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Case Study

A CASE STUDY ON BEEKEEPERS IN KUMAON HILLS OF UTTARAKHAND

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ABSTRACT

Honeybees play a major role in human food chain as pollinators of different crops. As pollinators Honeybees have an essential role in maintaining hill biodiversity and hill environment. Beekeeping has contributed to rural development through the centuries by supporting agricultural production and providing various bee products like honey, wax, and other products for domestic use and commercial sale. Beekeeping has a special significance for the farmers in the Kumon hills of the Uttarakhand as it offers a way for those with few resources, particularly poor and landless farmers and farm women. Empowerment of farmers and farm women is one of the critical issues in the development research and policy making in developing countries. It is a multidimensional concept and multifaceted process involving facilitation of women for action and involvement in social, economic and political spheres of life. Beekeeping helps hill farmers obtain quick income, as it requires little investment and can be easily carried out in a small space in close proximity to the beekeeper's home. Generally, investing in an apiary yield profits within a year of operation. Farmers in the hills have kept bees in hives for centuries for personal use, but now a day's beekeeping is also becoming more popular as it is now recognised as an income generating activity in hill areas. In order to take full advantage of bees, the farmers in hilly region need to take up modern approach to bee management using frame hives and focus on production of good quality honey.

Keywords: Beekeeping, Modern approach, Employment opportunities.

INTRODUCTION

Honeybees play an important role in rural hill communities. Honeybee products like honey and beeswax, are an important source of income, nutrition, as well as medicine to the local hill population. Honey bees play an important role as pollinators for agriculture and natural ecosystems. Bees as pollinators, strongly support agricultural production system, forestry, and helps in maintenance of biodiversity. They also help to combat soil degradation by enhancing the replenishment cycle. More pollination by honey bees will help in production of better seed set and more plants which will eventually result into more biomass production. Majorly there are four groups of bees that play role in pollination – bumble bees, stingless bees, solitary bees, and honeybees. Honeybee is the most important one among them all. It is estimated that around one third of the human diet comes from insect-pollinated plants, and among this the honeybees provide for about 80 per cent of that pollination. Honeybees are the only bee that can be easily managed by the farmers. Traditionally, poor and landless farmers in remote areas of the Kumaon hills have found bee colonies in the forest and harvested small amounts of honey from them. Local tradition allows farmers in the hills to claim 'ownership' of such colonies whilst leaving them at their original nesting site and thus acting as 'guardians of the biodiversity'. Farmers with more space and resources kept the indigenous hive bee in simple homemade log or wall hives in close proximity to the house. In more recent times, beekeeping has become more of a professional and income generating activity. The advent of frame hives made it possible for bees to be managed and also hives to be moved around to appropriate places. In recent past there has been a reduction in natural pollinators as a result of loss of natural habitats because of the increased use of insecticides and pesticides. This has made essential in many parts of the world to keep bees for the pollination of agricultural crops.

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Benefits of beekeeping in Kumaon hills

Beekeeping has several benefits including both direct and indirect benefits. The direct benefits are the hive products like honey, beeswax, pollen, royal jelly, bee venom, propolis, and bee colonies. These products can be consumed to improve family's nutrition, or also can be used as a basis for enterprise development, for an instance cosmetic based on beeswax. The indirect benefits of beekeeping include pollination. pollination leads to both increased crop productivity and maintenance of natural biodiversity, including sustaining the natural products used by farmers. Beekeeping also generates off-farm employment opportunities in different fields including hive carpentry, production and sale of honeybee colonies, honey trading, renting of bees for pollination, and bee-based micro enterprises. Beekeeping is an enterprise that is ideally a means of income generation for a wide range of people with limited opportunities, including the poor farmers, farm women, and people from disadvantaged groups. Beekeeping needs a very small start-up investment and can be easily carried out in a small space and yields profits within the first year of operation.

Importance of beekeeping in Kumaon hills

Beekeeping has a special significance for farmers in the Kumaon hills of Uttarakhand. It offers a way for those with few resources especially poor and landless farmers and women to generate off farm income. Bees provide honey, beeswax, propolis, royal jelly, and bee venom for home use and sale. Beekeeping has become increasingly important with the decrease in populations of indigenous bees and other pollinators as a result of loss of forage crops and nesting places. Beekeeping is needed to support pollination of the newly introduced cash crops, as well as traditional subsistence crops and natural vegetation on which farmers heavily depend. Beekeeping has a long tradition in Kumaon hills and is an important source of income, nutrition, and medicine for the hill communities. Farmers manage the indigenous honeybee species *Apisceranai*n log and wall hives close to the homestead, while some, especially in remote areas, protect

bees in the forest and harvest honey directly from forest. These traditional practices are still followed in many places in the region. Also now a day's farmers also rear honey bees by using frame hivers prepared from the locally available seasoned woods. Commercial beekeeping started in the region in the 1970s with the introduction of the exotic honeybee *Apismellifera*. Formal courses on beekeeping for farmers using *Apismellifera* bees and movable frame hives were started in the early 1980s in Bangladesh, India, and Nepal. They were not based on traditional practices, or the indigenous bee species. Beekeeping has generated employment for beekeepers; promoted cross-pollination services, which have enhanced the quality and productivity of crops; and helped in biodiversity conservation. The geophysical conditions of the Kumaon hills are very conducive to beekeeping as the hill region has the diversified natural forests across the region rich in bee flora. Many of the crops grown in different places of the Kumaon hills are a good source of pollen and nectar. The rich tradition of beekeeping in rural areas of the region, and the traditional skills and knowledge of hill beekeeping practices, can help in the promotion of commercial beekeeping.

Challenges faced by the beekeepers in Kumaon hills

There are Many factors that pose challenge to beekeepers and hinder the promotion of Beekeeping practices in the Kumaon hills of Uttarakhand. Few challenges faced by the beekeepers are threats to bee survival, barriers to honey trade, lack of knowledge, and non-conducive policies. There has been a constant reduction in bee foraging areas as a result of deforestation and forest fires. Use of poisonous pesticides instead of using biological measures for protection of crops against pest and diseases leads to indirect destruction of the beehive colonies. Lack of a pesticide residue monitoring programme and lack of accredited laboratories and equipment's are the major constraints faced by the beekeepers of the Kumaon hills. Poor quality honey extraction due to lack of processing and packaging services at different levels is a major challenge faced by the beekeepers in maintaining the proper functioning of the honey enterprise. Lack of awareness at the farmer's level about the role of honeybees in pollination and biodiversity conservation and the lack of skilled labour and effective mobilization of existing labour is a major challenge faced by the farmers while establishing an apiary site .

Honey bee species found in Kumaon hills

Honeybees are one of the best examples of social insects that live-in colonies. The main source of nutrition for the honey bees are flower nectar and pollen. The two common honey bee species found in the Kumaon hills of Uttarakhand are *Apiscerana*and *Apismellifera.* Their major characteristics of the two different honey bee species found in the hills are summarized as follows.

Asian or indigenous hive bee (Apiscerana)

Apiscerana is the only wild bee that can be kept in hives and can be traditionally managed by farmers in the region. The same species is also found in the plain region. The local race found in plains areas is smaller than the race found in hill areas. Apiscerana is a cavity nesting honeybee, which nests in hollow tree trunks, rock voids, and walls. This species builds multiple parallel combs and the number of combs depends on the size of the colony. For the purpose of commercial beekeeping bees can be kept in log, wall, or movable frame hives. A healthy colony has 25,000 to 30,000 bees. This can produce up to 20 kg honey per hive per year. These bees can fly up to 2 km from the hive to collect nectar, pollen, and has frequent swarming, absconding, and robbing tendencies. Cerana species are resistant to diseases and mites (especially European foulbrood and *Varroa* spp.) They are the excellent pollinators of fruit trees, field crops, oil seeds, and wild plants. The colonies can be transported to fields for crop pollination, particularly useful for pollination of locally available hill crops and plants.

European honeybee (Apismellifera)

This is the only honeybee species used for commercial beekeeping in most parts of the world. The specie originated in Africa and spread to Europe and Asia, introduced from Europe to the Americas and other countries throughout the world. This species builds multiple parallel combs. A healthy colony contains 60,000 to 70,000 bees. Average recorded honey yield per colony per year recorded is for about 40 kg in Nepal, 35 kg in India, 20 kg in Bangladesh and Bhutan. Bees can travel up to 5 km from the hive in a single foraging trip to collect nectar, pollen, water, and propolis. Swarming and absconding tendencies quite low. This bee specie is susceptible to diseases and parasites (such as brood and mites) and needs special management in terms of technology, knowledge, and skills. Migration of bee colonies can increase honey productivity. They are excellent pollinator of fruit trees, field crops, oil seeds, and other crops.

Conservation of honey bees in Kumaon hills

Bees are under threat all around the world. Loss of bee forage areas, loss of floral diversity, loss of natural forests, the move to monoculture cropping, the wide use of pesticides, and more recently the transfer of pests and diseases are all contributing to reduction in the total number of bees. The indigenous honeybees of the Kumaon hills plays a major role in the maintenance of the region's biodiversity, as well as in pollination of hill crops. Beekeeping offers a way for poor hill farmers, especially women and landless farmers, to earn some cash income without much investment. It can also be used to support pollination in crops such as fruit, vegetable and vegetable seed. Improved understanding of the benefits derived from bees, and the potential impact of their loss, will help people realize the need for the conservation of bee species and motivate governments and farmers alike to take action. Some of the actions needed are expansion of bee forage areas, plantation of bee flora in forests and on degraded waste lands, reduction of deforestation, control of forest fires, adoption of organic farming or integrated pest management systems for crop protection etc. Following of an integrated modern and traditional honey hunting practices should be encouraged to prevent brood destruction. Suitable sustainable policies should be formulated and promoted for the conservation of honeybees. Farmers should be made aware about the role of beekeeping in conserving the environment and biodiversity Beekeeping can be a profitable enterprise and at the same time can help conserve biodiversity if public awareness can be raised and the issues may be addressed at government and community level.

Beekeepers realising the benefits of beekeeping in Kumaon hills

Most of the beekeepers have not realised the economic benefits from beekeeping but they are now optimistic about future economic gains. In forest communities it may take for about two to three years for the beekeepers to reach full production capacity and realize a steady income from honey and honey product. On interviewing the beekeepers in the region, it was found that some of the beekeepers were discouraged because of the slow start in income generation and few of them dropped out because of the same, but the majority among them were looking forward to build more hives in order to increase their profit potential. Progressive beekeepers constantly remind the others that once honey production starts their income will be steady and a constant income will be

observed. A longer extension support period will also help the beekeepers in forest communities motivated. Regular cluster meetings and active bush managers can also play a crucial role in keeping the group of honey producers motivated.

Beekeepers recognize the value of non-economic benefits, particularly leadership and cooperation. In recent past years the beekeepers have recognized the importance of other non-economic benefits of honey bee rearing like co-management of beehives, visiting the beehives together, sharing of equipment, and looking after each other's hives when someone makes a trip out of town. This cooperation was most evident as beekeepers struggled to deal with ants and termites around their beehives. Beekeepers also shared their tips and solutions to solve these challenges and many of them were proud that others turn to them for support.

Gender and social inclusion are also evident in beekeeping activities. Traditional agriculture activities have defined gender roles that are passed down through generations. Beekeeping, however, is new to everyone so there is no gender division of labour. Women also make up a good percent of the active beekeepers. Everyone weather male or female equally participates is different hive management practices like how to build the beehives, care for the bees, and honey harvest.

Beekeepers changing behavior and attitude

Now a day's Beekeepers are aware of the link between beekeeping activities and the health of the forest. Across all interviews and focus group discussions conducted, it was observed that the beekeepers recognized the interdependence of health of their bees and the health of the forest. The beekeepers recognized that a beehive does not colonize when the forest environment is not suitable. In response to the problem, they generally reposition their beehives to a better location. They are also aware of the importance of the health of the forest for beekeeping. Bees need flower diversity from the forest to produce honey and the forest needs bees for pollination. Thus, the beekeepers are now aware of the fact that destroying the forest will affect their livelihoods and new source of income.

Attitudes about deforestation and wildlife depletion are changing. This awareness is linked to shifts in attitudes about cutting down trees and hunting in the forest. Most of the beekeepers in their interview stated they would speak up if others start cutting trees around their beehives as cutting down of trees affects their livelihood. They also expressed negative attitudes toward those who continue harmful practices and suggested that more community awareness and livelihood options are needed to shift others away from negative practices like ecosystem damage.

Beekeeper's report changing their behaviour. Most of the beekeepers earlier used to be hunters or were involved in the vegetable or fruit farming. Majority of the beekeepers reported that they participated in traditional farming practices but they also involved themselves in beekeeping. Beekeeping provides the farmers with additional income and helps them contribute towards a sustainable life style. These opinions from the beekeepers illustrates why beekeeping can be considered as a conservation enterprise an reduce deforestation, forest degradation, and biodiversity loss. The other complementary strategies include improvements to the policy and enabling environment for forest conservation and promoting the protection of threatened species. his to beekeeping.

Suggestions to improve beekeeping practices in Kumaon hills
Conservation enterprises must be locally relevant and appropriate in order to sustain participation. Since beekeeping does not take much time and effort, members can simultaneously undertake other income-generating activities, such as farming. This enables members to diversify their sources of income so when beekeeping is not yet providing economic benefits, they can rely on their farming activities for income.

Community clusters and beekeeper associations are important support structures that contribute to the sustainability and scaling up of beekeeping enterprises. These support structures provide the additional technical assistance, cooperation, and guidance that beekeepers reported needing during the first two years as their hives start producing honey. The learning curve is long in forest communities so these support structures at different levels (within the community, across communities, and across the region) increases the likelihood of continued engagement. Support structure also enable existing beekeepers to train others and expand beekeeping activities in their areas independently of external donor support.

Implementation challenges. It was observed that the beekeepers were discouraged because of the delayed economic benefits and therefore there should be proper organization of extension trainings to well inform the beekeepers about the sustainable profits and benefits that they can obtain from the enterprise.

Beekeeping as a conservation enterprise must be part of other complementary strategies to effectively change behaviour and reduce threats to biodiversity. On interviewing the farmers, it was observed that it takes a couple of years to fully realize the economic benefits of beekeeping. Initially the total number of farmers involved in beekeeping were small, later the number of farmers practicing apiculture increased. Complementary strategies such as improving policy and the enabling environment for forest conservation and promoting the protection of threatened species are necessary for biodiversity conservation.

CONCLUSION

Uttarakhand being a home to a large number of floras can be a good source of nectar flow for the reared honeybees resulting in good average honey production and therefore, beekeeping can result in good supplementary income generation. The native tribal population of Uttarakhand generally practice the traditional methods of beekeeping which results in poor honey yields. These traditional practices should be upgraded according to the climatic suitability of the hills and farmers should be encouraged to adopt the new advance practices to increase honey production. The farmers in the Kumaon hill are now realising the importance to conserve biodiversity and the role of bee in maintaining biodiversity. Farmers have also recognized the benefits of commercial rearing of honey bees. Although some of the beekeepers were resistant to rear honey bees commercially because of slow economic returns but majority of them were open for commercial rearing of honey bees. There are various challenges faced by the beekeepers of Kumaon hills in honey bee rearing and these can be compensated easily with the help of government support and extension agencies.

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