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CAMBODIA MSME 2/BEE PROJECT

CAMBODIA HONEY VALUE CHAIN ASSESSMENT

TASK ORDER NO. 04

MAY, 2009

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Cambodia Honey Value Chain Assessment

May 2009



Professional Honey Hunters and Bee Keepers in Siem Reap Province,
with *Apis dorsata* Nest Salvaged from a Forest Fire

Prepared for the USAID Cambodia MSME Project

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List of Acronyms

ADRA	Adventist Development and Relief Agency
CBCL	Cambodia Biologicals Co. Ltd.
CBO	Community-based organization
CFA	Community Forestry Association
CFI	Community Forestry International
CFiA	Community Fishery Association
CMU	Chiang Mai University
CPA	Community Protected Area
Danida	Danish International Development Agency
FA	Forest Administration
FAO	UN Food and Agricultural Organization
FOB	Free on board
GIS	Geographic information system
GPS	Global positioning system
GTZ	German Agency for Technical Cooperation
HMF	Hydroxymethylfurfural
ICIMOD	International Centre for Mountain Development.
IFOAM	International Federation of Organic Agriculture Movements
kg	Kilogram
KHR	Cambodian Riel (1 USD = 4100 KHR)
MAFF	Ministry of Agriculture, Forests and Fisheries
MFI	Micro-finance institution
MSME	Micro, Small and Medium Enterprise
NGO	Non governmental organization
NTFP	Non timber forest product
NTFP-EP	NTFP Exchange Program
RGC	Royal Government of Cambodia
SMART	Simple, measureable, achievable, relevant, and time-bound
UMF	Unique manuka factor
USAID	US Agency for International Development.
USD	US dollar
USDA	US Department of Agriculture
WWF	World-wide Fund for Nature
y	Year

Acknowledgements and Disclaimer

The authors wish to thank the many villagers in the four study areas, who gave us their time and trusted us with information about their livelihoods. We hope that this study will lead to results which will serve their aspirations for the wellbeing of their families.

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The Management and Staff of the MSME project gave valuable support, direction, and encouragement throughout the work. The special contribution of Robert Bouvier of DAI is gratefully acknowledged. He provided guidance on the role of spatial information and GIS technology in the proposed monitoring work.

The Alaskan beekeeper and tropical honeybee expert Stephen Petersen made significant contributions to the conceptualization and implementation of the work, in his role as guest researcher.

We acknowledge the support of the American People, whose elected representatives recognize the great need on this planet for balancing biodiversity conservation with sustainable and equitable development.

The opinions expressed in this report are those of the authors, and not necessarily those of DAI or USAID. We accept responsibility for any errors or omissions, and invite comment from interested parties.

1. Executive Summary

1. Under Congressional mandate, the MSME project has a concern for conservation of biodiversity. Forest biodiversity conservation in Cambodia requires the active participation of local communities, given the limited resources of government. It depends fundamentally on the ability of local residents to gain livelihoods from the resources over which they are being asked to exercise stewardship. Sustainably increased livelihood opportunities are thus a strategic success factor for conservation.
2. The social capital necessary for this is being developed in many areas through the efforts of the NGOs and the responsible government offices, in the form of Community Forestry Associations, Community Fishery Associations, and Community Protected Areas. However considerable effort is still required to strengthen these important civil society institutions.
3. After millions of years of co-evolution between wild honeybees and the flowering plants, the honeybees are the principal pollinators of many tropical forest trees and other species. Without them the plant populations would die off. Thus the wild honeybees are keystone species, whose status can provide SMART indicators for purposes of monitoring ecosystem health.
4. Data for these indicators can be collected by the honey hunting communities themselves, given effective training during the baseline surveys, data protocols designed by competent bee biologists, and the support of a GIS team. Geo-referenced monitoring of the bee populations, habitat variables, and human economic activities, will provide highly relevant data for the objectively verifiable indicators specified for the biodiversity conservation and the value chain development aspects of the MSME project.
5. Many rural people depend for their livelihoods on the products of biodiversity rich forest areas, notably wild honey among several other items (rattan, bamboo, medicinal and aromatic plants mushrooms, edible nuts, starchy tubers, etc.). Wild honey is an important cash source for many people. In some locations the bee colonies are harvested under some form of traditional management. Artificial nesting sites (“rafters”) are sometimes used to attract and make accessible the migrant honeybee populations. In other locations the colonies are taken by anyone who finds them, and often destroyed in the harvesting procedure.
6. Because of the seasonal nature of honey hunting and the informality of the supply chains, wild honey is usually overlooked in rural livelihood surveys. This is the first overview assessment of the Cambodian honey value chain, covering four locations pre-selected for their interest as biodiversity “hot-spots”. Based on this and their previous work on honey in Cambodia, the authors believe the overall conclusions and recommendations given in this report to be robust. There are probably many more locations with significant honey resources, and perhaps with the social capital needed to manage them.
7. Studies on honeybees, beekeeping and honey are sorely lacking through most of Asia. Here in Cambodia the very few studies which exist have been done at a provincial or village level. This study is the largest scale assessment done to date. There have been no published studies (or even credible estimates) of the number of colonies of the various species of honeybees that are harvested in Cambodia. No comprehensive data exists to give a reliable estimate of Cambodia’s actual honey production, much less its potential. The present assessment covered only a small part of the country. Therefore we lack basic data on the

potential for expansion and modernization of the honey supply chains, on which development agencies and investors might base programming decisions.

8. The Consultants have ventured an opinion, based on very weak anecdotal and extrapolated data, that the potential volume of quality honey from sustainably managed sources could be raised to something like 500,000 kg per year, possibly more, given an effective program to promote the industry. This might have an annual “farm-gate” value of USD4 million. This figure represents a USD750/ per year income for more than 5,000 families, based on seasonal work.
9. Wild honey production in Cambodia is village based, with very low standards of quality and hygiene. The product is often adulterated with sugar water, and usually contaminated when processed by hand in the village. Supply chain linkages are informal and lack information flow back to producers. Regulations exist, but they are neither appropriately designed nor consistently applied.
10. Some NGOs and at least one private company are engaged in attempting to develop the Cambodian wild honey supply chain. Success will require investment in third-party certified compliance with standards for sustainable management, product traceability, and product quality. This is necessary to access high-priced niche markets among consumers who are environmentally and socially concerned, and who are willing to pay for the substantial management costs which reliable satisfaction of that concern requires. Wild honey is very much an infant industry in Cambodia, but it has an interesting potential.
11. In Indonesia, NGO’s have been working with the rafter beekeepers in Danau Sentarum National Park in West Kalimantan, a seasonally inundated forest very similar to Cambodia’s Tonle Sap. Community based organizations have been developed to organize and promote rafter beekeeping as an income generating activity, and modern marketing methods have been applied (www.maduhutan.com). These efforts over the last decade are a model for other projects to emulate, in developing sustainable management of the wild honey value chain, as one livelihood element of community-based biodiversity management regimes.
12. The assessment reported here concentrated on four “landscapes”: Prey Long Forest (Kampong Thom and Kratie Provinces); Kampong Saum Bay and the Elephants Mountains (Kampot and Koh Kong Provinces); Boeung Per protected area (northern Kampong Thom Province); and the Chhloung forest in southern Kratie Province. Field observations were used to rank the four locations as candidates for project interventions, with the Kampong Saum Bay area showing the best prospects.
13. The scope of work for this assessment calls for proposed interventions to be presented in logical framework format. The Consultants have taken note of the overall framework for the MSME project, and adapted the objectives, outcomes, and objectively verifiable indicators to the requirements of an intervention in the honey value chain. A suite of activities are proposed that will serve the outcomes sought. These include training and strengthening community associations, developing and helping communities to implement science-based monitoring systems, facilitating industry associations, encouraging the design of standards and a regulatory framework, and facilitating a market development program.
14. The expected outcomes specified in the logframe are grouped under six headings consistent with the MSME project design: Biodiversity Conservation, Value chain Strengthening, Private Sector Voice, Public Sector System, Service Capacity, and Information for Management and Investment.
15. As a starting point, the consultants recommended in the mid-term report of this assessment that a baseline survey should be conducted in the honey hunting communities around

Kampong Saum Bay. This survey should be done in June and July 2009, during the wet-season when the honeybees are present in that lowland area. Baseline studies should involve the honey hunters and other community members, so that the training builds social and individual capital for ongoing collection of the data, needed for monitoring of environmental health. Wild honeybees are the keystone indicator species.

2. Introduction

The USAID Cambodia MSME Project is being implemented by Development Alternatives, Inc. (DAI). The Project improves the performance of firms in select value chains, supports public-private dialogue and strengthens the public sector through targeted technical assistance. The MSME project's geographical scope comprises the twelve provinces of Battambang, Siem Reap, Prey Veng, Kandal, Kampong Cham, Kampong Thom, Kratie, Kampot, Pursat, Kampong Speu, Takeo, and Svay Rieng. In these provinces, the principal areas of biological significance are areas of the Cardamom Mountains eco-region in Battambang, Kampong Speu and Kampot, areas of dry evergreen forest in Kampong Thom, Kratie and Siem Reap, areas of dry forest in Kampong Thom and Kratie, and areas of swamp forests around the Tonle Sap in Battambang, Siem Reap and Kampong Thom¹.

The survival of Cambodian biodiversity resources is under serious threat from unsustainable exploitation, by very poor people and by the rich and powerful, both operating in an environment where sustained productivity is unlikely due to short-term planning horizons, where small-scale supply chain actors have poor access to information and little voice, and where government services are lacking or counterproductive.

In comparison to its neighbors, the exploitation of Cambodia's rich resources of terrestrial plant and animal life (biodiversity) was slowed (not halted) by the difficulties of large-scale access between 1973 and 1993. Since that time there has been a well documented decline in forest cover due to the implementation of extensive concession forestry, and what the Government has called "anarchic logging". Cambodia's remaining forests are home to a wide variety of species and habitat units that are almost gone in other parts of the region, making them "biodiversity hotspots" of global significance. These resources are now under rapidly increasing exploitation pressure for subsistence and commercial purposes.

Life below the \$1/day poverty line is the lot of at least 35% of Cambodians, mostly in rural areas, with many more at or near the line, poor by any socially just definition. People with several months per year of rice deficit make up the difference through off-farm labor in urban areas when available, or by the collection of forest and wetland resources – small fish, wild animals, forest fruits and tubers, and other non-timber forest products (NTFP). Often these are directly consumed, but many enter the market via domestic and informal export supply chains. Collection of illegal wildlife products (e.g. tiger, bear, pangolin, reptiles, and monkeys) is the most commonly recognized threat to Cambodian biodiversity, but habitat destruction by unsustainable overharvesting of medicinal and aromatic plants, rattan, bamboo, honey, and other products is equally threatening to the local ecosystems and the overall biodiversity which they contain.

Regulation and management of these resources is the responsibility of the Forest Administration (FA), a division of the Ministry of Agriculture, Forestry and Fisheries (MAFF), except for those areas which are designated as protected areas under the Ministry of Environment, or as Community Fishery Areas (CFIA) under the Fishery Administration (also MAFF). While there are many well trained and well motivated staff in these agencies, the reality of the trade in forest products continues to be greatly influenced by the patronage structure of government in Cambodia, and the need for officials to collect fees for personal income and maintenance of position. Pervasive unofficial fee collection significantly distorts the pattern of value chains in forest products, and makes problematic both the data collection on which rational management depends, and the possibility of enforcement of management plans.

¹ From Honey value chain assessment scope of work

Cambodian forest biodiversity resources offer possibilities for sustainable livelihoods for poor rural people, based on effective management of resources by strong community forestry associations (CFA), functioning as producer organizations linked to robust and appropriately regulated value chains. Better returns to producers in these supply chains will enable better management of the forests and the biodiversity resources they contain. CFAs are an appropriate social mechanism for increasing the voice of micro-enterprise managers, and provide an efficient point of engagement for government services related to value chain issues.

One necessary condition for development of the Cambodian honey value chain is the social capital represented by functioning community-based forest management organizations, which may be CFAs or CPAs or CFiAs².

Since the demise of the concession forestry system in Cambodia, there has been considerable development of community forestry (CF), with active support from the donor community and indeed from the FA itself, who see CF both as a promising management tool, and as a means to help maintain their control over state private lands which might otherwise be allocated to economic land concessions. Some 350 community forestry associations (CFA) have been created, of which only 18 have been formally approved by FA, and another 131 are in the process of approval. CFAs are formed at the village or commune level, and therefore strategically they respond to the requirement for resource management decisions to be taken at the lowest capable level.

For community members, the motivation for developing and participating in CFAs is the recognition that their livelihoods depend on their stewardship of forest resources, that outsiders will not do it for them and that only through developing and participating in strong community-based organizations can they hope to have the voice necessary to fend off encroachment by more powerful interests. With capacity building support from NGO and FA programs, a number of CFAs have developed substantial if basic skills in organizational management (planning, monitoring, financial accounting, government liaison). If properly supported and linked to markets, CFAs can create micro and small enterprises which will manage the resources and add value to NTFP commodities and products, value which can increasingly be captured at the community level. The social capital represented by the CFA can enhance the voice of resource users in dealing with regulatory agencies, and in a complimentary way provide institutional channels for FA and other providers to deliver services more effectively.

To date there have been no published studies (or even credible estimates) of the number of colonies of the various species of honeybees that are harvested in Cambodia. The present study covered only a small part of the country. Therefore we lack basic data on the potential for expansion and modernization of the honey supply chains, on which development agencies can base programming decisions.

This report concerns an assessment of the honey value chain in Cambodia, as an opportunity for project interventions which will respond to the concerns of the US Congress for biodiversity conservation, and to the need and opportunity for forest-dwelling communities to sustain both their livelihoods and the forest resources of which they are the stewards.

The assessment concentrated on four “landscapes”: Prey Long Forest (Kampong Thom and Kratie Provinces); Kampong Saum Bay and the Elephants Mountains (Kampot and Koh Kong Provinces); Boeung Per protected area (northern Kampong Thom Province); and the Chhloung forest in southern Kratie Province. Field observations were used to rank the four locations as candidates for project interventions, with the Kampong Saum Bay area showing the best immediate prospects.

² CFiA are responsible for the wetland melaleuca forests in their territories

3. Keystone Species, Honeybees, Conservation, and Livelihoods

1. **Main Concept: Keystone species** are those that perform a role critical to the maintenance, sustainability and biodiversity of habitats.
2. **Role of Honeybees:** about one third of the plants in Southeast Asian forests are heavily dependent on wild honeybees for their pollination. Maintaining and enhancing honeybee populations will help sustain the forest.
3. **Livelihoods:** Local communities are the chief stewards of forest biodiversity in Cambodia. Without sustainable forest-based livelihoods, this role cannot be maintained.
4. **Monitoring** of honeybee populations will provide an indicator of ecosystem integrity and of the resource base for human livelihoods.

Honeybees have been co-evolving with the flowering plants for six to ten million years. Many plant species in the tropical forests are totally dependent on honeybees for their pollination and therefore for the survival of their populations. This places honeybees in the role of keystone species in those forests, i.e. those species that perform a role critical to the maintenance, sustainability and biodiversity of habitats. Their removal can have severe impacts on the viability of other species (no bees – eventually no forest). Thus the bee populations provide a SMART indicator for the status of forest areas which are important for the conservation of their biological/ecological resources.

In Cambodia, honeybees play a role in rural livelihoods especially of forest-dwelling communities, from the sale of honey, wax, and brood (bee larvae, an expensive delicacy). Because of the seasonal nature of honey hunting and the informality of the supply chain, it is usually overlooked in surveys. In some locations the bee colonies are harvested under some form of traditional management, in others the colonies are taken by anyone who finds them, and often destroyed in the harvesting procedure. In some areas, artificial nesting sites (“rafters”) are used to manage the bee populations.

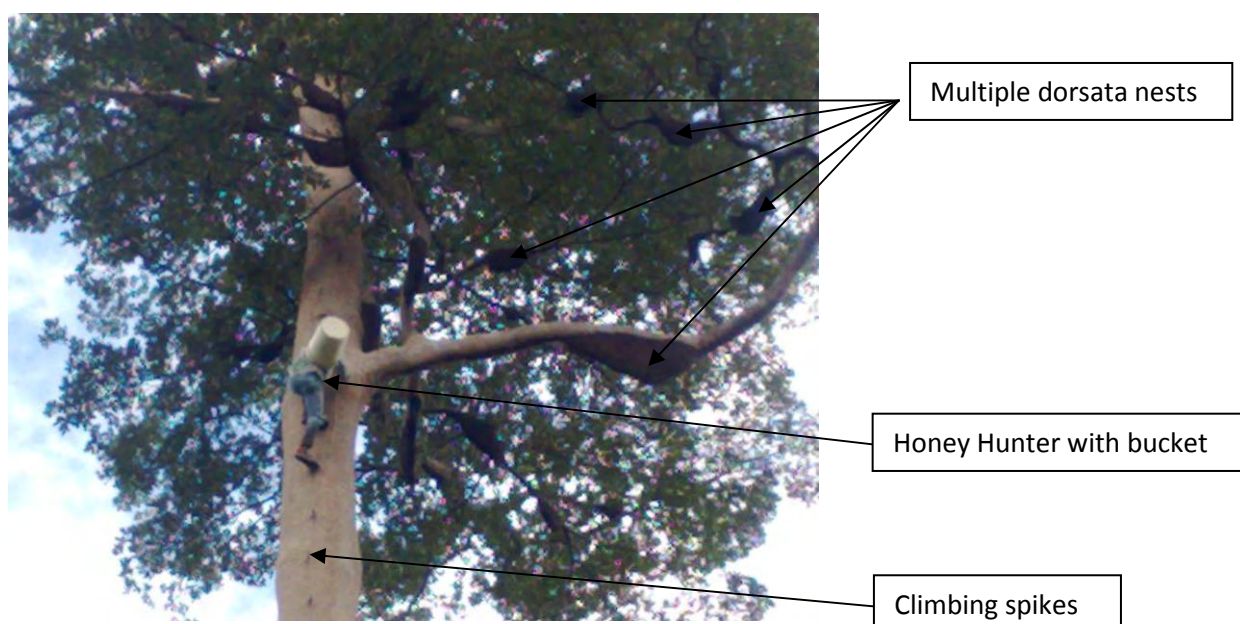
There are a variety of participants (stakeholders) in the supply chains, all of whom represent sources of information that will be useful both for conservation management and for developing more robust value chains, providing improved and more sustainable livelihoods for local people. Therefore geo-referenced monitoring of the bee populations, habitat variables, and the human economic activities will provide highly relevant data for the objectively verifiable indicators specified for the biodiversity conservation and the value chain development aspects of the MSME project.

4. The Cambodian Honey Value chain

Honeybee Species Found in Cambodia

There are nine species of honeybees (genus *Apis*) in the world, eight of which are indigenous to Asia. Cambodia is home to four of these species, of which two: *Apis dorsata*, the giant honeybee, and *A. florea*, the dwarf Asian honeybee are presently of economic importance in the local market. The Asian hive-bee (*A. cerana*) and the stingless bees of the genus *Trigona* have interesting potential and are managed elsewhere in the region. Several attempts have been made to introduce European bees (*A. mellifera*) with varying degrees of success to Asia including Cambodia; but this is not recommended as it is not sustainable and not suited for development projects, for the ecological and economic reasons discussed below.

Latin name	English	Khmer (Romanized) "Khmom" = honeybee
<i>Apis dorsata</i>	Giant Asian Honeybee	Khmom thom Khmom jung ay Khmom trahchiek damrei
<i>Apis florea</i>	Small Asian Honeybee	Khmom plat
<i>Apis andreniformis</i>	Dwarf Asian Honeybee	Khmom kampok ach chhikae Khmom angkoinh
<i>Apis cerana</i>	Asian Hive Bee	Pruit
<i>Trigona sp.</i> (34+ species)	Stingless bees	Mroam
<i>Apis mellifera</i>	European hive bee	Khmom barang



Bee tree in the Forest, with multiple *Apis dorsata* colonies

Honey Hunting for Apis dorsata

Honey hunting is practiced by many rural residents in Cambodia in areas where there are still sufficient tall trees and adequate bee forage to attract migratory swarms of bees.

Honey hunters fall into two categories: "opportunistic" and "professional" (see definitions below). The participants climb (or sometimes cut down) trees in order to access the nests. In some areas with proper conditions (suitable bee forage and lack of natural nesting sites) the *dorsata* bees may be induced to nest on man-made structures (rafters or "*bong kong*") allowing for simplified management and the potential for sustainable harvesting.

Honey Hunting for Other Bee Species

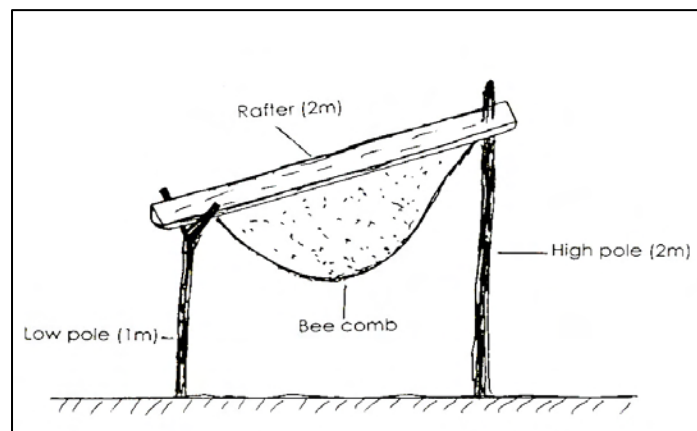
Nests of *Apis florea* and *A. andreniformis* are opportunistically gathered throughout Cambodia. The only locations presently known to have "professional" hunters collecting these two species include an area around Pring village in Kampong Speu and some areas of the Tonlé Sap Lake. Other such areas may exist.

Apis cerana bees are seldom sought out because the sting-to-honey gathered ratio is disproportionate (many stings/little honey). They can, with proper training, be kept in containers (hive boxes) much along the same lines as European bees, but produce smaller amounts of honey. They are successfully kept elsewhere in Asia, and may well offer livelihood opportunities. The stingless bees (*Trigona sp.*) are present in the Cambodian environment but are not much exploited. In Tanzania, the stingless bees are kept and the honey sold at high prices for Chinese medicinal purposes.

With some harvest methods, the bees are often killed, all of the honey, brood and wax are taken, nesting sites are sometimes destroyed, and in some cases insecticides are used to kill the bees thus contaminating the harvested products.

Beekeeping

Until recently there was no beekeeping, i.e. the management of honeybee colonies with indigenous species in Cambodia, with the important exception of some “rafter” (traditional artificial nesting sites) management of *A. dorsata* (Petersen 2001).



“Rafter”: Artificial Nesting Site for Dorsata Bees in Wet Season, Open Forest.
More sophisticated versions of this technology are used in Indonesia, discussed below

Brush fires caused either by a careless cigarette or intentionally set to stimulate greenery for cattle, pose a very serious risk to rafter colonies due to their proximity to the ground. Theft (claimed to be from outside the community) is another risk increasing proportionally with the market value of honey. These kinds of management problems can only be solved through community-based management methods.

Actual and Potential Magnitude of the Industry

No comprehensive data exists to give a reliable estimate of Cambodia’s actual honey production, much less its potential. What follows is an attempt to give at least some order of magnitude to this discussion.

FAOSTAT indicates that in 2006 the world honey production was 1,400 million kg, (mostly conventional product from *A. mellifera* bees. China is currently by far the largest honey producing nation in the world, with about 40 per cent of the market. The next biggest producers are the USA, Argentina and Ukraine. Thailand, Vietnam and Australia are also significant producers, with about 30 million kg of honey produced each year in Australia alone.

Vietnam has an active government program promoting honey production, originally supported by the Donor community (Netherlands and others). From 1991 to 2003 Vietnam's honey output rose from 1,000,000 kg per year to 16,000,000 kg per year, of which 14,000,000 kg were exported³. At the present FOB price of USD2.20/kg for conventional (*A. mellifera*) honey, that represents an export revenue of over USD30 million.

Cambodia and Vietnam share roughly similar ecological circumstances, with Cambodia having perhaps more intact forest, so the floral resource may be of similar order of magnitude. Cambodia does not have, and should not have, introduced *A. mellifera* bees as does Vietnam. Cambodia should be promoting the development of higher value niche-market products, based on indigenous species and supporting biodiversity conservation objectives.

The Forest Honey Network in Indonesia has 9 member groups across the country practicing sustainable management of indigenous bees. The one group for which we have information (APDS in Danau Sentarum West Kalimantan, described in more detail below) reported 25,000 kg last year. Extrapolating, that represents a total production for the whole network of 225,000 kg. Assuming a price of USD8/kg for premium, sustainably harvested and hygienically packed forest honey (as in Cambodia in many cases), there is an annual "farm gate" revenue of something like USD1.8 million.

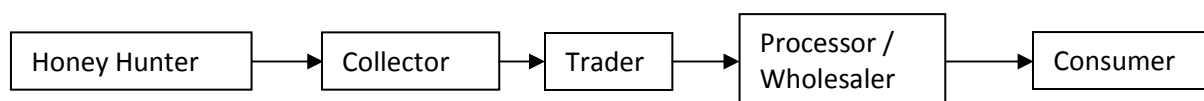
Cambodian honey-hunting communities interviewed in the present study gave widely ranging estimates of their seasonal output, from 2,000 to 8,000 kg/season. Last year CBCL bought 900 kg (said to be about half of the production) at US\$8.00 per kg from its partner CFA "Phnom Teub Cheung" in Koh Kong. This year an NGO has offered to buy 1,600 kg from the WWF project in Mondulkiri. One NGO (Ponlok Khmer) near Peuk Village has offered to buy \$2,000 worth of honey from the local communities at about \$4.50 per kg.

If we assume that half of perhaps 500 CFAs, CPAs and CFiAs have honeybee resources, the low end estimate of 2,000 kg per year, and a village price of US\$8/kg, we have a potential of 500,000 kg at an annual village value of USD4 million.

The authors make no claim as to reliability of these estimates, as they based on data which are seasonal and anecdotal. They are given only to indicate the realm of magnitudes under consideration, and to indicate the potential for benefits from a serious programmatic intervention.

Participants in the Value chain

The honey value chain in Cambodia is very traditional, with only a very few participants with a modern perspective. Product flow in the value chain can be diagrammed as:



³ Vietnam Review – 04/08/2004, as cited in Value chain Analysis for Honey and Beeswax in Tanzania, Match Maker Associates Limited, June 2007, Report for TraidCraft.

Most of the wild honey consumed in Cambodia comes from the efforts of honey hunters working in primary and second-growth forests, who either opportunistically harvest nests upon discovery while doing other work in the forest, or actively search out nests as a part-time profession.

Few (if any) people derive their sole income from honey hunting. Most honey hunting is done in a non-sustainable fashion by either professionals or opportunists. The professionals appear to have a greater appreciation for the value of the bees and may be potential candidates for learning sustainable harvest techniques. The opportunists are a less likely target, and may be a constraint on sustainable management.

Definitions

In this study we have identified the following as members of the "honey value chain". Some characters may play more than one role e.g., professional honey hunter and collector.

Professional Honey Hunter – A honey hunter who harvests *dorsata* or *florea/andreniformis* in a sustainable way (not killing bees and having some appreciation for the environment). They enter the forest with the express purpose of harvesting honey and may be involved with both rafters and/or forest hunting. They have skills learned from previous generations and can (and are willing to) pass knowledge on to others. Honey and bee management is a source of cash income.

Opportunistic Honey Hunter – They take nests as they find them – usually while engaged in other activities such as resin gathering, collecting firewood, charcoal production, clearing land or herding cattle. They are simply exploiting the resource and have little knowledge or appreciation of the role honeybees play in the environment. They may use insecticides or fire to kill the bees as they are afraid of stings, and may even cut the trees down. They are the group most likely to adulterate honey at the base of the value chain.

The men in the photo below are actually professional honey hunters and rafter beekeepers in Siem Reap, who took this nest “opportunistically”, when it was threatened by fire. Mr. Chhoign, on the left, is a well-known beekeeping trainer, a “Krou Khmom”. The “honey head” is clearly visible on the right of the nest. The alternate dark and white bands are various stages of brood development. The man on the right is scratching the one sting he got that day. This “windfall” harvest of honey, brood, and wax represents about US\$60 income, a tidy sum.



Honey Hunters with Whole Nest (*Apis dorsata*).

Collector – At the village level the collector is an individual (who may also be a honey hunter) who buys or collects honey from the local villagers (with payment due upon successful sale). He or she may visit other villages in the vicinity but always knows the people dealt with. As a focal point s/he will also be responsible for transportation of liquid honey to the next level of the value chain, and may also do some of the processing – if it is not done in the field; e.g. separating wax from honey, processing wax into bricks. The individual is usually a respected or senior member of the community often active in a community-based organization (CBO). In some cases the collector may deliver the "kabal tuk" (honey head) to the next level to guarantee the authenticity of the honey. Honey is delivered on motos in 20 liter pails.

Trader – Mostly women entrepreneurs; they buy from collectors they trust or know and retail to a loyal customer base, or to other merchants for sale in market stalls, on the street, or on demand. This segment is often characterized by personal and family relationships heavily dependent on trust as a guarantee of product purity. They may do some elementary processing by filling smaller containers from the 20 liter pails typical of honey delivery.

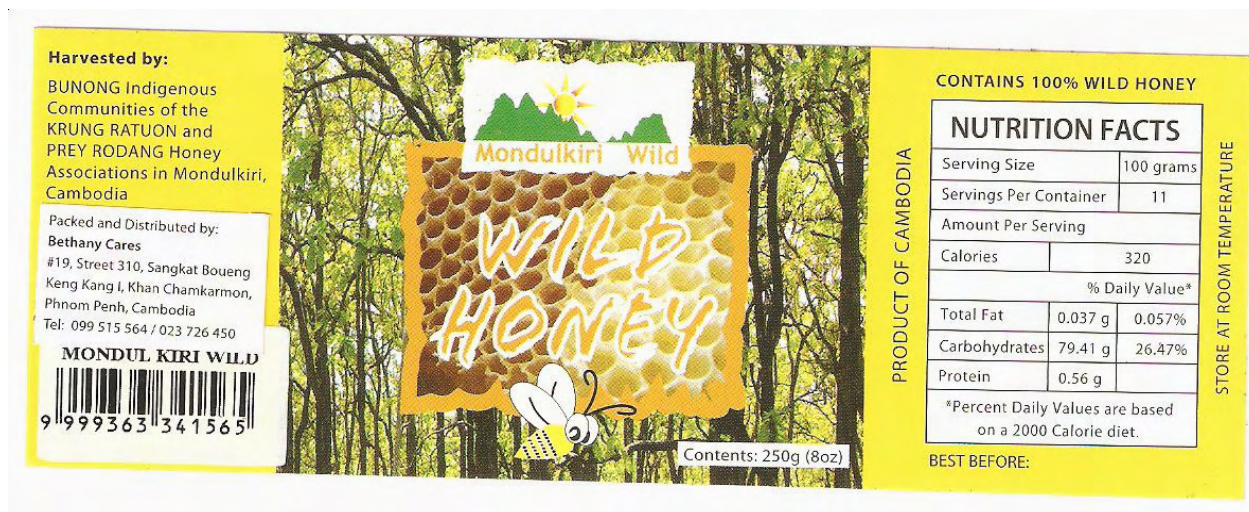


Honey Collectors in Kampong Speu, with baskets of *A. florea* and *A. andreniformis*. Both are high value varieties as they are sold in the comb, an assurance of genuineness and purity.

Retailer /Processor – There may be several levels of sophistication in this segment. One is more business and quality oriented; often adding value by processing, labeling, bottling and providing product information. Their sales are best characterized by "niche" or "gourmet" markets as the price is substantially higher but carries a product guarantee. Other retailers range from simple market stalls or street vendors, as in the photo below, to retail shops who buy off the street and bottle.



Retailer in Phnom Penh Market (Psar Thmei)



Label from NGO Honey Processor/Wholesaler associated with WWF project in Mondulkiri

Quality of Cambodian Honey

Consumer confidence in Cambodian honey is low due to several factors most of which are well founded. Typically Cambodian honey is of very poor quality primarily because of lack of education on the part of honey hunters, collectors, transporters, processors and even down to the consumers.

- **Adulteration/falsification** – A common perception among Cambodians is that honey is often adulterated with sugar syrup or water or is “manufactured” by adding pollen and hive debris to a brown sugar solution. There are no simple tests to detect this; the exception being if fresh cane sugar syrup is used the cellulose fibers may show up under at least 10X magnification.

- Unsanitary processing and hive detritus – to some Cambodians the presence of larvae, wax, pollen and dead bees is an assurance of authenticity (it is not!). Most honey processed in Cambodia is squeezed from the comb in the field or village under less than sanitary conditions (no hand-washing, use of unwashed containers, etc.).
- High moisture content/fermentation – The typical moisture content of tropical honeys is on the order of 22%-27% water (see honey samples chart) which, along with the comb detritus acting as a yeast nutrient, leads to rapid fermentation and spoilage. Storage at ambient temperatures facilitates the fermentation process and most raw/unprocessed honeys will begin to ferment in a few weeks.
- Label information – Except at the high end there is usually no label information. When it is present it is incomplete (country of origin, weight, volume, floral source, producer/packer etc.) or even misleading (imported honeys being sold as Cambodian, misleading net volume/weight).

Samples were taken during this value chain assessment for possible evaluation by Chiang Mai University (CMU) laboratories. Some simple measurements (% water, volume, net weight) were done at the offices of CBCL before sending off samples to CMU. CMU will be asked to perform the following tests⁴:

- HMF – Hydroxymethylfurfural levels are a reflection of the enzymatic activity of honey - high levels of HMF indicate overheating and/or poor storage conditions. Acceptable levels for tropical honeys are <80 mg/kg.
- Moisture content – typically Asian honeys have high moisture levels because of harvesting and storage practices. High moisture levels combined with comb detritus (e.g. pollen and larvae) increase the potential for fermentation and off taste. It should be <20% preferred to be <18.5%.
- Sugar profile – limits (glucose + fructose > 60 g/100 g; sucrose <5 g/100g) microscopic check for adulteration by addition of sucrose syrup screening for cane sugar elements (e.g. cellulose from cell walls); tests to determine C12/C13 ratios indicative of plant source (cane sugar has different C12/C14 ratios)
- Yeast count
- Presence of glycerol or ethanol. International limits not established; should be near zero.

Further testing to ascertain floral sources using a procedure called mellisopalynology (the study of pollen in honey) is being discussed with Dr. Vaughn M. Bryant (a world-renowned forensic palynologist), Texas A&M University, College Station, Texas.

Typical Prices Paid for Cambodia Honey at Value Chain segments

Producer – A typical “farm-gate” price paid to the honey hunters ranged between 3-5 USD per liter (average price per kg was \$4.95). Because honey has a specific gravity greater than one (depending on the moisture content), honey typically weighs 1300 to 1400 grams per liter. Seldom were volumes and weights accurately portrayed. Average moisture of farm gate honey was 25.3%, well above the standard 18-19%.

Collectors – The markup for collectors who are the intermediates between honey hunters and traders is about \$0.75 to \$1.00 per liter, or 25%. Most frequently they buy field processed honey or honey in the comb. In Pring village (Kampong Speu) where the main source of honey is from

⁴ MSME project could fund these tests, and some pollen analysis work at Texas A&M University, a world center of expertise in mellisopalynology. This would establish a reference collection so that monitoring of bee populations and their forest floral resources can be facilitated.

A. florea and *A. andreniformis* the unit of purchase is the “basket”. This is a selection of several combs, for which the traders make an offer for purchase. Collectors stated they sell the honey at the same price as they buy it making their profit on the sales of brood alone. This seems hard to believe - it is more likely that they were reluctant to reveal their profit margin on the honey portion in front of the group of honey hunters.

If the collectors are also traders their profit increases substantially. Traders usually move the bulk honey rapidly to market either to retailers or further along the chain to other traders, shortening the turnover time on the operating capital and incidentally reducing the fermentation. Brood may spoil if not consumed within three days of harvesting, so it must be expedited to market.

Trader - Average price per kg is \$9.72/kg. If this holds true across the board there is about a 100% mark-up from farm gate to retail. Average moisture content of these samples was 24.4%. Often due to poor storage the honey will ferment before it reaches the consumer.

Retailers – Roadside stand along Hwy# 4 selling honey in the comb (*florea* and *andreniformis*) sellers said \$2.50 was a good day. (See supermarket shelf price chart). For honey sold in recycled water bottles in the Phnom Penh markets the average price is about \$7.70 per kg. The following spot data were collected by the study in two Phnom Penh markets.

Honey Product	Selling Price USD
Honey Comb (Kg)	10
Brood Comb (Kg)	9 - 10
Cleaned Wax (Kg)	12 - 13
Squeezed Honey (L)	15
Squeezed Honey (L)	10

Product	Selling Price USD	Stated Source
Squeezed Honey (L)	15 (Khum Thom)	Battambang province
Squeezed Honey (L)	25 (Khum Plet)	Koh Krabei/Kandal
Honey Combs (Khum Plet or Khum Thom) (kg)	18	Battambang or Koh Krabei/Kandal
Honey combs+ Brood combs (kg)	18	Battambang or Koh Krabei/Kandal

Premium Priced Honey. The small combs of *A. andreniformis* and *florea* are often sold whole. The purity of comb honey is beyond reproach – it has a longer shelf life and little chance of adulteration or falsification. Average moisture content of our samples of comb honey from capped cells is 23.1%; from squeezed honey the average is 24.3% which is on the order of samples purchased from middlemen. When calculating the value of honey in the comb it may be compared by using liquid strained honey as a measure; in the case of the *florea* and *andreniformis* honeys purchased the liquid honey equivalent worked out to an astounding \$33.78/kg and \$64.52/kg.

Problems with consistency and volume of supply may be characterized by:

- Honey harvesting is a seasonal activity dependent on bloom times of flowers. The supply will also fluctuate with environmental conditions. March and April (dry season) tend to be the time when *A. dorsata* honey is most readily available in Cambodia, although some wet season harvests are made from the wetland areas.

- As environmental conditions vary so does the honey production, making it difficult to forecast yields. Honey markets tend to demand a consistent and regular supply – a demand not easily met by smaller producers lacking organization.
- Consistency of product. As floral sources vary so will the taste and appearance of the honey. Like vintage wines, some honeys appeal in varying degrees to the discriminating palate. Production of a floral specific honey in one year does not guarantee subsequent success in the same area.
- International markets, even niche markets, deal in tons of honey, not kilos. Putting together orders of sufficient size for international marketing requires sophisticated organization in the supply chain.

If the international marketing of Cambodian indigenous honey is to be successful, then a long road lies ahead in the area of brand recognition, determining sustainable harvest criteria, and certification according to international standards (e.g. food safety, organic and fair trade). Currently there are no reliable field methods for testing for honey adulteration or falsification, and laboratory testing is expensive and is unavailable in Cambodia.

Retail Sales of Honey in Cambodia at the Supermarket Level

Surveys were done at urban supermarkets in Phnom Penh and Siem Reap to ascertain the shelf prices paid for honey.



Imported and local Honey on Supermarket Shelf in Phnom Penh.

The majority of honey found is imported, only three local brands were found on the shelves (Senteurs d'Angkor, CCI Group, and New Rain Green Gold). The sources of imported honey are China, Australia, United States, Thailand, New Zealand and Vietnam. Details of brands and prices observed are provided in Annex 1. Average prices by source country are provided in the table below. These results should be considered indicative, as the averages are un-weighted.

The Chinese and Vietnamese honeys were the lowest price, as expected due to quality issues (pesticide and antibiotic residues) for these two sources. The Cambodian products fall in the middle of the range. USA prices include higher transport costs.

Honey Source-Country Average Retail Prices	(US\$/kg)
Cambodia	9.88
China	6.95
USA	12.79
Thailand	7.33
Australia	7.44
Vietnam	6.00
New Zealand monofloral and specialty honeys	14.40
New Zealand manuka honey	37.60 to 57.00

The Thai product shows *Apis florea* bees on the label and states “*madu asli*” (Malay for “wild honey”). It also claims to have a moisture content of 16.4% on the label, but that is not credible as the honey is very runny (standard is 18.6% and the honey looks like over 22%). Chinese honeys have a poor reputation on the international market due to reported contamination with chemicals and banned antibiotics. All of the imported honeys in Cambodia are produced by European bees (*Apis mellifera*). Those produced under tropical conditions (i.e., Thailand, Vietnam and some Chinese) have the usual high moisture problems, and would be fermented if not pasteurized. Pasteurization destroys subtle floral esters (bouquet) and enzymes, and produces a high content of hydroxymethylfurfural (HMF) from the thermal breakdown of the simple sugars. HMF level is a standard quality test.

The very high priced manuka honey (a monofloral honey from New Zealand) is sold under license as having higher than normal antibacterial properties (verified in the scientific literature using standard bacterial colony plate-count techniques). This is rated as “UMF” or Unique Manuka Factor and brings a premium price. Some other honeys are known to have this UMF attribute and Cambodian honeys (especially the wet season *Melaleuca* honey) should be tested to see if they can access this very high priced niche market (some Asian hospitals pay up to US\$200/kg for special high-UMF honeys for medical purposes).

World prices of conventional honey are currently high, at about USD2.20 per kg, as bulk at FOB. Chinese honey is at about USD1.50.

The Cambodian honey supermarket segment is probably stratified. Some well to do Cambodian consumers prefer to buy imports, considering them superior to any domestic product. One overseas Khmer woman interviewed said she would only buy Australian honey, because she did not trust any of the Asian honeys. Many consumers and restaurants simply buy the lowest price product (there is even a “honey-flavored syrup” on the market). Some international and Cambodian consumers have an awareness of the quality issues, or are disposed to buy local and “clean and green”. All three Cambodian brands have “wild, pure, natural” or some such claim on the label, whether or not the claim is substantial. Clearly any attempt to develop the Cambodian honey value chain will require a significant effort on branding and consumer education, in addition to the necessary education of value chain participants on the supply side.

Strengths and Weaknesses at Each Value chain Level.

Producer Strengths

- Professional hunters familiar with bees and not afraid of stings
- Some knowledge of bee habits
- Facility with appropriate tools and methodologies.
- May be some tenure associated with rafter beekeeping
- May have good business/personal relationship with collector
- May be member of organization for better marketing power
- Agree with the statement “no forest- no bees”

Producer Weaknesses

- Non tenure of trees in most cases
- No knowledge of proper sanitary food handling procedures
- No incentive for sustainable harvest may even use detrimental harvest techniques (insecticides and fire)
- No training in quality control for harvesting
- At the mercy of traveling collectors for price
- Difficult to change "the way we've always done it"
- Need education concerning understanding of the “no bees – no forest” concept.

Collector Strengths

- Knows areas and collectors producing honey
- Has knowledge of season and contacts producers
- Most likely has market for honey purchased
- May have personal relationship with producer lessening chance for cheating

Collector Weaknesses

- Knows little about honey quality (moisture levels, storage, adulteration)
- No knowledge of proper sanitary food handling procedures
- Must trust producers, seldom contractual relationship
- Lack business skills such as record keeping
- Little concern (due to lack of education) for environmental aspects of bees

Distributor Strengths

- Usually has buyer down the chain
- Loyal consumer base if past actions and quality have been satisfactory
- Potential for high quality niche market if product warrants

Distributor Weaknesses

- No control over producer (must trust collector)
- No control or knowledge of quality control at producer level
- Inconsistency of supply
- May face storage and processing problems
- No knowledge of proper sanitary food handling procedures

- Little concern (due to lack of education) for environmental aspects of bees
- Competition from "poor quality" honeys
 - Adulterated or falsified
 - Unlabeled imported low quality
 - Lack of educated consumer base "honey is honey"

Consumer Strengths

- Can choose brand if quality is assured
- Set price ceiling

Consumer Weaknesses

- Lack of "honey education"
- Consistency of supply and quality
- Disposable income allotment to "luxury of honey" may vary

5. Regulatory and Support Framework

Government of Cambodia Programs and Policies

In Cambodia, honey and other bee products are classed as "non-timber forest products" (NTFP), and fall under the purview of the Forest Administration (FA), except when they occur in protected areas under the Ministry of Environment or wetlands under the Fisheries Administration. In the FA, the responsible units are the Forest Industry Office and the Community Forestry Office, although NTFPs are also collected in non community-forestry areas. As a food product, standards for honey quality would come under the Ministry of Industry Mines and Energy, Department of Standards.

Interviews with the Chief and Deputy Chief of the Community Forestry Office indicated a strong recognition of the potential of the honey value chain to support their objectives of sustainable livelihoods for members of Community Forestry Associations (CFA). The Community Forestry Office has support for NTFP work including honey, from the International Development Research Centre and from Danida. Activities include PRA studies in CFAs in Kampot and Kampong Thom, and study tours to the rafter bee-keeping activity in Siem Reap.

FA policy is that forest products are subject to royalties and premiums. There is work being done on a new regulation (Prakas) which will exempt CFAs from royalties on NTFPs (funding from International Labor Organization). This exemption is already being implemented informally in some locations. The matters are the responsibility of the Legislation and Litigation Office of the FA.

The Forest Administration has a project with funding from the International Tropical Timber Organization on livelihoods and NTFPs, a three year project finishing in 2010. FA staff intend a first substantive report from that project in May 2009.

There is no policy coordination between the several responsible agencies concerning NTFPs including honey.

Donor and NGO Programs

Several donor and NGO programs dealing with biodiversity conservation, community forestry, sustainable livelihoods, or small business development have identified indigenous beekeeping as an element of their programs but only a few have progressed very far. The private donor funded ACCB biodiversity conservation project has done important work on sustainable

management of bees in Siem Reap Province, but is now no longer supporting honey activity. The GTZ supported Private Sector Promotion project in Pursat province, and the NZAID funded Cambodia Agribusiness Development Facility (CADF) in Siem Reap and Banteay Meanchey provinces have made efforts in the honey sector but are not presently active.

The NGO Community Forestry International (CFI) has been actively involved in the honey value chain for several years, as part of their overall community forestry support program. CFI's work is discussed in more detail below.

The NTFP Exchange Program (NTFP-EP) a Philippine based regional NGO, has been very active in Cambodia, including the support of an NTFP Working Group including a Honey Sub-Group.

The Private Sector

On the private sector side, a very few organizations are marketing Cambodian honey to the tourist and urban markets. Most of these are NGOs, not private firms (WWF & Bethany Cares, CEDAC, CGI). The CGI spokesperson said they are going out of business because they had not sufficient resources to promote the product effectively. CEDAC has only this year begun to be involved with honey marketing, using the substantial donor funding they have to offer rather high prices. They have not yet actually made any investment, and indications are that they may decide not to do so.

Of the three actual private sector firms involved, one Korean company in Siem Reap was selling Thai conventional honey labeled as Cambodian forest honey, mostly to Korean tourists from a fancy tour- bus stop in Siem Reap Town. Fortunately they have gone out of business. Senteurs d'Angkor sells honey in its airport outlets and in supermarkets. The Consultants were unable to get information concerning sources or quality control, and suppose they are buying from traders. Cambodia Biologicals continues to pursue its attempt to develop a certified and traceable supply chain for sustainably harvested, high quality honey, but suffers from under-capitalization.

Financial Services

Financial services in Cambodia are available to individuals and to micro-enterprises in rural areas, through the microfinance institutions (MFI). The Cambodian Microfinance Association has 18 members, all offering individual and group loans, at interest rates consistent with the rest of the Cambodian financial industry (3% to 3.5% per month, declining balance, up to 12 month term). The normal individual loan requires physical collateral and/or some form of guarantee. Inventory is not an acceptable collateral in the Cambodian financial system. Most MFIs offer group loans ("solidarity groups") which require group guarantee instead of collateral. These loans can be up to \$400 per group member (up to perhaps \$2,400 total). Some MFIs require solidarity groups to show some savings prior to approving a loan.

Donor programs are attempting to facilitate financing of SMEs in Cambodia, as for example the IFC negotiations with ANZ Royal Bank for guarantees associated with collateralization of inventory for agro-product processors. Also UNDP, the International Trade Centre, and the Agence Francais de Developpement are implementing a program for loan guarantees for agribusiness SMEs. Without some special facilitation, these programs may be too large to reach honey hunting community organizations.

Even for MFIs, one of the problems is outreach into their target areas, i.e. the logistical costs associated with delivering services. For honey-hunter groups in very remote areas whose operations could be developed under the proposed intervention, this may be a special problem.

Some means may be needed to encourage local MFI branches to make a special effort to deliver to these remote and small target communities.

6. Results of Field-Work in Target landscapes

The geographic scope of this study is given above in the introduction.

About sixteen days of field work were allocated for four locations at the north-central and southwest ends of the country, providing about two days of contact time on the ground plus travel, per location. Good preparation and support by the MSME team and significant support from other agencies especially some NGOs already working in the target areas, plus the Consultants' background from previous work in one of them, made it possible to get some very useful but still preliminary information.

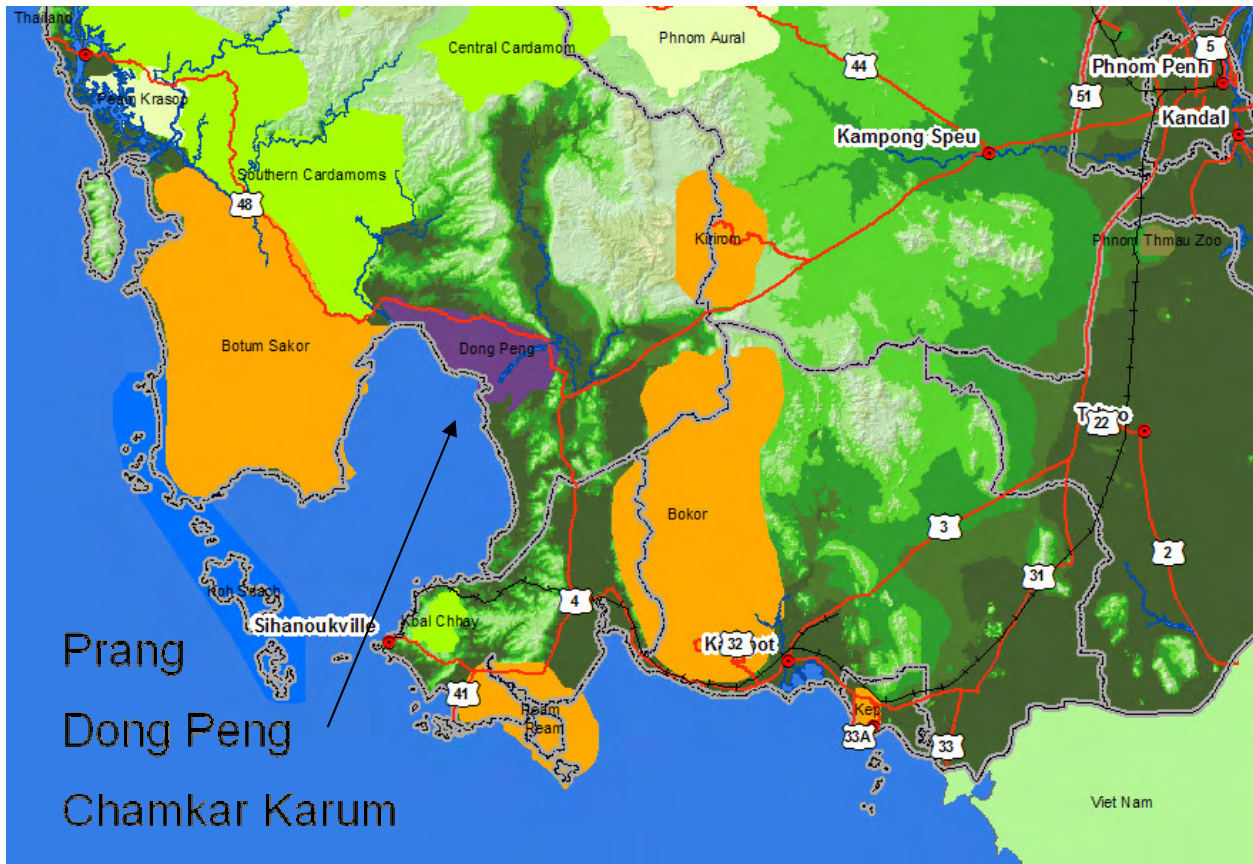
Provided below are brief descriptions of each area, followed by a summary assessment intended to assist the project to focus the proposed interventions geographically.

Kampong Saum Bay

Perhaps the most interesting area studied, with the most concentrated opportunity for a honey value chain intervention, is the Elephant Mountains and the national and local protected areas to the southwest. The map⁵ which follows shows the area around Kampong Saum Bay. Its fore-shore ecotope is the mangrove and melaleuca forests, which are the wet-season habitat for the *A. dorsata* bees which migrate in the dry season to the Elephant Mountains/Cardamom Mountains and the related protected areas which make up the "southern cluster", in Cambodian parks planning terminology. Included are Botum Sakor national Park, Southern Cardamoms Protected Forest, Kirirom National Park, Bokor National Park, Dong Peng Multiple Use Area, Kabal Chhay Protected forest, Ream National Park, Peam Krasop Wildlife Sanctuary, Central Cardamoms Protected Forest, Phnom Aural Wildlife Sanctuary, and a number of Community Forestry Association territories.

Discussion with the MSME Team indicated a general consensus that using Kampong Saum Bay as the geographic focus for the southwest (not limiting to Elephant Mountains) makes good sense in terms of both biodiversity conservation and project implementation aspects.

⁵ Map provided by MSME2 GIS Team



Three communities were visited: Prang, Dong Peng, and Chamkar Karum. Summary details of observations are provided in annex 2, and in the targeting matrix which follows later in this section. All three communities have active honey hunting, and two have well developed CFAs with professional honey hunters. Previous work by CFI and Cambodia Biologicals Co. Ltd. was in Phnom Teub Cheng village, directly south of Dong Peng, inland from the eastern shore of the bay.

Chhlong Protected Area, Kratie Province

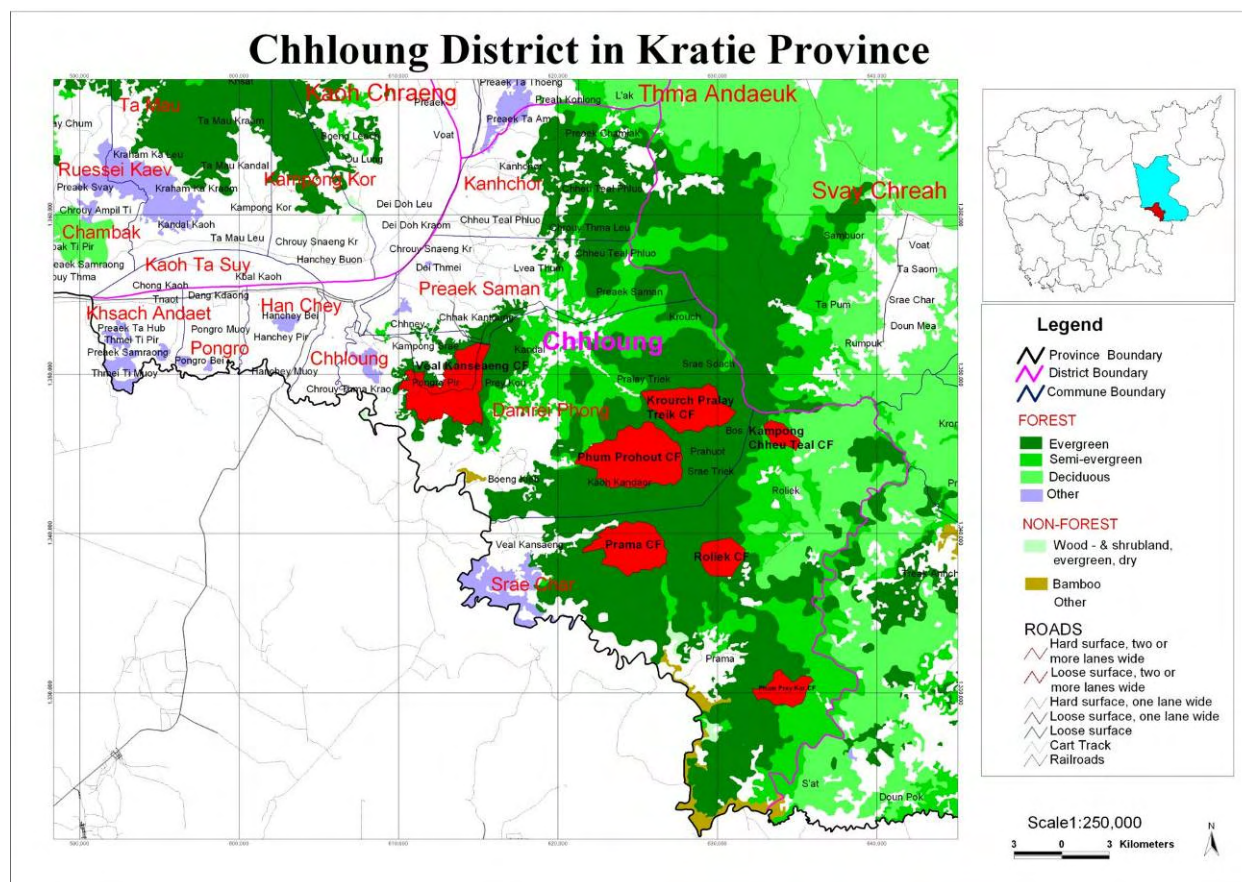
“The term *Chhlong* is used here to refer to the area surrounding the Chhlong River that drains the western slopes of the Chhlong Plateau in Monduliri. It features dry evergreen and semi-evergreen forests associated with both basalts and alluvia; as well as deciduous forests that are largely associated with sandstone areas. Lowland dry evergreen forests dominate an ancient alluvial plain on the border of Keav Seima and Snoul districts. Within Keav Seima district dry and semi-evergreen forests extend up to an elevation of about 700 meters above sea level at the top of the plateau. These forests also give way to extensive deciduous forests on the lowland plains. Bamboo dominates extensive areas where the dry evergreen and semievergreen forests have been heavily disturbed, particularly within Snoul.

Biodiversity Values

This forested landscape has particularly high conservation values. The areas have a particularly high potential for the conservation and sustainable use of biodiversity. These values stem from:

- The mosaic of dry evergreen and semi-evergreen forests associated with alluvial plains, basalt and sandstones.
- It's continuity with extensive deciduous forests of the Eastern Plains.
- The existence of healthy populations of a diversity of endangered species such as
- Gaur, banteng, tiger, fishing cat, marbled cat, yellow-cheeked gibbon, Asiatic black bears and black-shanked douc langeurs.”⁶

A number of CFAs are already established in Chhloung and are receiving support from the FA and from NGOs as shown in red on the following map⁷. The one community visited (Veal Kansaeng, at the center of the map) has professional honey hunters and an intention to include honey resources in the CFA management plan.



Prey Long Area, Kampong Thom

“The term *Prey Lang* has been used to refer to the extensive evergreen and semi-evergreen forest, landscape that is located between the Mekong and Stung Sen Rivers in northern Cambodia. This area supports roughly 3,600 square kilometers of forests. Lowland dry evergreen forests dominate the central portions. The forest grades through lowland semi-evergreen, forest to deciduous forests. In addition to the dry evergreen, semi-evergreen and deciduous forests this landscape also, features a number of other

⁶ Excerpt from Biodiversity Profile For The Biodiversity And Grassroots Advocacy Project, Prepared by David Ashwell M.Sc., On behalf of the EWMI/PRAJ Program, March 2008

⁷ Map provided by MSME GIS Team

forest communities. They include mixed deciduous forests dominated, by *Lagestroemia*, short riparian and *Melaleuca* forests, short semi-evergreen forests, deciduous, swamp forests and evergreen swamp forests.

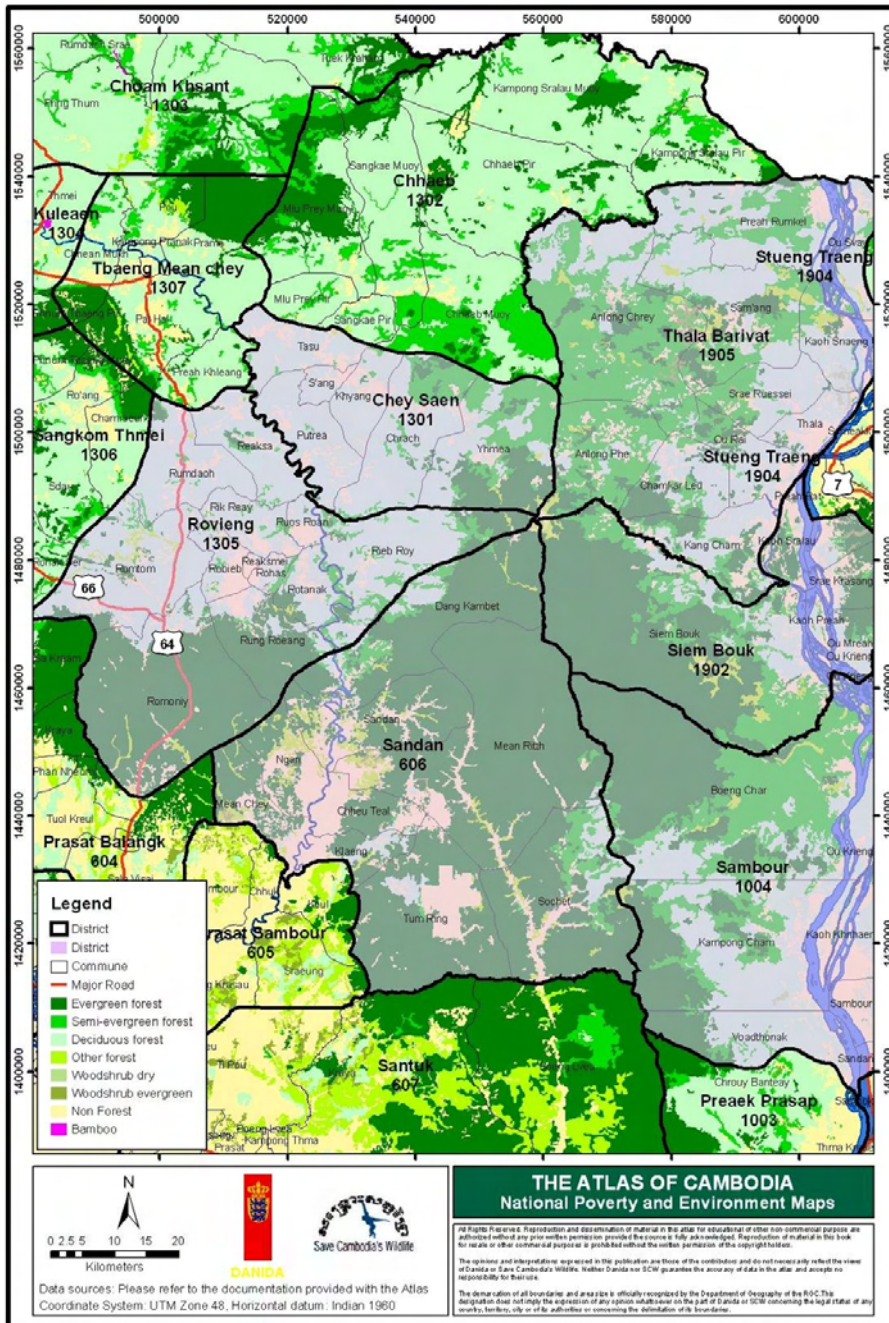
This heavily forested landscape has particularly high conservation values. The areas have a particularly high potential for the conservation and sustainable use of biodiversity. These values stem from:

- It being the largest primary lowland dry evergreen forest remaining in both Cambodia, and Indochinese Peninsula.
- The existence of the range of critical and fragile habitats including swamp forests that may act as repositories of ancient forest lineages and species with narrow ecological tolerances.
- The existence of healthy wildlife populations including endangered species such as, elephants, gaur, banteng, tiger and Asiatic black bears.”⁸

Two communities were visited on the east side of the Prey Long area, both of which have active honey hunters. In one village there are some hunters who might be classified as “professional” in terms of their awareness of the bees and the environment, and their use of relatively sustainable harvesting techniques. The USAID-funded PRAJ program implemented by East-West management Institute is active in this area, in cooperation with a local NGO, but they are not working on the honey value chain.

⁸ Excerpt from Biodiversity Profile For The Biodiversity And Grassroots Advocacy Project, Prepared by David Ashwell M.Sc., On behalf of the EWMI/PRAJ Program, March 2008

the honey gathered very little is sold (mostly for personal use) but it brings nearly \$6/kg. Wax is sometimes discarded but if saved brings about \$4.50/kg. Brood is most often eaten on the spot. Theft by “outsiders” was the main concern voiced by participants – there is no tenure system for trees that are the natural nesting site for *A. dorsata*.



7. Scope for MSME Project Interventions

Basics

The MSME project approach is to build relationships across the value chain. Such relationships can be sustainable only when the participants have the capacity to function effectively and reliably in the roles which are required for the chain to deliver equitable benefits. At the production end (resource management and harvesting), communities need business style organizations, and people with the necessary knowledge and administrative skills to make them work. Practical training is needed, from simple book-keeping to bee ecology. Processing enterprises need to be built up, working with the people who are already the more successful among the traders. Training in management, sanitary standards, finance and many other areas will be needed. Overall a branding and marketing program is required, to deliver high value products to consumers interested to buy them. Government personnel need a better understanding of their role as service providers, and the means to provide such services, within a policy and program framework which serves the needs of the industry and the wider society.

Fortunately there are good examples elsewhere in the world where wild honey industries have been built up in somewhat similar situations. A Cambodian strategy can be developed from these experiences. The “Honey Care Africa” program in Kenya and Tanzania has attracted world-wide attention for its business success in supporting small-scale honey producers. A more relevant example for the Cambodian situation, for ecological and social reasons, is the case of the “Forest Honey Network”, in Indonesia.

The Danau Sentarum Experience, an Indonesian Example

Danau Sentarum National Park is located near the headwaters of the Kapuas River in West Kalimantan, Indonesia. It is a seasonally inundated forest similar to Cambodia’s Tonle Sap, with many of the same trees and vegetation. The indigenous Iban populations were displaced in the 1600-1700’s by Muslim Malay settlers who were primarily fisher folk but also collected honey. Rafter beekeeping (similar to practices in Cambodia and Vietnam) has been practiced for many generations.

In the 1990’s several NGO’s began working with the rafter beekeepers of the area promoting capacity building and market assistance. One of them, *Riak Bumi*, was instrumental in developing community based organizations (similar to CFAs) to organize and promote rafter beekeeping as an NTFP income generating activity. Their efforts over the last decade are a model for other projects to learn from. Some of the key characteristics are:

- Mapping of community resource boundaries, rafter locations and their relationship to the villages.
- Adoption of community based rules and regulations for management of honeybee resources in the managed areas.
- Formation of “*periaus*” (local name for associations) whose members agree to follow the rules and regulations, receive training in quality control, quality assurance and sanitary handling of a food product.
- Grouping together of periaus into a larger association APDS (Asosiasi Periau Danau Sentarum) which deals with marketing through an even larger National Association (Dian Niaga – Forest Honey Network).
- Organic certification through an Indonesian independent certifying agency Bio-Cert.

- Development of attractive labeling, a good reputation and the ability to sell 20-25 tons per annum to a loyal customer base at higher than market prices (niche market), through Dian Negara, the national association.



Indonesian Wild Honey from Forest Honey Network – Attractively Packaged and Promoted, and Certified Organic

Intervention Logic

The scope of work for this assessment calls for proposed interventions to be presented in logical framework format. The Consultants have taken note of the framework for the MSME project, and adapted the objectives, outcomes and objectively verifiable indicators to the requirements of an intervention in the honey value chain. A suite of activities are proposed which will serve the outcomes sought. It is assumed that MSME will assign one or more senior staff people to have oversight of this intervention and responsibility to integrate the work.

Work at the community and government levels will have to be facilitated by contracted personnel, recruited preferably (at least for the community work) by engaging the NGOs who are already engaged in this, and who have the skilled personnel and working relationships with communities and in many cases with government staff. Some senior experts on the honey industry, on forest ecology, and on public sector strengthening will also be required.

These matters are presented in standard logical framework format in the following pages.

Intervention Logic		Objectively verifiable indicators of achievement (OVIs)	Source and means of verification
Overall Objective	To develop the Cambodian wild honey value chain as a significant element of the livelihood strategies of forest dwelling communities in biodiversity rich areas.	At the end of the third year, the volume of Cambodian branded wild honey sold on domestic and international markets reaches 50,000 kg per year with a retail value of \$20/kg (\$1M)	
Specific objectives	<ol style="list-style-type: none"> 1. To improve the productivity of the wild honey value chains, and the sustainable management of the biodiversity-rich landscapes on which they are based. 2. To develop private-sector led institutions capable of functioning as dialogue partners with government, on promotion and regulation of the wild honey industry. 3. To build capacity among relevant government agencies to provide appropriate services to the wild honey industry. 	<ul style="list-style-type: none"> • Producer group net income has increased by 75% in 30 CFA's at the end of the third year. • Number of wild bee colonies in target areas is maintained or increased. • National Honey Industry Association has been formed and strengthened • National honey standards and branding have been developed and are being implemented by RGC agencies. 	

Expected results (Outcomes)		Objectively verifiable indicators of achievement (OVIs)	Source and means of verification
1. Biodiversity Conservation	Forest dwelling communities in four biodiversity-rich areas are maintaining healthy forests by managing honey-bee populations in a sustainable manner	<p><i>Number of hectares in areas of biological significance under improved natural resources management</i></p> <p>At the end of the third year, a total of thirty community-based organizations (CFA/CPA/CFiA) in four landscapes:</p> <ul style="list-style-type: none"> • have incorporated the honey-bee resource into their forest management plans, with support from FA, Fisheries, and MoE and private service providers. • have established honey-producer groups within the CFA, CPA, or CFiA. • are formally allocating landscape resources (bee trees and rafter sites) to honey producers • are controlling access to the resource consistent with the plan and the allocations • are collecting and using appropriate data to enable adaptive management of the resource 	<ul style="list-style-type: none"> • CFA/CPA management plans • Producer group membership and allocation records. • Minutes of decisions and actions by CFA/CPA management concerning infractions by members and by outsiders. • Review of data-bases and decisions recorded in minutes of management meetings

<p>2. Value chain Strengthening</p>	<p>Honey value chain is returning increased incomes to participants by delivering quantities of honey and related products which meet modern standards for quality, moisture content, sanitary condition, and traceability.</p>	<p><i>Number of people with increased economic benefits derived from sustainable natural resources management and conservation</i></p> <ul style="list-style-type: none"> • Honey producer group net income has increased by 75% in 30 CFA's at the end of the third year. • Upper level value chain participants are operating as well organized small businesses able to deliver product which meets established standards. • Trading relationships are traceable and based on contracts. • Cambodian national honey brand is established and promoted locally and internationally by Ministry of Commerce and private sector. 	<ul style="list-style-type: none"> • Interviews, records, and contracts, compared to baseline. • Business plans and records of honey marketing enterprises. • Interviews with laboratory staff • Review of branding program.
<p>3. Private Sector Voice</p>	<p>Participants in the honey value chain have formed and are engaged in provincial and National Honey Industry Associations which function as venues for capacity building and give voice to private sector participants.</p>	<p><i>Number of Community working groups that have clear linkages in NTFP value chains</i></p> <ul style="list-style-type: none"> • Four provincial honey industry associations registered. • National association has been formed. • Technical and managerial training has been delivered effectively to members of community groups and provincial and national associations. 	<p>Registration records Training outcome assessments compared to baseline training needs assessments.</p>
<p>4. Public Sector System</p>	<p>Honey Industry Association and relevant RGC agencies have developed an industry regulatory and marketing framework consistent with WTO requirements.</p>	<p><i>Number of policies, laws, agreements or regulations supporting sustainable natural resources management and conservation</i></p> <ul style="list-style-type: none"> • Leaders of provincial and national associations engaged effectively with RGC agencies on honey industry development. • Cambodian honey quality standards have been established, promulgated and are being enforced in the market-place. 	<p>Minutes of meetings Publication of standards Institutional review of promulgation and enforcement program in relevant agencies (MoC- Camcontrol, MAFF, FA, MoE)</p>

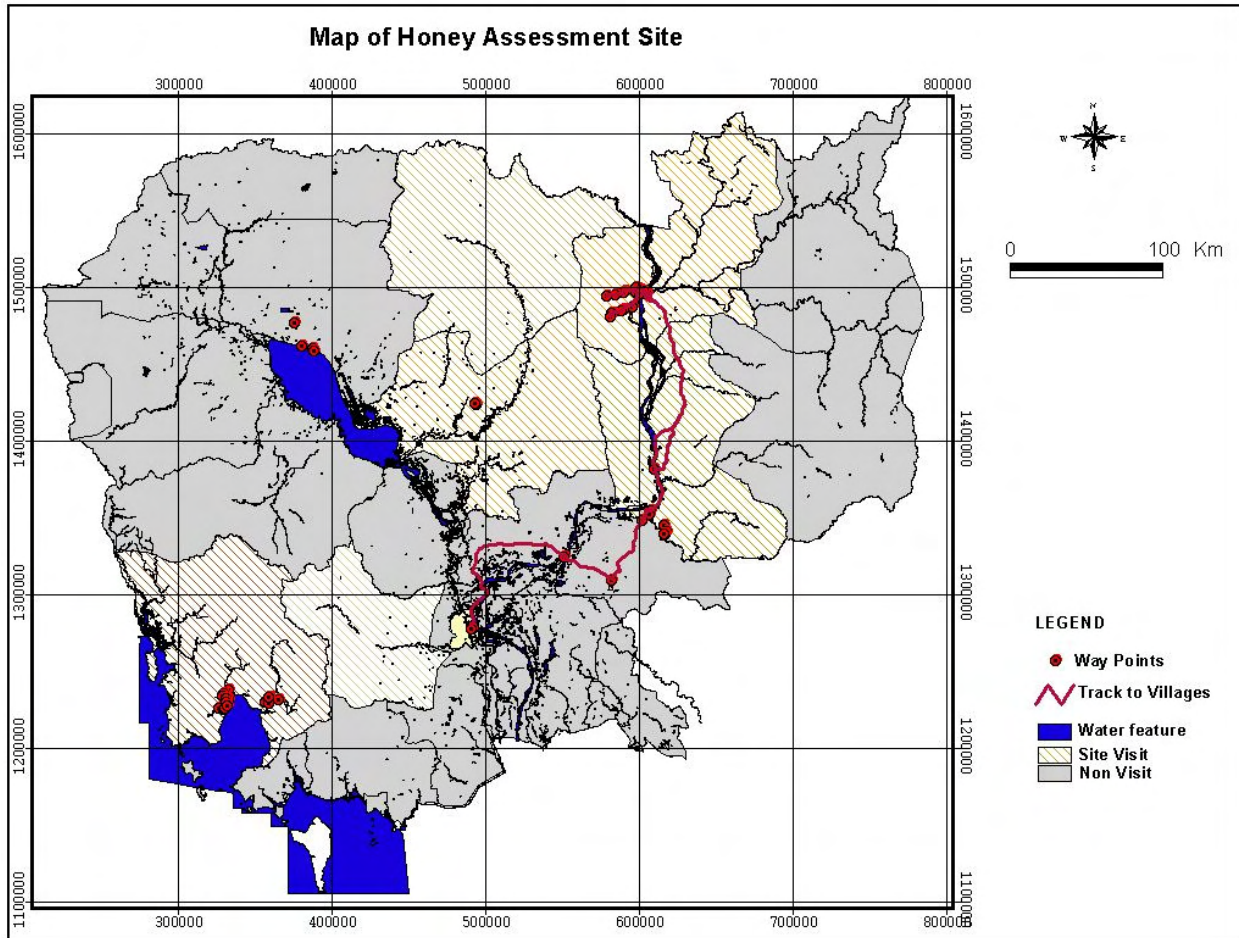
5. Service Capacity	Relevant RGC personnel are trained to respond effectively to industry requirements to enhance competitiveness.	<ul style="list-style-type: none"> • Honey quality laboratory established in MAFF National Agricultural Laboratory Facility or MIME Standards Bureau. • Staff of relevant ministries trained to understand honey value chain and its economic and ecological role. • MoC establishes a Honey task force to implement a honey export promotion strategy. 	Interviews with relevant personnel
6. Information for Management and Investment	Information needed for management of the resource and the value chain is developed from monitoring data and is effectively communicated to relevant stakeholders at all levels.	<ul style="list-style-type: none"> • Data on bee populations is being collected by producer groups and incorporated into data-bases. • Honey production and marketing data is being collected from participating enterprises. • By the end of the third year, the national association is collaborating with MoC to accumulate and process data and communicating useful information to members. 	Interviews with relevant personnel Records and field notes

	Activities
For Result #1 Biodiversity Conservation and Livelihoods	<ul style="list-style-type: none"> • Recruit staff or contract organizations with necessary experience and field skills to work with CFAs. • Design bee population monitoring systems based on sound biological science. • Assess and select 30 communities in target landscapes for suitability as project participants (see target matrix). • Establish and/or strengthen CFA/CPA/CFiA in selected communities. • Develop floral calendars, assess bee-forage seasonal gaps, and initiate forage planting interventions. • Assist honey producer sub-groups and CFA leaders to develop management plans incorporating bee resources • Develop training materials and implement workshops, field work, and study tours (Cambodia and external). Monitor training outcomes and strengthen trainers. • Train CFA Management Committees in skills needed to manage an enterprise (financial management, facilitation of decisions on benefit-sharing, ensuring transparency and accountability).

<p>For Result #2 Value chain Strengthening</p>	<ul style="list-style-type: none"> • Identify leading participants across the value chain, and facilitate meetings. • Develop value chain improvement plan with leading participants. • Follow up training for producer groups on sustainable harvest techniques and sanitary and traceable handling of products. • Develop appropriate technology for honey drying for small-scale processors. • Facilitate Introduction of rafter bee-keeping in appropriate locations. • Assessment business development needs and facilitate appropriate group training for participants at each level.
<p>For Result #3 Private Sector Voice</p>	<ul style="list-style-type: none"> • Adapt existing MSME project methodology for formation of local and higher level industry associations in honey value chain (interest/working groups, unofficial and official associations). • Facilitate technology-governance information exchange visits and semi-annual meetings of professional honey hunters and honey trainers from all provinces.
<p>For Result #4 Public Sector System</p>	<ul style="list-style-type: none"> • Adapt existing MSME project methodology for public sector development to honey value chain. • Encourage RGC agencies to develop and implement honey industry promotion program analogous to Cambodian silk export program
<p>For Result #5 Service Capacity</p>	<ul style="list-style-type: none"> • Implement staff training and laboratory development for assessing honey adulteration, moisture content, sugar profiles, and pollen spectra.
<p>For Result #6 Management Information</p>	<ul style="list-style-type: none"> • Train honey hunters to collect spatial data (GPS) on bee colony locations, water sources, plant communities, and bloom times (phenology). • Develop Cambodian standards based on a review of regional national standards (if any), proposed standards from Asian Apiculture Association, Codex Alimentarius, etc in consultation with other international agencies e.g. ICIMOD, FAO, Eurepgap, USDA, IFOAM. • Assist the Honey industry association and public sector partners to develop and manage the data base and to provide useful information to members.

Assessment of Suitability of Target Locations for Project Interventions

The field observations from the 11 sites visited are summarized in Annex 2. The locations are indicated in the following map.



For comparison purposes a set of criteria were developed reflecting the suitability of each site for intervention by the project, and the 11 sites ranked in a matrix of the criteria. The ranking matrix is given in annex 3. The results of the ranking are presented in the following table.

Visited Target Locations, Scores for Suitability for Project Interventions

			Access to Site/market	Bee Population	Story Line	Participant awareness	CFA/CPA strength	NGO partner	Tenure prospect	Supply chain strength	Potential volume	Season
Score	Site	Target Area										
29	Bos Veang	Boeung Per	5	3	4	2	4	5	1	1	3	1
25	Acacia	Boeung Per	5	5	2	2	1	1	1	1	4	3
34	Peuk	Prey Long (BP)	4	3	5	4	2	4	4	3	4	1
43	Kpg Saum Bay (3 villages names)	Elephant and Cardamon Mtns.	5	5	3	5	5	5	2	3	5	5
36	Pring	Kpg Speu	5	5	4	4	1	1	1	5	5	5
33	Veal Kansaeng	Chlounge	4	5	3	4	4	4	2	3	3	1
25	Ckr Leu (St Treng west)	Prey Long	1	5	3	2	1	4	4	1	3	1
26	Doung (Steung Treng west)	Prey Long	1	5	3	2	1	4	5	1	3	1

Other locations from Previous work

42	Tabeng	Phnom Kulen	5	5	3	5	4	5	3	4	3	5
36	Pursat	Cardamon/Tonle Sap	5	5	3	4	2	4	2	3	3	5

The following locations have the highest scores out of a maximum of 50 in this exercise, indicating high suitability as target locations for project interventions.

- Bay of Kampong Saum - Koh Kong (43)
 - Near Cardamoms, Elephant Mts. & other biodiversity hotspots.
 - Established communities of honey hunters/rafter beekeepers.
- Pring Village - Kampong Speu (36)
 - On the other side of Elephant Mountains from Kampong Saum bay.
 - Many professional hunters.
 - Specialty honey (floreana & andreniformis) with very high market value.
 - Well developed market channels
- Peuk Village – Preah Vihear (34)
 - Many seasonal professional honey hunters.
 - Indigenous community.
 - Proximity to Prey Long Forest.
 - High Value honey potential.
- Veal Kansaeng – Chhlong, Kratie (33)
 - Seemingly abundant bee population
 - Working CFO/CPA's and NGO's in this and many nearby locations in relatively intact evergreen forest.
 - High value honey potential.

Implementation

The work of NGOs in the community areas has been essential to the formation of the human and social capital on which the success of the process in Danau Sentarum has depended. Private sector actors with the vision and long-term investment capability were simply not there, as is also the situation in Cambodia at present. In the Danau Sentarum case, the transition from NGO assistance to a fully private sector supported (producers and sellers) association is now progressing, as the associations gain strength, the market potential is demonstrated, and private sector relationships develop.

The following cartoon from a Tanzanian case study⁹ illustrates the situation. In the absence both of strong private sector players and of governmental agencies with the capacity to build the value chain links (as in the case of “dragon-head” models in China and elsewhere), the NGOs play a pivotal facilitation role. This situation is changing in Cambodia, but there is a long way to go.

⁹ Case Study of *Same* Beekeepers Association (SABEA), The Evangelical Lutheran Church of Tanzania (ELCT) in partnership with VECO (Vredeseilanden Country Office) Tanzania.



In Cambodia, the NGOs, especially “Community Forestry International” (CFI), have been working for several years on supporting the development of Community Forestry Associations (CFA) in and near protected areas, including a number where the honey value chain is already important for local livelihoods. Considerable human, social, and material capital has been built up which could be very useful for an intervention in the honey value chain, including experienced staff, positive working relations with the communities and with the Forest Administration and other relevant government agencies, and a body of training materials. Included in the latter are modules in Khmer on:

- Introduction to Sustainable Honey Enterprise Development
- Community Organizing for Community-based Honey Enterprise Development
- Resource Assessment and Participatory Mapping
- Financial Management
- Participatory Value Chain Assessment
- Business Planning and Marketing
- Establishment of community forestry associations and community protected areas.
- Community education poster and audio slideshow on sustainable management of bees

CFI also played a catalytic and supportive role as the supportive third party in the development of the contractual relationship between Cambodia Biologicals Co. Ltd (CBCL) and a CFA in Koh Kong province, for the purchase of sustainably managed and traceably handled honey, for sale in urban markets. In this case CFI functioned as the facilitator for contract negotiation with the company, and as technical and management training support agency for the CFA.

Details of this experience are in a report by CFI and CBCL¹⁰ which has been provided to the project. The key point is that producing high quality honey products for international niche markets requires organization at the community level, for sustainable management and quality

¹⁰ Community Forestry and Honey Enterprise Development: A Case Study Report from Phnom Toub Cheang, Koh Kong Province, Cambodia. Amanda Bradley and Andrew McNaughton, Published by Community Forestry International (CFI)

control. Indeed organic and fair trade certification standards for small-holder production require community based organizations (not companies) to be the selling partner. The buying company in this case was able to build on the NGO's initial and ongoing work, in order to make a more robust value chain benefitting the company, the community, and the local forest environment.

It would not have been possible for an individual firm to make the sort of investment necessary to build the human and social capital needed for success. In the context of Cambodia, international public money was required (voluntary sector thus far) and will continue to be required if a modern and sustainable honey industry is to be developed. In this author's view, such an investment would address the intent of the Congressional "earmark" for biodiversity conservation rather well.

8. Annexes

Annex 1: Retail Products and Price Data

Brand Name	Market Name (Phnom Penh unless marked SR)	Labeled Country of Origin	Container size In grams	Price per Unit USD	Extended Price (USD per kg)
Sue Bee	Lucky	USA	227	3.20	14.90
Sue Bee	Lucky	USA	340	4.50	13.24
Sue Bee	Lucky	USA	680	7.90	11.62
Sue Bee (Sage)	Lucky	USA	454	6.65	14.65
McMahon's	Lucky	Australia	1000	7.80	7.80
Royal Honey	Lucky	Thailand	380	2.15	5.66
Royal Honey	Lucky	Thailand	1000	5.80	5.80
McMahon's	Pencil	Australia	1000	7.80	7.80
Cambodia Natural Honey	Pencil	Cambodia	1000	7.25	7.25
Cambodia Natural Honey	Pencil	Cambodia	650	5.75	8.85
Chinese script??	Pencil	China	500	3.75	7.50
Chinese script??	Pencil	China	500	3.00	6.00
Chinese script??	Pencil	China	450	3.40	7.55
Chinese script??	Pencil	China	500	3.90	7.80
Red Man	Pencil	China	1000	6.70	6.70
Thai script	Pencil	Thailand	360	3.75	10.42
Thai Longan (unifloral)	Pencil	Thailand	360	4.30	11.94
Aro	Pencil	Thailand	1000	7.10	7.10
Thai export	Pencil	Thailand	1000	6.00	6.00
Mat Ong Rung	Pencil	Vietnam	700	4.20	6.00
Senteurs d'Ankor	Pencil	Cambodia	280	3.00	10.71
Senteurs d'Ankor	Veggie	Cambodia	280	3.00	10.71
Chinese script??	Veggie	China	450	3.60	8.00
Thai script	Veggie	Thailand	375	2.65	7.06
Thai script	Veggie	Thailand	360	3.75	10.42
Red Man	Tai Hout	China	1000	6.20	6.20
Red Man	Tai Hout	China	500	3.60	7.20
McMahon's	Tai Hout	Australia	500	3.80	7.60
McMahon's	Tai Hout	Australia	1000	7.20	7.20
Cambodia Natural Honey	Tai Hout	Cambodia	1000	7.20	7.20
Cambodia Natural Honey	Tai Hout	Cambodia	650	5.75	8.85
Rosemary (unifloral)	Bayon	Romania	500	9.80	19.60
Sweet Meadow (clover)	Bayon	New Zealand	500	6.70	13.40
Sweet Meadow (creamed)	Bayon	New Zealand	500	6.70	13.40
Sweet Meadow (Rewarewa)	Bayon	New Zealand	500	6.70	13.40

Sweet Meadow (white clover)	Bayon	New Zealand	500	6.70	13.40
Sweet Meadow (wildflower)	Bayon	New Zealand	500	6.70	13.40
Sweet Meadow (Rata)	Bayon	New Zealand	500	6.90	13.40
Sweet Meadow (Blue borage)	Bayon	New Zealand	500	6.70	13.40
Sweet Meadow (Kamahi)	Bayon	New Zealand	500	6.70	13.40
McMahon's	Bayon	Australia	500	3.80	7.20
Senteurs d'Angkor	Angkor SR	Cambodia	90	2.50	27.77
Woodland's Certified Organic Manuka 5+ (UMF)	Angkor SR	New Zealand	500	19.95	39.90
Woodland's Certified Organic Manuka 10+ (UMF) (*3)	Angkor SR	New Zealand	500	21.80	43.60
Woodland's Certified Organic Manuka 15+ (UMF) (*3)	Angkor SR	New Zealand	500	28.50	57.00
Woodland's Natural Manuka 12+ (UMF)	Angkor SR	New Zealand	500	18.80	37.60
Dan "Z"	Angkor SR	China	4.50	3.30	7.33
"Pure Honey"	Angkor SR	China	500	3.50	7.00
"Pure Honey"	Angkor SR	China	1000	5.20	5.20
Cambodian Biologicals Ltd.	Star SR	Cambodia	230	3.60	15.65
Sue Bee Sage	Star SR	USA	227	2.60	11.45
Aunt Sue	Star SR	USA	454	4.95	10.90
Thai Label	Star SR	Thailand	500	5.80	11.60
Nu Zea Bee (Honey and Pollen)	Star SR	New Zealand	500	9.20	18.40
Nu Zea Bee (Lemon honey)	Star SR	New Zealand	500	9.20	18.40

Annex 2. Summary Notes from Village Visits

(Complete field notes have been retained by the authors)

1. Bos Veang village, Sala Vesei Commune, Balang District, Kampong Thom province.

(Visited February 4, 2009) Highlights include:

- The village was established in the 1950's with 5-6 families, it now has 132 families and most of the adult males consider themselves opportunistic honey hunters.
- Yield = 30 liters/season. Of the honey gathered very little is sold (mostly for personal use) but it brings 15-20K riel/liter. Wax is sometimes discarded but if saved brings 18K riel/kg. Brood is most often eaten on the spot.
- Theft by "outsiders" was the main concern voiced by participants; there is no tenure system for trees that are the natural nesting site for *dorsata*.
- We visited a couple of bee trees; one was burned in effort to get honey.
- On southern edge of Boeung Per Wildlife Sanctuary

2. Acacia plantation (4kms from Balang District center) (**Visited February 4, 2009**) Highlights of site:

- 3000 hectares of *Acacia mangium* (planted by Annmaradi with headquarters in Kampong Cham) with plans to expand to 10,000.
- Visited by bees from May until the end of November when there are abundant floral resources.
- *A. dorsata* is the primary bee species, there are *floreana* but no *cerana* because of lack of nesting sites (with boxes and introduced colonies at the right time they would produce honey).
- The *dorsata* bees depart in January for "the forest" (possibly Boeung Per).
- Local security guard climbs 8-10 meters into trees and in a good day may harvest 10-20 kg of honey. People buy honey at the "farm gate" during the height of the season for 20-30K riel/liter and off season for as much as 40K riel. Some people come to buy brood which he sells for 10-15 riel/kg.

ADRA office - (Visited February 5, 2009) Interview with Try Kimlong, ADRA assistant project manager HARVEST Project, Rovieng District, Preah Vihear Province, mobile (855) 12 870 605, office 23 880 693.

- Beginning in 2008 AUSAID has been the major funder for ADRA with an emphasis on training.
- A local has been in the area on two occasions for some training. On closer examination it was found that one trip was for ADRA staff orientation and another for survey of local honey hunters. Mr. Kimlong could not give any information on the results of #2 as no report has been filed to date. In his opinion all of the honey hunters were opportunistic with no true professionals. A main problem discovered (by ADRA consultant) during discussion was the lack of tenure or tree ownership.
- ADRA sees their role in bees and honey as an adjunct to their role in agriculture and in training extension agents. Farmers are very interested yet ignorant of the role of bees and their agriculture efforts as well as the natural environment. They appear to be keen to increase their participation in bee development.

3. Peuk Village (48P 0527581, 1494451 ±18 meters) (**Visited February 5, 2009**) is about one hour drive from Rovieng and is an **ethnic Kuie minority village** with about 580 households. Four men were interviewed. They stated 70-80 % of the adult males considered themselves as professional seasonal honey hunters (see definitions). Their hunting season is usually from March and April but sometimes goes into May depending on when the rainy season starts. Now (2005 to present) they access the forest by motorbike, bicycle or tak-tak (Chinese tractors used for hauling, plowing and general use); prior to this they went on foot. They utilize both BPWS and Prey Long when gathering honey. There are several other forest sites within their range. They are known by surrounding communities as a village of honey hunters. Highlights include:

- The villagers go into the forest in groups of 5-10 people (one representative from one family). The economic proceeds from the harvest are shared equally between all participants with any "remainder" going to the individual(s) who climb the trees.
- One group can gather from 130-150 liters per season (if we figure 75% of families contribute one group member (.75 X 580 = 435 potential members) and an average group is 7 people then 435/7= approximately 62 potential groups. If each group averages 140 liters per season then we can estimate that some 8500 liters comes from this one village. No records are kept and the number seems much too high.

- Early in the season when honey is plentiful the price is low (8,000 riels/liter, as the season progresses so does the price rise (12K mid season) and finally near the end when honey is scarce it may be 20K/liter. Wax is valued at 30k/kg.
- We queried them on their perceptions of the bees and populations. They all agree that bee populations were declining and attributed it to #1 loss of forest habitat. The second cause, according to respondents, was the fact that "non-professional opportunistic" hunters often used insecticide or fire to kill the bees as they were afraid of stings.
- There are no NGOs working in the village, but BDS (Buddhist Development Society) and Ponlok Khmer have had some presence. Ponlok Khmer based in Preah Vihear has offered a local collector \$2000 to buy local honey from hunters. (Contact Mr. Ang Cheth Long at 012547899 or 085276286 for follow-up on this).
- There are approximately 6 collectors (see definitions) in the village who buy and transport honey to Rovieng by moto bike using 2- 30 liter containers. Two times a season seems to be typical. If we do math on this then 6 collectors X 120 liters season equals 720 liters per season which sounds like a more reasonable estimation. It costs about 10K riel round trip for the motor bike transportation of honey (60 liters).
- Some villagers have had some training from IFAD on agriculture but all expressed an interest in getting training to improve their honey potential. This training would have to start before March. The best time would be mid-February of any year.

Peuk Lessons learned

- Peuk village is a model for village level cooperation – from honey hunting to collection and disbursement of monies received.
- As an ethnic group (village is 100% Kuie) there is evidence of cultural and social structure. This is further manifested in their ability to organize groups for honey hunting with representatives from each family.
- They have an awareness of declining populations and would probably be good targets for methods to ameliorate these losses.
- They have a reputation for excellence in honey hunting and would benefit from some training in QC, sanitary food handling, and sustainable harvest methods.
- ADRA is active in area and can provide some training as they realize the importance of bees and agriculture. They are hampered by budget considerations.

4. Pring – feeding to Kampong Speu markets (Assessment done previously)

The honey hunters in the area, which has a reputation of producing a lot of honey, they actively seek out the nests of *florea*, *andreniformis* and *dorsata*. *Dorsata* is more a rainy season activity. Honey hunters (50-60 in this village) typically harvest less than a dozen *florea/andreniformis* nests each/per day during the day which may average 1-1.5 kilos of honey comb and brood for the days' effort.

Upon returning to the village they sell their daily catch to regular buyers we have named "collectors" – the second step in the market chain. Cash is usually paid on the spot by the collectors; the collectors in turn transport the combs directly to market where they are sold primarily to end users. In some cases they wholesale to other buyers who do the market point-of-sale transaction.

There does not appear to be any sort of a community organization dealing with honey collection or sales – every transaction seems to be a private deal between individual buyers and sellers. Sales units (liters/kilos/combs) seem to be flexible – initial purchases are made of the "basket" (i.e. the combs collected that day); offers and counter-offers are made between hunter

and collector until a mutually satisfactory price is reached for the contents of the basket. Price naturally varies as to the amount of goods in the basket.

To insure quality (i.e. lack of adulteration or false honey) honey is sold in the comb with the honey head separated from the brood. The honey may be squeezed to fulfill custom orders for liquid honey.

Due to time constraints only a segment of the population of one village (Pring) was surveyed. Respondents indicated that within the Commune there were five villages whose residents participated in honey hunting activities. Estimates of the number of “professional” honey hunters in the five villages ranged from 150-200 people. As honey hunting involves climbing trees it is a male dominated activity.

The Honey Hunters

The professional honey hunters as a group may be characterized as males, very fit (in order to climb trees), and (in the small sample) young. They walk to Phnom Cheal (6-7 kms away) every day when the season is good (March and April), collecting less than a dozen nests on an average day. Nests can be harvested about 2 weeks after they are established indicates the colonies can rapidly grow in strength and resources. Honey may be stored in a cool dry place for times of shortage (November –December). Honey in the comb lasts for a “long” time.

The Collectors

In our survey group all of the collectors were women; this position appeared to be the venue of women. There are some 20 collectors spread out among the five villages. They buy honey combs in the evening (4:30- 8:00PM) as the hunters return from the field. Sales units (liters/kilos/combs) seem to be flexible – initial purchases are made of the “basket” (i.e. the combs collected that day); offers and counter-offers are made between hunter and collector and a mutually satisfactory price is reached for the contents of the basket. Price naturally varies as to the amount of goods in the basket.

A basket (kohn sangreik) of honey

Basket #/ Hunter	# of combs	Estimated weight	Price
1- Yeum Neun	9	?	50K riels
2- Niam Phanith	6	1.3 kg	55K riels
3- Yem Ravuth	5	?	40K
5- Older man (?)	1	0.7 kg	?
6- Kheun Vanneun	5	1+ kg	55K riels

The Markets

The “collectors” normally transport the still intact honey combs (the honey heads are separated from the brood comb soon after collection by honey hunters) to market in large enameled bowls commonly used for washing up. They are estimated to hold about 8-10 kilos of honey and comb. They commonly take motodups to market and will bring only honey and brood. On occasion they may transport wax cakes that have undergone village processing. Brood comb is sold separately for approximately 2,500 riels /100 grams (\$6.25/kilo). Honey is purported to sell at the same price as purchase, which seems unlikely. Honey in Kampong Speu brings a premium price (\$20/liter) compared to other areas of Cambodia – Siem Reap \$15/liter, Ratanakiri, Mondulkiri, Kratie – \$5/liter.

Transport to the market is part of the cost-of-goods sold; a typical round-trip cost for a moto to the near market (5 kms) is 3,500 riels (\$0.88) and to Phnom Penh 10,500 riels (\$2.65). It is assumed that some money is spent on food and water while at the market (<\$1.00). Ten to 15 people sell in the “local” market and it is known on the route to Sihanoukville as a place to get

honey on a regular basis. The roadside markets are along Hwy # 4 with easy access to PP and Sihanoukville and a common stop over for lunch.

The women do not have a regular stall at any of the Phnom Penh markets; instead, they wander around in specific areas. Some locations are in established markets – some in neighborhoods which have shown in the past to be good selling areas. The enameled bowls are carried on their heads and may be covered with a krama to keep out dust, debris and flies. All species are transported to the market in this fashion and no price distinction is made between the honeys of the different species.

5. Kampong Speu

- a. Provides a microcosm of the honey value chain
 - i. hunters from Pring (see Pring village assessment from 2007)
 - ii. collectors in Pring village
 - iii. transport to Kampong Speu for sale in market or sale to 2nd level middle women
 - iv. 2nd level middle women who buy from KS marketers** (this level)
 - v. They retail at our study point to road passersby
 1. foreigner only buy honey head
 2. locals will buy brood
 3. they must be careful when selling "squeezed" honey (passed thru mosquito netting) as they may misjudge the amount in the comb and lose money.
 4. honey, because it is sold in "kabal tuk", is seen as pure

6a. February 12, Sre Ambel (Bay of Kampong Saum)

List of protected areas which have bee connection with target area

- a. Botum Sakor national Park
- b. Southern Cardamoms Protected Forest
- c. Kirirom National Park
- d. Bokor National Park
- e. Dong Peng Multiple Use Area
- f. Kabal Chhay Protected forest
- g. Ream National Park
- h. Peam Krasop Wildlife Sanctuary
- i. Central Cardamoms Protected Forest
- j. Phnom Aural Wildlife Sanctuary

Prang village focus group meeting- start with 15 people; 7 (about 50%) consider themselves rafter beekeepers. There are some 40 families in the village who have some sort of interaction with bees (HH or rafter BK). All of the rafter BK also hunted bees; only 2 participants hunted bees but did not have rafters. Bees in trees were said to be "highly aggressive" they use cool white smoke to chase the bees from the comb and minimize stings. To access their rafters they travel 500 meters up to 2-3 kms. Rafters are placed in the mangrove forest which typically has water (sea water). Some honey hunting from "tall trees" is done in the mangroves. The rafters are placed at "working height" which may be but one meter above the water level if the water is a meter deep. It takes them about 1.5 hours to walk to their rafters in the mangrove forest. Boats are not used. The rafters are about 15 cm in diameter and about 2.5 meters long. They know wood from upland species "pring" is a superior wood for construction but it is "too much work" and "too far to carry" to use for rafters. Before 1998 honey went directly to Sre Ambel, now (1998-present) there are a few collectors (about 4 families) in the village of Prang who buy from HH or rafter beekeeper. To get back and forth to Sre Ambel by boat is about 4000 riel

There are two (2) community forests in the areas (get map copies) one shared by Prang and another community Cham Ka Krown, the other utilized by Prang village alone. They have heard about sustainable harvest techniques but have not employed the methods themselves. In good years they get 70-90% occupancy rate on rafters; in poor years 50-60%.

6b. Bay of Kampong Som

Chamkar Karum Village In this village all families are members of the CFA. There are about 140 families in the village and 40 have something to do with bees. They make new rafters every year (did not get which months rafters are installed). The average rafter beekeeper has about 10 rafters. A popular wood for rafter construction is "trasek" (*Peltophorum dasyrrachis*). In Prang village respondents said they don't put rafters in the melaleuca forest because the bees need the shade of the leaves making the rafters too high to work. In this village (Chamkar Karum) they do put the rafters in the Melaleuca but we did not ascertain exactly how the rafters were placed. An average BK may get 30 liters/season from an average of 1-5 liters per rafter. They harvest April through November. When I asked which month was the best one to see bees on the rafters the answer was "July".

6c. Proteil village (mangrove site)

Area has a Phnom Penh rafter beekeeper (not at home)

Fishing is main enterprise – honey plays a minor role but there are lots of bees.

Met with commune chief and rangers from Botum Sakor National park

7. Stung Treng Eastern side of Prey Long Forest Feb 24, 2009 -village of Chamka Leu (150 households) and also commune center. 1 km away is Roundeng, 10 kms away is Rheum. They see 1-2 dorsata nests per tree, they form groups for single day foraging trips into forest, may collect other NTFP's at the same time. They are opportunistic hunters. About 10 kms to the NW is Prey Kohn Khreup their first choice for honey hunting- many bees and also has water; there are more types of trees and it can be accessed by bicycle or moto. If they go there they spend 5-6 hours honey hunting. 5 kms to the east is Prey Romdieng, no bees but has water, 7 kms to west is Prey Traupong Angtong water and bees, 8 kms to south is Prey Kabal Ahm (water sink) has water and bees. It may be part of Prey Long forest area.

When they go out they will climb 5-6 trees to get 5-6 nest yielding 15-20 liters of honey for a one day expedition. A local collector sells to outsiders who come to the village looking for honey or he may transport to Stung Treng for sale there. He buys for 20K/liter and sells for 30K/liter. Processing is done in the field. They have heard of the HH from Peuk and Srei Veal – their season is about one month long in early April after major flowering in the deciduous dry dipterocarp forest. Finish interviews at 13:50.

8. February 25, 2009 2nd Stung Treng day – Doung Village group of men house building

Instant focus group. 10:20; about 25 men in group – they claim we're the first barang to come to village. Respondents are mainly opportunistic HH in the dry season (mid to late March through May). They hunt in the old forest (bigger and denser trees). They honey hunt in April – the bees arrive in March. They mark a bee tree for ownership; this mark is good for many seasons and can be passed down thru generations. Ownership is respected except by outsiders or "river people". Prey Oh Popiel 3.5 kms away is most used, Prey Long is used but not for honey hunting but for resin. No overnights for honey hunting.

9. Chhlong. Thursday February 26, 2009 Meeting with about 30 villagers in Veal Kongsang most consider themselves professional HH going into the forest in a group of 5-6 men for a single day. A good day in the forest will yield about 15 liters of honey. As the amount of honey increases in volume the price appears to go down e.g. 1st harvest in Feb 20K riel/liter; 2nd harvest in March 15K, and 3rd in April will yield 10-12 K riel per liter. A bonus is paid to the tree climber. The honey is processed by squeezing in the field and the brood is brought back to the village selling for 500 riels per “hand” (a palm sized piece), wax is sold for between \$4.50 to \$5.00/kilo, very little wax is used in the village. There are some 3 local collectors in the village selling to outsiders who come as they know they can get good pure honey in the village; or they take to Chhlong /Kratie for sale to people who know them. They can mark a honey tree for one season but next year it is up for grabs- sometimes bees come back to the same tree; 5-6 years ago people were more respectful of ownership marks but now this sense of ownership seems to be diminishing. Villagers see a strong need to protect forest thru community forestry program – they are at Level 5 now.

A straw poll using two phrases was taken

No forest: no bees - 100% agree

No bees; no forest few agree.

Estimate of amt of local honey produced 300-360 liters

Annex 3. Parameters for Ranking Sites

Access to Site / Market	Access from main road to village for honey export and for project personnel <ol style="list-style-type: none"> 1. Long walk 2. Long motorcycle ride 3. Short motorcycle (<2 hours) 4. Long car ride 5. Short car (<2 hours)
Bee Population in season	Participant assessment of resource within accessible distance from village <ol style="list-style-type: none"> 1. No bees 2. 3. some bees 4. 5. Plentiful
Honey quality / story line	<ol style="list-style-type: none"> A. Not mellifera B. Low moisture content C. Special species (andreniformis, florea) D. Monofloral E. Upland, value as medicine, perception of pure wild
Participant awareness of bees and environment	Character of existing honey supply-chain activity. <ol style="list-style-type: none"> 1. Opportunistic destructive harvesters 2. Opportunistic harvesters 3. 4. 5. Professional honey hunters and/or rafter bee-keepers among community
Tenure prospect	Possibility of assigning ownership to bee-trees and rafter locations, as reported by participants, based on experience

	<p>and tenure regime for resin.</p> <ol style="list-style-type: none"> 1. Completely open access to bee trees, no community control 2. Ownership of bee trees / rafters not respected by outsiders 3. 4. Ownership assigned to finder on seasonal basis. 5. Ownership of bee trees or rafters is respected and inherited
CFA/CFiA/CPA strength	<p>Indicator of potential for community to manage the resource and the supply chain (How well developed is the Association now?).</p> <ol style="list-style-type: none"> 1. No association 2. Community with strong local cooperation tradition (e.g. ethnic minority) 3. Association being developed, 4. Fully functional registered association, with ongoing NGO support 5. Bee resource management included in association planning
NGO partner	<p>Existing NGO operation in community, as potential implementation partner for honey value chain intervention.</p> <ol style="list-style-type: none"> 1. Not present 2. Present but not focused on natural resources 3. 4. Present. Working on NR. 5. Ongoing support of CFA/CPA management
Supply chain strength	<p>Established pattern of trading relationships</p> <ol style="list-style-type: none"> 1. Opportunistic harvest and sales 2. 3. Established trading relations between specific hunters, collectors, and wholesaler/retailers at local markets 4. 5. Supply chain managed by contract between Association and lead buyer.
Potential volume	<p>Forest and floral resources</p> <ol style="list-style-type: none"> 1. Not present 2. Small 3. Moderate (300 liters per village per season) 4. Reported by villagers to be abundant in season 5. High volumes
Potential Bee season	<p>Possible duration</p> <ol style="list-style-type: none"> 1. <3 months 2. 5 months 3. >8 months

Annex 4: List of Persons Met

Date	Person	Institution/Organizations	Contact Address	Remarks
03 Feb 2009	Mr. Nhim Theang	Official, Fishery Administration, Kg. Thom	+855-12 233 854	Meeting about Honey VC and bee population and migration in Kg. Thom
	Mrs. Sopheap	# 41-42, N6, Business Shop, Motorbike, Internet and Honey, Kg. Thom	+855-11 728 096	Meeting about Honey business in Kg. Thom
	Mr. Sieng Hay	Official, Provincial Department of Environment, Kg. Thom	+855-	Meeting about Honey business in Kg. Thom
04 Feb 2009	Mr. Phy Bunthon	Assistant Livelihood Officer, CFI	+855-92 670 001	Observer in the Sustainable Honey Hunting Training to gather information about Honey Hunting
	Mr. Yep Lav and	Assistant Livelihood Officer, CFI	+855-17 749 060	Observer in the Sustainable Honey Hunting Training to gather information about Honey Hunting
	Mr. Kheng Bunna	Villager, Bos Veang Village, Salavisay commune, Balang district, Kg. Thom	+855-92 132 329	Talk in the meeting and general talk/guide
	Mr. Mok Kimlong	Farm manager, Acacia plantation, Anmaradi Group, Kg. Thom	+855-12 477 783	
05 Feb 2009	Mrs. Fry Neang Meas	Livelihood Officer, CFI	+855-16 984 958	Proposed questions to be asked during the training
	Mss. Chea Lily	Assistant Livelihood Officer, CFI	+855-12 703 305	Proposed questions to be asked during the training
	Mr. Kimlong	Assistant Project Manager, HARVEST project, ADRA, Phreh Vihear	+855-12 870 605	Meeting about HARVEST Project activities
	Mr. Ang Cheth Long	Manager, Ponlok Khmer, Preh Vihear province	+855-12 547 899 +855-12 527 943 +855-85 276 286	Talk by phone about allocation USD 2000 for collecting Honey

08 Feb 2009	Mrs. Im Maradi	Senior Official, Office of Community Forestry, FA	+855-12 915 687	Talk in the meeting and few times by phone about contact address of Local FA and Protected Areas
	Mr. Sy Ramony	Director, Department of Protected Areas, MOE	+855-12 832 933	Talk by phone about contact address of Local BPA and access to BPA
10 Feb 2009	Mr. Net Nivin	Chief of Phnom Leu Triage, Forest Administration	+855-16 890 460	
	Mr. Nhil Phan	Chief of Botumsakor National Part, the coastal lowland areas	+855-11 272 005	
	Mr. Meng Tech	Vice Chief of Botumsakor National Part, the coastal lowland	+855-12 66 5 797	
12 Feb 2009	Mr. Sen Sok	Teacher, Dong Peng Primary School, Dong Peng commune, Sre Ambil district	+855-99 371 412 +855-15 371 412	Talk in the meeting and general talk/guide
	Mr. Meng Houy	Chief of Dong Peng Commune	+855-16 222 963	Meeting about Livelihood of people in Dong Paeng commune
	Mrs. Houy Kumnith	Senior Staff of AFSC, Sre Ambil district, Koh Kong province	+855-12 810 858	Talk several time by phone about AFSC and other NGO activities related to Honey VC in Sre Ambil
13 Feb 2009	Mr. Hi Tan	Chief of Andong Teuk Commune	+855-16 630 700	Meeting about Livelihood of people in Andong Teuk commune
	Mr. Cheng Hai	Second chief of Andong Teuk commune	+855-16 349 472	Talk in the meeting and general talk/guide
	Mr. ... Run	Chief of Rangers of Botum Sakor National Park, the coastal lowland areas	+855-11 829 334	Talk in the meeting
	Mr. Pen Kear	Ranger of Botum Sakor National Park, the coastal lowland areas	+855-11 529 458	Talk in the meeting and general talk/guide
	Mr. Norn Rem	Chief of Community Fishery	+855-11 215 388	Meeting and visiting few hours in two places of Mangrove Forest
14 Feb 2009	Mr. Chan Kong	LU/GIS Advisor Land	+855-12 350 287	Talk by phone about contact address and

		Management Component, Kratie province		road, Chlounge forest
16 Feb 2009	Mrs. Amanda Bradley	Manager of Community Forestry International		Talk in the meeting and few times by phone
	Mrs. Pyrou Chung	Field coordinator Biodiversity & Grassroots Advocacy	+855-92 351 674 +855-23 224 782	Meeting about contact address of existing communities at Prey Lang
17 Feb 2009	Mr. ... Cheth	Steung Treng province	+855-12 374 419	Talk by phone about road to Prey Lang and finding local guide
	Mr. Yous Pheary	Project Manger, CED, Steung Treng province	+855-12 600 830	Talk by phone to make an appointment on Monday of 23 Feb 2009
	Mrs. ... Phalline	Assistant to Project Manger, CED, Steung Treng province	+855-11 434 253	Talk by phone to make an appointment on Monday of 23 Feb 2009 and transportation arrangement

Annex 5. List of Villages Visited with Honey Activity

(Some from Previous work)

Province	District	Commune	Village	FAMILY	REMARKS
Kampong Thom	Sandan	Chheu Teal	Boeng Pra	134	Informed-Opportunistics
Kampong Thom	Prasat Balangk	Sala Visai	Bos Veaeng	129	Interviewed-Opportunistics
Kampong Thom	Prasat ambour	Koul	Chheu Teal Chrum	105	Informed-Opportunistics
Kampong Thom	Prasat Balangk	Phan Nheum	Phdiek	152	Informed-Opportunistics
Kampong Thom	Baray	Boeng	Boeng Khang Cheung	397	Informed-Opportunistics
Kampong Thom	Baray	Boeng	Boeng Khang Tboung	346	Informed-Opportunistics
Preah Vihear	Rovieng	Rung Roeang	Boh Pey	156	Informed-Opportunistics
Preah Vihear	Rovieng	Romony	Chi Aok	162	Interviewed-Opportunistics- few
Preah Vihear	Chey Saen	Chrach	Chrach	145	Informed-Opportunistics
Preah Vihear	Chhaeb	Mlu Prey Muoy	Mlu Prey	95	Informed-Opportunistics
Preah Vihear	Rovieng	Romony	Ou Pou	144	Interviewed-Opportunistics- few

Preah Vihear	Chey Saen	Putrea	Peuk	547	Interviewed- Professional
Preah Vihear	Chey Saen	Yhmea	Phneak Roluek	97	Interviewed-Oppoportunistics
Preah Vihear	Rovieng	Romony	Phnum Daek	225	Interviewed-No Honey Hunter
Preah Vihear	Chey Saen	Putrea	Putrea	224	Interviewed-Opportunistics- few
Preah Vihear	Rovieng	Romony	Rumchek	210	Interviewed-Opportunistics
Preah Vihear	Rovieng	Reaksa	Rumdaoh	33	Interviewed-Opportunistics
Preah Vihear	Chey Saen	S'ang	S'ang	281	Interviewed-Opportunistics- few
Preah Vihear	Rovieng	Romony	Srae Thnong	79	Informed-Opportunistics
Preah Vihear	Rovieng	Rung Roeang	Srae Thum	230	Informed- Opportunistics
Preah Vihear	Chey Saen	Yhmea	Srae Veal	136	Interviewed-Opportunistics
Preah Vihear	Rovieng	Romtomb	Svay Damnak Chas	143	Informed-Opportunistics
Preah Vihear	Rovieng	Romtomb	Svay Damnak Thmei	78	Informed-Opportunistics
Preah Vihear	Chey Saen	Yhmea	Thmea	406	Interviewed-Opportunistics
Preah Vihear	Rovieng	Robieb	Tnaot Mlu	227	Informed-Opportunistics
Preah Vihear	Choam Khsant	Yeang	Yeang	89	Informed- No Honey Hunter
Koh Kong	Srae Ambel	Srae Ambel	Chamkar Kraom	145	Interviewed-Opportunistics
Koh Kong	Srae Ambel	Chi Kha Leu	Chi Kha	200	Informed-Opportunistics
Koh Kong	Srae Ambel	Dang Peaeng	Dang Peaeng	210	Interviewed-Opportunistics
Koh Kong	Srae Ambel	Dang Peaeng	Prang	140	Interviewed-Seasonal Professional
Koh Kong	Botum Sakor	Andoung Tuek	Prateal	80	Informed-Opportunistics
Koh Kong	Botum Sakor	Andoung Tuek	Ta Meakh	164	Visited-Opportunistics
Koh Kong	Botum Sakor	Andoung Tuek	Ta Ok	78	Visited-Opportunistics

Annex 6: Bibliography for Honey Value Chain Assessment

Studies on bees, beekeeping and honey are sorely lacking through most of Asia. Here in Cambodia the few studies have been done at a provincial or village level. This study is the largest scale assessment done to date. There is one book on Asian honeybees (Oldroyd, B. and S. Wongsiri. 2006 *Asian Honeybees; Biology, Conservation, and Human Interactions*. Harvard University Press, Cambridge Massachusetts.) but it is more the science of Asian bees rather than any techniques or development concepts. Below is a list of literature examined for this study:

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