Although beekeeping has been practised in Myagdi since long ago, adoption of modern technical approaches and proper handling techniques is still not fully implemented. Traditional harvesting method of squeezing honey comb has resulted in low yield and low quality honey. The honey produced by individual households in Myagdi is sold within the district and they are not able to enter mainstream markets where they can obtain higher price. Honey is the main product harvested in Myagdi and production of other hive products are not yet explored in the region. The analysis of identified opportunities, challenges, and possibilities in Myagdi indicate that beekeeping practices can be commercially feasible in Myagdi with proper management, high quantity assurance, and diversification of bee products.

Beekeeper's story #1 Story shared by Mr. Meen Bahadur Khatri- Pioneer beekeeper in Daduwa, Myagdi

"I got interested to learn modern methods for beekeeping and decided to take a training in Kathmandu 25 years ago with my own expenses."



I was one of the pioneers in practicing modern beekeeping methods in Dadurwa VDC -5. I started beekeeping 25 years ago when I was a school teacher. Initially, I had only few hives, which later grew up to 70-80 hives. Currently, I have around 35 hives left after the disease infested and killed the bees. I am constantly consulting with experts and doing personal research to get rid of this bee disease in our hives. A. cerena is the only species we use here. I have learnt the techniques of beekeeping and honey harvesting from

Kathmandu, Godavari, as well as out of my interest and traditional knowledge of beekeeping. In the beginning, I struggled a lot to get bees. I even failed to maintain the bee hives because of lack of experience and knowledge. But now, with all the experience and learning, I can even train people and help them initiate beekeeping.

Log hives were used traditionally but now I have colonies in movable frame hives as well. I have my own crop plantation land, where I cultivate mustard, wheat, maize and other seasonal crops, which are used as forage for bees. Also, wild flora is best forage for honey bees. Depending on vegetation, flora and climatic conditions, I have even harvested more than 150 kg of honey per annum and sold off many hives with bees with very good profit. I used to have good income when there was no issue of diseases. But nowadays, we have been facing serious issues of disease in honey bees. We even talked about this issue with District Agriculture Office in Myagdi and experts in Kathmandu, but no effective measures have been taken to address this issue till now. I am really interested in beekeeping and honey production and ready to accept the new technologies to mitigate the current issues. Market for honey is not the issue in this area, we supply as much as we produce. We have assigned price depending on market price

outside Myagdi, which is Rs 1500/- per kg. Sometimes, there is price fluctuation based on the season and type of honey. Apart from ordinary products of honey bees, we know about their importance, but now we just dispose them as waste due to lack of market for value added products nearby. As I have received training and have extensive experience, I am interested in increasing the number of hives and want to solve the problem of disease in bees.

3.5 Traditional honey hunting

Honey hunting is one of the most ancient human activities and is still practiced by people in Myagdi. It is a very dangerous activity as it requires a person to be brave, strong, and skillful to gather honey safely. When there was no sugar, honey was considered as the main source of sweets. Though it looks very difficult and scary, local communities with good knowledge of rock climbing and handling bee hives easily perform honey hunting. The wild honey bees make beehives on the

cliffs and rock walls mostly nearby waterfalls. Climbing a bamboo ladder or rope is the only way to reach the beehives. Honey collection from wild bee colonies is normally performed by subduing the bees with smoke and breaking open the location of colonies like tree or rock, often resulting in the physical destruction of the colony. The lead honey hunter collects honey in the bucket from the beehives and passes down to another person. As per the honey hunters, hunting is best early in the morning or in the cold as in the cold the honeybees are not active and leave the beehives easily. In Myagdi, honey hunting is still a part of livelihood and one of the main income generation activities for many in bee hunting community.



Figure 3.3 Wild honeybee hives formed in rocks in Myagdi (Top), Smoky brush fire to subdue bees (Bottom-left), Destroying beehives for honey extraction (Bottom-right)

Beekeeper's story #2 Story shared by Ms. Dil Maya Chantyal: The female honey hunter from Gurja, Myagdi

"I have been practicing this since I was very young."



I am a resident of Gurja and I have been practicing honey hunting since I was very young. My grandparents as well as my parents were involved in this occupation and made money for our education and livelihood through beekeeping. I didn't study much, and I regularly used to go along with my parents because of which I quickly learned the activities they used to perform while bee hunting. It used to look very scary and hard but now as I know the skills, I can easily perform honey hunting. Mostly the Gurung and Magar communities perform these tasks. We need to take permission from the government officials before performing honey hunting. We wear aprons, gloves and carry necessary equipments to collect honey from nests of wild bees built on steep cliffs. We hang ourselves from cliffs as high as 300 meters using bamboo ladders and hemp ropes connected to each other. Firstly we create smoky brush fire and fan the smoke toward the opening for a certain time to subdue the bees and then only extract honey from combs. People get thrilled looking at our work. Being a girl, I dare to perform this and I love what I do as it needs much skill and courage and I can make sufficient amount of money for my family.

3.6 Difference between Wild bee and Domestic beekeeping Apiary

As, honey produced by wild and domestic honey bee vary in composition depending on forage and climatic conditions.^[8] Similarly, there are also differences in their apiary conditions as shown in **Table 3.4**.

Table 3.4 Comparison of Natural and Common Domestic Apiary

Natural tree Hives	Common Apiary
High off the ground 4-8 m having low humidity and warmer in winters	Apiary is very close to ground
Have small nest and small hive opening	Have large hive opening and large nest
Thick hives walls covered in propolis	Thin wooden floor and walls. Propolis removed and floor clean at least annually.
There is no chemical or antibiotic treatment	Regular chemical treatment for mites and common disease
Regular annual swarming	Swarm prevention
Hive consist of empty cavity	Farmers of easy honey removal and transfer of combs and brood between hives
Beehives have Static position	Sometimes migratory
No intervention to prevent loss	Intervention to prevent loss
Hive well spaced	Hives closely packed together
Queen live long on small brood comb	Queen often replaced by beekeepers(1-2 year of cycle) on large brood comb

3.7 Beekeeping Equipments used in Myagdi

3.7.1 Bee Hives Before the introduction of artificial hives, beekeepers used to depend on natural hives to extract honey. These natural hives (ghar in nepali) are the ones made by honey bees on the trees, corners of households (khope ghar), in the cliffs (Bheer mauri ghar). *Currently there are mainly two types of bee hives used in Myagdi households for beekeeping:*

1. Log hives (Mude Ghar in Nepali)
2. Wood box hives

3.7.2 Log hives

Big wood logs with cavity in the middle are placed for the honey bees to make their hives. These hives have been used traditionally used in the region before the wood box hives were introduced. Log hives are still used in the region for household purpose, but box hives are mostly used for commercial purpose.



Figure 3.4 Image of log hive frame (empty) that are used in Myagdi

3.7.3 Wood Box Hives

Wood box hives used in Myagdi are commonly used throughout Nepal for commercial beekeeping. Box hives can also be made of other materials, but in Nepal most hives are made of Nepal. Box hives different compartments/ components- bottom boards, queen excluder, brood chamber, supers, frames, hive stand, feeder, pollen trap, and covers.



Figure 3.5 Image of wood box hive used in Myagdi (left) and image of different components of wood box hive used in Myagdi (right)

Other equipments 3.7.4

Hive tool Smoker



Figure 3.6 Image of hive tool (left) and smoker (right) used in Myagdi



Figure 3.7 Image of local beekeeper wearing the protective head/face over and gloves.



Figure 3.8 Image of honey extractor

3.8 Beekeeping and honey production data

Almost every household in different VDCs of Myagdi is involved in beekeeping. The honey can be considered organic because of considerably less use of pesticides, insecticides and other agro-chemicals. The demand of natural unprocessed honey is increasing as per the data of District Agriculture Development Office, Beni Bazar, Myagdi. ^[9]

Table 3.5 Beekeeping and honey production data (2073-2075) from District Agriculture office,

Myagdi

Myagdi Data of beekeeping and honey production in Myagdi	2073	2074	2075
Number of registered beekeeping enterprises	-	-	-
Number of registered beehives	2995	4620	4700
Annual Honey production (kg)	5885.4	23,100	23,500
Honey yield per hives	2.0018	2.12	3.5
Honey price range for (NPR/Kg)			
Wild	1500	2000	2000
Domestic	1000	1500	1500

Source: Agriculture development office Myagdi

4 Feasibility of promoting beekeeping and beehive products as a sustainable and profitable enterprise in Myagdi

4.1 Beekeeping as an occupation and time commitment

Agriculture, animal husbandry and beekeeping are the main occupations of the people in Myagdi. Beekeeping has been in practice for many years in Myagdi and is a lucrative business made possible through simple management, and use of locally available equipments and traditional skills. Almost every house has at least one hive for local consumption of honey. During the course of interviewing several people involved in beekeeping, we found that beekeeping is a source of valuable income to a number of rural livelihoods. Though beekeeping tends to be perceived as a “sideline activity” or as a “hobby”, it has significantly contributed to livelihood security for those who have limited income from their primary occupation.^[1] Also, it is not invasive as bees function along the natural patterns of local agro-ecological zones and this provides positive impacts on the fauna and flora found in the region. Initially, few people started beekeeping with small start-up investments, simple technologies and were assisted by a weeklong training from Gandaki Bee Association in Godavari, Kathmandu. Later, the experience and knowledge was transmitted to other people interested in beekeeping. Honey is the only primary product produced till date from beekeeping. Despite being aware of value added products such as beeswax, bee venom, royal jelly, propolis, from bee products other than honey, beekeepers are reluctant to engage in activities to produce other bee hive products. The major concern of beekeepers was lack of knowledge of and access to market. Some beekeepers were also trained to produce beeswax, but they haven’t implement their training into practice for similar set of reasons and all these by-products from bee hive gets wasted or goes unutilized even though the additional cost if collecting additional bee hive products is minimal compared to their current investment. However, the beekeepers are interested to learn and diversify their product portfolio in case their concerns about market availability and technical gaps are adequately resolved. It is possible to find solutions to the identified challenges in Myagdi if the problem areas are strategically prioritized and tackled. Engagement of local stakeholders is necessary to make beekeeping activity a commercial success. Thus, bee keeping community and cooperatives play a key role in organizing and mobilizing these local stakeholders. There are few groups that are active as grassroots level in Myagdi.

4.2 The beekeeping community and co-operatives

Myagdi has unique and extensive natural resources and also has indigenous honeybees which are few of the earth’s remaining bees not being spoiled by diseases and predators. Therefore, there is a huge possibility ahead to extract abundant organic honey by addressing the current issues before the situation goes out of control. This situation calls for local level awareness to promote possible activities in honey production and beekeeping. Small co-operatives and enterprises can play a huge role in promoting the ecologically sound honey produce which is in high demand in worldwide market. These are examples of authorities and organisations that provide incentives, technical input and services to the honey beekeepers :

District Agriculture Development Office is helping beginners by providing 50% fund for hive box and also for bees. The office is also cooperating with beekeepers to resolve the issues they have been coming up with while beekeeping. DADO also conducts various types of training which

provides technical support to beekeepers and also keeps them updated about honey issues. Despite having great potential and the continuous incentives or training, honey yield in Myagdi is still very low.

Gandaki Bee Association in Godavari, Kathmandu has been providing technical training and education to the people interested in beekeeping. The training is generally basic which includes topics like hives construction, honey extraction methods, use of tools and other accessories during bee handling and extraction. Week long training has helped people in Myagdi to start beekeeping as an occupation. Few actively involved people in beekeeping are also training local communities to start their own work.

Mother's Group (Aama Samuha) is a body which is dedicated to facilitating and addressing various issues and problems in Myagdi. But on closer evaluation, these associations do not directly work for upgrading the honey business or addressing the challenges in beekeeping. Though every household in Myagdi is involved in beekeeping, they do not have cooperatives for bee products.

4.3 Different beehive products in the region

Apart from honey, different subsidiary hive products such as beeswax, bee venom, propolis, royal jelly also has high market value. Data from the district agriculture office suggests an increasing trend in honey production and increased number of hives from 4620-4700 in number in the last 2 years (2073-75 BS).^[9] This data also indicates higher possibility of introducing value added honey-based products in Myagdi because of increasing awareness, acceptance, and activity. Though honey is the only major product produced till date, people are aware about the benefits of processed value added products and are even willing to work on processed products, only if there is proper market accessibility. Value added products pass through all the activities of the chain in order, and with each activity the product gains some value, which automatically increases the cost of product. The value chain approach for different subsidiary products can be used to help Myagdi beekeepers in the chain gain greater benefits from their products.

Table 4.1 Current trends and possibilities for beehive products in Myagdi and their benefits

Beehive products Benefits/uses

Beehive products	Benefits/uses	Scoring in Myagdi (1-5)* 1 being lowest and 5 highest
		Current practice
Honey	Anti-bacterial property, Antibiotics on skin problems, Anti-oxidants	4
Beeswax	Medical skin creams, ointments, Pain relief and healing property	1
Pollen	Antibacterial, Antifungal and Antiviral properties	0
Propolis	Antibiotic properties,	0
Bee Venom	Therapeutic application in arthritis, rheumatism, chronic pain, and multiple sclerosis, Acupuncture therapy	0
Bee packages	Develop new and strengthen colonies	3

*The scoring is assigned qualitatively based on district agriculture office data, literature reviews, interviews, and focused group discussions.

4.4 Financial considerations

Out of the 27,727 households in Myagdi^[6], almost every household is involved in farming and beekeeping and it is considered a viable economic activity. Though they take beekeeping as a sideline activity (apart from their primary occupation), they have been generating income that can contribute significantly to maintain their livelihoods. Also, the domestic consumption of honey is high due to most people being involved in beekeeping. Richness of bees and extensive natural resources make honey a unique product resulting in high cost of honey than other commercial honey products. The price of honey has been the same in various VDCs of Myagdi and has been assigned by the beekeepers themselves based on the market outside Myagdi. Considering the medical importance and dietary supplement of honey, the pricing of NPR 1500/- per kg for domestic honey and NPR 2000/- per kg for wild honey is reasonable but is considered high as compared to processed honey exported from other countries. According to honey producers, the total honey produced in district is consumed within the district, and only a small amount of honey goes to the outside market through formal market chain. The organic honey has a high demand, and buyers come to the doorways of bee-farmers in Myagdi and sometimes the demand is more than the supply.

The distribution of Myagdi honey to the market is very direct. Mostly honey goes straight from the honey hunters and beekeepers in Myagdi to the consumers, or through village level middlemen and international clients. Only a small amount of honey goes through the formal marketing system to processors/wholesalers and retailers. The supply chain is highly vulnerable to price fluctuation. [10]

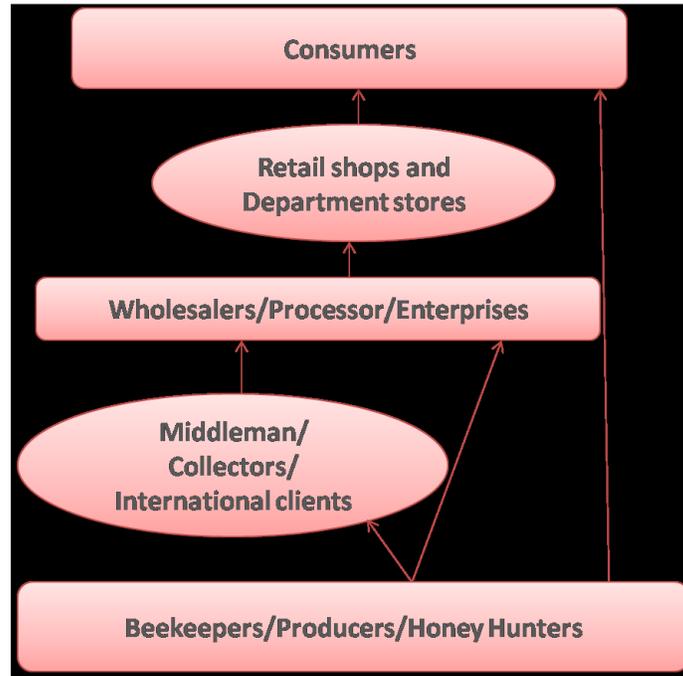


Figure 4.1 Most prevalent model of supply chain in Myagdi

The price variation from honey hunters to wholesalers varies and there are no official records of this data. The revenue generation from honey marketing and other subsidiary value added products is very less till now. The honey is sold as organic honey in most instances, or else sold to enterprises or processors if the amount of honey is large. Many beekeepers reported their income to be ranging from NPR 500 thousand to 700 thousand annually when there is consistent production of honey. The main challenge is that in the perception of honey hunters and bee-keepers, the benefits of bee products other than honey are few or non-existent. Despite awareness and knowledge about the economic importance of value added bee products, people are least bothered about using bee products other than honey because of less market access. Analysis of the amount of bee products other than honey and their value added importance necessitates the importance of taking into consideration the utilization of bee products effectively.

4.4.1 Financing Plan

Objectives:

- To identify financial needs in business
- To plan how financial needs can be met
- To assess if the financial plan is feasible or it needs to be revised

There could be several means of financing a business. It may be adapted depending on the context and need of the business. Means of finance can also be diversified to minimize risk. The following table (**Table 4.2**) has few practical examples of different means of financing and their advantages and disadvantages. This template can be modified and used as a guiding document in defining various source of financing per nature and needs of business.

Table 4.2 Advantages and disadvantages of different means of financing

Source	Advantages	Disadvantages
<ul style="list-style-type: none"> • Savings 	<ul style="list-style-type: none"> • No cost • Risk of losing own capital 	<ul style="list-style-type: none"> • Could be invested to obtain more returns • Might be needed for personal expenses
<ul style="list-style-type: none"> • Loans from family/friends 	<ul style="list-style-type: none"> • Less pressure to pay back • Less interests (if any) than other lending sources 	<ul style="list-style-type: none"> • Could jeopardize relationships if the investment undergoes loss
<ul style="list-style-type: none"> • Loans from local money lenders 	<ul style="list-style-type: none"> • Normally no collaterals needed 	<ul style="list-style-type: none"> • Could result in conflict if investment undergoes loss • They will ask for other assets • Usually high interest rates
<ul style="list-style-type: none"> • Loans from Banks 	<ul style="list-style-type: none"> • Lower interest rates than local money lenders 	<ul style="list-style-type: none"> • Collaterals needed
<ul style="list-style-type: none"> • Supply on credit 	<ul style="list-style-type: none"> • Payment later, ideally when cash is received from sales 	<ul style="list-style-type: none"> • Dependency on suppliers

Beekeeper's story #3

"I want to be one of the most successful beekeeper in Nepal."



I am Govinda KC, resident of VDC-1, Kulu. It has been 7 years since I came back from the UAE and I find great opportunities in my own country than foreign countries. Since my return, I have been involved in beekeeping and I am earning much from this occupation. I want to take it further and also want to transfer this knowledge to my son.

I started beekeeping officially four years ago and I earned Rs 10,000 in the first year of beekeeping. To start this occupation, I was supported by District Agriculture Development Office, Myagdi, Beni Bazar both financially (50% fund) and through vocational trainings. Such incentives and trainings were given to all community people in Myagdi who were interested in beekeeping. Through my hard work and dedication, I took beekeeping to another level and now I earn a very good amount to support my livelihood as well as the education of my two sons. I sold honey and beehives worth NRs 1.4 million in 2016 and now I am targeting to generate a revenue of NRs 1.7 million and sell maximum beehives. I have been using artificial insemination of queen bees to strengthen bee colonies and to increase the honey production. Initially, the market access was less but now as people have started recognizing the medicinal importance of organic honey, my honey has become so popular that I am unable to supply the received demands. I often get advanced payments for the honey. I believe in providing good services to my customers or buyers. I am also interested in trying to produce other subsidiary bee hive products if I get necessary technical support and guaranteed access to market. I would like to mention that with full dedication and hard work, there is nothing we cannot do in our own country. Our country is full of resources, if we could realize the importance and sustainable utilization. Also, I do not want to go back to any foreign country, because my country is paying my worth here.

4.5 Understanding the market

The following SWOT Analysis (**Figure 4.2**) was prepared based on the learnings in Myagdi and can be useful in understanding the bee keeping business contextually for Myagdi district.

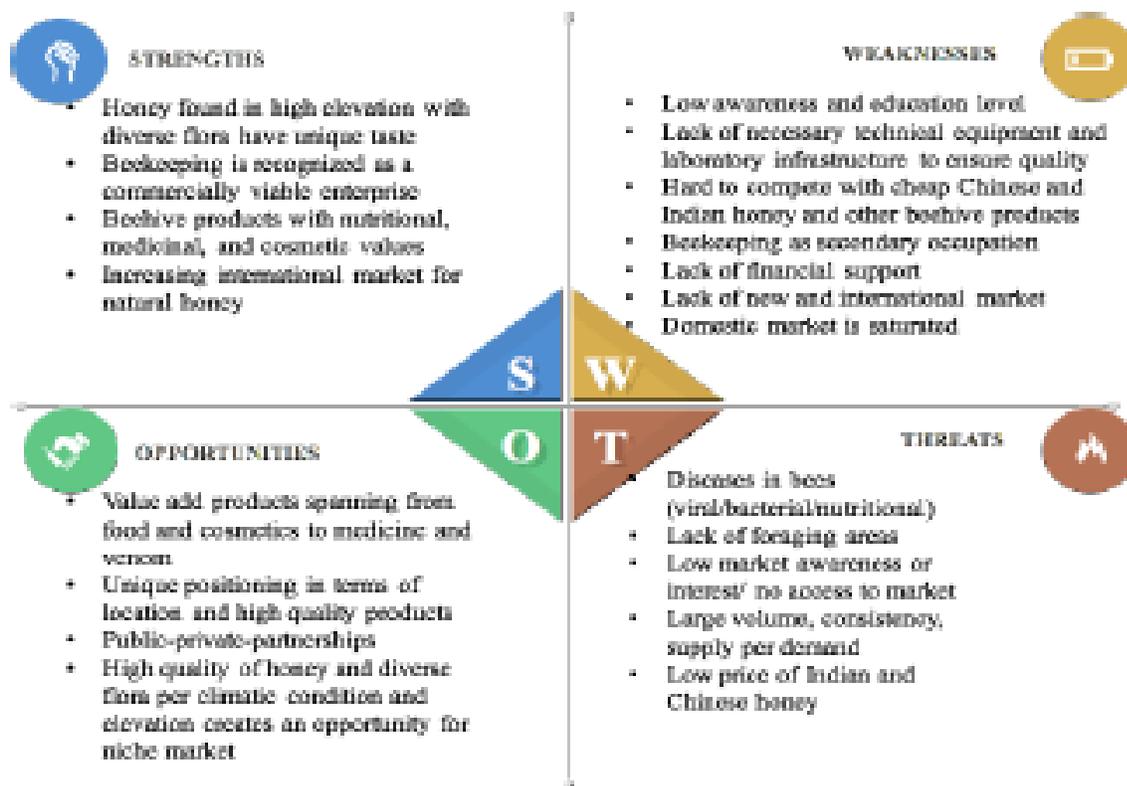


Figure 4.2 SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis for Beekeeping Enterprises

4.6 Employing strategies for proper marketing, branding, and pricing

Raw and unprocessed honey is in high demand throughout national and international markets, and because of its antimicrobial properties and medicinal value, raw honey is generally sold at a higher price. Myagdi, which has diverse flora and fauna, provides a wide range of forage resources for bee feeding resulting in diverse varieties of honey. This honey can be consumed for nutrition, sold for income generation or used as a basis for enterprise development. Attention needs to be paid at different stages from production to branding and marketing to ensure the production of good quality honey. Quality assurance and packaging services focusing on export standards can improve the quality and add up to pure quality Myagdi honey. Pure quality honey means that the honey has a natural essence, taste, and colour, is not adulterated, and is free from chemical residues. Branding is crucial for products and services sold in huge consumer markets, and branding Myagdi honey will help honey to stand out because of its pure quality. This will include quality assurance, presentable packaging, and product pricing. According to survey results, honey in Myagdi has a higher demand than the current supply, so in order to gain the maximum benefit from beekeeping and honey production, it is first necessary to know the potential markets and their requirements. This strategy will help to plan production to meet market demand and also to make the consumer market aware regarding uniqueness of Myagdi honey. Price analysis is also necessary to analyze the potential market price of different types of honey or other hive products.



Figure 4.3 Value chain map of key stakeholders, activities, and value propositions

4.7 Nepali honey production and value in international Market

In the fiscal year 2015/16, Nepal produced 3500 metric tonnes of honey. Production data suggests that Nepal’s honey production rate is increasing steadily over the last 3 years. Organic honey is widely used for treatment of various illnesses and also as an ointment for burns, bruises and cuts and as a medicinal supplement for cold, coughs, sore throats. But the success and importance of beekeeping has not translated itself to finding its niche in the international market. Statistics reveal that Nepal is yet to regularize its honey export to the European Union (EU) and India, despite its rising demand there. The statistical information of beekeeping and honey production in Nepal is given in Table 4.3.^[9] According to 4-digit Harmonized Tariff System, code prefix for natural honey is 0409.

Table 4.3 Statistical information of Beekeeping and honey production in Nepal

Year	Bee hives(No.)	Production (Mt)
2012/13	169,000	1,625
2013/14	170,000	1,650
2014/15	225,000	3,000
2015/16	232,000	3,500

Total global sales of natural honey totalled US\$2.4 billion in 2017. Among different countries exporting the highest dollar value worth of natural honey, China and New-Zealand are the two top exporters of honey in the world market. China contributes to 11.44% of total natural honey exports of worth US\$270.7 million, while New Zealand contributes to 11.38% of worth US\$269.2 million. Nepal rank 102nd in sharing export of honey in the global market and shared a value % of 0.01.^[3,11]

Table 4.4 Overall honey export appreciated by different continents

Rank	Exporters	Value % Contribution in Global honey export in 2017
1	Europe	39.5%
2	Asia	23.1%
3	Latin America	16.1%
4	Oceania (Australia+New Zealand)	12.7%
5	North America	8.1%
6	Africa	0.4%

Source: Worldstopexport

The rising demand of honey has not been translated in the rising production and export of honey in Nepal.

Table 4.5 List of Export Quantities and value of honey from Nepal to other countries in 2016 and 2017

S.No	2016			2017	
	Importers	Exported Quantity, tons	Exported unit Value USD/tons	Importers	Exported Quantity, tons
1	China	7	3,857	China	30
2	UAE	-	-	UAE	7
3	Malaysia	1	7,000	Malaysia	3
4	Japan	-	-	Japan	1
5	India	1	3000	India	-

Source: Trademap

Though the data reveals the deteriorating trade with some countries, there are honey exporters who are using informal channels for the export of honey in the international and national market, so the above mentioned figures are likely to be underestimated.

5 BUSINESS PLAN TEMPLATE FOR PRODUCTION OF HONEY AND BEESWAX

This template can be utilized or modified based on the types of products, scale of production, and many other factors in a specific business.

Business Profile and Summary

*Feasibility Analysis on Production of Beauty and Skin Care Products and Other Subsidiary Products Produced from Honey in Myagdi District
Business Plan for Honey and Bees Wax Production*

Goals

- Expand national and international distribution network from beekeeping products
- Maximize the returns from beekeeping by utilizing honey, beeswax, and all other subsidiary products that can be obtained from the beehives and bee colonies
- Increase awareness about honey from himalayan region
- Promote beekeeping practices as businesses in Myagdi in an organized and economically sustainable manner

Objectives

- Access international market for honey, beeswax, royal jelly, and other subsidiary products
- Determine the costs and returns associated with beekeeping
- Determine the feasibility of preparing skin care and other beauty products using honey and beeswax
- Obtain competitive price of products in the international market
- Recommend long term step-wise implementation strategies for sustainable growth of beekeeping enterprises in Myagdi
- Expand distribution network to include organic certified products' stores and international market
- Increase business to business sales to incorporate honey, beeswax and other products of beekeeping into cosmetics, medicinal products, and nutraceuticals

Business plan preparation date: dd/mm/yyyy

A Basic Information:

1. Entrepreneur's name:
2. Age
3. Sex:
4. Name of business:
5. Address:

B Market and Production Plan:

B1. Brief description about products/services:

Installation of beehives for beekeeping, and production of honey and beeswax.

Production scale: small and medium enterprise (SME)

B2. Major market centre (current and target): haat bazaar, district headquarters, Kathmandu, international market (target)

B3. Types of customers: (important for developing market strategy for individual entrepreneur)

All general households at market, small shops/retailers, middlemen.

B4. Products or service in comparison with competitors:

Name of service or products	Name of Major Competitors	Price Comparison	Quality Comparison	Packaging Comparison	Selling strategies Compared with Competitors
HONEY	Other beekeepers, high volume honey producers in terai regions	variable, mean = NRs. 1500/kg – in line with other producers in local area	Good – in line with other producers in local area	Very simple (plastic bottles) – in line with other producers in local area	Local markets at festivals, target institutions – currently no different strategy to competitors
BEESWAX	Other beekeepers, high volume beeswax producers in terai regions	2000 per kg	Good – in line with other producers in local area	Very simple (plastic bottles) – in line with other producers in local area	Local markets at festivals, target institutions – currently no different strategy to competitors

B5. Market target in unit or price (monthly or annually) (note: very important here to set a target!): Sales price varies over the year; data below based on mean annual selling price, see B4 above

Target

Honey: 800 kg of honey/year = NRs 12,00, 000

Beeswax: 50 kg beeswax/year = NRs 100,000

Estimates/ assumptions:

- i. total beeswax extracted is ~10-12 wt% of total honey produced from 100 hive frames multiple times in a year
- ii. additional investment in beekeeping is beeswax is extracted from the hives is ~25%.

B6. Required fixed capital (machines/ tools/furniture fixture)

#	Detail name	Quantity	Rate per unit	Total NRs.
1	House	1	3000	30000
2	Wooden Hive Box	10	3500	35000
3	Full protection gear	6	2000	12000
4	Hive tools	10	500	5000
5	Honey extractor	2	5500	11000
6	Brush	10	400	4000
7	Hive Box stands	10	1000	10000
8	Hive frames	100	400	40000
Total capital investment				1,47,000

B7. Depreciation over 3 years

#	Name of fixed capital	Total Amount (NRs.)	Depreciation rate (%)	Depreciation amount (NRs.)
1	Wooden hive Box	35000	33%	11550
2	Full protection gear	12000	33%	3960
3	Hive tools	5000	33%	1650
4	Honey extractor	11000	33%	3630
5	Brush	4000	33%	1320
6	Hive frames	50000	33%	16500
Depreciation in first year				38,160

NB. Depreciation is a fixed capital cost

C. Expenses Plan

C1. Calculation of raw materials (monthly/annually)

#	Description of raw materials	Quantity	Rate per unit	Total (NRs.)
1	Hive frames with bees colony	70	7000	49000
2	Sugar (food for bees)	200kg bulk	60	12000
3	medicine	Per need		3000
4	Packaging containers (honey)	500g X 100 1Kg X 50 5Kg X 20	40 per container 60 per container 150 per containers	10000
5	Packaging material beeswax	Bulk saran wrapping rolls	6-8 rolls for total 50 kg	5000
6	transport	transport 2-3 times in bulk per season (total 8-10 times)	1500	15000
7	Simple labeling materials			20000
Total Annual cost of inputs				1,14,000

C2. Human Resource cost for wage and salary – one-off and recurring

#	Description	Number of person days	Daily wage (NRs.)	Annual wage or salary (NRs.)	Remarks
1	Caretaker for bees	150	200	30000	The owner is usually the main beekeeper/ caretaker who supervises throughout the year
2	Labor required during harvest and for packaging	60	200	12000	
Total annual wage bill (first year only)				42,000	

C3. Other costs (including overheads)

#	Description	Monthly expenses (NRs.)	Annual Expenses (NRs.)	Remarks
1	Cost of land – rent equivalent	1500	18000	small scale beekeeping requires very little land
2	Miscellaneous		20000	
	Total		38,000	

D. Financial Plan

D1. Calculation of per unit cost and selling price

#	Description	Annual Cost (NRs.)		
		Honey	Beeswax	Annual Totals
1.	Cost of raw materials (C1)	Approx 75% of total cost = NRs. 85,500	Approx 25% of total cost = NRs. 28,500	1,14,000
2	Cost of Human Resource (C2)	31500	10500	42,000
3	Other costs (inc. overheads) (C3)	28500	9500	38,000
4	Depreciation (B7)	28620	9540	38,160
5	Interest	0	0	0
A.	Total annual cost	1,74,120	58,040	2,32,160
B.	Per kg cost (total annual cost/annual market target)	Total cost/total kg = NRs 1,74,120/800 = Nrs. 217/kg	Total cost/total =NRs 58,040/100 = NRs 580/kg	n/a
C.	Profit Margin (rough estimate)	142%	71%	n/a
D.	Target mean selling price (NRs) per kg	NRs 1500/kg	NRs 2000/kg	n/a

D2. Calculation of working capital

#	Description	Required days for calculation	Amount (NRs.)
1	Raw materials stock		0
2	Stock of semi-process goods		0
3	Stock		0
4	Credit facility		0
5	Cash for overhead cost management		0
	Total (NRs)		0

D3. Calculation of total capital

#	Description	Amount (NRs.)	Remarks
1	Total fixed capital (B6)	107,000	
2	Total working capital (D2)	0	
Total (NRs.)			

D4. Source of capital

#	Description	Amount (NRs.)	Remarks
1	Equity – self investment (D3)	1,47,000	
2	Loan	0	Bank, saving credit group, relatives
Total (NRs.)		1,47,000	

D5. Calculation of profit and loss

#	Description	Amount (NRs.)
1	Income from total sales (market target*selling price)	12,00,000
2	Deduction of total expenses	
a	Cost of raw materials (D1 line 1)	85500
b	Cost of Human Resource (D1 line 2)	31500
c	Cost of other costs (inc. overhead) (D1 line 3)	28500
d	Depreciation (D1 line 4)	28620
e	Annual interest (D1 line 5)	0
3	Sub-total of all expenses	1,74,120
4	Net profit (total income - total expenses)	10,25880

D6 Return on investment (RoI):

$$\text{Honey:} \quad = \frac{\text{Net profit} * 100}{\text{Total Investment}} = \frac{10,25880 * 100}{1,74,120} = 589 \%$$

$$\text{Beeswax:} = \frac{\text{Net profit} * 100}{\text{Total Investment}} = \frac{165097 * 100}{58,040} = 245 \%$$

D7 Conclusion:

Beekeeping for honey and beeswax production is feasible and highly profitable with more than 142% profit margin in honey and additional 70% profit margin in beeswax, and large return of investment (honey-589% and beeswax-245%) even in small- scale production of with total 100 beehive frames used in 10 hive boxes. This business plan template is based on the data obtained from the village development committee, beekeepers and the market estimates. The investment and infrastructure required for beekeeping is very little compared to huge return and possibility for growth and diversification of products. If diverse products from bee hive are commercially produced then there is even more possibility for higher return and higher profit margin. Preparation of value added products like beauty products, skin care products, nutraceuticals, medicinal additives and products could be much more lucrative business than selling raw materials. Additionally, the target pricing in the template is determined based on domestic market. The value of these products can be much higher in international market if the niche market is targeted that focuses on honey produced in himalayan region with diverse flora with medicinal values.

6 STANDARDS, QUALITY, AND CERTIFICATIONS FOR HONEY AND HIVE PRODUCTS

6.1 The need for quality assurance

The demand for honey and other beekeeping products has been increasing worldwide with desire to use natural and chemical free ingredients as an alternative to synthetic chemicals and highly processed ingredients. With this increasing demand, consumers are more aware and critical about the quality of the products they are consuming. Therefore, it is crucial to perform the necessary quality assurance tests before bringing the product in the market. Honey comprises of number of components like sugars, carbohydrates, acids, amino acids, enzymes, moisture, that are of great importance in various industries like food, cosmetics, medicine, etc. These components dictate and indicate the nutritional value, medical efficacy, texture, granulations of honey. Thus, analysing the chemical and physical properties of honey is important to identify the authenticity, adulteration possibilities, heat and storage damage, and source of honey. Currently, Nepal is in the preliminary stages in terms of quality assurance of honey compared to international standards. For Nepal to be competitive in the international bee products/honey market, the quality regulations and laboratory facilities for testing has to be upgraded to be in par with international code and standards.

6.2 International market quality standards and requirements

The international standards for honey may vary depending on the country or region. The European Union, United States and Canada in general have much stricter regulations in items related to food and medicines like honey. One of the most accepted and recognised standards for quality assurance of honey is ‘Codex Standards’, which was set by the Codex Alimentarius Commission (CAC) under the joint collaboration of Food and Agriculture organization (FAO) and World Health Organization (WHO) Food Standards Programme.

6.3 Domestic standards

To ensure domestic standards of honey in Nepal, some of the regulatory bodies like Department of Food Technology and Quality Control (DFTQC) and Nepal Bureau Standards and Metrology (NBSM) have set some key technical regulations. While it is an important step to ensure quality of honey, the standards set by these regulatory bodies are not aligned that can cause confusion and complication. Additionally, the parameters set by DFTQ and NBSM are much fewer than than internationally recognized Codex standards set by CAC (see above). Government laboratories lack adequate infrastructure to identify certain parameters set by DFTQC like identifying inorganic and organic matters foreign to the the composition of honey. Therefore, it becomes very difficult or impossible for honey producers, which mostly comprises of rural population, to be competitive in national and international market by assuring high quality of honey.

Table 6.1 Key parameters for the analysis of quality of honey samples

Parameters	Key functions or benefits
Moisture (%)	Low moisture content is preferred for longer shelf life of honey
pH	The low pH of honey inhibits the presence and growth of microbial organisms Acidity also contributes to the flavor and aroma of honey
Electrical conductivity (mS/cm)	Codex standard for honey is <0.8 mS/cm in 20g honey diluted in 100mL water. The value is influenced by factors by acidity, moisture, viscosity, salt content.
Ash content	Represents total amount of inorganic minerals salts present in honey and these minerals may also retard the growth of microbial organisms in honey
Enzyme	
Invertase	Enzymes are important chemicals in our body that supports various vital function like digestion, anti-aging, energy conversion, antimicrobial activities, etc.
Amylase	
Glucose oxidases	
Sugar and carbohydrate content	
Fructose	Sugars and carbohydrates are responsible for providing nutrition and energy to our body. Honey does not raise blood sugar level levels as quickly as other processed sugars (has low glycemic index than sugar). Honey may be easier to digest than other sugars because of digestive enzymes present in honey.
Glucose	
Turanose	
Maltose	
Oligosaccharides	
Others	
Amino acids	
Proline	Proline is the most abundant amino acid in honey. Amino acids make up proteins, so they play nutritional role in our health if consumed in adequate quantity.
Lysine	
Arginine	
Others	
Microbiological tests	The bacterial load in the product should be within the negligible range
Pesticides and heavy metals	harmful chemicals and metals that will adversely affect the health and body functions

Sources: Adapted from refs. [12],[13]

Table 6.2 Key parameters for the analysis of quality of beeswax samples

Parameters	Key functions or benefits
Moisture (%)	Same as table 6.1
Esters	These chemical properties are useful to determine the authenticity as well as to match the quality of wax with specific formulations
Hydrocarbons	
Free acids	
Alcohols	
Saponification value	This value is mostly important when making soap products
Other chemical components	
Colour	Yellow to yellow-brown
Consistency	Should not stick upon cutting or chewing
Melting point	These physical properties are determinant of various resulting properties of wax when being used for several purpose like skincare, lip balm, cosmetic, candle, etc. Therefore, based on these properties the quality and use of wax is determined.
Density	
Refractive index	
Paraffins test	Paraffins is considered overall harmful for skin or if swallowed
Authenticity (Gas Chromatography (GC) pattern)	Authenticity can be confirmed using GC technique
Contamination and residues	Harmful chemicals and metals that will adversely affect the health and body functions

Source: Adapted from *Quality and standards of pollen and beeswax* ^[11]

Table 6.3 Key parameters for the analysis of quality of propolis samples

Parameters	Key functions or benefits
Moisture (%)	Same as table 6.1
Carbohydrates	Same as table 6.1
Proteins/ Amino acids	Same as table 6.1
Dietary fiber	Good for nutrition and digestive health
Minerals	Represents total amount of inorganic minerals salts present in honey and these minerals may also retard the growth of microbial organisms in honey
Vitamins	Good for various body functions
Flavonoid glycosides	Beneficial for vital functions like cardiovascular, brain, metabolism
Visible contamination, taste, odour	Represents the authenticity, adulteration, and expiration of the product
Microbiological tests	The bacterial load in the product should be within the negligible range
Pesticides and heavy metals	harmful chemicals and metals that will adversely affect the health and body functions

Source: Adapted from *Quality and standards of pollen and beeswax* ^[11]

6.4 Certifications

Certifications of honey and other hive products ensures that producers have met a set standards and criteria that are allocated by the certifying body. These standards are generally set by the authorizing body with health and well being of consumers and sustainability of the environment as a priority.

6.4.1 Benefits of certifications

- Ensure greater access to existing and fast-growing markets
- Help protect the environment from harmful products and processes
- Helps beekeepers to receive premium prices for their products (honey and hive- based products)
- Support local economies
- Access additional funding and technical assistance programs

Challenges for certifications process in Nepal 6.4.2

The key challenges for international certification process in Nepal are:

Awareness : There is very low level of awareness and information about certifications and their benefits. Even though there may be awareness about certification, there is not sufficient information about the process of getting certified.

Process : The certification processes could be very strict and meticulous. It could involve many steps like training, inspection, and follow-ups, which have to be done within specific deadline and guidelines to be approved for certification.

Time and Cost : The international certification of products and services can be expensive and time consuming, since it involves a long process with several steps.



Figure 6.1 Examples of Various Certifications of Honey and Hive products ^[14]

7 KEY FINDINGS: CHALLENGES, INTERVENTIONS, AND RECOMMENDATIONS

In order to set up beekeeping as an enterprise, the aspiring entrepreneur should first understand current beekeeping-related challenges, the market opportunities, gaps, available resources, infrastructure, consumer needs, and market demand. Beekeeping can be a profitable business if conducted with appropriate knowledge and resources. For Hilly region like Myagdi, small to medium scale per household might be most favorable in the initial stages. The investment required is also low and can be started by anyone like-men, women, landless, poor and marginalized individuals. Thus, beekeeping as a business enterprise can provide sustainable household income and generate employment in the community.

7.1 Challenges of beekeeping as a business

Technical challenges: 7.1.1

They have been practising beekeeping for several years but since the last few years, they have been facing challenges related to the health conditions of honey-bees which has resulted in reduced production of honey and also less hives divisions. They have been consulting with concerned

experts in beekeeping but no major interventions have been made. Also, the solutions suggested by Agricultural Expert to get rid of the problems haven't proved very effective. This has resulted in a decline of the overall income generation as compared to the past. Lack of technology development/ research and effective measures to address the issues on beekeeping.

Socio-cultural Challenges: 7.1.2

Adoption of new technologies (other than traditional), organic farming and integrated pest control system for bee forage resources and crop protection can be biggest challenges as I understand there is lack of awareness about toxicity of insecticides on bees and resulting bee poisoning.

Market Challenges: 7.1.3

The beekeepers expressed low appetite to explore subsidiary products because of lack of direct access to market/ consumer for beeswax and other value-added products. They also have low to no business acumen to run beekeeping business strategically and in an organized manner. Product pricing is set based on external markets outside the districts. People are not much aware about the large economic importance of value-added products.

Financial Challenges: 7.1.4

Nepal government provides 50% subsidy for beekeeping box and 25% subsidy to buy the equipments. However, there is no insurance in case there is large loss of bee colonies. The beekeepers have been slowly scaling up with their own seed money, but there is not much awareness or willingness to scale up beekeeping as a primary and organized business due to the risks like lack of market access, lack of technical support for bee disease control, and lack of insurance.

7.2 Recommendations for Interventions

7.2.1 Increasing awareness and adoption of appropriate technology and technological interventions

In order to address the issues of diseases in bees, special management in terms of technology, knowledge, and skills is needed. Almost every house in Myagdi is involved in beekeeping and honey production, but the increased incidence of disease in bees has declined both general interest and income. Adopting advanced technologies from changing traditional log hives to appropriate technology log top-bar hives can be effective in increasing honey productivity if farmers are trained on how to use the hive to make stronger, healthier and better-fed bee colonies.^[15] Also, informing the community about advanced technologies and diversified benefits from apiculture such as value added products from raw hive products can be the best long-term solution to problems being faced by beekeepers and may lead to a market for bee products outside the district as well as within it.

7.2.2 Maximizing the strengths and opportunities & minimizing the weakness and threats

The following interventions (**Table 7.1**) are recommended to establish beekeeping as business and to promote products based on subsidiary ingredients from beekeeping. These recommendations are based on our field study in Myagdi, the SWOT analysis (**Figure 4.2**), and the value chain map of key stakeholders, activities, and value propositions (**Figure 4.3**).

Table 7.1 Recommendations based on the field study in Myagdi and the SWOT analysis

STRENGTHS	HOW TO MAXIMIZE?
<ul style="list-style-type: none"> • Honey found in high elevation with diverse flora have unique taste • Beekeeping is recognized as a commercially viable enterprise • Beehive products with nutritional, medicinal, and cosmetic values • Increasing international market for natural honey 	<ul style="list-style-type: none"> • Set up beehives in locations where there is availability of foraging vegetation (could be more effective if community led) • Test the nutritional and medicinal property of honey to gain competitive advantage and trust from the consumers • Train the community to extract subsidiary products like beeswax, pollen, royal jelly, etc. • Train the beekeepers to use these subsidiary products to make high value products like creams, soaps. • Connect beekeepers to the market
OPPORTUNITIES	HOW TO EXPLOIT?
<ul style="list-style-type: none"> • Low awareness and education level • Low technical capability • Beekeeping as secondary occupation • Lack of financial support • Lack of new and international market • Domestic market is saturated • Lack of necessary technical equipments and laboratory infrastructure to ensure quality • Hard to compete with cheap Chinese and Indian honey and other beehive products 	<ul style="list-style-type: none"> • Conduct awareness campaigns and information dissemination programs • Regular monitoring and vocational trainings for communities interested in beekeeping • Show maximum possibilities to generate high income not only from honey sells but also from value added products. • Provide incentives on regular basis to motivate beginners for both beekeeping and start up enterprises. • Make them aware about the importance of bee products in both National and international market.

THREATS	HOW TO COUNTER?
<ul style="list-style-type: none"> • Value add products spanning from food and cosmetics to medicine and venom • Unique positioning in terms of location and high quality products • Public-private-partnerships • High quality of honey and diverse flora per climatic condition and elevation creates an opportunity for niche market 	<ul style="list-style-type: none"> • Establishing new enterprises on a smaller or bigger scale • Supporting co-operatives in selected districts with technical assistance and skill development trainings in order to enhance product production and processing. • Quality assurance and co-ordination with established enterprises • Obtaining organic certifications • Identifying the medicinally important plant that can be used as a forage for bee • Providing stake to locally active people
WEAKNESSES	HOW TO MINIMIZE?
<ul style="list-style-type: none"> • Diseases in bees (viral/bacterial/nutritional) • Lack of foraging areas • Low market awareness or interest/ no access to market • Large volume, consistency, supply per demand • Low price of Indian and Chinese honey 	<ul style="list-style-type: none"> • Identifying the specific disease affecting bee's health and possible medications to minimise threat by discussing with veterinary experts • Adopting the biosafety measures in day to day management practices to minimise the risk of pest and disease transfer between bees and apiaries • Apply effective measures to regularly inspect the bee hives • Capitalizing on the niche market of himalayan honey • Encouraging people to contribute small portion of their land in forage cultivation which can directly compensate their loss through income generation

	<p>from bee products. This can promote consistency and large volume of honey and other subsidiary products</p> <ul style="list-style-type: none"> ▪ Involving and motivating bigger portion of community people in beekeeping by providing incentives and off-farming employment opportunities ▪ Make them aware about the rapid demand, economic importance of Myagdi organic honey and other subsidiary products in national and international market.
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Balancing demand and supply 7.2.3

Developing enterprises or co-operatives for the collection of honey produced throughout the district has not been in practice. The overall honey produced is utilized within the district and farmers do not even need to get their product to the market as they have buyers on their doorway. They are selling based on individual production rate. The selling price is set based on the prices in markets outside the district. Although a significant proportion of households in Myagdi is involved in beekeeping, they have not been able to fulfill the market demand because of several challenges.

Assuring quality to meet international standards 7.2.4

Quality assurance of raw honey is very necessary as bee forage resources are both wild and seasonal cultivation. There can be higher risk of taking poison filled pollens of wild flowers by honey bee, which needs to be checked before delivering hive products to the market. During the course of interviewing, beekeeper’s and traders raised the issues of receiving negative feedbacks in the quality of some varieties of honey (strong and caused dizziness). So, this issue demands the immediate need to consider pollen analysis from different species of plant found in the honey sample. This will provide some indication of the most important and harmful forage species in the bee surroundings. Also, quality analysis of unprocessed/raw honey based on international standards can be further used to compare with the quality and composition of processed honey to get the distinct standard/value of Himalayan honey (Myagdi district).

7.3 Conclusions

Myagdi is well known for its diverse vegetation, widespread practice of beekeeping, and popular destinations for tourism. These three sectors are directly or indirectly interconnected. Arranging these sectors in a particular niche can come up with greater benefits for both the district and the country. The survey in different VDCs in Myagdi has revealed active participation of various local associations, pre-dominantly women-led organizations (like Mother Group) on different community-reform and economic sectors. Though we didn’t find active beekeeping-related associations, we did note that the local people were highly interested in and are participating in

beekeeping and honey production. Furthermore, all the interviewed people were also found to be interested in receiving trainings for value added products and being involved in new enterprises, although the level of awareness about subsidiary hives products is very low.

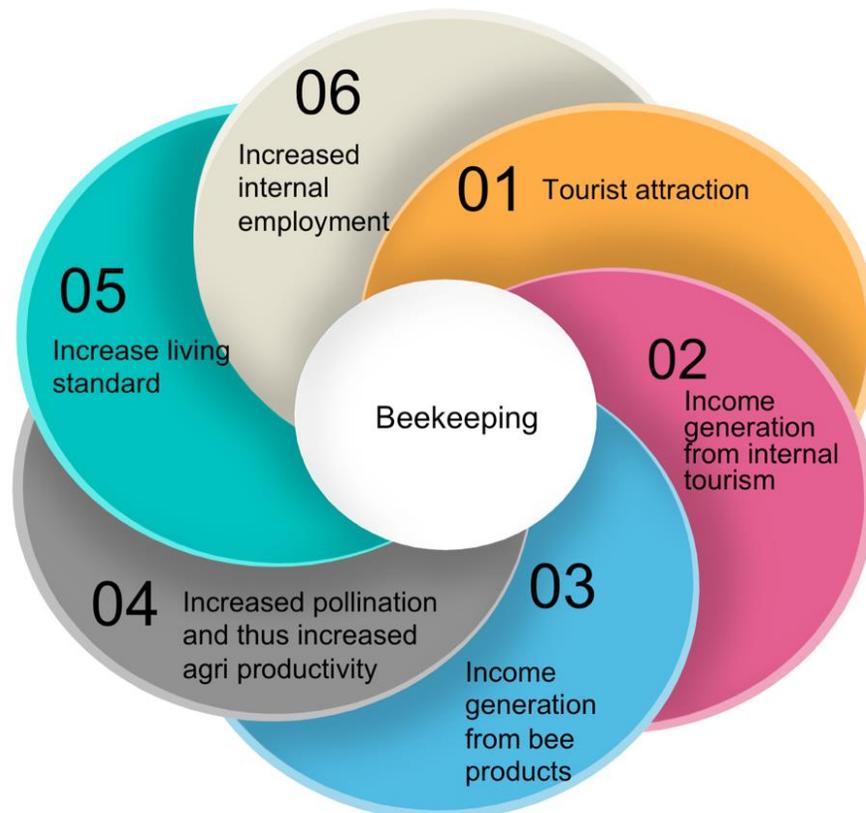


Figure 7.1 Representation of positive effect of beekeeping in the Myagdi district’s ecosystem.

Being one of biggest producers and a storehouse of abundant indigenous knowledge in beekeeping and honey hunting, Myagdi can create one of the biggest business ecosystems and hubs for beekeeping in Nepal, which in turn can improve the livelihoods of the local people through increased income generation and also increase the popularity of the quality honey produced there. Increased focus and investment on beekeeping in Myagdi will also play a big role in biodiversity conservation and organized agriculture and employment opportunities. In order to increase the yield of honey, several varieties of trees and bee-pollinated crops can be planted and thus beekeeping can be combined with agro-forestry, leading to increased yields from the trees and crops as well as increased honey yields. Placing bee colonies near cultivable land could provide surplus revenue from the land in addition to the revenue generated through increased crop yields. Such a systematic practice of beekeeping will also play a vital role in the conservation of bees.

In a nutshell, rearing bees has a great potential to promote income-generation and employment not only for those who practice beekeeping but also for those who harvest wild colonies for production of honey, beeswax and pollen. Moreover, promotion of beekeeping will also indirectly contribute to the conservation of the plants and vegetation. Hence, development and promotion of apiculture is an environmentally sound means of enhancing the financial status of the people and thus benefiting both the district and the country.

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Useful link of resources

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9 SUPPLEMENTARY INFORMATION

9.1 Focus Group Discussion with Community people

FGD/ interview with beekeepers/ traders/ cooperative

Objective:

- Types of Bees
- Types of honey
- Wild vs domestic beekeepers
- Beekeeping methods
- Current bee products being used?
 - Honey
 - Venom
 - Pollen
 - Royal Jelly
 - Bees Wax
- Processing methods and scale
- Trading Mechanism
- Raw or value added form?
- Livelihood
- Challenges

Questions:

1. Type of bees
 1. Types of bees available
 2. Are there any major preferential bees and why?
 3. According to which types of honey has high commercial value .
 4. Are there certain bees more risky to keep than others and why?
 5. What type of plantation is preferred near beekeeping sites
2. Types of honey
 - 2.1 What are different types of commonly and commercially produced honey
 3. Wild vs domestic beekeepers
 - 3.1 Preference -Wild or domestic ?
 - 3.2 Methods of honey extraction from domestic and wild bees
 - 3.3 Major constraint faced while extraction
 4. Beekeeping methods
 - 4.1 Existing methods of beekeeping
 - 4.2 Which seasonal is most favourable for beekeeping
 - 4.3 Is there any training programs for beekeepers ?
 - 4.4 Major constraints faced while beekeeping
 - 4.5 Any advanced technology introduced to mitigate management interventions?
 5. Current bee products being used?
 1. Honey
 2. Venom
 3. Pollen
 4. Royal Jelly
 5. Bees Wax

6. Scale of production
 1. Individual beekeeping scale vs cooperative beekeeping scale
 2. Annual production rates of honey (in kg)
 3. Is plant production consistent, increased or decreased in last 5 years?
 4. Collection model vs individual sellers model?
7. Processing methods and scale
 1. What is the final forms of bee products before trading?
 2. Based on the form what are the processing methods?
 3. How do you process each bee products?
 1. Honey
 2. Venom
 3. Pollen
 4. Royal jelly
 5. Beeswax
 4. What happens to the by-products after honey extraction or bee product extraction process?
5. What types of beekeeping boxes do you use?
6. What is the capacity per box (no. of tiers/ grams per tiers)?
7. How much did it cost? Where did you bring it from? Which year did you get it? (Make, Year, source, number of tiers,...)
8. Do you share or rent the boxes?
9. What does the beekeeping cycle look like?
10. Human resource involved in the process?
11. Are the HR/ technicians/beekeepers trained?
12. Maintenance process of beekeeping boxes and cost?
8. Trading Mechanism
 1. Do you trade directly or do you supply these to other traders?
 2. Where do you take these products?
 3. Who are the biggest buyers?
 4. How many middlemen are there in the trading process?
 5. How much do you get per kg?
 6. Does the price fluctuate? What are some of the factors for fluctuation of price as pointed by the buyers?
9. Raw or value added form? Branding/ Marketing?
 1. Are the bee products further refined?
 2. Are the bee products sold in bulk or small quantities?
 3. Are they branded before selling?
 4. Have you received trainings for marketing/ branding/ value add?
 5. Do you have some ideas for value add?
 6. What are some of the value added bee products?
 1. Creams using beeswax?
 2. Venom for therapy?
 3. Candles?...
10. Livelihood?
 1. Has beekeeping increased your income?
 2. When did you get the return of investment and started getting profit?

3. Do you plan on continuing or scaling up beekeeping?
4. Do you plan to diversify the bee types or bee product types?
5. How Socio-economic aspect of cultivating MAPs affects your life?
11. Multi stakeholder engagement?
 1. What kinds of support have you gotten from external stakeholders?
 1. Government
 2. Private sector
 3. NGOs/ INGOs
12. Challenges
 1. What are some of your challenges?
 2. Any challenges in these specific areas?
 1. Access to Market
 2. Risks related to farming and harvesting?
 3. Yield fluctuation
 4. Price fluctuation
 5. Social challenges
 6. Access to Finance?
 7. Climatic/Seasonal/year-to-year changes?
 8. Lack of skilled Human resource?
 9. Technical challenges- crop selection, technology used, distillation
 10. Business acumen
 11. Storage
 12. Lack of experts for utilizing available technology?

FGD FORM TRANSLATED TO NEPALI

माहुरी पालक/व्यापारीहरु/सहकारीसँगको एफजीडी/अन्तरवार्ता उद्देश्यः

- मौरीको प्रकार
- महको प्रकार
- जंगली vs घरेलु मौरी
- मौरी पालनका विविधहरु
- वर्तमान समयमा मौरी उत्पादन कसरी भइरहेको छ ?

क. मह

ख. जहर

ग. पराग

घ. रोयल जेली Royal Jelly

ड. मैन (Bees Wax)

- प्रशोधनको विधि र मापन
- प्रयपारक संयन्त्र
- कच्चा पदार्थ र value added product.
- जीवनशैली
- चुनौतीहरु

प्रश्नहरुः

१. माहुरीको प्रकार

क. माहुरीका प्रकारहरु उपलब्ध छ?

ख. त्यहाँ कुनै प्रमुख व्यापारिक माहुरी छ ? किन ?

ग. उच्च व्यावसायिक मूल्य अनुसार कुन प्रकारको माहुरी रहेको छ ?

घ. त्यहाँ अन्य माहुरीको तुलनामा कुनै माहुरीहरुलाई राख्न खतरा छ ? किन ?

ड. माहुरी पालन क्षेत्रको आसपास (नजिक) कस्तो किसिमको वृक्षारोपण गर्नु पर्दछ ?

२. महका प्रकारहरु

क. सामान्य र व्यावसायिक प्रकारको उत्पादन हुने महमा के कस्ता फरक रहेका छन् ?

३. जंगली vs घरेलु माहुरी

३.१ प्राथमिकाताको आधारमा (जंगली वा घरेलु) ?

३.२ घरेलु र जंगली माहुरीबाट मह निकाल्ने तरिका ?

३.३ मह काट्दा सामना गर्नु पर्ने प्रमुख अवरोध ।

४. माहुरी पालन गर्ने तरिकाहरु

४.१ माहुरी पालनको अवस्थित तरिका

४.२ माहुरी पालनको लागि कुन मौसम सबैभन्दा अनुकूल हुन्छ ?

४.३ के त्यहाँ माहुरी पालनसँग सम्बन्धित कुनै तालिमका कार्यक्रमहरु छन् ?

४.४ माहुरी पालनका क्रममा के कस्ता प्रमुख बाधाहरुको सामना गर्नुभयो ?

४.५ कुनै पनि आधुनिक प्रविधिहरु (Introduced to mitigate management intervention?)

५. हाल माहुरी उत्पादनहरु प्रयोग भइरहेको छ ?

क. मह

ख. जहर

ग. पराग

घ. रोयल जेली (Royal Jelly)

ड. मैन (Bees Wax)

६. उत्पादनको मात्रा

६.१ व्यक्तिगत रूपमा गरिने माहुरी पालन **VS** सहकारी मार्फत गरिने माहुरी पालन

६.२ महको वार्षिक उत्पादन दर (किलोग्राम)

६.३ पछिल्लो ५ वर्षमा महको उत्पादन दर घटेको वा बढेको

६.४ संकलन मोडेल **VS** व्यक्तिगत बिक्रेता मोडेल ?

७. प्रशोधनको विधि र मापन

७.१ व्यापार गर्नु भन्दा अघिको माहुरी उत्पादनको अन्तिम रूप के हो ?

७.२ फर्मको आधारमा प्रशोधन विधिहरू के हो ?

७.३ तपाईं प्रत्येक माहुरीको उत्पादन प्रक्रिया कसरी गर्नुहुन्छ ?

क. मह

ख. जहर

ग. पराग

घ. रोयल जेली (Royal Jelly)

ड. मैन

७.४ मह काट्दा अथवा मह निकाल्ने प्रक्रिया पछि उप-उत्पादनहरूलाई के हुन्छ ?

७.५ तपाईं कुन प्रकारका मासुको बक्सिड प्रयोग गर्नुहुन्छ ?

७.६ प्रति बक्स क्षमता (प्रति टायर ग्राम प्रति टायर) को क्षमता के हो ?

७.७ यो कस्तो भयो ? तपाईंले कहाँबाट ल्याउनु भयो ? तपाईंले कुन वर्ष पाउनु भयो ? (बताउनुहोस, वर्ष, स्रोत, टायरहरूको संख्या)

७.८ तपाईं (घार) बक्स साभ्ना वा भाडामा लिनुहुन्छ ?

७.९ माहुरीको (घार) बक्सको चक्र कस्तो हुन्छ ?

७.१० यस प्रक्रियामा मानव स्रोत, साधन पनि संलग्न छ ?

७.११ के मानव स्रोत, साधन/प्रविधि/माहुरी पालकले तालिम पाएका छन् ?

७.१२ माहुरीको (घार) बक्सको मर्मत प्रक्रिया र लागन कति हुन्छ ?

८. व्यापारिक संयन्त्र

८.१ के तपाईं सिधै व्यापार गर्नुहुन्छ वा तपाईं अन्य व्यापारीहरूलाई आपूर्ति गर्नुहुन्छ ?

८.२ तपाईं यी उत्पादनहरू विक्री गर्न कहाँ लैजानुहुन्छ ?

८.३ तपाईंको सबैभन्दा ठूलो खरीदारहरू (खरीद गर्ने) को हुन् ?

८.४ व्यापार प्रक्रियामा कति विचौलियाहरू छन् ?

८.५ तपाईंले प्रति किलोग्राम कति कमाउनुहुन्छ ?

८.६ के मूल्यमा उतार चढाव हुन्छ ? मूल्यको उतार चढाव हुनुको कारण खरीदारहरू (खरीद गर्ने) कुरालाई भन्छन् ?

९. कच्चा पदार्थ र ख्वगिभ वममभम उचयमगअत ? ब्रान्डिंग/वजारीकरण

९.१ माहुरीहरूको उत्पादनमा अझ परिष्कृत हुँदैछ ?

९.२ उत्पादन भएको मह थोक वा खुद्रा (सानो मात्रा) मा कसरी बिक्री गर्नुहुन्छ ?

९.३ के तपाईंसँग सामानको मूल्य थपिनका लागि कुनै उपाय छ ?

९.४ के तपाईं मार्केटिंग/ब्रान्डिंग/सामानको मूल्य थपिने तरिका सम्बन्धी कुनै तालिम प्राप्त गर्नु भएको छ ?

९.६ के गरिएमा माहुरी जन्य उत्पादनहरूमा **value add** गर्न सकिन्छ ?

क. मैन प्रयोग गरिएका क्रिमहरू

ख. **Venom** का लागि थेरापी ?

ग. मैनवती ?

१०. जीवनशैली

१०.१ के माहुरी पालन व्यवसायले तपाईंको आम्दानीमा वृद्धि गरेको छ ?

१०.२ तपाईं लगानी कहिले उठाउनु भयो र कहिलेबाट लाभ प्राप्त गर्न शुरू गर्नुभयो ?

१०.३ तपाईंले माहुरी पालनलाई जारी राख्ने वा स्केलिंग गर्ने योजना बनाउनु भएको छ ?

१०.४ के तपाईंले माहुरी जन्य उत्पादनको प्रकारमा विविधता गर्ने योजना बनाउनुहुन्छ ?

१०.५ माहुरीपालनले सामाजिक-आर्थिक पक्षमा तपाईंको जीवनलाई प्रभाव पार्दछ ?

११. सरोकारवालाहरूको सहभागिता

११.१ तपाईंले बाहिरी सरोकारवालाहरुबाट के कस्तो प्रकारको सहयोग प्राप्त गर्नुभयो ?
क. सरकार ख. निजी क्षेत्र ग. गैर सरकारी संस्थाहरु/आइ.एन.जी.ओ

१२. चुनौतीहरु

१२.१ तपाईंका चुनौतीहरु के के हुन् ?

१२.२ विशेष क्षेत्रहरुमा भएका कुनै पनि चुनौतीहरु ?

क. बजारमा पहुँच

ख. **Farming and harvesting** सँग सम्बन्धित जोखिम ?

ग. उतार चढाव

घ. मूल्य उतार चढाव

ङ. सामाजिक चुनौतीहरु

छ. मौसम/मौसमी/प्रत्येक सालमा परिवर्तनहरु ?

ज. दक्ष जनशक्ती शीपयुक्त मानव स्रोतको कमी ?

झ. प्राविधिक चुनौतीहरु (चयन, प्राविधिको प्रयोग, आसवन)

ञ. व्यापारिक क्षमता

ट. भण्डारण

ठ. उपलब्ध प्राविधिको प्रयोगका लागि विशेषज्ञहरुको कमी छ ?

2. Survey Form

नाम:	थर:
उमेर:	विवाहित अविवाहित एकल
ठेगाना:	टोलको नाम:
सम्पर्क नं.:	न.पा./गाविस र वार्ड नं.
शैक्षिक योग्यता: कति कक्षा सम्म पढनुभएको छ ? _____	
पारिवारिक बिबरण: सदस्य संख्या _____	
महिला संख्या _____	पुरुष संख्या _____
कमाउने _____	नकमाउने _____
विदेशमा _____	स्वदेशमा _____
वैदेशिक रोजगारीको लागि जानु भएको छ की छैन ?	

<p>तपाईं कुनै संघ सस्था वा समूह संग आबद्ध हुनुहुन्छ? यदि छ भने ति के-के हुनु, कृपया नाम सहित उल्लेख गर्नु होला?</p> <p>सहकारी _____</p> <p>आमा समुह _____</p> <p>महिला समूह _____</p>

कृषि समुह _____
अन्य _____

तपाईंको उद्यमको मुख्य बजार कुन कुन हुन् ?

समुदाय

सदरमुकाम

काठमाण्डौ

नेपालको अन्य ठूलो बजार

अन्तराष्ट्रिय बजार

अन्य _____

9.2 DATA from District Agriculture Development office

Table2: Beekeeping and honey production detail: Myagdi

S.no.	BeeKeeper's name	Address	Improves hives		Traditional Log hives	
			Number	Production (in kg)	Number	Production (in kg)
1		Bhakinli 9	15	31.5	11	16.5
2		Athurde 4	20	42	3	4.5
3		Athurde 7	17	35.7	4	6
4		Baranjaa 1	17	35.7	2	3
5		Baranjaa 1	15	31.5	10	15
6		Begkhola 5	24	50.4	20	30
7		Bhagwati 3	14	29.4	8	12
8		Bhagwati 3	16	33.6	2	3
9		Bhagwati 3	12	25.5	2	3
10		Bhagwati 6	9	15.9	8	12
11		Bhagwati 7	20	42	1	1.5
12		Bhakinli 4	21	44.1	2	3
13		Bhakinli 6	15	31.5	3	4.5
14		Bhakinli 9	15	31.5	13	19.5
15		Chimkhola 3	24	50.4	10	15
16		Chimkhola 7	18	37.8	12	18
17		Dagnaam 1	15	31.5	8	12
18		Dagnaam 4	11	23.1	12	18
19		Dagnaam 6	14	29.4	5	7.5
20		Ghar 6	26	48.3	2	3
21		Ghatan 3	19	39.9	0	0
22		Ghatan 3	14	29.4	2	3
23		Ghatan 3	15	31.5	0	0
24		Ghatan 3	12	25.2	6	9
25		Ghatan 3	15	31.5	12	18
26		Ghatan 3	15	31.5	2	3
27		Ghatan 3	18	37.8	5	7.5
28		Ghatan 5	14	29.4	9	13.5

29		Ghatan 6	10	21	8	12
30		Ghatan 6	12	25.2	5	7.5
31		Ghatan 8	13	27.3	5	7.5
32		Ghatan 9	15	31.5	2	3
33		Jyamrukkot 1	40	85	23	34.5
34		Jyamrukkot 1	16	33.6	5	7.5
35		Jyamrukkot 1	11	23.1	3	4.5
36		Jyamrukkot 1	13	27.3	8	12
37		Jyamrukkot 3	29	60.9	15	22.5
38		Jyamrukkot 3	27	56.7	15	22.5
39		Jyamrukkot 3	26	54.6	17	25.5
40		Jyamrukkot 3	15	31.5	8	12
41		Jyamrukkot 4	27	56.7	0	0
42		Jyamrukkot 5	18	37.5	12	15
43		Jyamrukkot 6	25	52.5	0	0
44		Jyamrukkot 6	25	52.5	0	0
45		Jyamrukkot 7	24	50.5	15	22.5
46		Jyamrukkot 7	17	35.7	12	18
47		Jyamrukkot 8	9	15.9	2	3
48		Jyamrukkot 9	15	31.5	10	15
49		Kuhu 1	22	46.2	10	15
50		Kuhu 1	15	31.5	2	3
51		Kuhu 1	28	58.8	5	7.5
52		Kuhu 2	26	54.6	5	7.5
53		Kuhu 2	15	31.5	0	0
54		Kuhu 2	10	21	3	4.5
55		Kuhu 2	20	42	5	7.5
56		Kuhu 2	15	31.5	0	0
57		Kuhu 2	29	60.9	2	3
58		Kuhu 2	14	21.4	3	4.5
59		Kuhu 3	25	52.5	5	7.5
60		Kuhu 3	31	65.1	0	0
61		Kuhu 3	15	31.5	5	7.5

62		Kuhu 3	12	25.2	6	9
63		Kuhu 3	50	105	6	9
64		Kuhu 3	10	21	7	10.5
65		Kuhu 3	10	21	10	15
66		Kuhu 4	15	31.5	4	6
67		Kuhu 5	27	56.7	5	7.5
68		Kuhu 5	13	27.6	15	22.5
69		Patalekhet 1	26	54.6	3	4.5
70		Patalekhet 1	14	29.4	15	22.5
71		Patalekhet 3	13	27.3	0	0
72		Patalekhet 3	28	58.8	5	7.5
73		Patalekhet 3	19	39.9	2	3
74		Patalekhet 6	25	52.5	2	3
75		Patalekhet 6	25	52.5	10	15
76		Patalekhet 6	25	52.5	2	3
77		Patalekhet 7	25	52.5	2	4.5
78		Patalekhet 7	23	48.3	4	6
79		Patalekhet 7	19	39.9	3	4.5
80		Piple 1	13	27.3	0	0
81		Piple 1	63	132.3	11	16.5
82		Piple 1	29	60.9	3	4.5
83		Piple 1	11	23.1	3	4.5
84		Piple 2	24	50.4	20	30
85		Pulachaur 2	15	31.5	3	4.5
86		Pulachaur 2	15	31.5	0	0
87		Pulachaur 3	14	29.4	1	1.5
88		Pulachaur 4	12	25.2	5	8.5
89		Pulachaur 4	10	21	5	7.5
90		Pulachaur 4	9	18.9	5	7.5
91		Pulachaur 6	15	31.5	3	4.5
92		Pulachaur 6	15	31.5	5	7.5
93		Pulachaur 6	8	16.8	10	15
94		Pulachaur 6	16	33.6	4	6

95		Pulachaur 7	55	115.5	0	0
96		Pulachaur 7	37	77.7	0	0
97		Pulachaur 7	36	75.6	0	0
98		Pulachaur 7	11	23.1	0	0
99		Pulachaur 7	20	42	2	3
100		Pulachaur 7	18	37.8	8	12
101		Pulachaur 7	17	35.7	2	3
102		Pulachaur 7	9	18.9	5	7.5
103		Pulachaur 7	21	44.1	5	7.5
104		Pulachaur 7	19	39.9	0	0
105		Pulachaur 7	13	27.3	2	3
106		Pulachaur 8	15	31.5	9	13.5
107		Pulachaur 8	20	42	5	7.5
108		Ramche 3	15	31.5	0	0
109		Ramche 3	16	33.6	3	4.5
110		Ratmechaur 2	32	67.2	5	7.5
111		Ratmechaur 5	25	52.5	14	21
112		Ratmechaur 5	29	60.9	16	24
113		Ratmechaur 5	15	31.5	3	4.5
114		Ratmechaur 5	17	35.7	2	3
115		Shukha 1	15	31.5	3	4.5
116		Shukha 3	11	23.1	2	3
117		Shukha 4	17	35.7	2	3
118		Shukha 4	14	21.4	10	15
119		Shukha 4	11	23.1	5	7.5
120		Singa 5	23	48.3	3	9
121		Takam 4	16	33.6	2	3
122		Takam 9	15	31.5	2	3
	Total		2322	5302.9	673	1013.5
			Total Ghar	Production (in kg)	Kg/Ghar	
			2995	6316.4	2.10898	

			1636	
		5.8854	Metric Ton	

Honey Production- Latest data

Year	Bee Hives	Production(in kg)
2073-74	4620	23100
2074-75	4700	23500

The produced honey is utilized within district

The information is delivered by District Agricultural Development office- Beni, Myagdi

9.3 Photo Gallery

Images taken during official meeting and Interview with FNCCI officials , Beni Bazar, Myagdi



Figure 9.1 Meeting with beekeepers and FNCCI officials



Figure 9.2 Image taken during FGD in Daduwa VDC-2



Figure 9.3 Selected pictures taken during FGD and workshop

Image taken while beekeepers were demonstrating their beekeeping practices and Equipment



Figure 9.4 Beehive box



Figure 9.5 Beekeeper showing how they use beekeeping equipment



Figure 9.6 Organic honey served at the homestay of the beekeeper

Image taken during FGD at Kuhu- Discussion with local people(right)



Figure 9.7 Beekeeping hut of Govind KC, Kuhu



Figure 9.8 Discussion with local people at Kuhu

1 INTRODUCTION

1.5 Beekeeping (Apiculture)

The word ‘apiculture’ is derived from the latin word ‘apis’ meaning bee, thus apiculture or beekeeping is the care and management of honey bees for honey and other hive products. Bees and their products are widely known and used worldwide. In fact, many countries, including Nepal, has been practicing beekeeping and wild bee hunting as a tradition generation-to-generation.

Beekeeping is an environment friendly activity to generate food, nutrition, and income. It can be started with locally available equipments and tools using traditional skills and knowledge within the community. It does not require large land ownership and can be incorporated as a complementary practice with other agricultural practices. Beekeeping also supports utilization of unharnessed ecological niche like nectars and pollens of flower. Beekeeping is also associated with purely biological nature of bees’ activities, such as plant pollination and conservation of natural flora, which enhances the yield of the crop so can be beneficial in agriculture sector as well.

Many have capitalized on beekeeping not just as a part of tradition or ‘hobby’, but also as a sustainable source of income or secondary occupation in micro, small or even large scale. This business is specifically lucrative since it requires minimum investment with potential for much larger gains. Beekeeping as a business enterprise offers diverse value added products made from honey, wax, royal jelly, propolis, pollen, and bee venom. These value added products can be sold at good price and can become an important source of income. These products can be used as traditional health care remedies and in alternative medicines (apitherapy) as well. To execute beekeeping as a viable business, it is imperative for beekeepers to have basic understanding of bees’ anatomy, developmental stages, types, and functions. General information on these aspects of beekeeping is covered in the section below.

1.6 Anatomy and functions of Honey bees

Honey bees are true insects with a complex structure because of which they are also known as “Swiss Army knife”. Honey bees store the nectar in their foregut or honey crop. The honey crop can hold upto 85 percent of total bee’s weight. After foraging, the bee returns to the colony and stores it in the hive. The wax is produced by abdominal glands. *Apis cerena* species are found in Myagdi region that have similar anatomy as explained above.

Honey bees have division of labor in their colony. Females do all the work based on their “caste”: Queen bee (fertile bee) or Worker bee (infertile female). The queen bee is responsible for laying eggs and maintaining the cohesion of colony. The worker bees are responsible for tending the brood at young age and foraging when older. Male bees or Drones are mainly responsible to mate with queen and are seasonal.

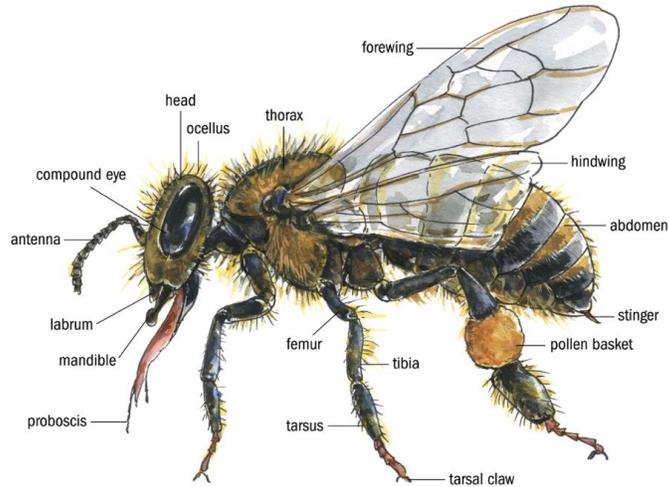


Figure 1.1 Anatomy of Honey Bee

1.7 Different development phases of Honey bees

Egg is the first stage of development of honey bees, which hatches into a small worm called **larva**. At the end of the larval stage, larva capped into a cell with beeswax enters a resting phase called **pupa**. During this stage pupa reorganizes its tissues to change its form from pupa to an adult. The **adult** then chews off the cap of its cell and joins other bees in the colony. Honey bees have different rate of development at each stage, and life span based on it’s type or “caste” (Table 1.1).

Table 1.1 Different developmental stages of Honey bees

Bee	Queen	Worker	Drone
Egg	3 days	3 days	3 days
Larva	5.5 days	6 days	6.5days
Pupa	7 days	12 days	14.5 days
Adult	15.5 days	19-21 days	24 days
Life Span	up to several year	Weeks to months	40-50 days

1.8 Products obtained from beekeeping and their uses:

Beekeepers should take advantage of other hive products as well, which can help generate more income. The hive products such as beeswax, pollen, propolis, royal jelly, and bee venom have both commercial and medicinal values and can be used in varieties of high value products. Types of bee hives and their uses are described below.^[1]

Honey 1.4.1

Honey is a naturally sweet viscous substance produced by honey bees. Honey bees collect the nectars from plants and transform the nectars into honey that are deposited in the bee hives. Honey consists of various nutritional chemical components like protein, carbohydrates, sugars, enzymes,

antioxidants that are beneficial for health and cosmetic purpose. It is also known for its antibacterial, antioxidant and other properties beneficial for human health. Honey has been used since centuries in various cultures in medicinal and beauty products.



Figure 1.2 Image of Beehive (left) and honey (right)

Beeswax 1.4.2

Beeswax (*cera alba*) is an important ingredient produced by the bees of genus *Apis*. Beeswax is a natural wax, light yellow to white in color, secreted by the wax glands present in the abdomen of the bees and are deposited in the hives. It is used by bees to form cells for pupal protection and honey storage. Beeswax mainly consists of esters of fatty acids and long chain alcohols. The extraction process of the beeswax is simple and can have commercial value more than honey. Beeswax can be used in the preparation of various products of cosmetic, pharmaceutical and also food additives. There uses in skin care and beauty products are in alarming rate. Lip balms, lip gloss, moisturizer, eyeliner, hand creams are few of the products of beeswax. ^[2]



Figure 1.3 Image of unprocessed beeswax (left) and processed beeswax (right)

Pollen 1.4.3

Pollen contains sugars, minerals (calcium, iron, potassium, phosphorus, and sodium), vitamins (A,

B1, B2, B6, C, E and H) and amino acids so it is considered as a primary food source for the hives. . It is also effective in treating intestinal disorders. And has powerful, antifungal, antibacterial and antiviral properties that stimulate the immune system and strengthen the capillaries and reduce inflammation. Pollen harvested does not need sophisticated equipments and does not harm the brood if handled properly. Pollen should only be harvested during flow season when more pollen is collected than the bees need.[2]



Figure 1.4 Image of honey bee collecting pollen (left) and separated pollen (right)

Royal jelly 1.4.4

Royal jelly also known as 'bee milk' is produced by the hypo-pharyngeal glands of worker bees to feed young larvae and the queen. Royal jelly is rich in protein, vitamins, amino acids, lipid, mineral salts, and antioxidant enzymes and has a tartaric taste. Its composition can vary depending on geography and climatic variation. It is also a hormone source which can be used for treating convalescence and fatigue, growth problems, aging, stress, and infertility. Royal jelly is a nutritious energy provider, promotes weight gain and growth. It also reduces hair loss, strengthens brittle nails, and is ideal for treating prostate problems. [2]



Figure 1.5 Image of unprocessed royal jelly in the beehive in larval cavity (left) and powdered royal jelly (right)

Propolis 1.4.5

Propolis is a resinous mixture of beeswax and saliva gathered from the buds of trees and balsamic plants by honeybees, mainly *Apis mellifera*, *A. florea*, and stingless bees. It is a sticky substance used as a sealant for unwanted openings in the hives and a defensive material against natural pests and excess. It contains pollen, vitamins, minerals, plant flavonoids, and volatile oils and known to have a spectrum of important antibiotic properties covering a wide range of bacterial groups. Its remarkable healing properties are attributed to its stimulating effect on tissue growth. Propolis is mainly harvested by commercial *Apis mellifera* beekeepers using propolis trap made with steel wire mesh put in place of the inner cover in the hive.



Figure 1.6 Image of bee deposited propolis being extracted (left) and propolis in the hive before extraction (right)

Bee venom 1.4.6

Bee venom is a bitter colorless liquid containing protein (poison) made by poison gland in the last abdominal segment. Venom maximum production is seen when bees are two to three weeks. One sting contains about 100 μg of dry Venom. It is used in defense of the colony. Bee stings (bee acupuncture therapy) have many therapeutic applications, particularly for arthritis, rheumatism, chronic pain, and multiple sclerosis. Directing sting on the point and area of pain or on associated acupuncture points has been known to bring remarkable results. Bee acupuncture therapy is an important part of traditional Chinese medicine and very recently, has been gaining popularity in other Himalayan countries.^[3]



Figure 1.7 Image of bee charging its sting (left) and bee sting (right)

2 RESEARCH METHODOLOGY

2.1 Scope of the research study

The main focus in this research study will be on understanding the current practices in beekeeping in Myagdi, to explore the types of beekeeping products being used, and the possibilities of value addition. There are several successful examples of profitable beekeeping enterprises in the world. However, in order to be profitable, the beekeeping activity must be analyzed properly and the beekeepers should have appetite to diversify their activities based on business essentials and market demand. This study aims to do exactly that by examining the current trends, investments, operating investments, infrastructure needs, technical needs, and other indices to reflect whether value addition in honey and other raw materials by preparing skin care, medicinal and other products can be profitable or not. In addition, strategic recommendations will be provided on step-wise implementation strategies to achieve the project goal and to promote the products of beekeeping in Myagdi region.

2.2 Approach

For the feasibility analysis of the beauty and skin care products from honey and other subsidiary products, we applied a set of research methodology and procedure to come up with impact oriented strategies. Different activities were carried out, mainly with government officials, community people and some with private enterprises. This interdisciplinary relationship helped us gather adequate information, strengthen capacities, and get clear idea about the challenges, weaknesses, strengths and opportunities in Myagdi for honey production and utilizing honey products for value addition.

The project has prioritized beekeeping as a sector having the potential to generate income and create employment opportunities other than farming. Different stakeholders and cooperatives in the community who are involved in beekeeping activities like beekeepers, traders, bee hunters, trade and commerce related governmental and private organizations, and stakeholders in the value chain were the major target groups of the research. Several field group discussions (FGDs), personal interviews, and multi-stakeholder discussions were conducted in Myagdi. The final report was prepared based on the learnings from these consultations, field observation visits, and literature study. From the beginning of the preparation of the report, the project expert team has undertaken the following activities:

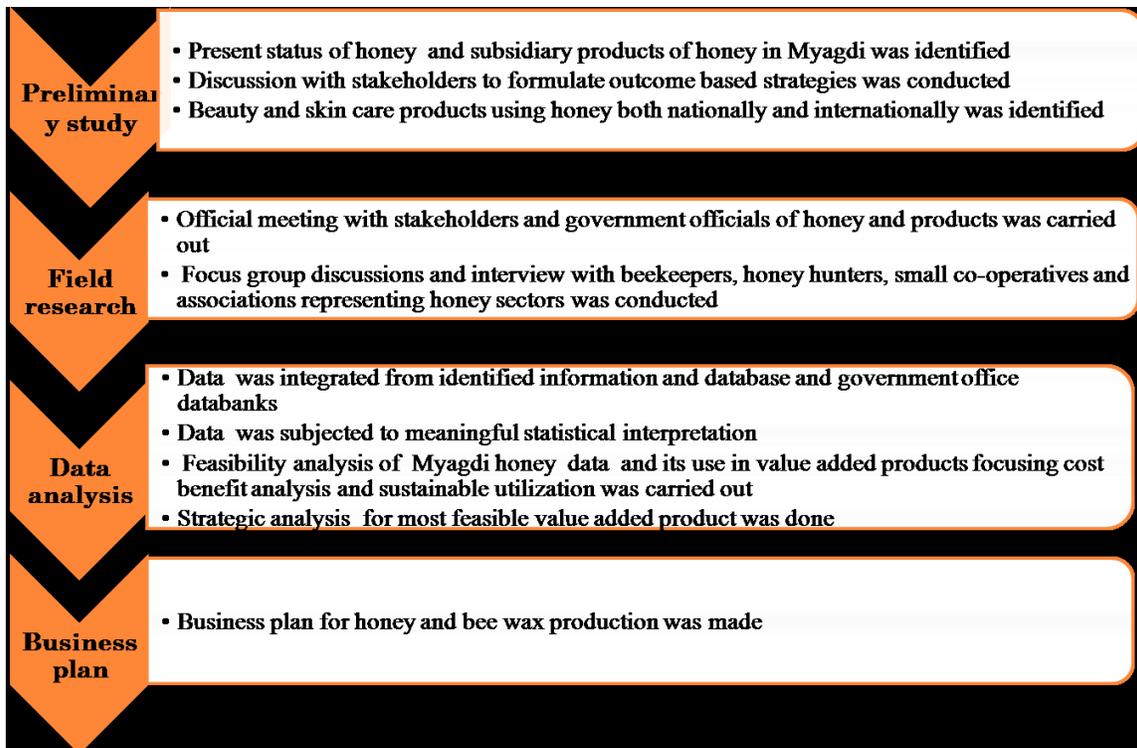


Figure 2.1 Flow of Research Activities

3 Beekeeping in the context of Nepal

Beekeeping is of rich tradition in the remote villages of Nepal and is recognized as an income-generating practice which has the potential to solve the problem of unemployment in Nepali communities. Commercial beekeeping in Nepal is practised mainly for the production of honey which mostly is associated with genetic diversity of the bee-species *Apis cerana*. *Apis mellifera* and *Apis cerana* are the most common honey-producing bees known in Nepal. *A. cerana* is very popular in Nepal not only because of the low cost of its beehive, the log hive, but also because it is much more resistant to cold and predators than *Apis mellifera*.

The local community uses available wild flora and cultivated plants as bee forage and indigenous knowledge in sustainable management of beekeeping in traditional log hives. Selling bee products contributes to cash income for the livelihood of multiple remote and isolated communities in Nepal.^[4] With the increasing trend and demand for bee products, newly introduced improved hives (or purposely made hives) permit quantity and quality honey production and also make it easier to harvest bee products.

3.1 Beekeeping in the context of Myagdi

Beekeeping in Myagdi 3.1.1

Beekeeping in Myagdi is associated with the genetic diversity of *Apis cerana*, availability of bee or for domestic consumption of honey.

In this section suitability and uniqueness of Myagdi for beekeeping is highlighted. The details and advantages of having specific bee species, geographic location, climatic condition, and diverse foraging flora in Myagdi are discussed. Furthermore, details of beekeeping practices with personalized stories from the beekeepers and bee hunters are mentioned in this section. Overall, Myagdi's potential for beekeeping and producing diverse bee hives products is currently minimally utilized, and thus there is huge prospect for growth of Myagdi's beekeeping practices as profitable and sustainable businesses.

Bee species in the region 3.1.2

Apis cerana is commonly used for beekeeping in Myagdi. It is well adapted to the local climate, environment and native flora. It is widespread and can be found between the altitudes of 60-3500m throughout the country. It is gentle in temperament, industrious, mite resistant and can be handled easily. The bees are kept in different types of hives such as hollowed Log Hives (Mude Ghar), Wall Hives (Khope Ghar) and Improved Hives (purposely made hive). No specific forage resources are cultivated for feeding the bees. Bee feeding is supported by the wild flowers and seasonal cultivated crops. It is these plants that provide the mix of diverse nectar and pollen upon which colony health and honey type is dependent (Rhododendron, mustard etc).

Why *A. cerana*? 3.1.3

A. cerana swarms in summer (March to May) and in winter (November to December). They can

survive in temperatures lower than -0.1°C in high hilly regions, while other species like *A. mellifera* completely freeze in such climatic conditions.^[5] Also, *A. cerena* is commonly used by rural people due to low cost of infrastructure for traditional log hives. They use local raw material for the construction of hives. *A. cerena* usually do not feed in dearth season like other species. The problem with *A. cerena* is they require constant brood nest temperature in extreme temperatures ($<-0.1^{\circ}\text{C}$) and proper nest management is required during transferring colonies from traditional to modern beekeeping as there is a chance of bees absconding during the process.

3.2 Geographic condition

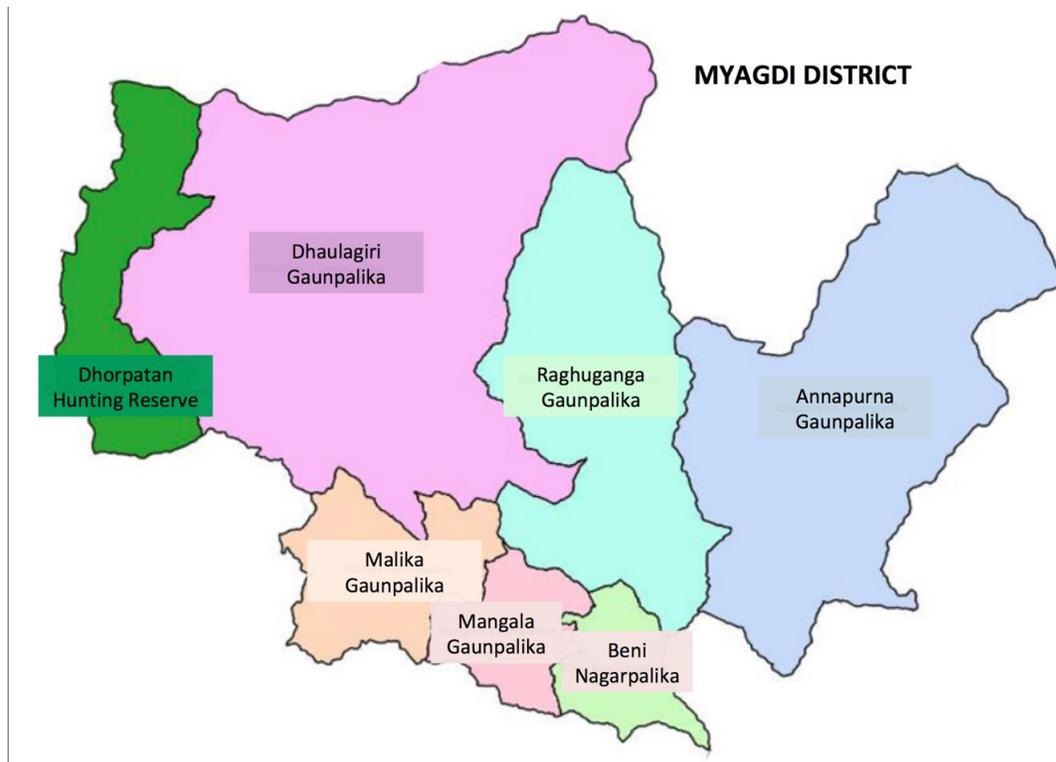


Figure 3.1 Map of Myagdi District

Myagdi District a part of Province No. 4, is one of the seventy-five districts of Nepal. The district, with Beni as its district headquarters, covers an area of 2,297 km², and had a population of 114,447 in 2001 and 113,641 in 2011. It is home to one of the most-valued honey types in the world.^[6]

3.3 Climatic condition

April and March are the most suitable months to gather the best quality honey from the cliffs. The extracted honey is sold to main cities like Kathmandu and Pokhara, and abroad in countries like South Korea and Japan. Foreigners mostly prefer raw and untreated honey in comparison to treated honey. The honey of the Himalayan bee is known for its unique taste, a result of the nectar the bees gather from flowers growing at altitudes higher than 2,000 m. The species *Apis cerena* is the only species that collects this intoxicating nectar, which can be sold by retailers for up to Rs. 1,500 per liter for domestic honey and NPR 2000 for wild honey.

The major factor for the survival of bees in the hilly region is the diverse flora and vegetation blooming almost round the year. The topography of Myagdi shows that, at every 10 km upland, diversity in vegetation is seen. Based on topography, species, hives and flora, honey production rate varies showing the diversity in honey products.^[5]

Table 3.1 Relationship between bee species and climatic variation, hive technology, cost and potential returns.

Climatic variation	Species	Types of Hives	Hive cost (with bees)	Honey Production
Alpine (below 3000m)	<i>A. Cerena</i>	Wall hives	>2500	Low
Cool temperate (above 2000m)	<i>A. Cerena</i>	Wall hives (without frame)	>2500	Fair
		Log hives	>500	Low
Warm Temperate (above 1000m)	<i>A. Cerena</i>	Wall hives (fixed frame)	7000	Good
		Log hives	>500	Low
Subtropical (Below1000m)	<i>A. Cerena</i>	Modern movable hive (fixed comb)	>7000	Good
		Log hives	>500	Low

Source: Himalayan honeybees and beekeeping in Nepal Bee forage

Cultivation, forest multi-flora, flowering medicinal herbs, agro-forestry are all forage for honey bees. Climatic conditions of hilly region favors the growth of diverse medicinal plants which when used as forage for honey bees results in medicinally potent honey. Plants having high nutritional and medicinal values which are being used as bee forage found in Myagdi are listed in Table 3.2 and 3.3.^[7]

Table 3.2 Available cultivable crops as bee forage based on flowering season in Myagdi

Scientific name (Common Name)	Plant Picture	Flowering season
Fagopyrum esculentum (Buckwheat)		July to September
Brassica nigra (Mustard)		June to August
Helianthus (Sunflower)		July to September
Sesamum indicum (Sesame)		July
Citrus × sinensis (Orange)		April-May

*Above table shows the picture of cultivated plants with flower in respective flowering season. The western hilly region has diverse flora with important medicinal properties. Medicinal herbs as a forage for bees can lead to honey of high medicinal values.

Table 3.3 Medicinal herbs as a bee forage based on flowering season found in Myagdi

Scientific name (Common Name)	Plant Picture	Flowering season
Rhododendron arboretum (Laliguras)		March-April
Euphorbia pulcherrima (Lalupate)		December-January
Berberis asiatica (Chutro)		May

Jatropha Curcus L. (Sajiwani)		April-June
Litsea cubeba(Lour.) Pers. (Siltimur)		November -January
Swerti Chirayita (Chiraito)		August-Sept
Rosa Serica (Wild Rose(Jungli Gulab))		June-September
Tithonia diversifolia (Wild Sunflower- Jungli Suryamukhi)		September -November
Diploknema butyracea (Chiuri)		October-December
Rhume austral (Chulthe Amilo)		July-September

*Above table shows the picture of medicinal plants with flower in respective flowering season

Honey production/extraction normally occurs once in autumn from October to November and the honey gathered in this period is known as autumn honey and is considered to be of high medicinal value, while on the other hand, honey extracted in summer between March-April is called summer honey. In the winter season, honey production is very low due to the harsh environmental conditions and low vegetation, so while extracting in winter, the honey quantity deteriorates. The autumn honey having high medicinal properties is considered to me more expensive than summer honey. Despite these variations, the demand for organic honey and other bee product is increasing rapidly.

3.4 Domestic beekeeping:

Beekeeping is a common practice in Myagdi. Every household has at least 1 hive at home. Colonies were traditionally kept in log hives, wall hives, and fixed hives but now people also use modern movable hives (movable frame). Harvesting is generally performed twice a year with the production of almost 6-8 kg per hive. The domestic cultivation nearby as well as wild flora are main source of bee forage. Bee specific cultivation of plants for forage is not performed in Myagdi. During seasons when there is lower availability of natural foraging source, sugar syrup preparations are provided to bees to provide enough food and nutrition.



Figure 3.2 Image of Log hive (left), Bee hive box with movable frames (middle), and Local beekeeper holding an isolated frame (right)

Although beekeeping has been practised in Myagdi since long ago, adoption of modern technical approaches and proper handling techniques is still not fully implemented. Traditional harvesting method of squeezing honey comb has resulted in low yield and low quality honey. The honey produced by individual households in Myagdi is sold within the district and they are not able to enter mainstream markets where they can obtain higher price. Honey is the main product harvested in Myagdi and production of other hive products are not yet explored in the region. The analysis of identified opportunities, challenges, and possibilities in Myagdi indicate that beekeeping practices can be commercially feasible in Myagdi with proper management, high quantity assurance, and diversification of bee products.

Beekeeper's story #1 Story shared by Mr. Meen Bahadur Khatri- Pioneer beekeeper in Daduwa, Myagdi

"I got interested to learn modern methods for beekeeping and decided to take a training in Kathmandu 25 years ago with my own expenses."



I was one of the pioneers in practicing modern beekeeping methods in Dadurwa VDC -5. I started beekeeping 25 years ago when I was a school teacher. Initially, I had only few hives, which later grew up to 70-80 hives. Currently, I have around 35 hives left after the disease infested and killed the bees. I am constantly consulting with experts and doing personal research to get rid of this bee disease in our hives. A. cerena is the only species we use here. I have learnt the techniques of beekeeping and honey harvesting from

Kathmandu, Godavari, as well as out of my interest and traditional knowledge of beekeeping. In the beginning, I struggled a lot to get bees. I even failed to maintain the bee hives because of lack of experience and knowledge. But now, with all the experience and learning, I can even train people and help them initiate beekeeping.

Log hives were used traditionally but now I have colonies in movable frame hives as well. I have my own crop plantation land, where I cultivate mustard, wheat, maize and other seasonal crops, which are used as forage for bees. Also, wild flora is best forage for honey bees. Depending on vegetation, flora and climatic conditions, I have even harvested more than 150 kg of honey per annum and sold off many hives with bees with very good profit. I used to have good income when there was no issue of diseases. But nowadays, we have been facing serious issues of disease in honey bees. We even talked about this issue with District Agriculture Office in Myagdi and experts in Kathmandu, but no effective measures have been taken to address this issue till now. I am really interested in beekeeping and honey production and ready to accept the new technologies to mitigate the current issues. Market for honey is not the issue in this area, we supply as much as we produce. We have assigned price depending on market price

outside Myagdi, which is Rs 1500/- per kg. Sometimes, there is price fluctuation based on the season and type of honey. Apart from ordinary products of honey bees, we know about their importance, but now we just dispose them as waste due to lack of market for value added products nearby. As I have received training and have extensive experience, I am interested in increasing the number of hives and want to solve the problem of disease in bees.

3.5 Traditional honey hunting

Honey hunting is one of the most ancient human activities and is still practiced by people in Myagdi. It is a very dangerous activity as it requires a person to be brave, strong, and skillful to gather honey safely. When there was no sugar, honey was considered as the main source of sweets. Though it looks very difficult and scary, local communities with good knowledge of rock climbing and handling bee hives easily perform honey hunting. The wild honey bees make beehives on the

cliffs and rock walls mostly nearby waterfalls. Climbing a bamboo ladder or rope is the only way to reach the beehives. Honey collection from wild bee colonies is normally performed by subduing the bees with smoke and breaking open the location of colonies like tree or rock, often resulting in the physical destruction of the colony. The lead honey hunter collects honey in the bucket from the beehives and passes down to another person. As per the honey hunters, hunting is best early in the morning or in the cold as in the cold the honeybees are not active and leave the beehives easily. In Myagdi, honey hunting is still a part of livelihood and one of the main income generation activities for many in bee hunting community.



Figure 3.3 Wild honeybee hives formed in rocks in Myagdi (Top), Smoky brush fire to subdue bees (Bottom-left), Destroying beehives for honey extraction (Bottom-right)

Beekeeper's story #2 Story shared by Ms. Dil Maya Chantyal: The female honey hunter from Gurja, Myagdi

"I have been practicing this since I was very young."



I am a resident of Gurja and I have been practicing honey hunting since I was very young. My grandparents as well as my parents were involved in this occupation and made money for our education and livelihood through beekeeping. I didn't study much, and I regularly used to go along with my parents because of which I quickly learned the activities they used to perform while bee hunting. It used to look very scary and hard but now as I know the skills, I can easily perform honey hunting. Mostly the Gurung and Magar communities perform these tasks. We need to take permission from the government officials before performing honey hunting. We wear aprons, gloves and carry necessary equipments to collect honey from nests of wild bees built on steep cliffs. We hang ourselves from cliffs as high as 300 meters using bamboo ladders and hemp ropes connected to each other. Firstly we create smoky brush fire and fan the smoke toward the opening for a certain time to subdue the bees and then only extract honey from combs. People get thrilled looking at our work. Being a girl, I dare to perform this and I love what I do as it needs much skill and courage and I can make sufficient amount of money for my family.

3.6 Difference between Wild bee and Domestic beekeeping Apiary

As, honey produced by wild and domestic honey bee vary in composition depending on forage and climatic conditions.^[8] Similarly, there are also differences in their apiary conditions as shown in **Table 3.4**.

Table 3.4 Comparison of Natural and Common Domestic Apiary

Natural tree Hives	Common Apiary
High off the ground 4-8 m having low humidity and warmer in winters	Apiary is very close to ground
Have small nest and small hive opening	Have large hive opening and large nest
Thick hives walls covered in propolis	Thin wooden floor and walls. Propolis removed and floor clean at least annually.
There is no chemical or antibiotic treatment	Regular chemical treatment for mites and common disease
Regular annual swarming	Swarm prevention
Hive consist of empty cavity	Farmers of easy honey removal and transfer of combs and brood between hives
Beehives have Static position	Sometimes migratory
No intervention to prevent loss	Intervention to prevent loss
Hive well spaced	Hives closely packed together
Queen live long on small brood comb	Queen often replaced by beekeepers(1-2 year of cycle) on large brood comb

3.7 Beekeeping Equipments used in Myagdi

3.7.1 Bee Hives Before the introduction of artificial hives, beekeepers used to depend on natural hives to extract honey. These natural hives (ghar in nepali) are the ones made by honey bees on the trees, corners of households (khope ghar), in the cliffs (Bheer mauri ghar). *Currently there are mainly two types of bee hives used in Myagdi households for beekeeping:*

1. Log hives (Mude Ghar in Nepali)
2. Wood box hives

Log hives 3.7.2

Big wood logs with cavity in the middle are placed for the honey bees to make their hives. These hives have been used traditionally used in the region before the wood box hives were introduced. Log hives are still used in the region for household purpose, but box hives are mostly used for commercial purpose.



Figure 3.4 Image of log hive frame (empty) that are used in Myagdi

Wood Box Hives 3.7.3

Wood box hives used in Myagdi are commonly used throughout Nepal for commercial beekeeping. Box hives can also be made of other materials, but in Nepal most hives are made of Nepal. Box hives different compartments/ components- bottom boards, queen excluder, brood chamber, supers, frames, hive stand, feeder, pollen trap, and covers.



Figure 3.5 Image of wood box hive used in Myagdi (left) and image of different components of wood box hive used in Myagdi (right)

Other equipments 3.7.4

Hive tool Smoker



Figure 3.6 Image of hive tool (left) and smoker (right) used in Myagdi



Figure 3.7 Image of local beekeeper wearing the protective head/face over and gloves.



Figure 3.8 Image of honey extractor

3.8 Beekeeping and honey production data

Almost every household in different VDCs of Myagdi is involved in beekeeping. The honey can be considered organic because of considerably less use of pesticides, insecticides and other agro-chemicals. The demand of natural unprocessed honey is increasing as per the data of District Agriculture Development Office, Beni Bazar, Myagdi. ^[9]

Table 3.5 Beekeeping and honey production data (2073-2075) from District Agriculture office,

Myagdi

Myagdi Data of beekeeping and honey production in Myagdi	2073	2074	2075
Number of registered beekeeping enterprises	-	-	-
Number of registered beehives	2995	4620	4700
Annual Honey production (kg)	5885.4	23,100	23,500
Honey yield per hives	2.0018	2.12	3.5
Honey price range for (NPR/Kg)			
Wild	1500	2000	2000
Domestic	1000	1500	1500

Source: Agriculture development office Myagdi

4 Feasibility of promoting beekeeping and beehive products as a sustainable and profitable enterprise in Myagdi

4.1 Beekeeping as an occupation and time commitment

Agriculture, animal husbandry and beekeeping are the main occupations of the people in Myagdi. Beekeeping has been in practice for many years in Myagdi and is a lucrative business made possible through simple management, and use of locally available equipments and traditional skills. Almost every house has at least one hive for local consumption of honey. During the course of interviewing several people involved in beekeeping, we found that beekeeping is a source of valuable income to a number of rural livelihoods. Though beekeeping tends to be perceived as a “sideline activity” or as a “hobby”, it has significantly contributed to livelihood security for those who have limited income from their primary occupation.^[1] Also, it is not invasive as bees function along the natural patterns of local agro-ecological zones and this provides positive impacts on the fauna and flora found in the region. Initially, few people started beekeeping with small start-up investments, simple technologies and were assisted by a weeklong training from Gandaki Bee Association in Godavari, Kathmandu. Later, the experience and knowledge was transmitted to other people interested in beekeeping. Honey is the only primary product produced till date from beekeeping. Despite being aware of value added products such as beeswax, bee venom, royal jelly, propolis, from bee products other than honey, beekeepers are reluctant to engage in activities to produce other bee hive products. The major concern of beekeepers was lack of knowledge of and access to market. Some beekeepers were also trained to produce beeswax, but they haven’t implement their training into practice for similar set of reasons and all these by-products from bee hive gets wasted or goes unutilized even though the additional cost if collecting additional bee hive products is minimal compared to their current investment. However, the beekeepers are interested to learn and diversify their product portfolio in case their concerns about market availability and technical gaps are adequately resolved. It is possible to find solutions to the

identified challenges in Myagdi if the problem areas are strategically prioritized and tackled. Engagement of local stakeholders is necessary to make beekeeping activity a commercial success. Thus, bee keeping community and cooperatives play a key role in organizing and mobilizing these local stakeholders. There are few groups that are active as grassroots level in Myagdi.

4.2 The beekeeping community and co-operatives

Myagdi has unique and extensive natural resources and also has indigenous honeybees which are few of the earth's remaining bees not being spoiled by diseases and predators. Therefore, there is a huge possibility ahead to extract abundant organic honey by addressing the current issues before the situation goes out of control. This situation calls for local level awareness to promote possible activities in honey production and beekeeping. Small co-operatives and enterprises can play a huge role in promoting the ecologically sound honey produce which is in high demand in worldwide market. These are examples of authorities and organisations that provide incentives, technical input and services to the honey beekeepers :

District Agriculture Development Office is helping beginners by providing 50% fund for hive box and also for bees. The office is also cooperating with beekeepers to resolve the issues they have been coming up with while beekeeping. DADO also conducts various types of training which provides technical support to beekeepers and also keeps them updated about honey issues. Despite having great potential and the continuous incentives or training, honey yield in Myagdi is still very low.

Gandaki Bee Association in Godavari, Kathmandu has been providing technical training and education to the people interested in beekeeping, The training is generally basic which includes topics like hives construction, honey extraction methods, use of tools and other accessories during bee handling and extraction. Week long training has helped people in Myagdi to start beekeeping as an occupation. Few actively involved people in beekeeping are also training local communities to start their own work.

Mother's Group (Aama Samuha) is a body which is dedicated to facilitating and addressing various issues and problems in Myagdi. But on closer evaluation, these associations do not directly work for upgrading the honey business or addressing the challenges in beekeeping. Though every household in Myagdi is involved in beekeeping, they do not have cooperatives for bee products.

4.3 Different beehive products in the region

Apart from honey, different subsidiary hive products such as beeswax, bee venom, propolis, royal jelly also has high market value. Data from the district agriculture office suggests an increasing trend in honey production and increased number of hives from 4620-4700 in number in the last 2 years (2073-75 BS).^[9] This data also indicates higher possibility of introducing value added honey-based products in Myagdi because of increasing awareness, acceptance, and activity. Though honey is the only major product produced till date, people are aware about the benefits of processed value added products and are even willing to work on processed products, only if there is proper market accessibility. Value added products pass through all the activities of the chain in order, and with each activity the product gains some value, which automatically increases the cost of product.

The value chain approach for different subsidiary products can be used to help Myagdi beekeepers in the chain gain greater benefits from their products.

Table 4.1 Current trends and possibilities for beehive products in Myagdi and their benefits

Beehive products Benefits/uses

Beehive products	Benefits/uses	Scoring in Myagdi (1-5)* 1 being lowest and 5 highest
		Current practice
Honey	Anti-bacterial property, Antibiotics on skin problems, Anti-oxidants	4
Beeswax	Medical skin creams, ointments, Pain relief and healing property	1
Pollen	Antibacterial, Antifungal and Antiviral properties	0
Propolis	Antibiotic properties,	0
Bee Venom	Therapeutic application in arthritis, rheumatism, chronic pain, and multiple sclerosis, Acupuncture therapy	0
Bee packages	Develop new and strengthen colonies	3

*The scoring is assigned qualitatively based on district agriculture office data, literature reviews, interviews, and focused group discussions.

4.4 Financial considerations

Out of the 27,727 households in Myagdi^[6], almost every household is involved in farming and beekeeping and it is considered a viable economic activity. Though they take beekeeping as a sideline activity (apart from their primary occupation), they have been generating income that can contribute significantly to maintain their livelihoods. Also, the domestic consumption of honey is high due to most people being involved in beekeeping. Richness of bees and extensive natural resources make honey a unique product resulting in high cost of honey than other commercial honey products. The price of honey has been the same in various VDCs of Myagdi and has been assigned by the beekeepers themselves based on the market outside Myagdi. Considering the medical importance and dietary supplement of honey, the pricing of NPR 1500/- per kg for

domestic honey and NPR 2000/- per kg for wild honey is reasonable but is considered high as compared to processed honey exported from other countries. According to honey producers, the total honey produced in district is consumed within the district, and only a small amount of honey goes to the outside market through formal market chain. The organic honey has a high demand, and buyers come to the doorways of bee-farmers in Myagdi and sometimes the demand is more than the supply.

The distribution of Myagdi honey to the market is very direct. Mostly honey goes straight from the honey hunters and beekeepers in Myagdi to the consumers, or through village level middlemen and international clients. Only a small amount of honey goes through the formal marketing system to processors/wholesalers and retailers. The supply chain is highly vulnerable to price fluctuation. [10]

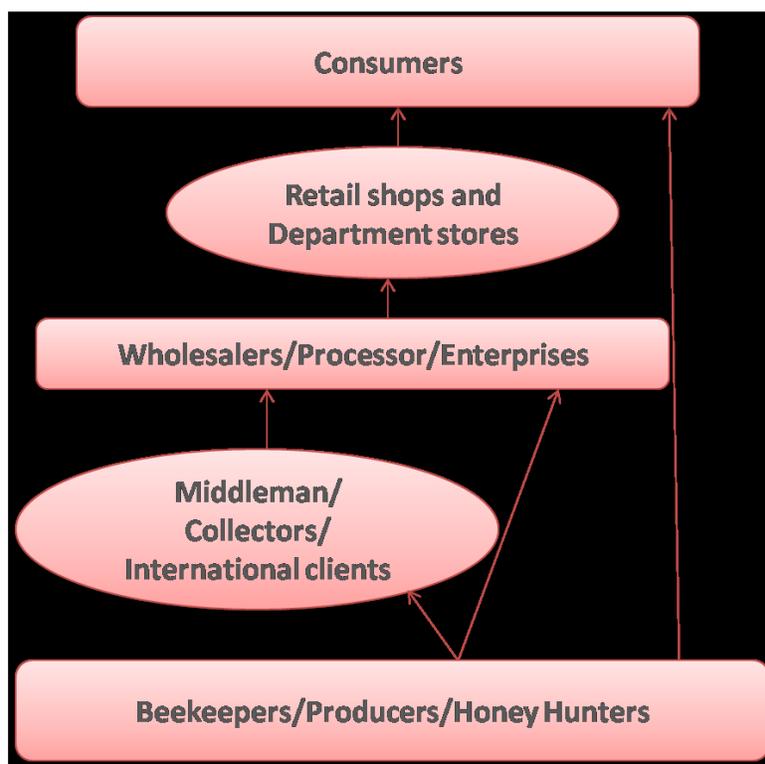


Figure 4.1 Most prevalent model of supply chain in Myagdi

The price variation from honey hunters to wholesalers varies and there are no official records of this data. The revenue generation from honey marketing and other subsidiary value added products is very less till now. The honey is sold as organic honey in most instances, or else sold to enterprises or processors if the amount of honey is large. Many beekeepers reported their income to be ranging from NPR 500 thousand to 700 thousand annually when there is consistent production of honey. The main challenge is that in the perception of honey hunters and bee-keepers, the benefits of bee products other than honey are few or non-existent. Despite awareness and knowledge about the economic importance of value added bee products, people are least bothered about using bee products other than honey because of less market access. Analysis of the amount of bee products other than honey and their value added importance necessitates the importance of taking into consideration the utilization of bee products effectively.

Financing Plan 4.4.1

Objectives:

- To identify financial needs in business
- To plan how financial needs can be met
- To assess if the financial plan is feasible or it needs to be revised

There could be several means of financing a business. It may be adapted depending on the context and need of the business. Means of finance can also be diversified to minimize risk. The following table (**Table 4.2**) has few practical examples of different means of financing and their advantages and disadvantages. This template can be modified and used as a guiding document in defining various source of financing per nature and needs of business.

Table 4.2 Advantages and disadvantages of different means of financing

Source	Advantages	Disadvantages
<ul style="list-style-type: none">• Savings	<ul style="list-style-type: none">• No cost• Risk of losing own capital	<ul style="list-style-type: none">• Could be invested to obtain more returns• Might be needed for personal expenses
<ul style="list-style-type: none">• Loans from family/friends	<ul style="list-style-type: none">• Less pressure to pay back• Less interests (if any) than other lending sources	<ul style="list-style-type: none">• Could jeopardize relationships if the investment undergoes loss
<ul style="list-style-type: none">• Loans from local money lenders	<ul style="list-style-type: none">• Normally no collaterals needed	<ul style="list-style-type: none">• Could result in conflict if investment undergoes loss• They will ask for other assets• Usually high interest rates
<ul style="list-style-type: none">• Loans from Banks	<ul style="list-style-type: none">• Lower interest rates than local money lenders	<ul style="list-style-type: none">• Collaterals needed
<ul style="list-style-type: none">• Supply on credit	<ul style="list-style-type: none">• Payment later, ideally when cash is received from sales	<ul style="list-style-type: none">• Dependency on suppliers

Beekeeper's story #3

"I want to be one of the most successful beekeeper in Nepal."



I am Govinda KC, resident of VDC-1, Kulu. It has been 7 years since I came back from the UAE and I find great opportunities in my own country than foreign countries. Since my return, I have been involved in beekeeping and I am earning much from this occupation. I want to take it further and also want to transfer this knowledge to my son.

I started beekeeping officially four years ago and I earned Rs 10,000 in the first year of beekeeping. To start this occupation, I was supported by District Agriculture Development Office, Myagdi, Beni Bazar both financially (50% fund) and through vocational trainings. Such incentives and trainings were given to all community people in Myagdi who were interested in beekeeping. Through my hard work and dedication, I took beekeeping to another level and now I earn a very good amount to support my livelihood as well as the education of my two sons. I sold honey and beehives worth NRs 1.4 million in 2016 and now I am targeting to generate a revenue of NRs 1.7 million and sell maximum beehives. I have been using artificial insemination of queen bees to strengthen bee colonies and to increase the honey production. Initially, the market access was less but now as people have started recognizing the medicinal importance of organic honey, my honey has become so popular that I am unable to supply the received demands. I often get advanced payments for the honey. I believe in providing good services to my customers or buyers. I am also interested in trying to produce other subsidiary bee hive products if I get necessary technical support and guaranteed access to market. I would like to mention that with full dedication and hard work, there is nothing we cannot do in our own country. Our country is full of resources, if we could realize the importance and sustainable utilization. Also, I do not want to go back to any foreign country, because my country is paying my worth here.

4.5 Understanding the market

The following SWOT Analysis (**Figure 4.2**) was prepared based on the learnings in Myagdi and can be useful in understanding the bee keeping business contextually for Myagdi district.

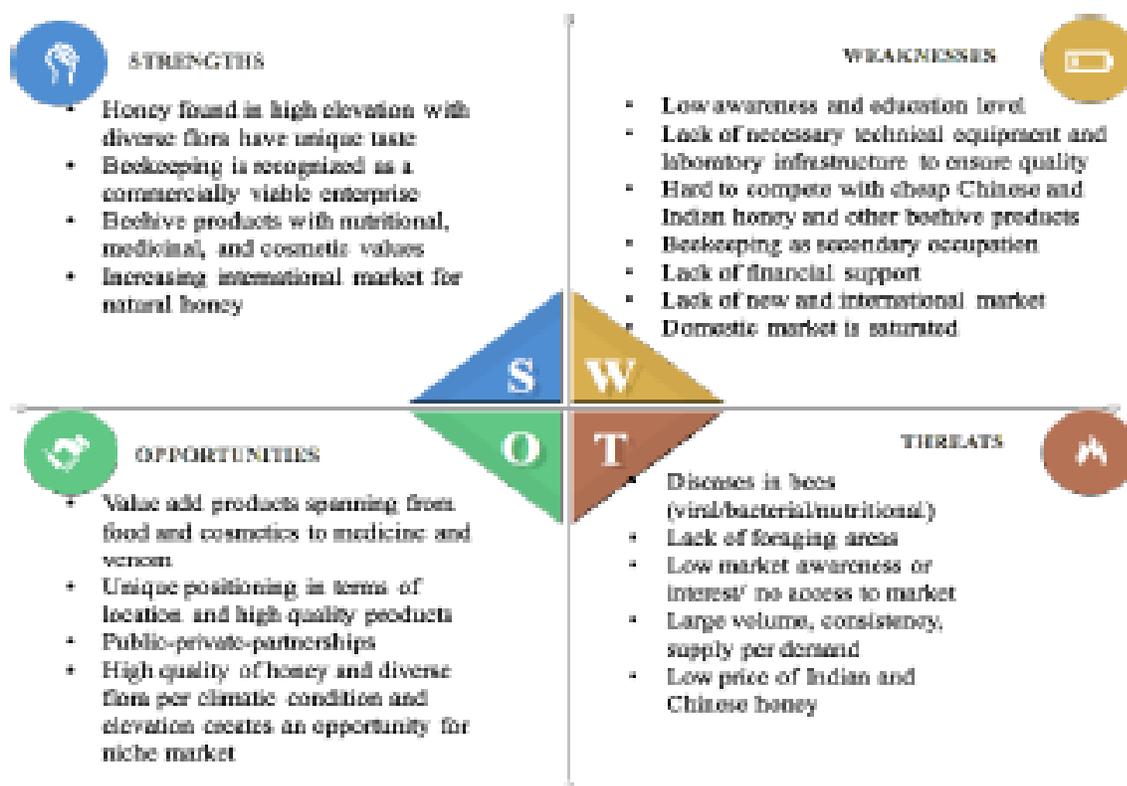


Figure 4.2 SWOT (Strengths, Weaknesses, Opportunities, and Threats) Analysis for Beekeeping Enterprises

4.6 Employing strategies for proper marketing, branding, and pricing

Raw and unprocessed honey is in high demand throughout national and international markets, and because of its antimicrobial properties and medicinal value, raw honey is generally sold at a higher price. Myagdi, which has diverse flora and fauna, provides a wide range of forage resources for bee feeding resulting in diverse varieties of honey. This honey can be consumed for nutrition, sold for income generation or used as a basis for enterprise development. Attention needs to be paid at different stages from production to branding and marketing to ensure the production of good quality honey. Quality assurance and packaging services focusing on export standards can improve the quality and add up to pure quality Myagdi honey. Pure quality honey means that the honey has a natural essence, taste, and colour, is not adulterated, and is free from chemical residues. Branding is crucial for products and services sold in huge consumer markets, and branding Myagdi honey will help honey to stand out because of its pure quality. This will include quality assurance, presentable packaging, and product pricing. According to survey results, honey in Myagdi has a higher demand than the current supply, so in order to gain the maximum benefit from beekeeping and honey production, it is first necessary to know the potential markets and their requirements. This strategy will help to plan production to meet market demand and also to make the consumer market aware regarding uniqueness of Myagdi honey. Price analysis is also necessary to analyze the potential market price of different types of honey or other hive products.



Figure 4.3 Value chain map of key stakeholders, activities, and value propositions

4.7 Nepali honey production and value in international Market

In the fiscal year 2015/16, Nepal produced 3500 metric tonnes of honey. Production data suggests that Nepal’s honey production rate is increasing steadily over the last 3 years. Organic honey is widely used for treatment of various illnesses and also as an ointment for burns, bruises and cuts and as a medicinal supplement for cold, coughs, sore throats. But the success and importance of beekeeping has not translated itself to finding its niche in the international market. Statistics reveal that Nepal is yet to regularize its honey export to the European Union (EU) and India, despite its rising demand there. The statistical information of beekeeping and honey production in Nepal is given in Table 4.3.^[9] According to 4-digit Harmonized Tariff System, code prefix for natural honey is 0409.

Table 4.3 Statistical information of Beekeeping and honey production in Nepal

Year	Bee hives(No.)	Production (Mt)
2012/13	169,000	1,625
2013/14	170,000	1,650
2014/15	225,000	3,000
2015/16	232,000	3,500

Total global sales of natural honey totalled US\$2.4 billion in 2017. Among different countries exporting the highest dollar value worth of natural honey, China and New-Zealand are the two top exporters of honey in the world market. China contributes to 11.44% of total natural honey exports of worth US\$270.7 million, while New Zealand contributes to 11.38% of worth US\$269.2 million. Nepal rank 102nd in sharing export of honey in the global market and shared a value % of 0.01.^[3,11]

Table 4.4 Overall honey export appreciated by different continents

Rank	Exporters	Value % Contribution in Global honey export in 2017
1	Europe	39.5%
2	Asia	23.1%
3	Latin America	16.1%
4	Oceania (Australia+New Zealand)	12.7%
5	North America	8.1%
6	Africa	0.4%

Source: Worldstopexport

The rising demand of honey has not been translated in the rising production and export of honey in Nepal.

Table 4.5 List of Export Quantities and value of honey from Nepal to other countries in 2016 and 2017

S.No	2016			2017	
	Importers	Exported Quantity, tons	Exported unit Value USD/tons	Importers	Exported Quantity, tons
1	China	7	3,857	China	30
2	UAE	-	-	UAE	7
3	Malaysia	1	7,000	Malaysia	3
4	Japan	-	-	Japan	1
5	India	1	3000	India	-

Source: Trademap

Though the data reveals the deteriorating trade with some countries, there are honey exporters who are using informal channels for the export of honey in the international and national market, so the above mentioned figures are likely to be underestimated.

5 BUSINESS PLAN TEMPLATE FOR PRODUCTION OF HONEY AND BEESWAX

This template can be utilized or modified based on the types of products, scale of production, and many other factors in a specific business.

Business Profile and Summary

*Feasibility Analysis on Production of Beauty and Skin Care Products and Other Subsidiary Products Produced from Honey in Myagdi District
Business Plan for Honey and Bees Wax Production*

Goals

- Expand national and international distribution network from beekeeping products
- Maximize the returns from beekeeping by utilizing honey, beeswax, and all other subsidiary products that can be obtained from the beehives and bee colonies
- Increase awareness about honey from himalayan region
- Promote beekeeping practices as businesses in Myagdi in an organized and economically sustainable manner

Objectives

- Access international market for honey, beeswax, royal jelly, and other subsidiary products
- Determine the costs and returns associated with beekeeping
- Determine the feasibility of preparing skin care and other beauty products using honey and beeswax
- Obtain competitive price of products in the international market
- Recommend long term step-wise implementation strategies for sustainable growth of beekeeping enterprises in Myagdi
- Expand distribution network to include organic certified products' stores and international market
- Increase business to business sales to incorporate honey, beeswax and other products of beekeeping into cosmetics, medicinal products, and nutraceuticals

Business plan preparation date: dd/mm/yyyy

A Basic Information:

1. Entrepreneur's name:
2. Age
3. Sex:
4. Name of business:
5. Address:

B Market and Production Plan:

B1. Brief description about products/services:

Installation of beehives for beekeeping, and production of honey and beeswax.

Production scale: small and medium enterprise (SME)

B2. Major market centre (current and target): haat bazaar, district headquarters, Kathmandu, international market (target)

B3. Types of customers: (important for developing market strategy for individual entrepreneur)

All general households at market, small shops/retailers, middlemen.

B4. Products or service in comparison with competitors:

Name of service or products	Name of Major Competitors	Price Comparison	Quality Comparison	Packaging Comparison	Selling strategies Compared with Competitors
HONEY	Other beekeepers, high volume honey producers in terai regions	variable, mean = NRs. 1500/kg – in line with other producers in local area	Good – in line with other producers in local area	Very simple (plastic bottles) – in line with other producers in local area	Local markets at festivals, target institutions – currently no different strategy to competitors
BEESWAX	Other beekeepers, high volume beeswax producers in terai regions	2000 per kg	Good – in line with other producers in local area	Very simple (plastic bottles) – in line with other producers in local area	Local markets at festivals, target institutions – currently no different strategy to competitors

B5. Market target in unit or price (monthly or annually) (note: very important here to set a target!): Sales price varies over the year; data below based on mean annual selling price, see B4 above

Target

Honey: 800 kg of honey/year = NRs 12,00, 000

Beeswax: 50 kg beeswax/year = NRs 100,000

Estimates/ assumptions:

- i. total beeswax extracted is ~10-12 wt% of total honey produced from 100 hive frames multiple times in a year
- ii. additional investment in beekeeping is beeswax is extracted from the hives is ~25%.

B6. Required fixed capital (machines/ tools/furniture fixture)

#	Detail name	Quantity	Rate per unit	Total NRs.
1	House	1	3000	30000
2	Wooden Hive Box	10	3500	35000
3	Full protection gear	6	2000	12000
4	Hive tools	10	500	5000
5	Honey extractor	2	5500	11000
6	Brush	10	400	4000
7	Hive Box stands	10	1000	10000
8	Hive frames	100	400	40000
Total capital investment				1,47,000

B7. Depreciation over 3 years

#	Name of fixed capital	Total Amount (NRs.)	Depreciation rate (%)	Depreciation amount (NRs.)
1	Wooden hive Box	35000	33%	11550
2	Full protection gear	12000	33%	3960
3	Hive tools	5000	33%	1650
4	Honey extractor	11000	33%	3630
5	Brush	4000	33%	1320
6	Hive frames	50000	33%	16500
Depreciation in first year				38,160

NB. Depreciation is a fixed capital cost

C. Expenses Plan

C1. Calculation of raw materials (monthly/annually)

#	Description of raw materials	Quantity	Rate per unit	Total (NRs.)
1	Hive frames with bees colony	70	7000	49000
2	Sugar (food for bees)	200kg bulk	60	12000
3	medicine	Per need		3000
4	Packaging containers (honey)	500g X 100 1Kg X 50 5Kg X 20	40 per container 60 per container 150 per containers	10000
5	Packaging material beeswax	Bulk saran wrapping rolls	6-8 rolls for total 50 kg	5000
6	transport	transport 2-3 times in bulk per season (total 8-10 times)	1500	15000
7	Simple labeling materials			20000
Total Annual cost of inputs				1,14,000

C2. Human Resource cost for wage and salary – one-off and recurring

#	Description	Number of person days	Daily wage (NRs.)	Annual wage or salary (NRs.)	Remarks
1	Caretaker for bees	150	200	30000	The owner is usually the main beekeeper/ caretaker who supervises throughout the year
2	Labor required during harvest and for packaging	60	200	12000	
Total annual wage bill (first year only)				42,000	

C3. Other costs (including overheads)

#	Description	Monthly expenses (NRs.)	Annual Expenses (NRs.)	Remarks
1	Cost of land – rent equivalent	1500	18000	small scale beekeeping requires very little land
2	Miscellaneous		20000	
	Total		38,000	

D. Financial Plan

D1. Calculation of per unit cost and selling price

#	Description	Annual Cost (NRs.)		
		Honey	Beeswax	Annual Totals
1.	Cost of raw materials (C1)	Approx 75% of total cost = NRs. 85,500	Approx 25% of total cost = NRs. 28,500	1,14,000
2	Cost of Human Resource (C2)	31500	10500	42,000
3	Other costs (inc. overheads) (C3)	28500	9500	38,000
4	Depreciation (B7)	28620	9540	38,160
5	Interest	0	0	0
A.	Total annual cost	1,74,120	58,040	2,32,160
B.	Per kg cost (total annual cost/annual market target)	Total cost/total kg = NRs 1,74,120/800 = Nrs. 217/kg	Total cost/total =NRs 58,040/100 = NRs 580/kg	n/a
C.	Profit Margin (rough estimate)	142%	71%	n/a
D.	Target mean selling price (NRs) per kg	NRs 1500/kg	NRs 2000/kg	n/a

D2. Calculation of working capital

#	Description	Required days for calculation	Amount (NRs.)
1	Raw materials stock		0
2	Stock of semi-process goods		0
3	Stock		0
4	Credit facility		0
5	Cash for overhead cost management		0
	Total (NRs)		0

D3. Calculation of total capital

#	Description	Amount (NRs.)	Remarks
1	Total fixed capital (B6)	107,000	
2	Total working capital (D2)	0	
Total (NRs.)			

D4. Source of capital

#	Description	Amount (NRs.)	Remarks
1	Equity – self investment (D3)	1,47,000	
2	Loan	0	Bank, saving credit group, relatives
Total (NRs.)		1,47,000	

D5. Calculation of profit and loss

#	Description	Amount (NRs.)
1	Income from total sales (market target*selling price)	12,00,000
2	Deduction of total expenses	
a	Cost of raw materials (D1 line 1)	85500
b	Cost of Human Resource (D1 line 2)	31500
c	Cost of other costs (inc. overhead) (D1 line 3)	28500
d	Depreciation (D1 line 4)	28620
e	Annual interest (D1 line 5)	0
3	Sub-total of all expenses	1,74,120
4	Net profit (total income - total expenses)	10,25880

D6 Return on investment (RoI):

$$\text{Honey:} \quad = \frac{\text{Net profit} * 100}{\text{Total Investment}} = \frac{10,25880 * 100}{1,74,120} = 589 \%$$

$$\text{Beeswax:} = \frac{\text{Net profit} * 100}{\text{Total Investment}} = \frac{165097 * 100}{58,040} = 245 \%$$

D7 Conclusion:

Beekeeping for honey and beeswax production is feasible and highly profitable with more than 142% profit margin in honey and additional 70% profit margin in beeswax, and large return of investment (honey-589% and beeswax-245%) even in small- scale production of with total 100 beehive frames used in 10 hive boxes. This business plan template is based on the data obtained from the village development committee, beekeepers and the market estimates. The investment and infrastructure required for beekeeping is very little compared to huge return and possibility for growth and diversification of products. If diverse products from bee hive are commercially produced then there is even more possibility for higher return and higher profit margin. Preparation of value added products like beauty products, skin care products, nutraceuticals, medicinal additives and products could be much more lucrative business than selling raw materials. Additionally, the target pricing in the template is determined based on domestic market. The value of these products can be much higher in international market if the niche market is targeted that focuses on honey produced in himalayan region with diverse flora with medicinal values.

6 STANDARDS, QUALITY, AND CERTIFICATIONS FOR HONEY AND HIVE PRODUCTS

6.1 The need for quality assurance

The demand for honey and other beekeeping products has been increasing worldwide with desire to use natural and chemical free ingredients as an alternative to synthetic chemicals and highly processed ingredients. With this increasing demand, consumers are more aware and critical about the quality of the products they are consuming. Therefore, it is crucial to perform the necessary quality assurance tests before bringing the product in the market. Honey comprises of number of components like sugars, carbohydrates, acids, amino acids, enzymes, moisture, that are of great importance in various industries like food, cosmetics, medicine, etc. These components dictate and indicate the nutritional value, medical efficacy, texture, granulations of honey. Thus, analysing the chemical and physical properties of honey is important to identify the authenticity, adulteration possibilities, heat and storage damage, and source of honey. Currently, Nepal is in the preliminary stages in terms of quality assurance of honey compared to international standards. For Nepal to be competitive in the international bee products/honey market, the quality regulations and laboratory facilities for testing has to be upgraded to be in par with international code and standards.

6.2 International market quality standards and requirements

The international standards for honey may vary depending on the country or region. The European Union, United States and Canada in general have much stricter regulations in items related to food and medicines like honey. One of the most accepted and recognised standards for quality assurance of honey is ‘Codex Standards’, which was set by the Codex Alimentarius Commission (CAC) under the joint collaboration of Food and Agriculture organization (FAO) and World Health Organization (WHO) Food Standards Programme.

6.3 Domestic standards

To ensure domestic standards of honey in Nepal, some of the regulatory bodies like Department of Food Technology and Quality Control (DFTQC) and Nepal Bureau Standards and Metrology (NBSM) have set some key technical regulations. While it is an important step to ensure quality of honey, the standards set by these regulatory bodies are not aligned that can cause confusion and complication. Additionally, the parameters set by DFTQ and NBSM are much fewer than than internationally recognized Codex standards set by CAC (see above). Government laboratories lack adequate infrastructure to identify certain parameters set by DFTQC like identifying inorganic and organic matters foreign to the the composition of honey. Therefore, it becomes very difficult or impossible for honey producers, which mostly comprises of rural population, to be competitive in national and international market by assuring high quality of honey.

Table 6.1 Key parameters for the analysis of quality of honey samples

Parameters	Key functions or benefits
Moisture (%)	Low moisture content is preferred for longer shelf life of honey
pH	The low pH of honey inhibits the presence and growth of microbial organisms Acidity also contributes to the flavor and aroma of honey
Electrical conductivity (mS/cm)	Codex standard for honey is <0.8 mS/cm in 20g honey diluted in 100mL water. The value is influenced by factors by acidity, moisture, viscosity, salt content.
Ash content	Represents total amount of inorganic minerals salts present in honey and these minerals may also retard the growth of microbial organisms in honey
Enzyme	
Invertase	Enzymes are important chemicals in our body that supports various vital function like digestion, anti-aging, energy conversion, antimicrobial activities, etc.
Amylase	
Glucose oxidases	
Sugar and carbohydrate content	
Fructose	Sugars and carbohydrates are responsible for providing nutrition and energy to our body. Honey does not raise blood sugar level levels as quickly as other processed sugars (has low glycemic index than sugar). Honey may be easier to digest than other sugars because of digestive enzymes present in honey.
Glucose	
Turanose	
Maltose	
Oligosaccharides	
Others	
Amino acids	
Proline	Proline is the most abundant amino acid in honey. Amino acids make up proteins, so they play nutritional role in our health if consumed in adequate quantity.
Lysine	
Arginine	
Others	
Microbiological tests	The bacterial load in the product should be within the negligible range
Pesticides and heavy metals	harmful chemicals and metals that will adversely affect the health and body functions

Sources: Adapted from refs. [12],[13]

Table 6.2 Key parameters for the analysis of quality of beeswax samples

Parameters	Key functions or benefits
Moisture (%)	Same as table 6.1
Esters	These chemical properties are useful to determine the authenticity as well as to match the quality of wax with specific formulations
Hydrocarbons	
Free acids	
Alcohols	
Saponification value	This value is mostly important when making soap products
Other chemical components	
Colour	Yellow to yellow-brown
Consistency	Should not stick upon cutting or chewing
Melting point	These physical properties are determinant of various resulting properties of wax when being used for several purpose like skincare, lip balm, cosmetic, candle, etc. Therefore, based on these properties the quality and use of wax is determined.
Density	
Refractive index	
Paraffins test	Paraffins is considered overall harmful for skin or if swallowed
Authenticity (Gas Chromatography (GC) pattern)	Authenticity can be confirmed using GC technique
Contamination and residues	Harmful chemicals and metals that will adversely affect the health and body functions

Source: Adapted from *Quality and standards of pollen and beeswax* ^[11]

Table 6.3 Key parameters for the analysis of quality of propolis samples

Parameters	Key functions or benefits
Moisture (%)	Same as table 6.1
Carbohydrates	Same as table 6.1
Proteins/ Amino acids	Same as table 6.1
Dietary fiber	Good for nutrition and digestive health
Minerals	Represents total amount of inorganic minerals salts present in honey and these minerals may also retard the growth of microbial organisms in honey
Vitamins	Good for various body functions
Flavonoid glycosides	Beneficial for vital functions like cardiovascular, brain, metabolism
Visible contamination, taste, odour	Represents the authenticity, adulteration, and expiration of the product
Microbiological tests	The bacterial load in the product should be within the negligible range
Pesticides and heavy metals	harmful chemicals and metals that will adversely affect the health and body functions

Source: Adapted from *Quality and standards of pollen and beeswax* ^[11]

6.4 Certifications

Certifications of honey and other hive products ensures that producers have met a set standards and criteria that are allocated by the certifying body. These standards are generally set by the authorizing body with health and well being of consumers and sustainability of the environment as a priority.

6.4.1 Benefits of certifications

- Ensure greater access to existing and fast-growing markets
- Help protect the environment from harmful products and processes
- Helps beekeepers to receive premium prices for their products (honey and hive- based products)
- Support local economies
- Access additional funding and technical assistance programs

Challenges for certifications process in Nepal 6.4.2

The key challenges for international certification process in Nepal are:

Awareness : There is very low level of awareness and information about certifications and their benefits. Even though there may be awareness about certification, there is not sufficient information about the process of getting certified.

Process : The certification processes could be very strict and meticulous. It could involve many steps like training, inspection, and follow-ups, which have to be done within specific deadline and guidelines to be approved for certification.

Time and Cost : The international certification of products and services can be expensive and time consuming, since it involves a long process with several steps.



Figure 6.1 Examples of Various Certifications of Honey and Hive products ^[14]

7 KEY FINDINGS: CHALLENGES, INTERVENTIONS, AND RECOMMENDATIONS

In order to set up beekeeping as an enterprise, the aspiring entrepreneur should first understand current beekeeping-related challenges, the market opportunities, gaps, available resources, infrastructure, consumer needs, and market demand. Beekeeping can be a profitable business if conducted with appropriate knowledge and resources. For Hilly region like Myagdi, small to medium scale per household might be most favorable in the initial stages. The investment required is also low and can be started by anyone like-men, women, landless, poor and marginalized individuals. Thus, beekeeping as a business enterprise can provide sustainable household income and generate employment in the community.

7.1 Challenges of beekeeping as a business

Technical challenges: 7.1.1

They have been practising beekeeping for several years but since the last few years, they have been facing challenges related to the health conditions of honey-bees which has resulted in reduced production of honey and also less hives divisions. They have been consulting with concerned

experts in beekeeping but no major interventions have been made. Also, the solutions suggested by Agricultural Expert to get rid of the problems haven't proved very effective. This has resulted in a decline of the overall income generation as compared to the past. Lack of technology development/ research and effective measures to address the issues on beekeeping.

Socio-cultural Challenges: 7.1.2

Adoption of new technologies (other than traditional), organic farming and integrated pest control system for bee forage resources and crop protection can be biggest challenges as I understand there is lack of awareness about toxicity of insecticides on bees and resulting bee poisoning.

Market Challenges: 7.1.3

The beekeepers expressed low appetite to explore subsidiary products because of lack of direct access to market/ consumer for beeswax and other value-added products. They also have low to no business acumen to run beekeeping business strategically and in an organized manner. Product pricing is set based on external markets outside the districts. People are not much aware about the large economic importance of value-added products.

Financial Challenges: 7.1.4

Nepal government provides 50% subsidy for beekeeping box and 25% subsidy to buy the equipments. However, there is no insurance in case there is large loss of bee colonies. The beekeepers have been slowly scaling up with their own seed money, but there is not much awareness or willingness to scale up beekeeping as a primary and organized business due to the risks like lack of market access, lack of technical support for bee disease control, and lack of insurance.

7.2 Recommendations for Interventions

7.2.1 Increasing awareness and adoption of appropriate technology and technological interventions

In order to address the issues of diseases in bees, special management in terms of technology, knowledge, and skills is needed. Almost every house in Myagdi is involved in beekeeping and honey production, but the increased incidence of disease in bees has declined both general interest and income. Adopting advanced technologies from changing traditional log hives to appropriate technology log top-bar hives can be effective in increasing honey productivity if farmers are trained on how to use the hive to make stronger, healthier and better-fed bee colonies.^[15] Also, informing the community about advanced technologies and diversified benefits from apiculture such as value added products from raw hive products can be the best long-term solution to problems being faced by beekeepers and may lead to a market for bee products outside the district as well as within it.

7.2.2 Maximizing the strengths and opportunities & minimizing the weakness and threats

The following interventions (**Table 7.1**) are recommended to establish beekeeping as business and to promote products based on subsidiary ingredients from beekeeping. These recommendations are based on our field study in Myagdi, the SWOT analysis (**Figure 4.2**), and the value chain map of key stakeholders, activities, and value propositions (**Figure 4.3**).

Table 7.1 Recommendations based on the field study in Myagdi and the SWOT analysis

STRENGTHS	HOW TO MAXIMIZE?
<ul style="list-style-type: none"> • Honey found in high elevation with diverse flora have unique taste • Beekeeping is recognized as a commercially viable enterprise • Beehive products with nutritional, medicinal, and cosmetic values • Increasing international market for natural honey 	<ul style="list-style-type: none"> • Set up beehives in locations where there is availability of foraging vegetation (could be more effective if community led) • Test the nutritional and medicinal property of honey to gain competitive advantage and trust from the consumers • Train the community to extract subsidiary products like beeswax, pollen, royal jelly, etc. • Train the beekeepers to use these subsidiary products to make high value products like creams, soaps. • Connect beekeepers to the market
OPPORTUNITIES	HOW TO EXPLOIT?
<ul style="list-style-type: none"> • Low awareness and education level • Low technical capability • Beekeeping as secondary occupation • Lack of financial support • Lack of new and international market • Domestic market is saturated • Lack of necessary technical equipments and laboratory infrastructure to ensure quality • Hard to compete with cheap Chinese and Indian honey and other beehive products 	<ul style="list-style-type: none"> • Conduct awareness campaigns and information dissemination programs • Regular monitoring and vocational trainings for communities interested in beekeeping • Show maximum possibilities to generate high income not only from honey sells but also from value added products. • Provide incentives on regular basis to motivate beginners for both beekeeping and start up enterprises. • Make them aware about the importance of bee products in both National and international market.

THREATS	HOW TO COUNTER?
<ul style="list-style-type: none"> • Value add products spanning from food and cosmetics to medicine and venom • Unique positioning in terms of location and high quality products • Public-private-partnerships • High quality of honey and diverse flora per climatic condition and elevation creates an opportunity for niche market 	<ul style="list-style-type: none"> • Establishing new enterprises on a smaller or bigger scale • Supporting co-operatives in selected districts with technical assistance and skill development trainings in order to enhance product production and processing. • Quality assurance and co-ordination with established enterprises • Obtaining organic certifications • Identifying the medicinally important plant that can be used as a forage for bee • Providing stake to locally active people
WEAKNESSES	HOW TO MINIMIZE?
<ul style="list-style-type: none"> • Diseases in bees (viral/bacterial/nutritional) • Lack of foraging areas • Low market awareness or interest/ no access to market • Large volume, consistency, supply per demand • Low price of Indian and Chinese honey 	<ul style="list-style-type: none"> • Identifying the specific disease affecting bee's health and possible medications to minimise threat by discussing with veterinary experts • Adopting the biosafety measures in day to day management practices to minimise the risk of pest and disease transfer between bees and apiaries • Apply effective measures to regularly inspect the bee hives • Capitalizing on the niche market of himalayan honey • Encouraging people to contribute small portion of their land in forage cultivation which can directly compensate their loss through income generation

	<p>from bee products. This can promote consistency and large volume of honey and other subsidiary products</p> <ul style="list-style-type: none"> ▪ Involving and motivating bigger portion of community people in beekeeping by providing incentives and off-farming employment opportunities ▪ Make them aware about the rapid demand, economic importance of Myagdi organic honey and other subsidiary products in national and international market.
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Balancing demand and supply 7.2.3

Developing enterprises or co-operatives for the collection of honey produced throughout the district has not been in practice. The overall honey produced is utilized within the district and farmers do not even need to get their product to the market as they have buyers on their doorway. They are selling based on individual production rate. The selling price is set based on the prices in markets outside the district. Although a significant proportion of households in Myagdi is involved in beekeeping, they have not been able to fulfill the market demand because of several challenges.

Assuring quality to meet international standards 7.2.4

Quality assurance of raw honey is very necessary as bee forage resources are both wild and seasonal cultivation. There can be higher risk of taking poison filled pollens of wild flowers by honey bee, which needs to be checked before delivering hive products to the market. During the course of interviewing, beekeeper’s and traders raised the issues of receiving negative feedbacks in the quality of some varieties of honey (strong and caused dizziness). So, this issue demands the immediate need to consider pollen analysis from different species of plant found in the honey sample. This will provide some indication of the most important and harmful forage species in the bee surroundings. Also, quality analysis of unprocessed/raw honey based on international standards can be further used to compare with the quality and composition of processed honey to get the distinct standard/value of Himalayan honey (Myagdi district).

7.3 Conclusions

Myagdi is well known for its diverse vegetation, widespread practice of beekeeping, and popular destinations for tourism. These three sectors are directly or indirectly interconnected. Arranging these sectors in a particular niche can come up with greater benefits for both the district and the country. The survey in different VDCs in Myagdi has revealed active participation of various local associations, pre-dominantly women-led organizations (like Mother Group) on different community-reform and economic sectors. Though we didn’t find active beekeeping-related associations, we did note that the local people were highly interested in and are participating in

beekeeping and honey production. Furthermore, all the interviewed people were also found to be interested in receiving trainings for value added products and being involved in new enterprises, although the level of awareness about subsidiary hives products is very low.

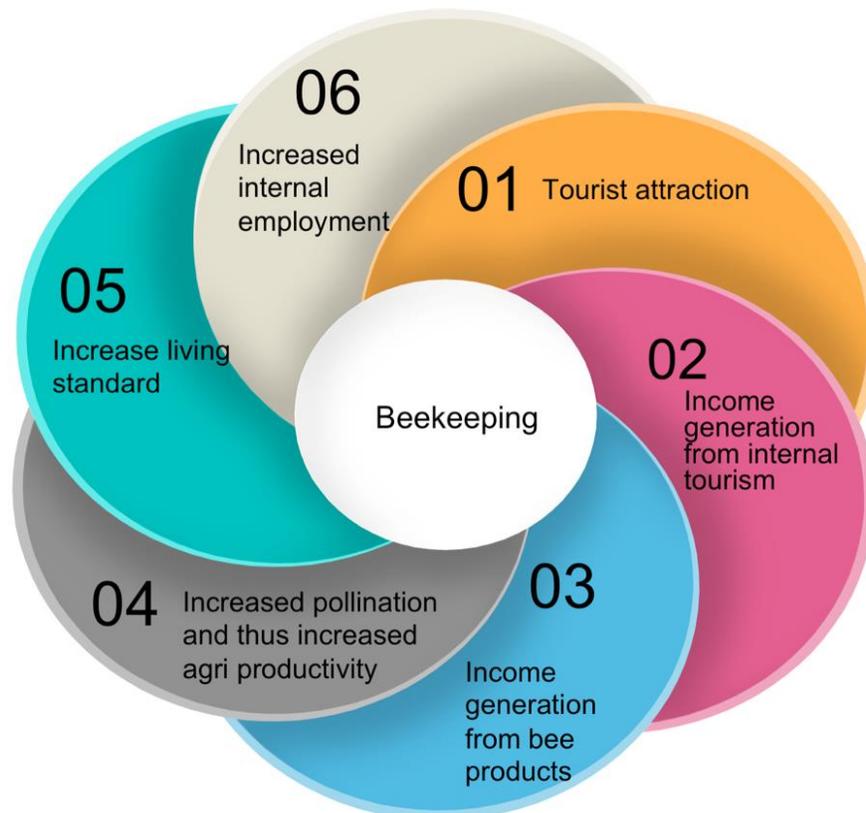


Figure 7.1 Representation of positive effect of beekeeping in the Myagdi district’s ecosystem.

Being one of biggest producers and a storehouse of abundant indigenous knowledge in beekeeping and honey hunting, Myagdi can create one of the biggest business ecosystems and hubs for beekeeping in Nepal, which in turn can improve the livelihoods of the local people through increased income generation and also increase the popularity of the quality honey produced there. Increased focus and investment on beekeeping in Myagdi will also play a big role in biodiversity conservation and organized agriculture and employment opportunities. In order to increase the yield of honey, several varieties of trees and bee-pollinated crops can be planted and thus beekeeping can be combined with agro-forestry, leading to increased yields from the trees and crops as well as increased honey yields. Placing bee colonies near cultivable land could provide surplus revenue from the land in addition to the revenue generated through increased crop yields. Such a systematic practice of beekeeping will also play a vital role in the conservation of bees.

In a nutshell, rearing bees has a great potential to promote income-generation and employment not only for those who practice beekeeping but also for those who harvest wild colonies for production of honey, beeswax and pollen. Moreover, promotion of beekeeping will also indirectly contribute to the conservation of the plants and vegetation. Hence, development and promotion of apiculture is an environmentally sound means of enhancing the financial status of the people and thus benefiting both the district and the country.

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9 SUPPLEMENTARY INFORMATION

9.1 Focus Group Discussion with Community people

FGD/ interview with beekeepers/ traders/ cooperative

Objective:

- Types of Bees
- Types of honey
- Wild vs domestic beekeepers
- Beekeeping methods
- Current bee products being used?
 - Honey
 - Venom
 - Pollen
 - Royal Jelly
 - Bees Wax
- Processing methods and scale
- Trading Mechanism
- Raw or value added form?
- Livelihood
- Challenges

Questions:

1. Type of bees
 1. Types of bees available
 2. Are there any major preferential bees and why?
 3. According to which types of honey has high commercial value .
 4. Are there certain bees more risky to keep than others and why?
 5. What type of plantation is preferred near beekeeping sites
2. Types of honey
 - 2.1 What are different types of commonly and commercially produced honey
 3. Wild vs domestic beekeepers
 - 3.1 Preference -Wild or domestic ?
 - 3.2 Methods of honey extraction from domestic and wild bees
 - 3.3 Major constraint faced while extraction
 4. Beekeeping methods
 - 4.1 Existing methods of beekeeping
 - 4.2 Which seasonal is most favourable for beekeeping
 - 4.3 Is there any training programs for beekeepers ?
 - 4.4 Major constraints faced while beekeeping
 - 4.5 Any advanced technology introduced to mitigate management interventions?
 5. Current bee products being used?
 1. Honey
 2. Venom
 3. Pollen
 4. Royal Jelly
 5. Bees Wax

6. Scale of production
 1. Individual beekeeping scale vs cooperative beekeeping scale
 2. Annual production rates of honey (in kg)
 3. Is plant production consistent, increased or decreased in last 5 years?
 4. Collection model vs individual sellers model?
7. Processing methods and scale
 1. What is the final forms of bee products before trading?
 2. Based on the form what are the processing methods?
 3. How do you process each bee products?
 1. Honey
 2. Venom
 3. Pollen
 4. Royal jelly
 5. Beeswax
 4. What happens to the by-products after honey extraction or bee product extraction process?
5. What types of beekeeping boxes do you use?
6. What is the capacity per box (no. of tiers/ grams per tiers)?
7. How much did it cost? Where did you bring it from? Which year did you get it? (Make, Year, source, number of tiers,...)
8. Do you share or rent the boxes?
9. What does the beekeeping cycle look like?
10. Human resource involved in the process?
11. Are the HR/ technicians/beekeepers trained?
12. Maintenance process of beekeeping boxes and cost?
8. Trading Mechanism
 1. Do you trade directly or do you supply these to other traders?
 2. Where do you take these products?
 3. Who are the biggest buyers?
 4. How many middlemen are there in the trading process?
 5. How much do you get per kg?
 6. Does the price fluctuate? What are some of the factors for fluctuation of price as pointed by the buyers?
9. Raw or value added form? Branding/ Marketing?
 1. Are the bee products further refined?
 2. Are the bee products sold in bulk or small quantities?
 3. Are they branded before selling?
 4. Have you received trainings for marketing/ branding/ value add?
 5. Do you have some ideas for value add?
 6. What are some of the value added bee products?
 1. Creams using beeswax?
 2. Venom for therapy?
 3. Candles?...
10. Livelihood?
 1. Has beekeeping increased your income?
 2. When did you get the return of investment and started getting profit?

3. Do you plan on continuing or scaling up beekeeping?
4. Do you plan to diversify the bee types or bee product types?
5. How Socio-economic aspect of cultivating MAPs affects your life?
11. Multi stakeholder engagement?
 1. What kinds of support have you gotten from external stakeholders?
 1. Government
 2. Private sector
 3. NGOs/ INGOs
12. Challenges
 1. What are some of your challenges?
 2. Any challenges in these specific areas?
 1. Access to Market
 2. Risks related to farming and harvesting?
 3. Yield fluctuation
 4. Price fluctuation
 5. Social challenges
 6. Access to Finance?
 7. Climatic/Seasonal/year-to-year changes?
 8. Lack of skilled Human resource?
 9. Technical challenges- crop selection, technology used, distillation
 10. Business acumen
 11. Storage
 12. Lack of experts for utilizing available technology?

FGD FORM TRANSLATED TO NEPALI

माहुरी पालक/व्यापारीहरु/सहकारीसँगको एफजीडी/अन्तरवार्ता उद्देश्य:

- मौरीको प्रकार
- महको प्रकार
- जंगली vs घरेलु मौरी
- मौरी पालनका विविधहरु
- वर्तमान समयमा मौरी उत्पादन कसरी भइरहेको छ ?

क. मह

ख. जहर

ग. पराग

घ. रोयल जेली Royal Jelly

ड. मैन (Bees Wax)

- प्रशोधनको विधि र मापन
- प्रयपारक संयन्त्र
- कच्चा पदार्थ र value added product.
- जीवनशैली
- चुनौतीहरु

प्रश्नहरु:

१. माहुरीको प्रकार

क. माहुरीका प्रकारहरु उपलब्ध छ?

ख. त्यहाँ कुनै प्रमुख व्यापारिक माहुरी छ ? किन ?

ग. उच्च व्यावसायिक मूल्य अनुसार कुन प्रकारको माहुरी रहेको छ ?

घ. त्यहाँ अन्य माहुरीको तुलनामा कुनै माहुरीहरुलाई राख्न खतरा छ ? किन ?

ड. माहुरी पालन क्षेत्रको आसपास (नजिक) कस्तो किसिमको वृक्षारोपण गर्नु पर्दछ ?

२. महका प्रकारहरु

क. सामान्य र व्यावसायिक प्रकारको उत्पादन हुने महमा के कस्ता फरक रहेका छन् ?

३. जंगली vs घरेलु माहुरी

३.१ प्राथमिकाताको आधारमा (जंगली वा घरेलु) ?

३.२ घरेलु र जंगली माहुरीबाट मह निकाल्ने तरिका ?

३.३ मह काट्दा सामना गर्नु पर्ने प्रमुख अवरोध ।

४. माहुरी पालन गर्ने तरिकाहरु

४.१ माहुरी पालनको अवस्थित तरिका

४.२ माहुरी पालनको लागि कुन मौसम सबैभन्दा अनुकूल हुन्छ ?

४.३ के त्यहाँ माहुरी पालनसँग सम्बन्धित कुनै तालिमका कार्यक्रमहरु छन् ?

४.४ माहुरी पालनका क्रममा के कस्ता प्रमुख बाधाहरुको सामना गर्नुभयो ?

४.५ कुनै पनि आधुनिक प्रविधिहरु (Introduced to mitigate management intervention?)

५. हाल माहुरी उत्पादनहरु प्रयोग भइरहेको छ ?

क. मह

ख. जहर

ग. पराग

घ. रोयल जेली (Royal Jelly)

ड. मैन (Bees Wax)

६. उत्पादनको मात्रा

६.१ व्यक्तिगत रूपमा गरिने माहुरी पालन **VS** सहकारी मार्फत गरिने माहुरी पालन

६.२ महको वार्षिक उत्पादन दर (किलोग्राम)

६.३ पछिल्लो ५ वर्षमा महको उत्पादन दर घटेको वा बढेको

६.४ संकलन मोडेल **VS** व्यक्तिगत बिक्रेता मोडेल ?

७. प्रशोधनको विधि र मापन

७.१ व्यापार गर्नु भन्दा अघिको माहुरी उत्पादनको अन्तिम रूप के हो ?

७.२ फर्मको आधारमा प्रशोधन विधिहरू के हो ?

७.३ तपाईं प्रत्येक माहुरीको उत्पादन प्रक्रिया कसरी गर्नुहुन्छ ?

क. मह

ख. जहर

ग. पराग

घ. रोयल जेली (Royal Jelly)

ड. मैन

७.४ मह काट्दा अथवा मह निकाल्ने प्रक्रिया पछि उप-उत्पादनहरूलाई के हुन्छ ?

७.५ तपाईं कुन प्रकारका मासुको बक्सिड प्रयोग गर्नुहुन्छ ?

७.६ प्रति बक्स क्षमता (प्रति टायर ग्राम प्रति टायर) को क्षमता के हो ?

७.७ यो कस्तो भयो ? तपाईंले कहाँबाट ल्याउनु भयो ? तपाईंले कुन वर्ष पाउनु भयो ? (बताउनुहोस, वर्ष, स्रोत, टायरहरूको संख्या)

७.८ तपाईं (घार) बक्स साभ्ना वा भाडामा लिनुहुन्छ ?

७.९ माहुरीको (घार) बक्सको चक्र कस्तो हुन्छ ?

७.१० यस प्रक्रियामा मानव स्रोत, साधन पनि संलग्न छ ?

७.११ के मानव स्रोत, साधन/प्रविधि/माहुरी पालकले तालिम पाएका छन् ?

७.१२ माहुरीको (घार) बक्सको मर्मत प्रक्रिया र लागन कति हुन्छ ?

८. व्यापारिक संयन्त्र

८.१ के तपाईं सिधै व्यापार गर्नुहुन्छ वा तपाईं अन्य व्यापारीहरूलाई आपूर्ति गर्नुहुन्छ ?

८.२ तपाईं यी उत्पादनहरू विक्री गर्न कहाँ लैजानुहुन्छ ?

८.३ तपाईंको सबैभन्दा ठूलो खरीदारहरू (खरीद गर्ने) को हुन् ?

८.४ व्यापार प्रक्रियामा कति विचौलियाहरू छन् ?

८.५ तपाईंले प्रति किलोग्राम कति कमाउनुहुन्छ ?

८.६ के मूल्यमा उतार चढाव हुन्छ ? मूल्यको उतार चढाव हुनुको कारण खरीदारहरू (खरीद गर्ने) कुरालाई भन्छन् ?

९. कच्चा पदार्थ र ख्वगिभ वममभम उचयमगअत ? ब्रान्डिंग/वजारीकरण

९.१ माहुरीहरूको उत्पादनमा अझ परिष्कृत हुँदैछ ?

९.२ उत्पादन भएको मह थोक वा खुद्रा (सानो मात्रा) मा कसरी बिक्री गर्नुहुन्छ ?

९.३ के तपाईंसँग सामानको मूल्य थपिनका लागि कुनै उपाय छ ?

९.४ के तपाईं मार्केटिंग/ब्रान्डिंग/सामानको मूल्य थपिने तरिका सम्बन्धी कुनै तालिम प्राप्त गर्नु भएको छ ?

९.६ के गरिएमा माहुरी जन्य उत्पादनहरूमा **value add** गर्न सकिन्छ ?

क. मैन प्रयोग गरिएका क्रिमहरू

ख. **Venom** का लागि थेरापी ?

ग. मैनवती ?

१०. जीवनशैली

१०.१ के माहुरी पालन व्यवसायले तपाईंको आम्दानीमा वृद्धि गरेको छ ?

१०.२ तपाईं लगानी कहिले उठाउनु भयो र कहिलेबाट लाभ प्राप्त गर्न शुरु गर्नुभयो ?

१०.३ तपाईंले माहुरी पालनलाई जारी राख्ने वा स्केलिंग गर्ने योजना बनाउनु भएको छ ?

१०.४ के तपाईंले माहुरी जन्य उत्पादनको प्रकारमा विविधता गर्ने योजना बनाउनुहुन्छ ?

१०.५ माहुरीपालनले सामाजिक-आर्थिक पक्षमा तपाईंको जीवनलाई प्रभाव पार्दछ ?

११. सरोकारवालाहरूको सहभागिता

११.१ तपाईंले बाहिरी सरोकारवालाहरुबाट के कस्तो प्रकारको सहयोग प्राप्त गर्नुभयो ?
क. सरकार ख. निजी क्षेत्र ग. गैर सरकारी संस्थाहरु/आइ.एन.जी.ओ

१२. चुनौतीहरु

१२.१ तपाईंका चुनौतीहरु के के हुन् ?

१२.२ विशेष क्षेत्रहरुमा भएका कुनै पनि चुनौतीहरु ?

क. बजारमा पहुँच

ख. **Farming and harvesting** सँग सम्बन्धित जोखिम ?

ग. उतार चढाव

घ. मूल्य उतार चढाव

ङ. सामाजिक चुनौतीहरु

छ. मौसम/मौसमी/प्रत्येक सालमा परिवर्तनहरु ?

ज. दक्ष जनशक्ती शीपयुक्त मानव स्रोतको कमी ?

झ. प्राविधिक चुनौतीहरु (चयन, प्राविधिको प्रयोग, आसवन)

ञ. व्यापारिक क्षमता

ट. भण्डारण

ठ. उपलब्ध प्राविधिको प्रयोगका लागि विशेषज्ञहरुको कमी छ ?

2. Survey Form

नाम:	थर:
उमेर:	विवाहित एकल अविवाहित
ठेगाना:	टोलको नाम:
सम्पर्क नं.:	न.पा./गाविस र वार्ड नं.
शैक्षिक योग्यता: कति कक्षा सम्म पढनुभएको छ ? _____	
पारिवारिक बिबरण: सदस्य संख्या _____	
महिला संख्या _____	पुरुष संख्या _____
कमाउने _____	नकमाउने _____
विदेशमा _____	स्वदेशमा _____
वैदेशिक रोजगारीको लागि जानु भएको छ की छैन ?	

<p>तपाईं कुनै संघ सस्था वा समूह संग आबद्ध हुनुहुन्छ? यदि छ भने ति के-के हुनु, कृपया नाम सहित उल्लेख गर्नु होला?</p> <p>सहकारी _____</p> <p>आमा समुह _____</p> <p>महिला समूह _____</p>

कृषि समुह _____
अन्य _____

तपाईंको उद्यमको मुख्य बजार कुन कुन हुन् ?

समुदाय

सदरमुकाम

काठमाण्डौ

नेपालको अन्य ठूलो बजार

अन्तराष्ट्रिय बजार

अन्य _____

9.2 DATA from District Agriculture Development office

Table2: Beekeeping and honey production detail: Myagdi

S.no.	BeeKeeper's name	Address	Improves hives		Traditional Log hives	
			Number	Production (in kg)	Number	Production (in kg)
1		Bhakinli 9	15	31.5	11	16.5
2		Athurde 4	20	42	3	4.5
3		Athurde 7	17	35.7	4	6
4		Baranjaa 1	17	35.7	2	3
5		Baranjaa 1	15	31.5	10	15
6		Begkhola 5	24	50.4	20	30
7		Bhagwati 3	14	29.4	8	12
8		Bhagwati 3	16	33.6	2	3
9		Bhagwati 3	12	25.5	2	3
10		Bhagwati 6	9	15.9	8	12
11		Bhagwati 7	20	42	1	1.5
12		Bhakinli 4	21	44.1	2	3
13		Bhakinli 6	15	31.5	3	4.5
14		Bhakinli 9	15	31.5	13	19.5
15		Chimkhola 3	24	50.4	10	15
16		Chimkhola 7	18	37.8	12	18
17		Dagnaam 1	15	31.5	8	12
18		Dagnaam 4	11	23.1	12	18
19		Dagnaam 6	14	29.4	5	7.5
20		Ghar 6	26	48.3	2	3
21		Ghatan 3	19	39.9	0	0
22		Ghatan 3	14	29.4	2	3
23		Ghatan 3	15	31.5	0	0
24		Ghatan 3	12	25.2	6	9
25		Ghatan 3	15	31.5	12	18
26		Ghatan 3	15	31.5	2	3
27		Ghatan 3	18	37.8	5	7.5
28		Ghatan 5	14	29.4	9	13.5

29		Ghatan 6	10	21	8	12
30		Ghatan 6	12	25.2	5	7.5
31		Ghatan 8	13	27.3	5	7.5
32		Ghatan 9	15	31.5	2	3
33		Jyamrukkot 1	40	85	23	34.5
34		Jyamrukkot 1	16	33.6	5	7.5
35		Jyamrukkot 1	11	23.1	3	4.5
36		Jyamrukkot 1	13	27.3	8	12
37		Jyamrukkot 3	29	60.9	15	22.5
38		Jyamrukkot 3	27	56.7	15	22.5
39		Jyamrukkot 3	26	54.6	17	25.5
40		Jyamrukkot 3	15	31.5	8	12
41		Jyamrukkot 4	27	56.7	0	0
42		Jyamrukkot 5	18	37.5	12	15
43		Jyamrukkot 6	25	52.5	0	0
44		Jyamrukkot 6	25	52.5	0	0
45		Jyamrukkot 7	24	50.5	15	22.5
46		Jyamrukkot 7	17	35.7	12	18
47		Jyamrukkot 8	9	15.9	2	3
48		Jyamrukkot 9	15	31.5	10	15
49		Kuhu 1	22	46.2	10	15
50		Kuhu 1	15	31.5	2	3
51		Kuhu 1	28	58.8	5	7.5
52		Kuhu 2	26	54.6	5	7.5
53		Kuhu 2	15	31.5	0	0
54		Kuhu 2	10	21	3	4.5
55		Kuhu 2	20	42	5	7.5
56		Kuhu 2	15	31.5	0	0
57		Kuhu 2	29	60.9	2	3
58		Kuhu 2	14	21.4	3	4.5
59		Kuhu 3	25	52.5	5	7.5
60		Kuhu 3	31	65.1	0	0
61		Kuhu 3	15	31.5	5	7.5

62		Kuhu 3	12	25.2	6	9
63		Kuhu 3	50	105	6	9
64		Kuhu 3	10	21	7	10.5
65		Kuhu 3	10	21	10	15
66		Kuhu 4	15	31.5	4	6
67		Kuhu 5	27	56.7	5	7.5
68		Kuhu 5	13	27.6	15	22.5
69		Patalekhet 1	26	54.6	3	4.5
70		Patalekhet 1	14	29.4	15	22.5
71		Patalekhet 3	13	27.3	0	0
72		Patalekhet 3	28	58.8	5	7.5
73		Patalekhet 3	19	39.9	2	3
74		Patalekhet 6	25	52.5	2	3
75		Patalekhet 6	25	52.5	10	15
76		Patalekhet 6	25	52.5	2	3
77		Patalekhet 7	25	52.5	2	4.5
78		Patalekhet 7	23	48.3	4	6
79		Patalekhet 7	19	39.9	3	4.5
80		Piple 1	13	27.3	0	0
81		Piple 1	63	132.3	11	16.5
82		Piple 1	29	60.9	3	4.5
83		Piple 1	11	23.1	3	4.5
84		Piple 2	24	504	20	30
85		Pulachaur 2	15	31.5	3	4.5
86		Pulachaur 2	15	31.5	0	0
87		Pulachaur 3	14	29.4	1	1.5
88		Pulachaur 4	12	25.2	5	8.5
89		Pulachaur 4	10	21	5	7.5
90		Pulachaur 4	9	18.9	5	7.5
91		Pulachaur 6	15	31.5	3	4.5
92		Pulachaur 6	15	31.5	5	7.5
93		Pulachaur 6	8	16.8	10	15
94		Pulachaur 6	16	33.6	4	6

95		Pulachaur 7	55	115.5	0	0
96		Pulachaur 7	37	77.7	0	0
97		Pulachaur 7	36	75.6	0	0
98		Pulachaur 7	11	23.1	0	0
99		Pulachaur 7	20	42	2	3
100		Pulachaur 7	18	37.8	8	12
101		Pulachaur 7	17	35.7	2	3
102		Pulachaur 7	9	18.9	5	7.5
103		Pulachaur 7	21	44.1	5	7.5
104		Pulachaur 7	19	39.9	0	0
105		Pulachaur 7	13	27.3	2	3
106		Pulachaur 8	15	31.5	9	13.5
107		Pulachaur 8	20	42	5	7.5
108		Ramche 3	15	31.5	0	0
109		Ramche 3	16	33.6	3	4.5
110		Ratmechaur 2	32	67.2	5	7.5
111		Ratmechaur 5	25	52.5	14	21
112		Ratmechaur 5	29	60.9	16	24
113		Ratmechaur 5	15	31.5	3	4.5
114		Ratmechaur 5	17	35.7	2	3
115		Shukha 1	15	31.5	3	4.5
116		Shukha 3	11	23.1	2	3
117		Shukha 4	17	35.7	2	3
118		Shukha 4	14	21.4	10	15
119		Shukha 4	11	23.1	5	7.5
120		Singa 5	23	48.3	3	9
121		Takam 4	16	33.6	2	3
122		Takam 9	15	31.5	2	3
	Total		2322	5302.9	673	1013.5
			Total Ghar	Production (in kg)	Kg/Ghar	
			2995	6316.4	2.10898	

			1636	
		5.8854	Metric Ton	

Honey Production- Latest data

Year	Bee Hives	Production(in kg)
2073-74	4620	23100
2074-75	4700	23500

The produced honey is utilized within district

The information is delivered by District Agricultural Development office- Beni, Myagdi

9.3 Photo Gallery

Images taken during official meeting and Interview with FNCCI officials , Beni Bazar, Myagdi



Figure 9.1 Meeting with beekeepers and FNCCI officials



Figure 9.2 Image taken during FGD in Daduwa VDC-2



Figure 9.3 Selected pictures taken during FGD and workshop

Image taken while beekeepers were demonstrating their beekeeping practices and Equipment



Figure 9.4 Beehive box



Figure 9.5 Beekeeper showing how they use beekeeping equipment



Figure 9.6 Organic honey served at the homestay of the beekeeper

Image taken during FGD at Kuhu- Discussion with local people(right)



Figure 9.7 Beekeeping hut of Govind KC, Kuhu



Figure 9.8 Discussion with local people at Kuhu