

# **WCS - HUNCHUN**



## **WCS CHINA – HUNCHUN NTFP ANALYSIS**

**June 2010**

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# WCS CHINA – HUNCHUN NTFP ANALYSIS

## 1.0 Executive Summary

The following document has been created by a group of students working towards their Master's of Business Administration from the Hass Business School at the University of California, Berkeley. The Wildlife Conservation Society (WCS) hired us to conduct a feasibility study on Hunchun non-timber forest products (NTFPs). The objective was to analyze these NTFPs to apply to a Tiger Friendly Certification (TFC) program to mitigate or alleviate the detrimental activities associated with villagers living in the Hunchun forest reserve such as poaching, harvesting, and cattle raising. Ultimately, through the NTFP business medium, WCS hopes to promote tiger and forest conservation by providing villagers financial incentives to change current living habits.

Our document outlines the process for analyzing NTFPs and our rationale for the final four NTFPs that we believe can be piloted for an initial investment. Based on our discussions with domestic stakeholders (green / organic businessmen and local consumers), the TFC program alone would not qualify as a differentiating factor. The product itself must be demanded on the basis of its taste and beauty / health benefits. Although our research confirms that products under a TFC will collect a premium in the international markets, we believe this represents a future potential opportunity. However, we recommend that current domestic markets be explored prior to international expansion. Due to the larger effort and capital investment required, we recommend first establishing the business model, organic certificates, and conservation structure on a local scale and then incrementally work towards international deployment. Developing solutions to unexpected development challenges on a small scale will make future expansion easier and less costly.

Through a variety of primary and secondary research methods, we conducted a comprehensive analysis of the NTFP list. Our team sought to confirm and better understand the major Hunchun environmental conflicts and how these issues will be addressed with a NTFP business model. Our report applies this situational analysis and balances it against the different needs and goals of our stakeholders. Based on our findings, our final recommendation focuses on developing business models around honey, wine grapes, Schisandra berries, and Matsutake mushrooms.

Our report explores the market dynamics for each of these products and applies our research to develop a preliminary business model. To facilitate WCS' future roles in the NTFP business model, we have included a value chain analysis of current processes, financial estimates, a list of potential partners, and a summary for partnership selection.

Our general findings indicate that the Hunchun area has verifiable marketable NTFPs which are demanded both domestically and internationally. With a partner to secure market delivery, we believe that these products will be highly prized by consumers. The challenge stems from linking conservation activities with the NTFP business model. With any approach, there needs to be monitoring mechanisms that enforce strict adherence to contract agreements among WCS, villagers, government, and public / private business partners. This coordination activity will be critical to accomplish WCS' goals around tiger conservation. This represents potentially the largest hurdle for WCS. Because of the large economic incentives for villagers to poach and overharvest NTFPs, we believe the NTFP model will serve as a mitigative conservation strategy and will not end detrimental activities all together. Due to this conclusion, we explored alternative business models and summarized them in this document.

Our hope is that the information and recommendations contained within this document will help WCS

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approach investment into opportunities that can curb the further incursion into the forest while bettering the financial situation of villagers. Additionally, we hope that the general process used to identify potential NTFPs will serve as a useful tool for future business model exploration.

The team found the project especially fulfilling and appreciates the opportunity to visit Hunchun and learn about tiger conservation. Furthermore, the team found the WCS Hunchun and Beijing teams to be especially helpful and gracious in welcoming us. We hope to continue the Haas and WCS China relationship and look forward to learning about future development.



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## 2.0 Background

### 2.1 WCS Hunchun Mission

The main mission of WCS in Hunchun is to work with relevant stakeholders to protect the Wild Amur tigers. To achieve this objective, WCS has to create a sustainable environmental and economic ecosystem in Hunchun for humans, tigers and other species to coexist. This requires a comprehensive understanding of the habitats, i.e. the resource needs of the relevant species and the interconnection between them. This process will help identify the conflicts between humans, tiger and other species within the ecosystem.

As we further understand the reasons and motives behind the different conflicts, we can develop better solutions to mitigate the issues. These issues need to be addressed simultaneously as they are often interconnected requiring a concerted and integrated solution. For example, villagers will not agree to keep their cattle out of the forest without an economical alternative to feeding their cattle. WCS believes through a non-timber forest product (NTFP) business model associated with financial incentives, tiger conservation activities can be supported locally.

### 2.2 WCS Activities in Hunchun

WCS in conjunction with WWF, RARE, and the Hunchun Forestry Bureau, has implemented several pilot programs to mitigate the threats to tigers and its habitats since 1999. These programs include working with local stakeholders such as the government and village communities to conduct snare / trap patrol, improve cattle raising practices, encourage bee farming, educate local communities about tiger and environmental conservation, and study biogas and NTFP cultivation feasibility. WCS has attempted to link economic incentives with environmental conservation. For example, the families that receive subsidized bee boxes are also encouraged to conduct trap and snare patrol. However, such activities are difficult to monitor and enforce and participation is often voluntary.

### 2.3 Haas-WCS Project Scope & Focus

The focus of Haas-WCS project is to develop a viable business model around one or more NTFPs that will allow WCS to positively shape the attitude and behavior of villagers towards becoming better citizens for the forest ecosystem. For example, WCS and its partners can assist villagers in producing an NTFP such that the villagers can receive a premium and higher profit through the branding and distribution that WCS and its partners control. To have access to this branding and distribution channel, the villager must agree to tiger friendly practices such as removing snares and herding the cattle home every evening using salt feeding practices.

While the largest environmental impact stems from forest habitat destruction and environmental pollution, addressing these issues is beyond the scope of our project. We recommend further research into slowing the process of deforestation such as substituting other raw material and fuel for wood and finding alternative methods of economic development along with programs to moderate environmental pollution.

### 2.4 Village Background

Jilin Hunchun Manchurian National level Nature Reserve is located within Hunchun municipality, near the intersection of China, Russia and North Korea. The Nature Reserve covers an area of 108,700 ha with a resident population of 5,015. There are 67 natural villages with 38,278 people in the surrounding area,

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including different nationalities of Han, Korean, Man and Hui people. The primary industries include agriculture, animal husbandry and associated industry. Agriculture products including corn, rice, bean, sweet potato are sold to Chunhui city. Chunhui City Statistical Yearbook (2007) indicates the average income of local rural residents is ¥5,070 per capita per year.

Because the activity area of Manchurian tiger and leopard are concentrated in the Nature Reserve and the north part of Chunhui administration area, our study will focus on the Hadamen & Chunhua Township with an area of 50,779 ha and a population of 13,769 people in 37 villages. 4,830 people are from Hadamen Township and 8,939 people from Chunhua township. Specifically The key audience of the project is the residents from Chunhua Township.

Chinese and Korean are the official languages. Investigation reveals that 39.6% of the population completed 9-year education; 10.3% finished high school, 0.9% finished post high school education; 4.5% of the sampled people did not receive any kind of formal education.<sup>1</sup>

Almost everyone in the Hunchun region is literate. The government also provides each household in the surrounding villages with satellite TV. Each household has one or more mobile phone as services are affordable and coverage is near 100%. Even poor villagers have cell phones given the ¥0.10 per minute or less than ¥20 per monthly rates.

On average the villagers of Hunchun make about ¥5,000 per year and own approximately 0.5 to 1.0 hectare of farmland per household. Each household consists of two to three adults. In the village of XiaCaoMao according to the village head, the economic activities include farming (40%), cattle raising (40%), NTFP (10%), and hired labor (10%). Other villages including GuanDaoGou and Shangcaomao supplement their income with bee farming. While there are other economic activities that occur in the rural areas such as frog farming, deer raising, and ginseng cultivation, these activities often belong to the well-connected, rich and powerful and are typically not a source of income for the average villager.

There is a general trend for younger villagers to move out of the village into cities for a better education and better living, leaving just the older generation to live off the land. In many of the ~20 villages around the Hunchun Natural Reserve, all of the younger generation has moved to urban area. Typically, the villagers above the age of 60 stop working the land allotted to them and pass them on to their children. Since the younger generation is no longer in the villages to work the land, these elders lease their land for ¥200 – 300 per hectare that typically generates ¥1,500 – 2,000 of agricultural product a year depending on weather and harvest.

Due to the harsh winters, villagers in the area are accustomed to working hard for a short period of time to earn the majority of their annual income. They depend on this income for the rest of the year. Most of the farming, NTFP collection, honey cultivation, cattle raising, and frog farming activities occur in this cycle of short periods of intense labor followed by a long lull. This downtime encourages villagers to seek other economic and entertainment activities, especially during the winter season which last 6 months out of the year.

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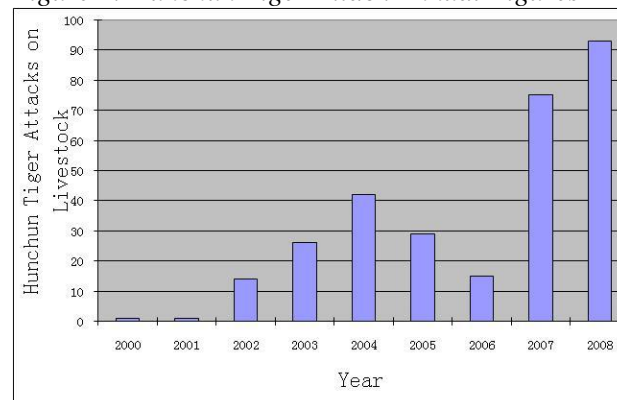
## 2.5 Major Human-Tiger Conflicts

Amur tiger is the top animal of cat family in the natural food-chain. Its size is the biggest among the five existing subspecies. The male tiger's body is around 2.8m long and its tail is about 1m and weighing nearly 350kgs. Amur tiger is mainly distributed in northeast China, east Russia and possibly some northern parts of North Korea.

Amur tigers hide in the day time and hunt at night. Mostly, the tigers live in mountain valleys below the elevation of 1200m and hunt wild pigs, red & spotted deer and dogs. One tiger eats around 50 ungulate animals every year, roughly 1 per week. Its breeding season is at the end of winter and beginning of spring with three months of pregnancy term. Normally an adult female tiger gives birth to 2-4 cubs during late spring and summer time. A cub stays with the mother for 18 months before it becomes independent. Amur tiger is facing serious threats and isolation caused by human activities such as illegal poaching and habitat degradation. There are only 500 Amur tigers in the world mostly in Russian Siberia, with only 17-22 in Northern China, of which 4-6 are in the Hunchun region.<sup>2</sup>

We have identified 5 major conflicts through our analysis, including forest habitat destruction, environmental pollution, illegal poaching, cattle raising, and NTFP harvesting. The main motivation for forest habitat destruction is to convert forest land into farmland, produce commercial wood, and gather firewood. As for firewood, villagers use tractors to harvest wood for cooking and heating. On average each household uses 11 cubic meters of woods per annum. Environmental pollution originates from the industrial development and agricultural activities that negatively impact the land and water. Illegal hunting is primarily motivated by villagers seeking to supplement their income and sometimes food intake. The average villager earns ¥5,000 annually, while one head of deer can fetch ¥1,500-2,000 depending on the species, gender, and weight. This is attractive opportunity as it potentially increases villager's income by 30-40%. Therefore, despite the risk of being caught for illegal poaching, some villagers still do so. Cattle raising can represent a large portion of a villager's income. For example in XiaCaoMao, it accounts for 40% of the average villager's income. Cattles feeding in fenced pastures that border the Hunchun Natural reserve reduces food for prey species of the tigers and encourages the tigers to prey on the cattle.

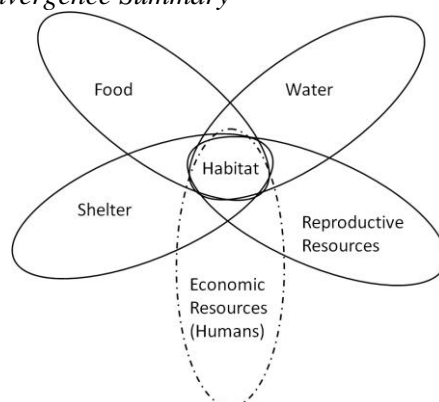
*Figure 1. Hunchun Tiger Attack Annual Figures*





While one head of cattle can be sold for ¥2,000 of profit ( $4,000 - 2,000 = 2,000$ ) on average every three years, the villagers will only be compensated for 70% of the value of the cattle attacked by a tiger, but only after a slow bureaucratic process lasting for 6 to 12 months. (See Appendix 1. Livelihood Survey for additional collected demographics)

*Figure 2. Conflict Convergence Summary*



The above diagram illustrates the resources and territory needs of an individual species. The overlap of these needs indicates a conflict between two or more species that may either be natural or human generated. For example, tigers hunting prey species conflicts with the reproductive resources of that species, but is entirely natural. However, cows foraging in forest pasture conflicts with the food needs of the tiger prey species, which is a human generated conflict that needs to be mitigated.

### **2.5.1 Conflict Prioritization**

WCS recognizes that of the 5 major threats, snares and traps are most threatening to tigers as it directly harms tigers and decimate their prey species. Fortunately, this is also the least difficult threat to address through continued education and snare patrol and removal programs, because only a minority of villagers conduct illegal poaching punishable by 2 years of prison term.

*Figure 3. Major Tiger Threats*



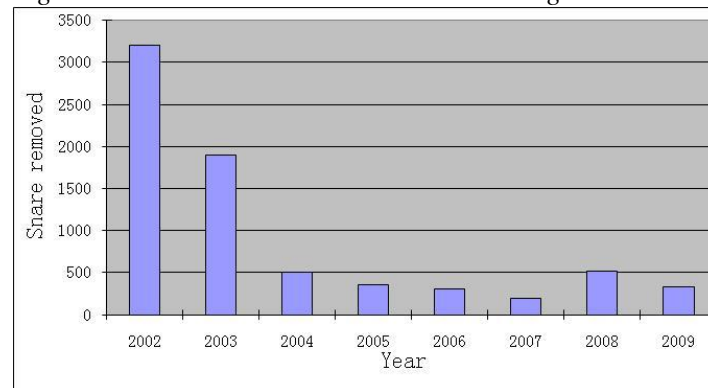
Since the 1990s, hunting of all wildlife in northeastern China has been banned and gun ownership is illegal. The regulation has been effective in eliminating guns, but people have turned to wire snares to catch wildlife. Surveys indicate that hunters are setting snares to supplement their income rather than providing food for the

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table. It is believed that as many as 2,200 prey species—mainly deer and wild boar—may be killed in snares annually in Hunchun Reserve alone.<sup>3</sup>

Most traps and snares are found during the winter because poachers who set traps and snares often do so in the winter. In addition, the traps are also easier to find by following the tracks of poachers in the snow. While the density of traps has been steadily decreasing as indicated by fewer traps found per patrol individuals every year, the cost of setting up a snare is relatively inexpensive. One snare requires ¥1 – 2 worth of metal wiring and some basic technical knowhow. One poacher can setup 20 to 100 snares in one day. And on average one patroller can collect 3 to 50 per day during the winter seasons because patrollers often follow human foot tracks in the snow but these tracks often are not tracks left by poachers but rather by villagers cutting firewood.

*Figure 4. Hunchun Snare Removal Annual Figures*



The other conflicts that include villagers entering the forest to harvest firewood and NTFP or letting cattle to graze in pastures that are in the buffer zone of the forest reserves are more difficult to monitor and control since most villagers depend on these activities to survive and to significantly supplement their income. For example, WCS attempted to cooperate with the Korean cattle company TianYi to assist farmer to produce YanBian yellow cattle for a premium price given that the villagers stall feed their cattle. Villagers refused to pay to feed their cattle for ¥20/day per bull for 3 months (or ¥1,800 total) when the male cattle is 3 years old, because they can do so for free by letting the cattle feed on forest pastures. WCS discovered that out of the 10 families that expressed interest in the program in the village of XiaCaoMao, only 3 families remained in the program after the first year due to the high cost. This demonstrates the difficulty in changing the behavior of allowing cattle to feed in pastures that border the forest reservation. Furthermore, cutting firewood for heating and cooking is a means of survival even though it harms the tiger habitat. Unless WCS and its partners develop an economically viable alternative for heating and cooking, the villagers have no other choice but to continue their logging practices.

## **2.6 NTFP Overview**

Non-timber forest products (NTFPs) are any product or service other than timber that is produced in forests. They include fruits and nuts, vegetables, fish and game, medicinal plants, resins, essences and a range of barks and fibers such as bamboo, rattans, and a host of other palms and grasses. Many NTFPs may be used for subsistence while others are the main or only source of income. Over the past two

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decades, governments, conservation and development agencies and non-government organizations have encouraged the marketing and sale of NTFPs as a way of boosting income for poor people in the tropics and encouraging forest conservation.<sup>4</sup> This is effectively done by assisting communities to connect with new markets or receive higher premiums via marketing / branding activities. NTFP business models represent a mitigative conservation strategy rather than a preventive one.<sup>5</sup> It is deemed an incentive program based on either a sustainable business or grant based subsidy to offset the cost of conservation by demanding the adoption of conservation-friendly practices by participants. This forms the basis of a NTFP model – the mutual exchange of benefits among stakeholders.

Interest in NTFP has grown slowly since the 1980s in response to calls for using forests sustainably for the benefit of the wider society and particularly rural populations.<sup>6</sup> NTFPs may come from natural forests, forest plantations or agro-forestry systems. NTFP are a rapidly growing market sector with a total value in world trade of US\$1,100 million.<sup>7</sup> In some cases the value of NTFP trade is higher than that generated by commercial timber businesses. Although being potentially beneficial for local livelihood at the short term, the commercial extraction of NTFP is not always sustainable.<sup>8</sup> These include but are not limited to cases of overharvesting and harmful human related activities intrinsic in entering the forest as described above. Naturally, villagers who collect NTFPs will extract all saleable resources while capitalizing on opportunities to capture prey species. Previously, social and environmental factors created constraints on the overharvesting of NTFPs. Where population numbers are low and accessibility is restricted, most products are still used sustainably for personal subsistence where traditional restrictions and regulations are maintained. Today, however, even remote areas are accessible, resulting in the breakdown of traditional controls. As a result, very aggressive collection behavior develops for commercially important NTFPs such as wild honey, mushrooms, rattan, and bird nests. Because of these concerns and the incentive to intensify harvesting, NTFPs require special management and monitoring considerations in order to ensure the long-term viability of species and to minimize adverse social and ecological impacts.<sup>9</sup>

### ***2.6.1 Hunchun NTFP Perspective***

We acknowledge the challenges and negative externalities for the Hunchun Nature Reserve. Nevertheless, NTFP businesses can effectively create income generation for local communities while supporting conservation initiatives. This has been demonstrated in several NTFP models globally. In our case specifically, the Hunchun area is a unique ecosystem with a variety of threats to tiger habitat and survival. Therefore, although destructive behavior will continue under any proposed NTFP model, we believe that they can be mitigated given the appropriate financial incentive, monitoring, and enforcement network through a contract based agreement with a select group of villagers in the highest tiger prone areas. Additionally, via immediate but smaller monetary successes, momentum will grow for additional conservation initiatives. Essentially, by providing alternative revenue generating opportunities which would otherwise be unavailable to villagers, WCS can promote conservation in the major conflict areas.

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## 3.0 Project Genesis & Objective

### 3.1 UC Berkeley Haas School of Business IBD program

Given these challenges, WCS engaged the UC Berkeley Haas School of Business International Business Development program to conduct a feasibility study of NTFPs, and build a sustainable business model that can incentivize stakeholders of the Hunchun area to conserve the Amur tigers. This constitutes a new effort by WCS to develop financial incentives in a growing and proven technique in conservation and social enterprise as seen in other rural or developing communities. Specifically, the Haas team was tasked to analyze the situation, survey, categorize, and select NTFPs, validate with stakeholders, and develop the business model strategy for the identified top NTFPs. The Haas team sought to identify the NTFP products and the associated business model to best address the tiger-human conflicts with the understanding that any model would serve to *mitigate* and not completely resolve these conflicts.

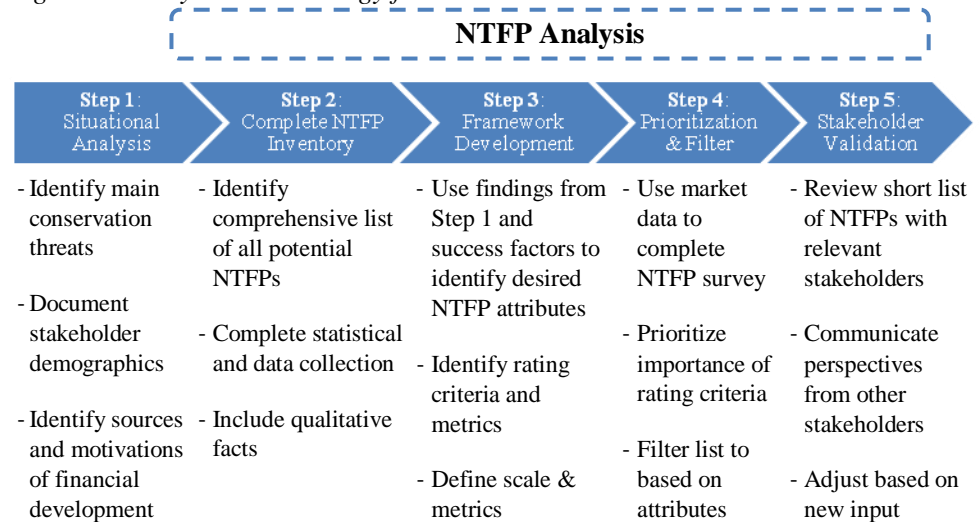
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## 4.0 Approach & Methodology

### 4.1 NTFP Analysis Methodology

NTFP identification should be conducted in systematic method to take into account various local perspectives to fully understand all available opportunities. After completing a situational analysis (see Conflict Prioritization; *Figure 5 “Step 1”*) to determine the main conservation issues and socio-economic considerations, an NTFP analysis must be conducted. It represents a critical step in selecting the appropriate product(s) for commercialization and business model development, which support conservation. The following figure summarizes the steps necessary to systematically identify viable NTFPs in a target area.

*Figure 5. Analysis Methodology for a NTFP Model*



**Step 2 Complete NTFP Inventory:** Foremost, an inventory must be developed to accurately document all potential NTFPs in the selected management area. The inventory should represent a comprehensive list of all products that are available. In conjunction with this data collection, specific product details should be documented. These details include but are not limited to retail / wholesale pricing, volumes collected, harvesting periods, and current income dedicated to NTFPs. For our purposes, the following information was necessary or helpful to identify potentially commercial Hunchun NTFPs:

- **Price:** Wholesale and retail pricing
- **Quantity / Volume:** Amount harvested per season to understand total capacity
- **Timing:** Grow, harvest, collection, and fallow periods
- **Collection:** ~% of villagers currently collecting
- **Income:** % of villagers who sell the NTFP; % of income that specific NTFP represents

- **Subsistence:** % of villagers who use NTFP for personal use
- **Market Demand:** Level of demand from international markets, specific countries / markets, and market size and growth figures (*if available*)
- **Producing Area:** Local and international areas of supply

The following Hunchun NTFP list was developed with WCS' data and primary research via villager surveying and local market visits. (See Appendix 2 for complete NTFP database)

*Table 1. Hunchun Full NTFP List*

#	Chinese Name	English Name
1	榛蘑	Honey Mushroom
2	冬蘑	Late Fall Oyster Mushroom
3	小黄蘑	Golden Pholiota
4	松茸	Matsutake Mushroom
5	山木耳（种植）	Tree Ear(planted)
6	野生木耳	Tree Ear(wild)
7	蕨菜	Pteridium aquitinum
8	明叶菜	Kikyuu leaf
9	刺老芽	Aralia mandshrica
10	薇菜	Osmunda cinnamomea
11	沙参	Coastal glehnia root
12	松子	Korean Pine seed
13	山核桃	Pecan seed
14	普通榛子	Hazel seed
15	毛榛子	Fussy hazel seed
16	椴树蜜	TuanLinden/TuanLime honey
17	杂花蜜	Mixed honey
18	林蛙	Siberian frog
19	野生枸杞	Barbary Wolfberry Fruit
20	五味子（种植/野生）	Schisandra Berries (plan ed and wild)
21	刺五加	Siberian Ginseng seed
22	山茱萸	Asiatic Cornelian Cherry Fruit
23	人参（种植）	Ginseng(planted)
24	榆黄蘑	Pueurotus Citrino Pileatus
25	粘蘑	Suillus luteus / Boletus luteus
26	菌蘑	Mushroom: Bacteria Ru
27	灰蘑	Tricholoma terreum
28	枪头菜	Atractyl des lancea (Thunb.) DC.
39	小根蒜	Longstamen Onion Bulb (Min. Garlic)
30	蒲公英	Dandelion
31	马蹄叶	Ligulariasibirica Cass
32	驴蹄叶	Caltha membranacea

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33	青广东	Matteuccia struthiopteris
34	猴腿菜(猴腿蹄盖蕨)	Athyrium multidentatum (Doll.) Ching
35	四叶菜	Radix Pseudostellaria
36	细辛	Asarum
37	山地瓜 (羊乳)	Codonopsis lanceolata
38	苦菜	Sonchus oleraceus
39	黄花菜	Hemerocallis minor
40	老山芹	Heracleum moellendorffii
41	山白菜	Aster tongolensis
42	柳蒿菜	Artemisia selengensis
43	山菠菜	Prunella asiatica
44	山梨	pyrus ussuriensis
45	山葡萄	Vitis amurensis
46	蚂蚁	Black Ant P.E.

**Step 3 NTFP Framework Development:** Following this inventory documentation, a systematic analysis needs to be conducted based on both quantitative and qualitative metrics. This will help to identify primary NTFPs to target for pilot sites or a potential complete business strategy for broader consumer markets. In order to do this, the main criteria for success need to be identified. After this is established, a metric to gauge this criterion needs to be developed. For example, if conservation is the primary objective, each NTFP needs to be rated on its ability to improve or impact conservation.

For the Hunchun NTFP project, the main goals were to promote nature conservation through the medium of increasing villagers' income. Following these major needs, we identified other criteria that supported successful NTFP business development. Our project specific criteria are found in the section "NTFP Hunchun Framework Development."

**Step 4 Prioritization & Filter:** Given the multitude of data, it is important to identify which criteria and associated metrics are critical components for a successful NTFP commercialization program. Vital criteria will help to generate a shorter list of potential NTFPs. Following this, there will be secondary metrics which help to further rate NTFPs. A general prioritization should be applied to these remaining metrics. Following this defined prioritization will help further filter the list to more sustainable NTFPs; however this will be a much more qualitative process. This is because a single factor for a specific NTFP can be particularly favorable while maintaining an average rating for the other metrics. These cases need to be evaluated on a relative basis. More importantly, because NTFP is not solely a quantitative analysis, it is important to incorporate stakeholder opinions into NTFP selection.

**Step 5 Stakeholder Validation:** As in criteria identification, it is important to distinguish which stakeholders are affected or have influence in the NTFP business model. The initial NTFP assessment should incorporate stakeholder opinions. However after a concrete group of high potential NTFPs have been identified, the list should be further reviewed with pertinent stakeholders to communicate

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methodology and share new information regarding market opportunities. Following this process, the top set of NTFPs is again modified especially in cases when a critical stakeholder has voiced a strong inclination or disregard for a specific NTFP.

In Hunchun, we communicated our findings to not only our WCS stakeholders but also took into consideration the opinions of villagers, government, and potential partners in commercialization. We were able to identify these primary stakeholders by doing secondary research on the power dynamics in China and the local region. However, to fully understand the dynamics of a socio-economic area, we recommend conducting direct interviews with individuals/groups which have any connection with the NTFP business model. These interviews are critical in establishing our own balanced view of who are the primary stakeholders and gauge their relative impact or authority in supporting a NTFP business model



## 5.0 NTFP Analysis

### 5.1 NTFP Hunchun Framework Development

Following the inventory of the Hunchun NTFPs (*Table 1*), we continued by developing a framework to aid in the rating of NTFPs. Based on our research on viable markets for local Hunchun products, we were able to quickly identify a select number of products that had the volume to make production attractive for manufacturers and distributors. Therefore, although some products were attractive to local villagers because a specific NTFP had been collected traditionally for generations, we deemed it necessary to have the critical mass to make commercialization viable. Through this filter, we were able to effectively short-list our NTFP list to approximately 18 NTFPs (*Table 2*).

*Table 2. Hunchun Filtered NTFP List Based on Volume*

#	Chinese Name	English Name
1	榛蘑	Honey Mushroom
2	冬蘑	Late Fall Oyster Mushroom
3	松茸	Matsutake Mushroom (fresh)
3.2	松茸	Matsutake Mushroom (dried)
4	山木耳 (种植)	Tree Ear(planted)
5	蕨菜	Pteridium aquitinum
6	明叶菜	Kikyou leaf
7	刺老芽	Aralia mandshrica
8	薇菜	Osmunda cinnamomea
9	松子	Korean Pine seed
10	山核桃	Pecan seed
11	普通榛子	Hazel seed
12	毛榛子	Fussy hazel seed
13	椴树蜜	TuanLinden/TuanLime honey
14	杂花蜜	Mixed honey
15	五味子 (种植)	Schisandra chinensis(Turcz.)BailL(planted)
15.2	五味子 (野生)	Schisandra chinensis(Turcz.)BailL(wild)
16	人参 (种植)	Ginseng (planted)
17	林蛙	Rana Temporaria Chensinensis (Siberian frog)
18	山葡萄	Amur Grape (Vitis amurensis)

The following criteria and rating was used to ultimately identify the top potential NTFP products for commercialization. This represents “Step 3: *Framework Development*” of our NTFP analysis. We organized these categories into **Primary** and **Secondary** measures.

#### 5.1.1 Primary Criteria

##### **Market Demand [Metric: High, Medium, Low]**

Foremost, we consider market attractiveness as the primary metric that needs to be satisfied for any product. This was developed through interviews with exporters and other experts in the local markets. We have confirmed that branding alone as

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“Tiger Friendly” would not be sufficient to generate market demand. In some unique instances a conservation brand is tied with market demand, however, we believe this to be a relatively minor consideration. Because of this, we believe “Tiger Friendly” branding will serve as a useful tool when creating partnerships in markets such as the U.S. and EU where eco-consciousness is much higher. It will also help in product differentiation among the other available breadth of current products on the market, but will not serve as a defining factor for consumer purchases.

In fact, consumers value a product, especially in local markets (Tier I/II cities) because it is purely demanded. We find this demand to be linked to taste, better health, appearance, and can address sickness. The first quality of better health is also associated with the growing organic and green market in China. We further investigate this in Section 7: Industry Analysis. Asian markets already prize products that are shown to be wild versus planted. In some cases, we have recorded cases where the premiums range anywhere between 1.5x – 3.3x in retail prices. The organic market is estimated to maintain margins of up to 10x.

***Environmental Impact [Metric: 1(low) – 5(high)]***

As part of our initiative, it was critical to examine how promoting a product would impact the environment in an adverse or beneficial way. We were able to use a scale and rate using the qualitative data collected from village visits and discussions with WCS conservationists. We tried to fully understand how increasing the demand on a specific NTFP would potentially have negative externalities for both forest and tiger conservation. The following are examples of specific NTFPs and how they were found to be weak cases for environmental sustainability.

- **Seeds (松子, 山核桃, 普通榛子, 毛榛子):** Currently, the collection of seeds has already been on the brink of overharvesting. Because of the high demand and price garnered from quality seeds, villagers collect virtually any seed that they can find. Additionally, the premium garnered especially in Chinese and Korean markets has driven some villagers to climb trees and cut off branches to harvest seeds. We deem this activity to be severely destructive and would not approach commercialization which would further heighten this activity. [Rating: 4]
- **Ginseng (人参):** Although a viable cash crop across Asian markets, ginseng growing is highly environmentally intensive. The crop drains nutrients from the soil. To mitigate this, land grants are given on a 10-year basis and following this period, the field must be planted with trees to give the land the chance to regain some of its fertility. Additionally, ginseng requires specific growing conditions which are traditionally accompanied with wide forest clearing. Although this is no longer in practice, we would not encourage the continued incursion into the forest. [Rating: 5]
- **Siberian Frog (林蛙):** The cultivation of Siberian frogs, in itself, is not environmentally detrimental – the maintenance is. From our discussions with conservationists, frog farms are managed by individuals who enter deep into the reserve and have material environmental impact by having

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dogs, cutting wood and setting snares. Although these managers are few in number, their individual impact is large. We believe if we are able to find opportunities for individual villagers to maintain this business, this would mean increase the negative impact on the forest by many-fold. The ability to control these managers would be very difficult given their current locations and association with influential and wealthy villagers.  
[Rating: 5]

***Economic Viability [Metric: ¥per KG or piece]***

Pricing also represents a critical component in analyzing the NTFP list. Using retail market research on similar NTFP or products, we could get an idea of both the type of market demand and the premiums that may be garnered. This was under the proposed NTFP branded model associated with an organic price premium. More importantly, we collected the data between wholesale and retail parties to understand what revenue is lost between villager collection and customer consumption. This would help us estimate the potential and size of profits that can be redistributed to villagers to better their livelihoods and incentivize behavior.

***Economic Distribution [Metric: 1(low) – 5(high)]***

The NTFPs vary in the level of access and thus potential for income generation. In cases when most villagers which directly impact deforestation and hinder tiger conservation do not have access to these opportunities, we considered these opportunities low in economic distribution. These cases pertain specifically to NTFP harvesting or cultivation which is only permitted through government or privately rented land rights and access. This is seen in both ginseng and frog farms which require both political connections and material capital investment.

**5.1.2 Secondary  
Criteria**

***Stakeholder Support [Metric: 1(low) – 5(high)]***

After speaking to WCS, we were able to further understand the power dynamics in the local region and the stakeholders most critical in NTFP business model development. We identified that our critical stakeholders were villagers, middlemen, and government. Based on our interviews with each group, we identified the level of their readiness or interest in each product and layered this perspective onto the analysis.

The unique political environment and ownership structure for China and the local region has made it very important to understand the perspectives of local government officials in addition to individuals who collect and help bring products to the market. Specifically, we found it important to get the support from the following government groups. For our purposes, we attempted to review our findings and gain support from three different levels.

*Figure 6. Government Stakeholder Summary*



We also met with the Hunchun Forest Bureau leader: Mr. Xu and the Hunchun Nature Reserve leader Mr. Zhao.

#### ***Timing [Metric: Various]***

In order to successfully integrate a new conservation business model into the local region, we found it important to demonstrate quick successes to gain traction in the local community. This is particularly critical in our case because of the potential backlash from villagers which could result in further negative behavior towards tiger conservation. Therefore, we were careful to pick NTFPs which could be harvested quickly or consistently so that there will be a constant and material financial stream to encourage commitment to the program on a long-term basis and attract private business partners.

#### ***Value Proposition [Metric: Various]***

Finally, there were unique branding aspects that were available to some of the NTFPs which would help to differentiate them on the open market. We used this as a qualitative measure. These differentiating factors included:

- **Health Benefits:** NTFP known to have health benefits based on TCM knowledge
- **Location / Regional:** NTFP is unique to the local region or only found in limited areas globally
- **Quality:** NTFP grown in this region is superior to other marketed products
- **Branding Opportunity:** Product easily associated with tiger conservation in by both WCS and consumers to a lesser degree

## **5.2 Criteria Summary**

*Table 3. Hunchun NTFP Criteria Summary*  
**Primary**

Criteria	Definition	Metric
Market Demand	Current and expected future demand of product	High, Medium, Low
Environmental Impact	Negative impact on the forest and tiger habitat	1(low) – 5(high)
Economic Viability	Current price of products in the domestic and international markets	¥per KG / piece
Economic Distribution	Distribution of income from	1(low) – 5(high)

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	NTFPs across villages/villagers	
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***Secondary***

Criteria	Definition	Rating
Stakeholder Support	Level of support from Government and Villagers	1 – 5
Timing	Cultivation / Harvest Timing	Various
Value Proposition	Level of differentiation	Various

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## 6.0 Hunchun NTFP Application

### 6.1 Application of Framework

After discussing and confirming with relevant stakeholders, we then used the validated framework and applied the criteria to the short-list of Hunchun NTFPs. We filtered the list by the primary and secondary data, but used a qualitative analysis, substantiated by village and official visits to identify top NTFPs. The tradeoffs were discussed by top marketable NTFPs for all listed criteria. Therefore, although market demand is top prioritization, we would not recommend investment if the NTFP was environmentally detrimental, was not economically distributable, and was not supported by officials. Below is a snapshot of our assessment, refer to Appendix 3: Hunchun NTFP Framework for the full analysis.

*Table 4. Hunchun NTFP Framework Snapshot*

English Name	Market Demand	Environmental Neg. Impact	Economic viability (¥/kg)			Income Distribution
			Retail Intl	Retail Hunchun	Wholesale	
Honey Mushroom	H: (China)	4		80	60	5
Late Fall Oyster Mushroom	M: (China, Korea, Japan)	4		75	56	5
Matsutake Mushroom (fresh)	H (Korea, Japan)	4	200-300 / piece		1200	5
Matsutake Mushroom (dried)	M (China)	4		520-770	520-770	5

### 6.2 NTFP Selection Summary

Following the application of the our framework for the NTFP feasibility study, we were able to identify the following NTFPs as high potential opportunities (listed in terms of attractiveness):

#### 1. Honey

- Reasoning: High demand product due to wide recognition of health benefits. Local honey also receives a premium for the unique biodiversity that creates a differentiated honey product linked to better taste, quality, and medicinal attributes. Moreover, this product is cultivated; therefore environmental impact is very low. The capital and effort required is also relatively low, thus more villagers will have access to this business opportunity. The return for villagers is quick and investment costs are recovered in a short period. Also, because capital is required and access to sales markets is an issue, there is a natural role for WCS to play. WCS has a verifiable value add by being a funding arm and partnership developer. It is also a business that can be more easily be monitored and regulated by WCS and business partners. In the long term business approach, this NTFP represents a more recognizable and demanded product in international developed markets. Therefore making an investment now in honey, creates future options for opportunities worldwide where the Tiger Friendly brand will garner additional premiums.

#### 2. Wine Grapes: Amur grape / Schisandra Berries

- Reasoning: Medium / high demand product for a growing domestic wine

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market. Although the market is burgeoning, local Chinese wine makers have several challenges in succeeding in the large Tier I/II markets which represent the majority of demand. This is due to brand recognition and competition with more notable wine producing countries. Despite these market challenges, there exists substantial local demand from middlemen funding the cultivation (no incursion into forest) of wine grape among local villages. Most villages will have access to this opportunity; however village selection must be handled closely as not all areas have been able to successfully produce grapes. The right agricultural conditions and business partner need to be verified before a full-scale investment.

### **3. Schisandra Berries**

- Reasoning: High demand NTFP domestically due to the associated medicinal benefits. Previous efforts exist from WCS Russia on a similar Tiger Friendly program. They have also identified an existing buyer who can possibly guarantee a large market. This opportunity should be explored but based on Chinese sourcing. The Schisandra market seems to have several market drivers from both processed (wine / drinks) to dry raw form. As with the above NTFPs, because we are recommending a cultivated business model, environmental impact is relatively lower.

### **4. Matsutake Mushroom**

- Reasoning: The market demand and economic viability for the Matsutake is probably the highest among all the listed NTFPs. Because of the pure financial attractiveness, we believe that there may be a high opportunity to translate the economic rewards into promoting tiger conservation among villagers. However, because the mushroom is not cultivated, the environmental impact still remains high. We acknowledge that any forest harvest model will also be accompanied with other detrimental forest harvesting activities. This business model necessitates strict and enforcement measures which are not currently in place. These activities must be coordinated with local forest officials and represent potential high barriers to implementation. Therefore developing a model around the Matsutake is listed as our least favorable opportunity of the top NTFP candidates.

Following this identification, we conducted more detailed research on each NTFP to understand the market dynamics ranging from the local level to international wide markets. Although the latter, represents further long term opportunities, we wanted to understand how expansive demand can be and the level of future opportunities.

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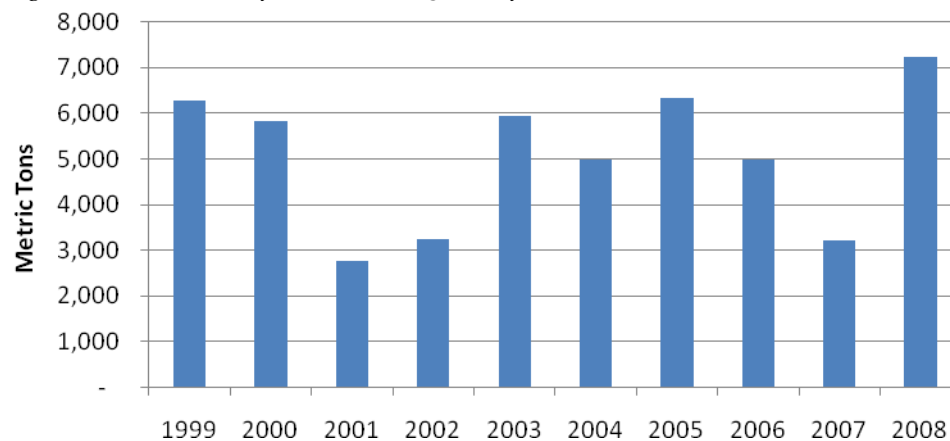
## 7.0 Industry Analysis

### 7.1 Honey Market Overview

The global market for honey is projected to exceed 1.9 MM tons by the year 2015. The U.S., alone, imported 2.4 MM pounds of honey in 2007, primarily from China, Argentina and Vietnam, at a value of \$154.9 MM.<sup>10</sup> This is primarily driven by increasing awareness levels and health consciousness among the consumers, leading to increasing demand for healthy and natural food products. In line with the trend, several honey producers are launching new products and varieties at regular intervals. The increasing trend of organic and healthy spreads is expected to continue giving rise to new variants and flavors in the global honey market.<sup>11</sup>

China dominates honey production in the world, accounting for 22% of production and growing nearly 3X faster than the world average. However, challenges exist for Chinese sourced honey internationally. China has been accused of dumping to avoid tariffs and providing subsidies for honey production. This helps to keep the Chinese honey price lower than that of other countries.<sup>12</sup>

*Figure 7. China Honey Production Quantity<sup>13</sup>*



Additional quality concerns exist about Chinese honey which stems from the use of a toxic antibiotic to fight a contagious bacterial epidemic that raged through hives across China in 1997. The drug, chloramphenicol, has been banned from all food products by the FDA. The administration says tainted honey from China is at the top of its watch list and has issued three "import alerts" to port and border inspectors about tainted Chinese honey. Officials have also found other antibiotics in Chinese honey and blends of honey syrup and recently warned that corn or cane sugar could also be tainted with bad honey.<sup>14</sup> EU also banned Chinese honey imports in 2002 due to the discovery of antibiotics in the honey. The ban was lifted in 2004.

Domestically and regionally, honey consumption has grown along with general income growth and acknowledgement of health benefits. One report indicates that China has become the world's biggest honey consumer, significantly increasing its share of the global market from 8% in 1993 to 16% in 2004.<sup>15</sup> Various bee



products such as royal jelly and beeswax are also prized locally for their medicinal properties. Royal jelly is the special food that bees feed their next queen. Some scientists believe royal jelly can cure everything from eczema and impotency to Parkinson's disease. An entire system of alternative medicine is connected to royal jelly.<sup>16</sup> Many of these claims, however, are still scientifically unproven. Because of the growth in local demand and less negative connotations with Chinese based honey products, this market is a more viable market. Targeting this market also complements the current relative small scale and time to market objectives of the WCS developmental program. According to Nairobi-based Honey Care Africa, associations and cooperatives should not consider international certifications or exporting products until they are producing at least 100 tons of honey per year, as the processes involved are expensive and time consuming. Associations should work to develop well-run local markets and only consider expanding once production is exceeding demand. Therefore in many similar developmental based honey businesses, internet / international sales are limited, with the bulk of sales limited to local markets for small-scale poverty alleviation.

Hunchun located in the resource rich Jilin Province, representing China's largest base of commercial grain. There are 300 varieties of wild plants that provide a rich source for honey-making.<sup>17</sup> Honey production is a traditional practice with some villagers having 30+ years experience in beekeeping. Although the area is well known for its honey, the Linden type is especially renowned due to the Chinese Linden, located in Changbai Mountains in the Northeast China. The RARE program is currently piloting programs (60% subsidized by WCS) in local villages to achieve similar objectives around income generation and tiger conservation. Based on our local survey, the average retail price for honey in the area ranges from ¥16 – 40 depending on quality with an overall Hunchun capacity of honey of 300 – 400 tons annually.

*Table 5. Local Hunchun Honey Snapshot*

Village	# Families	Boxes / Family	Cost (¥/ box)	Revenue (¥/ box)
XiaCaoMao	16	6 – 14	500	300 – 1,000
GuanDaoGou Gou	8	8 – 12	500	300 – 800

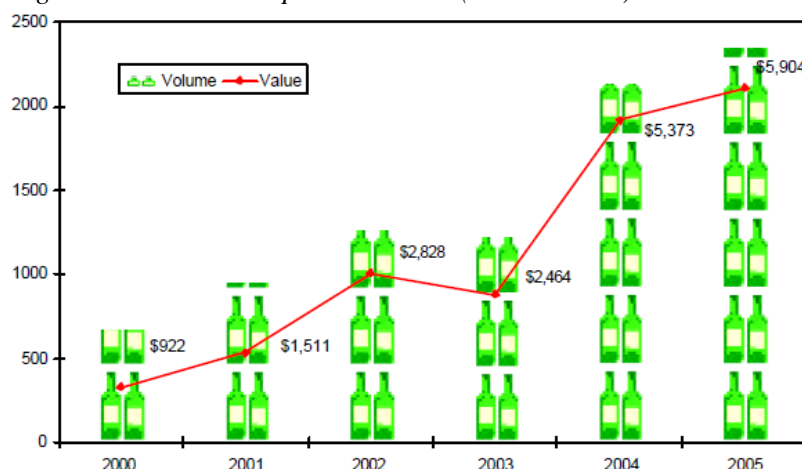
## 7.2 Wine Market Overview

The Chinese wine market is growing area of investment due to the rise in consumption by larger local cities and rising trends. Consumption of Chinese based wines however is limited to local markets due to the continuing lack of quality relative to other international wine producing countries.

In 2005, China began mass introduction and cultivation of grapes with rise of Chinese demand for red and white wine grapes. The planting area also became much larger. In 2008, China's 453,000 hectares of vineyards produced 6.4MM tons of grapes, representing 10% of the world's market. Using about 10% of the domestic grape production, Chinese wineries produced 665MM liters of wine in 2007, which was up 34% from the year prior. And per capita consumption of wine in China is up 55% from 2000 to 2006, according to the U.S. Department of Agriculture Trade Office, Shanghai, making China one of the six biggest wine

consuming countries in the world.<sup>18</sup> Beijing, Shanghai, Guangzhou, Shenzhen and Chengdu are the leading wine consumption cities in China mainland. This is substantiated by the high growth of wine imports in recent years.<sup>19</sup>

Figure 8. U.S. Wine Exports to China (Volume = kL)



Of the 500 wineries, four domestic companies control 27% of the total wine market: COFCO, Changyu, Weilong, and Dynasty. With foreign investment and streamlining production methods, domestic producers are catching up to western production capabilities, leaving a small window of opportunity for new market entrants.<sup>20</sup>

The sales channels of Chinese domestic grape wines can be divided into two parts: one is for the hotels and restaurants. The other is for the retail sales in the supermarkets. According to the industrial average statistics, the hotel and restaurant consumption accounts for 50% and the left volumes are in the convenience stores, specialty stores and the food stores.

As for the quality level standards, China has made concerted efforts to indicate standards and impose labeling to reflect chemical and sensory criteria. As a result, the first domestic comprehensive quality level systems were created which linked grape production (gardens, raw materials, brewing technologies, aging, bottling, and storage) to labeling / marketing. (See Appendix 5 for Standards Summary) Individual domestic wine makers have created unique labeling to differentiate quality. Changyu divided the grape wines into four levels according to the quality like the master level, reserve level, special level and preferred level. Another domestic grape wine giant, China Great Wall Wine Co., Ltd, put the level standards according to the producing areas.<sup>21</sup>

The main grape regions are Tonghua Jilin, Bohai Bay, Huaizhuo basin, Wuwei Gansu, Ancient Yellow River, Yinchuan Ningxia, Shihezi Turpan Xinjiang and Yunnan. More than 80% of the planting areas are used to grow Cabernet Sauvignon, Cabernet Franc, Merlot, Chardonnay, Riesling and Italian Riesling.

The northeast China grape region consists of Jilin, Heilongjiang and Liaoning.

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Owing to the cold weather, *Vitis amurensis*, a grape that is very resistant to frost, can grow here and the annual output is around 50,000 tons. In the grape region of Tonghua Jilin region where the lowest temperature is 45-C degree below zero, the climate is cold and suitable for the growing of Amur grape vine.<sup>22</sup> Wine from the Northeast ChangBai Shan region is known for the dry grape or Schisandra sweet wine. The quantity is small, and most of them grow in Tonghua Jilin.<sup>23</sup>

- Wine grape planting area: 4,000 hectares
- Variety: *Vitis Amurensis*, and some other varieties.
- Wine type: *Vitis Amurensis* wine and ice wine
- Producing capacity: 32,600 tons
- Main brand: ChangBai Mountain Wine Group, Tonhwa Winery, Tian Chi
- Grape Winery, Hua Xin Winery, Hua Long
- Main wine producing city: Tonghua - Jilin Province, Changchun – Jilin Province

Based on our survey to the Madida village and a discussion with a local wine producer, grapes are being cultivated and harvested in the wild for wine production. The producer provides villagers with vines to cultivate and purchases the grapes following harvest. The price ranges based on type (i.e. cultivated vs. wild). Due to strict national standard for wine, local producers are producing and distributing wine on an informal basis.

In Madida village, seven families were participating in a grape growing program. The village committee selects the family. Grapes vines were provided to the villagers from an entrepreneur for ¥5 / vine. For an area of 1 mu (1 Chinese Acre), the maintenance cost is ~ ¥100 – 200 annually and represents 100 vines. The vines bear fruit after two years of cultivation. During the winter, the vine is coiled and placed into the ground to protect it from frost. The following summarizes our findings:

*Table 6. Local Hunchun Grape Snapshot*

Contact	# families	Wholesale (¥/ kg)	Retail (¥/ 750 ml)
Kanghua	N/A	Buy for 4 ¥/ kg	20 – 200
Madida	7	Sell for 20 ¥/ kg	N/A

### 7.3 Schisandra Berries Market Overview

Schisandra is a woody vine with numerous clusters of tiny, bright red berries. It is found throughout northern and northeast China and the adjacent regions of Russia and Korea. Schisandra is commonly used in Chinese medicine, where it is considered to be one of the 50 fundamental herbs. In addition, it is used to make wine in China and tea in Korea (omija cha).

In the past three decades, traditional Chinese medicine has been adopted throughout the Western world and has become one of the fastest-growing

healthcare choices in the United States. This phenomenon is illustrated by the increase in the number of licensed Chinese medicine providers in the U.S., from 5,525 in 1992 to 14,228 in 2002<sup>24</sup>. As more Western consumers become aware of the health benefits of Schisandra berries, demand is expected to increase outside of Asia. In addition to its use in Chinese medicine, Schisandra berries can potentially be used in juice or energy drinks in the U.S. and Europe. Energy drinks refer to beverages that contain caffeine in combination with other presumed energy-enhancing ingredients such as taurine, herbal extracts, or vitamins. They fall into the functional beverages category, which includes sports and nutraceutical drinks. In the U.S., energy drinks hold 62 percent of the functional beverages market, and their market share continues to grow. It is currently a multibillion dollar business<sup>25</sup>.

Schisandra berries can be collected from the forest and cultivated. They are widely farmed in China, especially northeast China in Lianoning, Hebei, Jilin and Heilongjiang provinces. Liaoning Yimen Group, a private owned company that integrates planting, developing, and researching Chinese medicine, has 2000 mu (1.3 million square meters) of Schisandra berry farm with 2,000 local farmers. The company is developing a series of Schisandra berry products such as beverage, liquor, and extracts. Bioworld Organic, a company that specialize in organic herbs & spices, botanical extracts and bee products, has established the first and biggest NOP/EEC organic certified Schisandra berry plantation in northeastern China. BioPharm Asia, a U.S. listed pharmaceutical company that is involved in the cultivation of Chinese herbal medicine, pharmaceutical production and medicine wholesale, has a Chinese Herbal Medicine Planting Demonstration Park in Tonghua county of Jilin. The total planting area is > 233ha, and 200 ha is for Schisandra berries. In the U.S., one company has successfully cultivated organic Schisandra berries and made the world's first Schisandra liquid dietary supplement called ChiBerry™.

Currently in Hunchun, the local market sells both wild Schisandra berries that villagers collect from the forest as well as cultivated Schisandra berries that are likely to come from farms outside of Hunchun. One village in Hunchun tried to cultivate Schisandra berries a few years ago, but was unsuccessful due to low temperatures in the mountain area.

*Table 7. Local Hunchun Schisandra Snapshot*

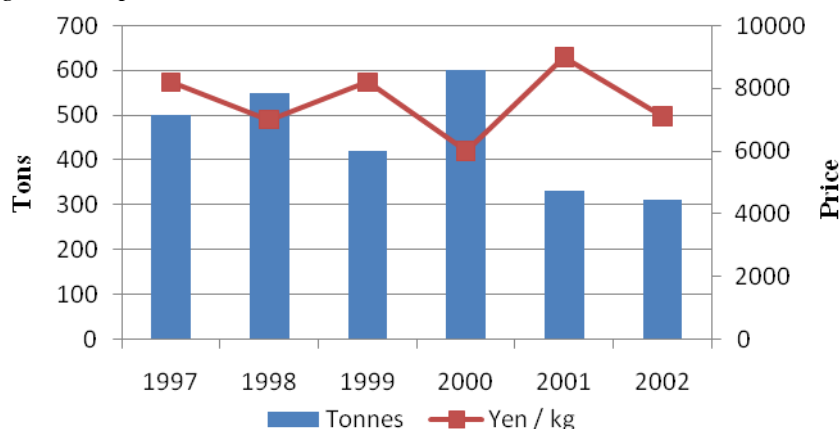
Area	Wild	Cultivated	Est. Wholesale $\pi$
Hunchun Local Market	¥100 / kg	¥40-70 / kg depending on quality (color, dryness)	NA

## 7.4 Matsutake Market Overview

Matsutake mushrooms are among the most prized and expensive mushrooms on the market. Matsutake Mushroom (*Tricholoma matsutake*) has been a prized edible mushroom in Japan since ancient times. However, its production has fallen dramatically in Japan since the mid 1800s when consumption was between 10,000 and 12,000 tons per year. Consumption is now approximately 3,000 tons per year of which Japan produces 1,000 tons in a good year. In 2002, the Tokyo wholesale system handled a total of a 3,267 tones at an average annual wholesale price of ¥ 664 / kg or US\$5.73. The balance is imported mainly from China, Morocco,

North America, and South and North Korea. As a result, the past few decades have witnessed a dramatic increase in both price and demand owing to the global increase in wealth in Japan.<sup>26</sup>

Figure 9. Japanese Matsutake Market<sup>27</sup>



In Southwest China, the trade of Matsutake Mushroom became a major source of income generation for both local villagers and local governments. In Shangri-La County for 2001, the taxation of Matsutake trading respectively reached ¥2.3MM. Harvesters can be paid about 40 – 50 USD / kg for top-grade Matsutake, reaching ¥1,000 per kg for a few days of the season.<sup>28</sup> Because of this sizable market opportunity, it has created overexploitation and unsuitable management practices leading to a significant decline in production and quality. Pickers harvest Matsutake as young as possible. Higher prices for buttons are an incentive for local collectors to dig for the buttons under the duff layer. Japanese consumers prefer Matsutake before the cap has expanded and its veil is ripped. Digging for buttons seriously disturbs the mycelium. Exposing the mycelium and its primordia, which would grow into buttons, seriously reduces its fruiting capacity, undermining sustainability.<sup>29</sup> This trend seems to be starting in some areas of very intensive collection in Yunnan and Tibet. Some local governments in Tibet have initiated a harvest rotation system where locals can collect only once in three years. Therefore, to mitigate against this trend, a model around good collection practices with training and education is recommended.<sup>30</sup>

Despite strenuous efforts, Matsutake has never been cultivated. To find Matsutake, one must forage in forests, where the mushrooms emerge in association with particular host trees. Once they are picked, they must be sent quickly to Japan; there is little market for dried or preserved Matsutake, because the mushroom loses its aroma if not consumed fresh.

Locally in Hunchun, people continue to harvest Matsutake, however in limited quantity because of the lack of supply. Of the mushrooms that are harvested, the

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price premiums supported our secondary market research.

*Table 8. Local Hunchun Matsutake Snapshot*

Area	Dried	Fresh	Est. Wholesale $\pi$
Hunchun Local Market	¥100 / 130 g	¥1,200 / kg or ¥200 – 300 / piece	¥20 – 100/kg

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## 8.0 Business Model Strategy

### 8.1 Initial Pilot Strategy

Pilot site identification represents an important step in deploying an NTFP project. The major considerations should revolve around the project goals of demonstrating early successes and easy learning opportunities. However, the pilot site choice will have to accommodate tradeoffs (i.e. although one village is in more need of income generation, another village is chosen because it has a stronger leadership structure).

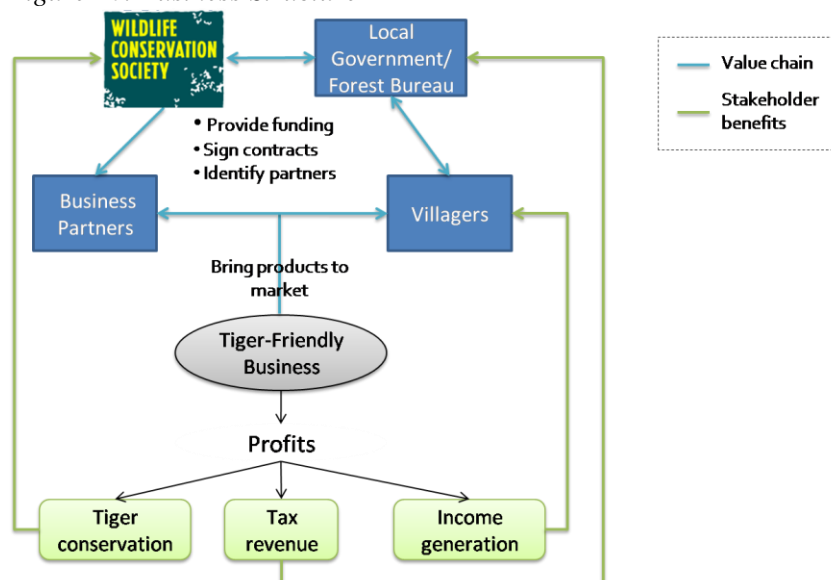
For our purposes, our site centered in the Chunhua Township because of the concentration of tiger incidents and presence of supporting leadership. WCS identified this location for a pilot opportunity because of existing relationships and leadership who has demonstrated past cooperation. In this region, relationship and stakeholder support represent substantial success factors for business development. Further analysis and discussions with Chunhua leadership allowed us to understand which of the top NTFP models were suitable and the applicable villages to initiate the pilot.

These initial steps will support commercialization / distribution of a premium product into local / domestic markets such as Beijing and Shanghai and potential Korean markets. Following entry into these markets, further expansion and partnerships can be developed to enter more difficult and quality driven international markets.

### 8.2 Overall Business Summary

WCS' role involves initiating business development via direct investment and ensuring that income generation is continually linked to tiger conservation activities. WCS works with Chunhua villages and local governments to create a start-up funding mechanism for a select group of families in identified villages. WCS would also supply the training / education necessary to support environmentally sustainable and high quality NTFP products. WCS will co-develop the contracts with villagers and villager leadership to develop a basis of understanding of product and conservation expectations. These contracts should also be reviewed with local officials to develop an enforcement measure in cases when there is a breach of contract. The figure below summarizes the proposed business model.

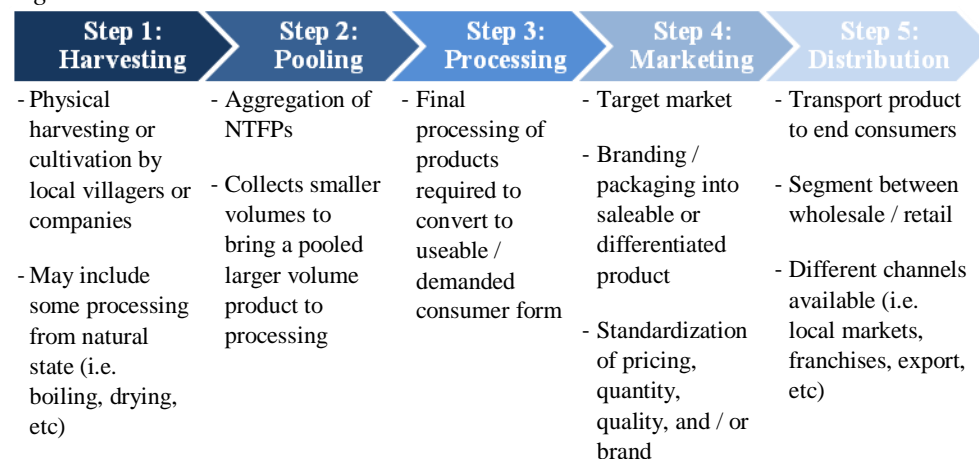
Figure 10. Business Structure



### 8.3 Overview of Value Chain

We identified the major steps required for commercialization and documented the current local / regional and mass distribution process. By identifying the activities and people involved in getting products to the market, we can develop our analysis on what capabilities are currently in place. For functions that do not exist, partners must be contacted or capabilities must be built. We used the following value chain to highlight and define the major processes for NTFP commercialization:

Figure 11. NTFP Value Chain





### 8.3.1 NTFP Value Chain

For each NTFP, we summarized the current understood processes. This information discovered from our local village and market inquiries. This helps identify how much effort needs to be invested in order to achieve a more formal product market delivery.

Figure 12. NTFP Product-Specific Value Chain

	Step 1: Harvesting	Step 2: Pooling	Step 3: Processing	Step 4: Marketing	Step 5: Distribution
<b>Honey</b>	<ul style="list-style-type: none"> <li>- Cultivate the bees for the entire year</li> <li>- Harvest honey between late July and mid-August</li> <li>- Hard:</li> <li>- Liquid: Heats and melts into honey</li> </ul>	<ul style="list-style-type: none"> <li>- Informal and inconsistent middleman gathers honey</li> <li>- Villagers go to market</li> <li>- Sometimes stores go to middlemen to work out source or vice versa</li> </ul>	<ul style="list-style-type: none"> <li>- In some cases, the honey actually needs to be concentrated to remove water and impurities</li> </ul>	<ul style="list-style-type: none"> <li>- Local: Store fronts will package alone</li> <li>- Commercial: Mass branding</li> </ul>	<ul style="list-style-type: none"> <li>- Local: Sold at farmer markets or at local businesses</li> <li>- Mass: Honey from the Northeast region typically cultivated on mass scale and sold through large supermarkets or stand-alone branded franchise honey stores</li> </ul>
<b>Amur Grape / Schisandra</b>	<ul style="list-style-type: none"> <li>- Wine maker or middleman provides vines for initial cost of ¥5 / vine</li> <li>- Villagers cultivate grapes for 2 years</li> </ul>	<ul style="list-style-type: none"> <li>- Wine maker or an informal middleman collects grapes for wine production</li> </ul>	<ul style="list-style-type: none"> <li>- Grapes are processed into wine</li> <li>- Aged for drinkability</li> </ul>	<ul style="list-style-type: none"> <li>- Local: Store fronts will distribute for retail or wholesale from large wine vats</li> <li>- Commercial: Mass branding</li> </ul>	<ul style="list-style-type: none"> <li>- Local: Sold at local farmer markets or at local businesses</li> <li>- Mass: Typically cultivated on mass scale and sold through large supermarkets</li> </ul>
<b>Matsutake</b>	<ul style="list-style-type: none"> <li>- Wild mushrooms harvested from deep in the forest</li> <li>- Villagers bring fresh mushrooms directly to local markets</li> <li>- Fresh mushrooms that are not sold are dried</li> </ul>	<ul style="list-style-type: none"> <li>- TBD</li> </ul>	<ul style="list-style-type: none"> <li>- Fresh &amp; high quality: Packaged immediately</li> <li>- Dry: Sold by weight for remaining season</li> </ul>	<ul style="list-style-type: none"> <li>- N/A</li> <li>- Dry: Some local businesses will package into branded Northeast or “Dong Bei” Matsutake</li> </ul>	<ul style="list-style-type: none"> <li>- Fresh: Shipped immediately to premium markets</li> <li>- Dry: Sold year round in local markets</li> </ul>

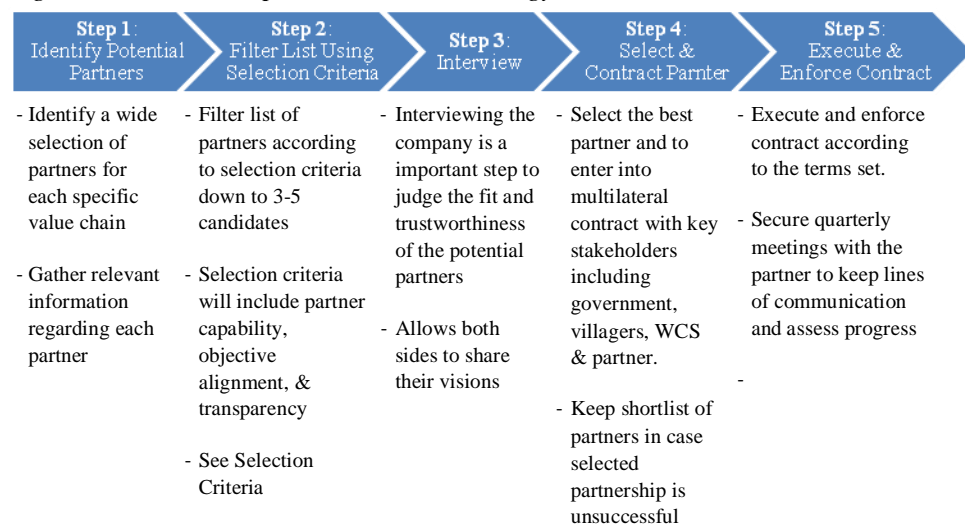
#### WCS PROPOSED ROLES

WCS	- Identify initial village and NTFPs	- Identify business partners to guarantee price and sale of cultivated products	- Managed by business partner	- Majority managed by business partner	- Managed by business partner
	- Develop funding system and contract details			- Application of “Tiger Friendly” or WCS branding requires WCS guidance	
	- Lead conservation activities	- Develop contract for agreement			

## 8.4 WCS Partnership Development

A critical role that WCS serves will be identifying and securing the partners. This is essential as villagers will be unwilling to take the risk of investing in other activities without a guaranteed market opportunity to work from. A short-list of partners has been already identified for each NTFP (Appendix 8). WCS should research and follow-up discussions with these companies to understand which groups align with WCS’ conservation principles. These partners will be responsible for managing the business and ensuring product quality going forward. Because the business structure is highly dependent on these business partners, yet villagers will hold WCS responsible for their investment, partner selection is very important. WCS should also develop contracts with partners to avoid confusion and establish business expectations between WCS & partners and partners & villagers. Therefore, WCS would be essentially serving an advisory and partnership development role.

*Figure 13. Partnership Selection Methodology*



### Partnership Selection Criteria

#### Capabilities

- Technology
- Resources
- Connections
- Scale
- Vertical integration

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Objective alignment

- Commitment to the program
- Mutual benefit
- Conservation

Trustworthiness

- Transparency
- Willingness to enter into multilateral contract
  - Business Partner & WCS & village partner
- Monitoring
- Enforcement

## 9.0 Financial Analysis

### 9.1 Honey – Financial Model

From our visits to multiple villagers that raise honey bees, we arrived at the following assumptions. We remained conservative with our assumptions given the villagers estimates. For example, villagers estimated that each box of bees can produce anywhere from 20 to 50kg of honey per year, with one villager claiming an average of 50kg.<sup>31</sup> However we decided to use 30kg for our model. Similarly, the price of honey per kilo ranged from \$11 to 20/ kg, but we chose \$12 for our model. Our conservatism stems from our desire to select a robust program that has a high likelihood of success despite our cautious assumptions.

Assumptions	
Capital Cost/ Box	500
Price/kilo	12
Kg/box/yr	30
Revenue	360
Maint. Cost/ box/year	50

Sensitivity Analysis						
Rev/box	Price/kilo					
Kg/box/yr	10	12	14	16	18	20
15	150	180	210	240	270	300
20	200	240	280	320	360	400
25	250	300	350	400	450	500
30	300	360	420	480	540	600
35	350	420	490	560	630	700
40	400	480	560	640	720	800
45	450	540	630	720	810	900
50	500	600	700	800	900	1,000

We understand that our model is highly sensitive to the price of honey and the yield per box of honey. Above is a sensitivity analysis of these two variables that could drastically alter our revenue projection.

Per Box Financial Model										
Year	1	2	3	4	5	6	7	8	9	10
Capital Cost/ Box	500									
Price/kilo	12	12	12	12	12	12	12	12	12	12
Kg/box/yr	30	30	30	30	30	30	30	30	30	30
Revenue/box	360	360	360	360	360	360	360	360	360	360
Cost / box / year	50	50	50	50	50	50	50	50	50	50
Profit	310	310	310	310	310	310	310	310	310	310
Pay back of capital	300	200								
Cash to villager	10	110	310	310	310	310	310	310	310	310

Above is a financial model for 1 single box of honey. We expect the payback period to be 2 years, with villagers receiving a meaningful cash income starting the second year with \$110/box by the second year, and \$310/box thereafter. Each box has a useful life of roughly 10 years with the need to replace the queen every 2 years.

# of boxes / family	10									
<b>Per Family Financial Model</b>										
<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Capital Cost	5,000									
Price/kilo	12	12	12	12	12	12	12	12	12	12
Kg/box/yr	30	30	30	30	30	30	30	30	30	30
Revenue/family	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
Boxes Cost / year	500	500	500	500	500	500	500	500	500	500
Profit	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100
Pay back	3,000	2,000								
Cash	100	1,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100	3,100

We assumed that WCS will provide 10 boxes of bees to a family in our model, so that the program would increase the villager's income meaningfully (\$3,100 after the 3rd year given an average income of \$5000 per capita) in order for WCS to ensure a credible influence over the villagers' attitude and behavior toward the environment.

Families / village	50									
% of family	25%									
# of families for pilot	13									
<b>Per Village Financial Model</b>										
<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Capital Cost	65,000									
Price/kilo	12	12	12	12	12	12	12	12	12	12
Kg/box/yr	30	30	30	30	30	30	30	30	30	30
Revenue/Village	46,800	46,800	46,800	46,800	46,800	46,800	46,800	46,800	46,800	46,800
Cost / box / year	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500	6,500
Profit	40,300	40,300	40,300	40,300	40,300	40,300	40,300	40,300	40,300	40,300
Pay back	39,000	26,000								
Cash	1,300	14,300	40,300	40,300	40,300	40,300	40,300	40,300	40,300	40,300

We took an average village size of 50 households and applied the bee program to 25% of the households. This would create a scarcity incentive for villagers to be on their best behavior in order to remain in the program. Also, we wanted to ensure that there will not be an overproduction that could lead to a collapse in honey prices in the Hunchun area.

Given that 13 families will be provided 10 boxes at \$500 each, we estimate the variable cost of the program to be \$65,000 and the payback time to be 2 years, or possibly even 1.3 years if the program were executed in a timely manner. Specifically, the boxes would have to be distributed by end of March in time for the first peak honey season in July. The first repayment of \$300/box will occur in august after the honey is sold, and the process repeats the following year, until the box is entirely fully financed in August of the 2nd year.

## 9.2 Wine Grapes – Financial Model

The assumptions are based on our research and field interviews. We remained conservative with our estimates for the same reasons as for the Financial Models for Bees. The average grape vine can yield 5 to 15 kg of grapes. But to ensure the quality of the grapes and the resulting wine, the vine must be pruned so that it produces only 5 kg of grapes.

<b>Assumptions</b>			
Capital Cost/ Vine	15		
Price/Kg	3.0		
Kg/Vine/yr	5		
Revenue/Vine/yr	15		
# of Vine/Mu	500	1 Mu = 667 sq meter	
Revenue/Mu/yr	7,500		
Maint. Cost/Mu/yr	450		
Maint. Cost/Vine/yr	0.9		

Our sensitivity analysis also took into consideration the possibility of a bad harvest with yields of 2kg/vine/year. We estimate that each Mu (667 sq meters) can hold 500 vines, which is conservative since vines are typically spaced only 1 meter apart. Finally, even

though the Kang Hua Company (康华) that we spoke with hand contracts with 7 villagers in the village of Hadamen to purchase all the grapes they can produce at \$4/kg, we believe that a \$3.0/kg price is warranted since wild grapes can be harvested and collected at \$3.0/kg.

<b>Sensitivity Analysis:</b>						
Revenue/Mu/yr	Price/Kg	# of Vines/Mu =		400		
Kg/Vine/yr	2.0	2.5	3.0	3.5	4.0	4.5
2	1,600	2,000	2,400	2,800	3,200	3,600
3	2,400	3,000	3,600	4,200	4,800	5,400
4	3,200	4,000	4,800	5,600	6,400	7,200
5	4,000	5,000	6,000	7,000	8,000	9,000
6	4,800	6,000	7,200	8,400	9,600	10,800

Revenue/Mu/yr	Price/Kg	# of Vines/Mu =		500		
Kg/Vine/yr	2.0	2.5	3.0	3.5	4.0	4.5
2	2,000	2,500	3,000	3,500	4,000	4,500
3	3,000	3,750	4,500	5,250	6,000	6,750
4	4,000	5,000	6,000	7,000	8,000	9,000
5	5,000	6,250	7,500	8,750	10,000	11,250
6	6,000	7,500	9,000	10,500	12,000	13,500

Revenue/Mu/yr	Price/Kg	# of Vines/Mu =		600		
Kg/Vine/yr	2.0	2.5	3.0	3.5	4.0	4.5
2	2,400	3,000	3,600	4,200	4,800	5,400
3	3,600	4,500	5,400	6,300	7,200	8,100
4	4,800	6,000	7,200	8,400	9,600	10,800
5	6,000	7,500	9,000	10,500	12,000	13,500
6	7,200	9,000	10,800	12,600	14,400	16,200

Revenue/Mu/yr	Price/Kg	# of Vines/Mu =		700		
Kg/Vine/yr	2.0	2.5	3.0	3.5	4.0	4.5
2	2,800	3,500	4,200	4,900	5,600	6,300
3	4,200	5,250	6,300	7,350	8,400	9,450
4	5,600	7,000	8,400	9,800	11,200	12,600
5	7,000	8,750	10,500	12,250	14,000	15,750
6	8,400	10,500	12,600	14,700	16,800	18,900

We tested 3 main variables in our assumption: Price/Kg, Kg/Vine/yr, and # of Vines/Mu to analyze the sensitivity of Revenue/Mu/yr. We believe these variations capture the majority of events that can occur within the grape production process. Since Hunchun faces harsh winters, there is a risk of extreme cold and freeze wiping out the entire annual grape production or even the grape field itself. However, these extreme events were not factored into our business model as it can impact most all NTFPs and hence would not change our selection results.

Per Vine Financial Model										
Year	1	2	3	4	5	6	7	8	9	10
Capital Cost/ Vine	15									
Price/Kg			3	3	3	3	3	3	3	3
Kg/Vine/yr			5	5	5	5	5	5	5	5
Revenue/Vine/yr			15	15	15	15	15	15	15	15
Maint. Cost/Vine/yr	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
Profit	(0.9)	(0.9)	14	14	14	14	14	14	14	14
Pay back of capital			10	7						
Cash to villager	(0.9)	(0.9)	4	7	14	14	14	14	14	14

Above is a financial model for 1 single grapevine. Each vine cost \$15 to plant and starts producing grapes in the 3<sup>rd</sup> year. In the first 2 years, some labor and natural fertilizer (i.e. chicken dropping) are needed to keep the plant healthy. During the winter, the vines need to be coiled up and buried under ground to keep it from freezing. We expect the payback period to be 4 years. In the first harvest year (i.e. 3<sup>rd</sup> year after planting), WCS will collect \$10/vine and \$7/vine the following year. WCS should expect to also pay for the \$0.9 maintenance cost/vine/year for the first two years. Thus the total capital investment per vine will be ~\$17 (\$15+\$2) that WCS needs to recoup. The grape vines have a lifetime of 10+ years, as estimated by the Kang Hua Company.

# of Mu / family	0.5									
# of Vines / Mu	500									
# of Vines / Family	250									
Per Family Financial Model										
Year	1	2	3	4	5	6	7	8	9	10
Capital Cost/ Vine	3,750									
Price/Kg			3	3	3	3	3	3	3	3
Kg/Vine/yr			5	5	5	5	5	5	5	5
Revenue/Family/yr			3,750	3,750	3,750	3,750	3,750	3,750	3,750	3,750
Maint. Cost/Family/yr	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0
Profit	(225.0)	(225.0)	3,525	3,525	3,525	3,525	3,525	3,525	3,525	3,525
Pay back of capital			2,500	1,750						
Cash to villager	(225.0)	(225.0)	1,025	1,775	3,525	3,525	3,525	3,525	3,525	3,525

We assumed that WCS will provide 250 vines per family to plant roughly 0.5 mu of land (1mu = 667 sq meters). Accordingly WCS will increase the family's income by 3750, by the 5<sup>th</sup> year. WCS will have to invest \$4,250 per household (\$3,750 for initial planting and ~\$500 for maintenance cost for the first 2 years). WCS will expect to receive a return of investment by the 3<sup>rd</sup> and 4<sup>th</sup> year.

While this is a longer time for WCS to return its investment and the villagers to see an improvement in income, we believe it is crucial for WCS to have a diversified portfolio of projects to influence the villagers. If WCS focuses only on 1 project such as honey, WCS runs the risk of over production if the program were universalized, or the risk of being inconsequential if the program were not expanded to other villages. We believe WCS should target certain villages with specific programs and attempt to reach a critical mass of 20-25% of the households in order to obtain a significant influence over the villagers' attitude and behavior.

Families / village	50									
% of family	25%									
# of families for pilot	13									
<b>Per Village Financial Model</b>										
<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
Capital Cost/ Vine	48,750									
Price/Kg			3	3	3	3	3	3	3	3
Kg/Vine/yr			5	5	5	5	5	5	5	5
Revenue/Village/yr			48,750	48,750	48,750	48,750	48,750	48,750	48,750	48,750
Maint. Cost/Village/yr	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0	2,925.0
Profit	(2,925.0)	(2,925.0)	45,825	45,825	45,825	45,825	45,825	45,825	45,825	45,825
Pay back of capital			32,500	22,750						
Cash to villager	(2,925.0)	(2,925.0)	13,325	23,075	45,825	45,825	45,825	45,825	45,825	45,825

We estimate the variable cost of a pilot program in one village for 13 households to be ~\$55,000. We have not factored in administrative and overhead cost such as management and monitoring. We believe the WCS will have a better understanding of the cost associated with administrating such a program.

In addition, wine grape farming carries the additional risk of finding a long term partnership. Wine grapes take an additional 3 years of processing and fermenting before it can be bottled as wine. There is a risk that the market is not receptive to Hunchun grown grapes, and that WCS finds out only after 6 years of investing into the grape program. However, the mitigating factor is that the ChangBai Shan Wine Company (长白山) is located near Hunchun (~100km away from Hunchun). ChangBai Shan derives their wine from grapes grown in an area with similar climate and soil as Hunchun, and its wine is well received in the market. In the largest super market in Hunchun, the ChangBai Shan brand took 25% of the entire shelf space for wines with prices ranging from \$20 to \$600 per 750ml.

### 9.3 Schisandra Berries – Financial Model

In 2007 the schisandra berry market crash, in response to an oversupply of cultivated schisandra berries after the schisandra soda and wine markets severely contracted. Due to this market correction, we were unable to identify any village in or near the reserve still cultivating schisandra berries. We were, however, able to locate a villager in Yan Tong Lazi who cultivated 1 hectare of schisandra before the 2007 market correction. Based on his cost and yield estimates, we calculated that an annual profit generated per mu is only 2,000 yuan. At this level of profitability, the payback period for the required investment of 9,333 (6,667 yuan for initial investment and 2,666 for the first two years of maintenance without commercialized yields) is 7 years if we assume all profits are used to pay down the cash balance, please refer to exhibit below.



<b>Assumptions</b>	
Capital Cost/mu	6,667
Price/Kg	10
Kg/mu/yr	333
Revenue/mu/yr	3,333
Maint. Cost/Mu/yr	1,333

1 Mu = 667 sq meter

<b>Per Mu Financial Model</b>							
<b>Year</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
Capital Cost/mu	6,667						
Price/Kg			10	10	10	10	10
Kg/mu/yr			333	333	333	333	333
Revenue/mu/yr			3,333	3,333	3,333	3,333	3,333
Maint. Cost/Mu/yr	1,333	1,333	1,333	1,333	1,333	1,333	1,333
Profit	(1,333)	(1,333)	2,000	2,000	2,000	2,000	2,000
Pay back of capital			2,000	2,000	2,000	2,000	1,333
Cash Balance	(8,000)	(9,333)	(7,333)	(5,333)	(3,333)	(1,333)	-

Given our findings on the schisandra market in Hunchun and the aggressive 7 year payback schedule, we feel that is less attractive than the honey and grapes, but could offer a complement or hedge against oversupplying the honey and grape markets, as these products develop. Additionally, as the grape wine market grows in China, so will schisandra wine. Currently, companies such as Chang Bai Shan Wine Company also offer schisandra berry wine with prices ranging from 10 yuan to 120 yuan for a 750 ml bottle. Schisandra berry wine may have the added advantage of being associated with health and well-being, allowing wine producers to market as such. These factors may increase the demand for schisandra wine, thus possibly increasing the per kilo price for schisandra berries.

One factor that needs further consideration is the current market make-up of schisandra berries. In addition to the wine producing companies the schisandra market consist of middlemen that purchase schisandra berries in its dried form for about 40 to 60 yuan per kg with an estimated dry to fresh ratio of 1 to 5 and pharmaceutical companies that cultivate enough berries to satisfy their current requirements. Based on the maturing wine industry, highly fragmented middlemen market and the self-sustaining pharmaceutical industry, there still exist market risk from the demand side. Therefore, it is critical that WCS identify potential business partner, who can gain access to larger domestic markets such as tier 1 cities, or gain a relationship a pharmaceutical or wine company, who will purchase the cultivated berries. Potential companies of interest are Guang Yuan, the largest schisandra berry grower near the Hunchun region or Kang Hua Wine Company, who is planning to cultivate schisandra to supply its wine needs. We also feel due to limited number of data points WCS must further validate these cost and yield estimates before pursuing any schisandra berry opportunities.

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## 10.0 Certification / Branding

### 10.1 Organic Market - China

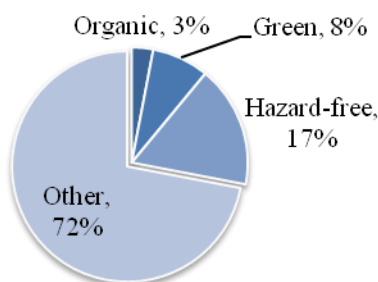
In order to support this business development, we believe that WCS should work with villagers to develop the certification necessary to support credibility in products. By investing in these certificates early on, the future option to enter international markets is available. Additionally, although in domestic and regional Asian markets, products are prized for their health related benefits, the association with Organic and Green products are growing. These certifications will help in further differentiating NTFP in larger cities.

In China, three levels of food certifications are available: “Hazard-free”, “Green Food”, and “Organic”. Whereas “Green Food” is well-known and widely available in Chinese markets, “Organic” is still a relatively new concept to the average consumer.

In 2005, the Chinese government established a national standard and regulation of organic products. Since then, the organic market has seen a slow but steady growth. The key drivers of organic market growth in China are increased awareness of health and food safety issues, and increased disposable incomes. Currently, the main consumers of organic food in the domestic market are upper-class in big cities. However, given the growth of China’s middle class and the increased emphasis on healthy and safe foods, the organic market is expected to grow in the next few years. In 2007, 3% of cultivated land was certified organic, 8% Green, and 17% hazard-free (Figure 14). Approximately 1% of all products on the big city markets are certified organic and 5% Green.<sup>32</sup>

Organic food products are typically found in supermarkets such as Carrefour and Wal-Mart in Tier 1 cities (e.g. Beijing, Shanghai). In addition, there are stores dedicated to organic food, such as Lohao City, Cityshop, and Hiquality organic specialty shops. Lohao is a chain of organic grocery shops in Beijing and Shanghai. In the Shanghai stores, most of the produce is grown at their own organic certified farms in the Zhejiang and Jiangsu provinces. Cityshop is a chain of 10 high-end grocery stores, which specializes in imported products. It has a separate organic food section. Most of Cityshop’s produce comes from its own OFDC-certified City Garden. Hiquality has 15 stores in Shanghai. 90% of its food products are certified organic, and 20% are imported goods.<sup>33</sup>

*Figure 14- % of organic, green, hazard-free production in China<sup>34</sup>*



Distribution of cultivated land (122 million ha) in China (2007)

For certified Green Food, the average price premium over regular products is 2x. For certified organic products, the price premium ranges from 3x-10x (Table 9).

Table 9- Price premium of organic and green products in China<sup>35</sup>

Certification	Organic	Green Food	Hazard-Free	None
Price in RMB/kg unless otherwise noted				
Cabbage	13.0		1.2	
Carrots	23.8	12.6	2.3	
Tree ear				
Pepper	29.0	9.8	5.5	
Green pepper	29.6	11.8	5.0	
Onion	19.0	9.8	3.9	
Garlic	25.6	19.8	11.8	
Tomato	27.0	19.8	13.8	
Cucumber	11.0	17.6		
Peanuts	5.5/108g			7.8/240g
Mushroom	38/bag			22.5/bag
Honey	50/375g			18/450g
Tree ear	17.6/100g	11.9/100g		

To promote organic market growth in China, consumer education is critical. In Shanghai, Carrefour stores have bilingual (Chinese and English) banners defining “organic” and describing its benefits. These educational promotion programs are necessary to increase consumers’ awareness and understanding of organic products, and expand the organic market to middle class consumers.

## 10.2 Organic Market - International

The international market for organic products has grown significantly in recent years. International consumers have become more conscious of the various environmental, health, and sustainability issues. Government policies in industrialized and developing countries have been formulated to encourage organic and sustainable farming.

Based on data from the International Federation of Organic Agriculture Movements and Research Institute of Organic Agriculture, the amount of organic land more than doubled between 2000 and 2007. Total global sales of organic products reached USD \$46 billion in 2007. In the U.S., organic food sales reached USD \$22.9 million in 2008<sup>36</sup>. Compared to the Chinese market, consumers in

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other countries have higher awareness and appreciation of organic products, especially in the U.S. and Europe. Organic products appeal to consumers because they are perceived to be of higher quality, safer, and healthier.

Organic products are commonly found in supermarkets in the U.S. The top three retail chains where consumers purchase organic foods are Wal-Mart, Whole Foods, and Trader Joe's. Wal-Mart's supercenters in the U.S. offer organic products at lower price than other stores. It also sells private-labeled organic products under the Sam's Choice brand name. Whole Foods is the leading supermarket chain in selling organic products. It has more than 270 stores in North America and the U.K. Trader Joe's is a chain of more than 300 small grocery stores that emphasize frequent new product introductions and locally farmed produce. Private labeled organic/natural products account for 80% of all goods sold in Trader Joe's. Safeway, the second-largest supermarket chain in the U.S., sells its proprietary "O Organics" food label with more than 400 organic products.

The U.S. organic market has been growing at least 15% a year for the past 10 years. With high demand for organic products and not enough supply, the U.S. imports about 10% of organic food. The share of imported organic food is expected to increase in the future as the organic market continues to grow.

### **10.3 Ethical Product Market** (e.g. eco-friendly, earth-friendly, fair trade)

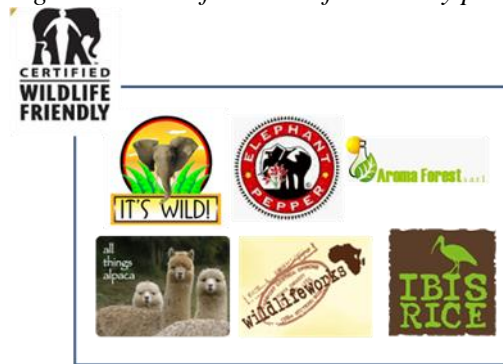
The U.S. is the leader in ethical product sales, followed by the U.K. In 2009, U.S. retail sales of ethical products were estimated to be USD \$38 billion. Ethical values are not necessarily the primary reason for purchasing ethical products. While some consumers purchase eco-friendly or animal-friendly products because of ethical consumerism, others do so because such products typically carry organic certification.

Numerous consumer surveys have indicated that consumers are willing to pay more for ethical products, even in economically challenging times. According to the 2009 Conscious Consumer Report: Redefining Value in a New Economy by BBMG, a sustainable brand strategy agency in the U.S., one out of two consumers claimed that they are willing to pay more for products with social and environmental benefits<sup>37</sup>. While U.S. consumers might be willing to pay a premium for ethical products such as tiger-friendly NTFPs, such premium cannot be guaranteed in the Chinese market. The average Chinese consumer places lower value on animal-friendly products and are unlikely to pay a premium unless the products offer other health benefits.

Examples of ethical-friendly products include Wal-Mart's line of private-label fair trade, organic, and Rainforest Alliance Certified coffee; Australian Koala Foundation's "Certified Koala Friendly" organic products; "Certified Wildlife Friendly<sup>TM</sup>" products (*Figure 15*) COMACO's "It's Wild" line of organic products help Zambians lead better and healthier lives while conserving wildlife and habitat, Ibis Rice<sup>TM</sup> is a premium rice from improved farming practices that protect and monitor the Giant Ibis and other species in Cambodia, Elephant Pepper helps African farmers to coexist with elephants by offering cash crop income to farmers who produce chili products.<sup>38</sup>

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Figure 15- *Certified Wildlife Friendly products*



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#### 10.4 Tiger-Friendly Certification

##### **Tiger Friendly™**

WCS Russia developed the Tiger Friendly™ Certification system. TFC aimed to provide local, community-based Wildlife Management Leases (WML) access to markets for NTFPs with higher profit margin than non-certified products. The program provides an economic incentive for the local villagers to conserve tiger habitat. Consumers of Tiger Friendly NTFPs are assured that they are conserving habitat for tigers and other wildlife. Producers derive direct benefits through access to markets and increased profit margin, which are unavailable to uncertified producers.

The NTFPs are USDA-certified organic products.

The key components of the Russian TFC are:

- Retain adequate numbers of tigers and their prey,
- Effectively control poaching,
- Sustainably harvesting of NTFPs,
- Educate communities and promote their involvement in conservation
- Ensure fair distribution of revenue

The main target market of the Russian Tiger Friendly NTFPs was the U.S. American consumers have higher awareness of eco-friendly or animal-friendly products, and typically are more willing to pay a premium for such products. Herb Trade, an industrial-scale distribution of organic-certified products, was selected to be the sole distributor of the Russian Tiger Friendly NTFPs. Herb Trade imports products from over 40 countries and distributes them to outlets in the U.S. such as Whole Foods. The program is currently on hold due to Russian export restrictions.

##### **Certified Wildlife Friendly™**

The Wildlife Friendly Enterprise Network (WFEN) was established in 2007 to promote wildlife conservation through responsible productions and branding. The requirements for Certified Wildlife Friendly include:

- The product contributes directly to the conservation of key species
- Production has positive economical impact on the local communities
- Enforcement mechanism is required such that failure to follow the conservation policies results in immediate economic consequences

Producers or partners must monitor the impact of production activities on wildlife to ensure that conservation goals are achieved

#### 10.5 Green Certification - China



The China Green Food Development Center (CGFDC) was founded in 1992 under the Ministry of Agriculture. CGFDC owns the logo, develops and maintains the standard, and is responsible for certification, inspection, and monitoring. 42 provincial and municipal branch agencies have been set up. In addition, 38 quality inspection stations and 71 environmental monitoring branches have been appointed.

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Requirements for Green Food include<sup>39</sup>:

- Cultivation area should meet the highest grade of air standards in China
- Heavy metal residues are restricted in irrigation, water and soil (tests for mercury, cadmium, arsenic, lead, chrome, etc.)
- Processing water must meet the National Drinking Water Standard
- Chemical applications are restricted and regulated, and some of the most poisonous pesticides and herbicides are banned

To apply for Green Food certification, an applicant must submit an application to the provincial Green Food Office with the following information:

- Declaration of green food standards
- Production procedure (planting, breeding, processing)
- Quality control system (contract, map, farm inventory management system)
- Product performance standards
- Registered trademark text, enterprise business license
- Quality management manual

The provincial office reviews the application, and conducts on-site inspection, product testing, and environmental quality survey. Green Food certification is valid for three years.<sup>40</sup>

## 10.6 Organic Certification - China



Organic Food Development Center, MEP of China (OFDC) was founded in 1994. It is the oldest and largest specialized organic research, inspection and certification organization and the only organic certifier in China that has been IFOAM (the International Federation of Organic Agriculture Movements) and ISO65 accredited. In April 2005, the China National Organic Product Standard (CNOPS) was established. All products sold in China as organic or organic-in-conversion must comply with the CNOPS. CNOPS works in accordance with the CNCA Rule on Implementation of Organic Products Certification. There are currently 28 organic certification agencies that are approved by the Certification and Accreditation Administration of China (CNCA), and they all follow CNOPS. Organic inspectors must be registered with the China Certification and Accreditation Association (CCAA). The General Administration of Quality Supervision, Inspection and Quarantine of China (AQSIQ) oversees the certification agencies and the administration of organic certification at the local level.

CNOPS includes national standards for organic products in 1) production, 2) processing, 3) marketing and labeling, and 4) management system.<sup>41</sup> Organic standards include:

1) Production

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- No chemosynthetic pesticide, chemical fertilizer, growth regulator or feed additive
  - Follows natural laws and ecological principles and with coordinated balance between plant and animal production
  - No genetically modified organisms
  - Organic seeds or seedlings must be used
  - Crop rotation and intercropping system must be adopted to maintain biodiversity and improve soil fertility
  - If organic production area is possibly affected by pollution from neighboring conventional production areas, buffer zones or physical barriers need to be established
  - Conversion period starts at the time a certification application is submitted and lasts at least 24 months for annual crops and at least 36 months for perennial crops

## 2) Processing

- In processing factories, no dust, hazardous gases, radioactive materials and other diffusive pollution sources
- Ingredients used in product processing must be certified organic materials or certified natural products. Weight of volume of these organic ingredients needs to be at least 95% of the total ingredients in final products

## 3) Marketing and labeling

- The term “Organic” and the Chinese national organic certification seal can only be used on labels of certified products
- Processed products containing at least 95% certified organic ingredients can be labeled as “organic” and those that have been certified as conversion to organic can be labeled as “conversion to organic”
- Processed products containing between 70% -95% certified organic ingredients can be labeled as “produced with organic ingredient”
- Processed products containing less than 70% organic ingredients can only label the organic ingredients in the ingredient list

## 4) Management system

- Documents for management system for organic production, processing and handling should include:
  - Location map of production, processing, and handling facilities
  - Quality management manual for organic production, processing, and handling operations



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- Operation guidelines for organic production, processing, and handling
  - Records of organic production, processing, and handling operations
  - Internal inspection system should be set up to ensure organic production, processing management system and production operations
  - Audit trail system should be established

To apply for organic certification, an applicant must submit an application to an organic certification agency. Organic certification is valid for one year.<sup>42</sup>

### 10.7 Organic Certification – U.S



The U.S. Department of Agriculture (USDA) regulates organic products in the U.S. There are 56 domestic USDA Accredited Certifying Agents (ACAs) and 43 foreign ACAs. Producers and handlers can choose from any of the 99 ACAs. Products seeking organic label must be certified by an USDA ACA except for very small producers (<\$5,000).

Agricultural products may be labeled “100% organic,” “organic” (containing at least 95% organic ingredients, with a limited number of strictly regulated non-organic ingredients, such as baking soda or pectin), or “made with organic ingredients” (at least 70% organic). If a product’s organic content is below 70%, the term may not be used on the front of the package, but organic ingredients may be listed on the side panel.

Organic product is defined as:

No use of synthetic pesticides, herbicides, fungicides or fertilizers

Cropland must be free of chemical applications for at least three year

No genetic modification or irradiation

No processed “biosolids” used as fertilizer

Animals must be given certified organic feed and have outdoor access, no antibiotics or growth hormones

To apply for USDA organic certification, an applicant must submit information to an ACA. Information must include:

Type of operation to be certified

History of substances applied to land for the previous 3 years

The organic system plan (OSP) - a plan describing practices and substances used in production. The OSP should describe monitoring practices to be performed to verify that the plan is implemented, a record-keeping system, and practices to prevent commingling of organic and non-organic products and to prevent contact of products with prohibited substances.

Applicants for certification should keep accurate post-certification records for 5 years of production, harvesting, and handling of organic products.<sup>43</sup>

### 10.8 Organic Certification – International



ECOCERT is an organic certification agency founded in France in 1991. It conducts inspection in over 80 countries. ECOCERT is accredited by EU authorities, National Organic Program of USDA, Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF), and can provide certification services according to Chinese Organic Standards.

Since 1998, ECOCERT has cooperated with Beijing Greenfield Environment

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Technology Centre and Agro-ecology Research Institute of China Agriculture University on organic certification services. The Beijing ECOCERT Certification Centre Co., Ltd. is a CCAA-authorized certification agency. ECOCERT China/Beijing ECOCERT Certification Center has been approved by CNCA for the Chinese organic and Good Agriculture Practice (GAP) certification.

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## 11.0 Alternative Business Models

### 11.1. Frog Farming

Raising forest frogs is a profitable business as frog oil, ovaries, and other derivatives are highly prized for health and beauty benefits. For instance, at Li Fu Company (李富), a box of 80-100 frog ovaries can be sold for \$1,600 to a cosmetic company Wuxianji that to be processed into \$20,000 worth of face cream. As a result Li Fu, a local Hunchun company, plans to brand and market its own cosmetic line in the future.

The cost to raising frogs is prohibitive to the average villager because a frog farmer has to sign an 8-year lease for an entire valley in or near the Hunchun natural reserve next to a ravine. Not only is the undertaking massive and labor intensive, but the number of available valleys are very limited, so only the rich and well connected are able to afford so. The valley owned by Li Fu Company produces 50-60K frogs per year and each frog could generate \$20+ / frog in revenue totaling \$1.2M in revenue.

While this is clearly a profitable business, there are some negative environmental impacts. Frog farming alters the natural balance and biodiversity of the ecosystem. In addition, the hired hands that are responsible for managing the farm typically live deep inside the natural reserve and cause damage to the environment via human activities such as NTFP and firewood harvesting. They also own hunting dogs that not only hunt tiger prey species, but are also a favorite meal of Amur tigers. Overall frog farming is counter to WCS's objective of reducing human-tiger conflict in Hunchun.

### 11.2 Deer Farming

Like frogs, raising Deer can also be a profitable business, but is more subjected to market cycles of overproduction and thus price fluctuation since the operation does not require limited resources such as booking an entire mountain valley.

Stall feeding deer is a business based mainly on selling the deer antlers to the traditional medicine market in southern China. At \$1200-1600/kilo, the 3-5 kilo antlers are lucrative. Each male deer grows and sheds his antlers annually. For the deer farm that we visited which had 120+ deer, over half of them were male, this represented anywhere from \$250,000 to \$350,000 of revenue on antlers alone. To a lesser extent, the deer farm also sells deer meat (\$10-20/ kg), deer penis (\$700/penis), and live breeding couples (\$3500/baby couple) for extra income. The female deer are typically kept for breeding.

While deer farming does not have to occur in the natural reserve like frog farming does, deer farms are expensive and thus cannot be distributed as easily to multiple villagers. The cost of a deer pen is a barrier that reduces WCS ability to reach a large number of villagers, thus limiting WCS ability to influence the community.

### 11.3 Cattle – Stall Fed

China is one of the leading beef suppliers in the world with total output of beef accounting for nearly 12% of the world's supply, making China the 3<sup>rd</sup> largest supplier behind the United States and Brazil. The rapid increases in both domestic and export markets for dairy and beef products have drawn the attention of the Chinese government to the Chinese livestock industry.

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The Chinese Government encourages the development of the livestock industry as a fundamental interest of the country. In the “Eleventh Five Year Plan,” the Chinese government declares that it will provide greater support to the livestock industry through financial investment and preferential policy making. Moreover, since joining the WTO, China has reduced beef tariff from 45% to 12%, which compares favorably to the average tariff reduction on agriculture products of 24%-32% to 17%<sup>44</sup>.

In addition to the government’s financial investment and preferential policies, China’s cattle industry also benefits from the growth in domestic beef consumption, as well as geographical, consumer preferences and price advantages. China’s recent economic development has led to improvements in living standards, resulting in an increase in domestic demand for meat products. In 2006, China’s annual per capita beef consumption was only 4.3 kg compared to the global per capita beef consumption of 9.8 kg, strongly indicating that Chinese beef consumption will continue to grow as China’s economy continues to approach developed country status. China is also located close to Japan, Russia and Korea, which are the top three largest beef product importing countries with an average of 1.8 million tons of beef imported per year. Furthermore, Japanese and Korean consumers tend to prefer marbled textured beef. Australian beef lacks this texture, and the fat of Australian beef produces an unpleasant smell when boiled. Chinese beef cattle that are raised by crop feeding and grazing may have a texture, aroma and flavor more suitable to Japanese and Korean palates. Finally, due to relatively low husbandry costs, China can export beef at much lower price than other beef exporting countries. All of these factors have resulted in continuous growth in the demand and production of China’s cattle industry.

To support this unrelenting growth, China’s Ministry of Agriculture has designated northeast and central regions of China as the areas of focus for the beef cattle industry. The northeast beef cattle region, which includes Jilin, Liaoning and Heilongjiang provinces, accounts for 9% of national livestock totals and 16% of domestic produced beef. Like much of China, the beef cattle industry in the northeast region consists mainly of hundreds of individual family farms making up the foundation of the beef cattle industry. Estimates have shown that the individual family farms account for more than 80% of the total number of beef cattle ready for slaughter. This is in strong contrast to other beef producing countries, which produce most of the beef cattle on large scale commercialized ranches.

In addition to not gaining production efficiencies through the utilization of economies of scale, the individual family farms in the villages within the Hunchun reserve primarily raise beef cattle in a low cost - low yield manner. Currently, the villagers allow their cattle to freely roam throughout the village during the spring and sometime early summer months, depending on how much the cold weather conditions delays the timing of planting the current season’s crops (i.e. rice, corn, soybean...etc). During these months, cattle are often found grazing throughout villages and even on public roadways. To prevent the cattle from eating the current season’s crops, once the crops begin sprouting, the cattle are then herded to the village-controlled, forest pastures deeper within the Hunchun reserve. Here the cattle are not only allowed to freely graze within the assigned pastures, which are enclosed by a low fence, but also released outside of the pastures to graze the

surrounding forest. The villagers only check their cattle once every few days to feed them salt and ensure that their cattle are safe. During the winter months between November and March, villagers herd their cattle back to the village to feed them cornstalk and other residual vegetation from the current year's harvest. The feed is only nutritional enough to sustain the cattle, and larger cattle often lose weight.

While current husbandry techniques have relatively low feed and labor costs, averaging annually only 300 yuan per head, the resulting yields are also fairly low. Male cattle (bulls) are preferred over female cattle (cows), as they are heavier and fatter. Three to four years old bulls are usually sold to middlemen, who sell to midsize beef companies or local meat mongers. While there is a per kilo rate of 13 to 14.4 yuan associated with the transaction, the weight of the bull is just an eyeball-estimate agreed upon between the villager and middlemen that works out to approximately 5,000 to 6,000 yuan. Cows are used for breeding, and are only sold for 4,000 to 5,000 yuan when they can no longer breed. Given the average husbandry cost of raising 3.5 year old bull and the average transaction price of 5,500 yuan, a villager could expect to earn profit of 4,450 yuan per bull, equaling only 1,271 yuan per year over the entire life of the bull, please refer to *Table 10*.

*Table 10. Profits Generated Through Current Cattle Husbandry Methods Per Bull*

Age of Bull	Annual Husbandry cost	Total Husbandry cost	Sell Price	Total Profits	Annualized Profits
3.0	¥300	¥900	¥5,000	¥4,100	<b>¥1,367</b>
3.5	300	1,050	5,000	3,950	<b>1,129</b>
4.0	300	1,200	5,000	3,800	<b>950</b>
3.0	300	900	5,500	4,600	<b>1,533</b>
<b>3.5</b>	<b>300</b>	<b>1,050</b>	<b>5,500</b>	<b>4,450</b>	<b>1,271</b>
4.0	300	1,200	5,500	4,300	<b>1,075</b>
3.0	300	900	6,000	5,100	<b>1,700</b>
3.5	300	1,050	6,000	4,950	<b>1,414</b>
4.0	300	1,200	6,000	4,800	<b>1,200</b>

When factoring in losses due to cattle depredation from illness, accidental snaring and tiger attacks, the profitability projection of cattle rearing using current husbandry techniques has fairly low yield. Depredation due to tiger attacks is the only form that villagers receive any compensation. Currently, the Forest Bureau, in charge of managing the Hunchun reserve, has a policy that no compensation should be paid if a tiger kills cattle in the buffer or core zones of the reserve, but this policy is not enforced. The Forest Bureau representative in charge of subsidy program stated that villagers lived in the area before it was designated a reserve, and to not provide some form of compensation would be wrong. Villagers receive 70% to 80% of the value of killed cattle.

While this form of compensation is equitable and compassionate, it does reinforce the current practice of allowing the cattle to freely roam and graze forest areas of

the Hunchun reserve. Cattle freely grazing the forest lands increase the potential of tiger-cattle conflicts in two-folds. Firstly, by increasing the time cattle are in the forest in areas that are not tiger-proofed, this increases the opportunities for cattle to roam into tiger hunting territories. Secondly, cattle are vigorous eaters, and graze on most of the vegetation in the forest, thus reducing the food supply for creatures in the forest such as ungulates and other prey species of the tigers. As the forest food sources are over grazed by cattle, the population of ungulates and other prey species will continue to reduce as the food supply cannot sustain natural prey populations, thus forcing tigers to hunt other sources of food such as cattle.

To resolve the issues of identifying a more profitable way of rearing beef cattle in Hunchun and reducing the incidents of tiger attacks on cattle, a difference method of husbandry known as stall-fed is being piloted and evaluated in the village of XiaCaoMao. By stall feeding bulls older than two-years old with special feed for the last 100 days, villagers hope to fatten the bulls enough to warrant a higher transaction price in terms of a higher overall weight and per kilo rate of 15 yuan, on average stall-fed bulls are 500 kilograms or 100 kilograms heavier than current free grazing bulls. The bulls are also weighed to determine the sell price instead of estimating the bulls' weight. This would also in affective reduce the potential of tiger attacks on older bulls as they are housed in a barn during the duration of being stall-fed. The additional cost for stall feeding a bull for 100 days is about 1500 yuan for labor and feed, and the projected sell price for a stall-fed bull is 7,000 to 8,000 yuan, resulting in an average additional profit of 500 yuan per bull, please refer to *Table 11*.

*Table 11. Profits Generated Thru Stall-Fed Husbandry Methods Per Bull*

Age of Bull	Annual Husbandry cost	Additional Stall-fed cost	Total Husbandry cost	Sell Price	Total Profits	Annualized Profits
3.00	¥300	¥1,500	¥2,400	¥7,000	¥4,600	<b>¥1,533</b>
3.50	300	1,500	2,550	7,000	4,450	<b>1,271</b>
4.00	300	1,500	2,700	7,000	4,300	<b>1,075</b>
3.00	300	1,500	2,400	7,500	5,100	<b>1,700</b>
<b>3.50</b>	<b>300</b>	<b>1,500</b>	<b>2,550</b>	<b>7,500</b>	<b>4,950</b>	<b>1,414</b>
4.00	300	1,500	2,700	7,500	4,800	<b>1,200</b>
3.00	300	1,500	2,400	8,000	5,600	<b>1,867</b>
3.50	300	1,500	2,550	8,000	5,450	<b>1,557</b>
4.00	300	1,500	2,700	8,000	5,300	<b>1,325</b>

While the stall-fed method has some merit in resolving the fore mention issues, there are several factors and risks that need addressing before further expansion of this program.

- Sources of funding for the construction of a barn to the bulls. The initial

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barn cost 100,000 yuan, and was funded 80/20 by the government and WCS, respectively. The 100,000 yuan invest represents a relatively large capital cost for villagers that may be difficult to fund and finance.

- For a stall-fed system to be economically viable a minimum of 50 bulls are required with a more optimal number of a 100 bulls, thus requiring multiple households in a village to join the cooperative, as most households only 5 to 10 head of cattle. During the initial pilot program, there were 20 families interested in participating, but because the families could not resolve the lack trust that the other families would equally feed and treat their cattle during each other shifts only three families participated when the barn was finally completed. A possible solution is to appoint a trustee to oversee the daily management of the bulls, and compensate this trustee with greater share of profits.
- While the current method generates less profit, it also requires less upfront cost. The additional feed and labor costs of 1,500 yuan per bull are unattractive to many villagers, who would prefer not to bear the additional cost burden and risk. In fact, of the initial 8 stall-fed bulls sold 4 made profits and 4 were sold at lost. The initial result was also affected by the delay in the completion of the barn late into the first season.
- These fatter bulls are only purchased by midsize beef companies such as Tian Yi and Jixing, who sell the higher quality cuts at premium prices to tier one city in China. Therefore, this presents greater risk to the villagers in terms of pricing power, since currently the only channel to sell at these higher rates is through 3 to 6 regional beef companies, the prices for these fatter bulls can be dictated by these companies.
- Because of the bulls are purchased in batches by the middlemen and not on a continuous basis due to transportation cost, the bulls may not be sold at the optimal time and generate less profits. While on average the bulls reach their optimal weight after 100 days, some bulls peak as soon as 80 days and others required 100 plus days, this means villagers may need to pay for additional feed cost for the faster developing bulls and not earn the maximum sell price for slower developing bulls.
- The stall-fed system only mitigates the overgrazing of the forest areas in the reserve for last 100 days of older mature bulls. The stall-fed system does not reduce the impact of cows and younger bulls, as they are still allowed to continue freely grazing the forest areas. Moreover, if the stall-fed program demonstrates some degree of success, the benefits of reduced grazing by older adult bulls may just be offset or made worst as villagers would have greater funds to invest in growing their cattle herds. A potential solution to the expansion problem is villagers could purchase two-year bulls from other regions and stall-fed them, instead rearing the cattle for the entire 3 to 4 years. This may be a short-term solution, but as the cattle markets matures the villagers profits would then be squeezed on the supply and demand sizes. The regions selling the cattle to local villages would want greater share of profits and the beef cattle companies would have another source for bulls that could be levered to drive down prices even further.

Given the relatively small incremental profits that may only be available in the near- term as priced will be driven down by midsize beef companies, who have

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oligopoly pricing power, and the limited benefits to the overgrazing problem that may eventually be offset by the increase in cattle numbers, we recommend that WCS not to heavily invest into stall-fed programs at this time. We feel that WCS would gain similar benefits in its efforts to reduce tiger-cattle conflict by simply educating and encouraging villagers to feed their cattle salt in the evening, thus training them to return to a tiger-proof fenced enclosure such as the one built in Madida by WCS and villagers. By feeding the cattle salt, the cattle would return to the enclosure every evening looking for salt, thus preventing tiger attacks, as tigers are most active during the evenings. WCS could encourage villagers to practice salt feeding by integrating this requirement into all concession contracts with villages. Currently, only some villages in the Hunchun reserve practice salt feeding. These villages have been successful in preventing tiger-cattle conflicts. The village of Madida should be one of the first villages targeted for a salt feed incentive program, as it has experienced 1/3 of the tiger-cattle conflicts and already has a tiger-proof enclosure.

#### **11.4 BioGas**

Biogas is used to address the need for villagers to cut firewood for cooking and heating. A biogas digester takes livestock wastes and converts the waste into ethanol through a process of fermentation. The waste from 1 cow or 10 pigs would be able to supply enough gas for the cooking needs of 1 household. Depending on the harshness of the winter, it is estimated that the biogas digester needs to be 7 to 10 times larger in order to supply the fuel needs to heat 1 house.

Typically cutting going into the mountains to cut firewood is a labor intensive process that requires an entire day of work to fill 1 cart of wood or 1.8m<sup>3</sup>. Every year, each household uses about 11m<sup>3</sup> worth of wood, and thus requiring each household to make the trip 5 to 8 times a year. If an economically viable alternative fuel source was available, the villagers will have little incentive to continue the firewood cutting practices.

According to our research, a biogas digester sufficient to supply a household with cooking fuel will cost \$2,500 to \$4,000. One that is able to also supply fuel for heating will cost 5 to 10 times as much. The government has implemented a subsidy program for the village of Yangpao to basic install biogas digesters for free at a rate of \$2,400 a household. The program achieved only moderate success, because it was only able to supply the average villager enough fuel for cooking in the later Spring and Summer. During the rest of the year with colder temperatures, the digester was only able to supply fuel cooking only once a week. In addition, there is little incentive to use biogas in the winter since the kitchen stove is already burning firewood to heat the entire house. During winter, most villagers simply cook their meals over the fire from the kitchen stove.

There are existing and developing technology to allow the biogas digesters to maintain optimal temperature during the winter to foster continuous fermentation and gas production. One solution that a villager developed was to burn firewood to warm the biogas digester and the attached greenhouse, however, we believe this process defeats the original purpose of reducing firewood consumption. Another possibility is to integrate a solar water heater into the system, with prices for solar water heaters ranging from \$1500 - \$5000 retail price.



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The stand alone biogas model will not be able to pay for itself, since villagers will not generate extra income from substituting one fuel (firewood) they get for free for another fuel biogas. Other biogas model, such as the 4-in-1 model attempts to incorporate a greenhouse, livestock pen and fertilizing system with the biodigester to make it more economically appealing. One study suggests that the cost of this \$11,000 4-in-1 biogas model could be recovered in one or two years based on a 75 X 7.5m<sup>2</sup> greenhouse that produces annual income of \$15,000 for planting peaches.<sup>45</sup>

The potential for replacing the need of firewood with biogas or other fuels is an attractive one that needs to be further explored. However, based on our research, we remain cautious about this opportunity because we were unable to find a successful biogas model that works in the northern China during the harsh winters. In addition, the biogas system must be large enough to supply fuel for not only cooking, but also for heating as the vast majority of the firewood is used for heating.

We believe that warmer clothing and under garments, such as a fleece hooded and footed undergarment would be a more economical solution to keeping warm. Instead of warming the poorly insulated house, a villager will only have to warm his own body. In addition, the clothing can be worn multiple years as opposed to firewood which must be laboriously collected every year.

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## 12.0 Recommendations

### 12.1 Next Steps

We recommend WCS to conduct a pilot NTFP program in Chunhua Township. WCS should work with the Hunchun government, Forest Bureau, township and village leaders to fund the initial capital investment. 10-15 families should be selected for each NTFP program. Appropriate family selection criteria should be developed. A critical aspect of the program will be a conservation contract that participating villagers will be required to sign. WCS will need to work with relevant stakeholders to develop and enforce the contract to ensure that Amur tiger conservation objectives can be achieved. This contract will also serve as the basis for Tiger-Friendly Certification if WCS/partners decide to market the products as such.

We believe that organic or Green certification will differentiate the NTFPs in the market, especially honey. WCS should educate villagers on the appropriate cultivation techniques for certification. Organic certification is strongly recommended for entering international markets, specifically the U.S. By investing in organic/Green farming practices now, it might be possible to pursue USDA or other international organic certification for market expansion in the future.

To bring NTFPs to market, WCS will need to identify business partners. We have initiated the partnership identification process. The current list of potential partners [Appendix 8] is not comprehensive and should only serve as a starting point in WCS' effort to identify potential business partners. WCS will need to work with the government and village leaders in the partnership selection process.

With stakeholder support and appropriate business partners, we believe that a successful tiger-friendly NTFP program can be developed and implemented throughout villages in the Hunchun area. While a NTFP program will not prevent all habitat destructive behaviors, it will serve as a mitigative conservation strategy. The NTFP program will be one of the initiatives to help WCS achieve its tiger conservation goals.

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# APPENDIX

## APPENDIX 1. Livelihood Survey

	Xiacaomao							AVERAGE
<b>DEMOGRAPHICS:</b>								
- Male or Female:	M	M	M	M	M	M	F	
- How many people are in your family?	4	4	3	5	3	4	2	
<b>INCOME:</b>								
1) What is your average annual income?	¥12,000	¥12,000	¥36,000	¥16,000	¥52,000	¥21,500	¥4,200	¥22,000
2) Where do you earn your income from? Estimate								
a) <b>Cattle</b>	4 cattle (no sale)	8 cattle (no sale)	7,000 (sold 3 of 13)	5 cattle (no sale)	5,000 (10 left)	4,500 (10 cattle)		7 cattles
Percentage	0%	0%	19%	0%	10%	21%		8%
b) <b>Crops</b>	¥8,000	¥10,000	¥20,000	¥13,000	¥40,000	¥10,000	¥1,000	¥14,600
Percentage	66%	83%	56%	81%	77%	47%	24%	62%
c) <b>NTFP - Collection</b>	¥4,000	¥2,000	¥4,000	¥3,000	¥4,000	¥3,000	¥200	¥2,900
Percentage	33%	17%	11%	19%	8%	14%	5%	15%
d) <b>Part-time job</b>			¥5,000			¥4,000		
Percentage			14%			19%		
e) <b>Bee keeping</b>								
Percentage								
f) <b>Frog farming</b>								
Percentage								
g) <b>Business</b>					¥3,000			
Percentage					6%			
h) <b>Pension</b>							¥3,000	
Percentage							71%	
<b>NTFPs:</b>								
8) How many days required for harvesting NTFPs in a year?	30	15	40--50	20	10--20	45	1--2	25
Usually how far to go? (km)	20--25	5+	5--8	5--8	10	3--5	1	8
More or less for selling?	Most	Most	Most	Most	Most	Most	Most	Most
<b>Other:</b>								
9) How often do you collect firewood? (times/year)	4--5	1	2--3	2	5	2	1	2.6
How many days required for preparing firewoods in a year?	4--5	1	2--3	1	5	2	1	2.4
Usually how far to go?	10--15	1--2	2--3	1.5	3--5	Not far - use tractor	Hire others	4.5
10) Do you allow your cattle to graze in the forest?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11) Have your cattle been eaten by tigers?	No	No	No	No	No (but my cattle was injured by a tiger in 2002)	No	No (But my crops often depredated by the wild boars)	No
12) If there was a program provide technology on NTFP growing, how do you interested in it?	I have no idea since never did.	I have no idea since no one did.	I think this region is perfect for growing NTFPs, must be successful if the output is big enough and the market is available.	The benefits must be better than traditional farming if there's technic and market resource.	High technic is required, I don't know.	Too much farm and fund are required, I prefer breed more cattles.	I have no idea.	

	Guandao Valley								AVERAGE
<b>DEMOGRAPHICS:</b>									
- Male or Female:	F	M	M	M	F	F	M	M	
- How many people are in your family?	1	2	2	1	2	2	2	4	
<b>INCOME:</b>									
1) What is your average annual income?	¥10,000	¥3,160	¥1,600	¥2,000	¥30,500	¥41,000	¥23,000	¥70,000	¥22,700
2) Where do you earn your income from? Estimate									Top 3 Incomes
a) <b>Cattle</b>									
Percentage									
b) <b>Crops</b>		¥500	¥600		¥200	¥1,000	¥2,000		¥860
Percentage		16%	38%		1%	2%	9%		13%
c) <b>NTFP - Collection</b>	¥10,000	¥500	¥1,000		¥300		¥1,000	¥10,000	¥3,800
Percentage	100%	16%	63%		1%		4%	14%	33%
d) <b>Part-time job</b>									
Percentage									
e) <b>Bee keeping</b>		Got 28 beehives from the WCS-RARE project in	Got 14 beehives from the WCS-RARE project in the spring.		¥30,000	¥40,000	¥5,000		¥25,000
Percentage					98%	98%	22%		73%
f) <b>Frog farming</b>							¥15,000	¥60,000	
Percentage							65%	86%	
g) <b>Business</b>				¥2,000					
Percentage				100%					
h) <b>Pension</b>		¥2,160							
Percentage		68%							
<b>NTFPs:</b>									
8) How many days required for harvesting NTFPs in a year?	45--50	30+	50		20--30	2	40	50--60	36
Usually how far to go? (km)	20--25	15	15		7--8	1	6	15--20	12.8
More or less for selling?	Most	Most	Most		Most	None	Most	Most	Most
<b>Other:</b>									
9) How often do you collect firewood? (times/year)	8--10	3	many		5--6	5--6	10	5--6	6.4
How many days required for preparing firewoods in a year?	4--5	3	many		5--6	5--6	5	3	4.4
Usually how far to go?	4--5	Not far, use tractor.	1		2--3	1	1--2	3--9	2.8
10) Do you allow your cattle to graze in the forest?									
11) Have your cattle been eaten by tigers?									
12) If there was a program provide technology on NTFP growing, how do you interested in it?	This is what am I planning to do and why I came back from Russia.	This village is good for bee keeping, because there's good forest in the south.	I have no idea.		Nobody thought about growing as so close to and convenient to collect from the mountain.	I have no idea.	I have no idea since no one did.	The benefits must be better than traditional farming if there's technic and market resource.	

## APPENDIX 2: Hunchun NTFP Database Inventory

Name	English Name	Latin Scientific Name	Price (dry) ¥/kg	Harvest months												Sample Statistics from Survey of 14			
																% Collect	% Eat	% Sell	Avg Sales ¥ (¥ / half kg)
榛蘑	Honey Mushroom	<i>Armillariella Mellea</i>	60-100	1	2	3	4	5	6	7	8	9	10	11	12	100%	100%	93%	18
冬蘑	Late Fall Oyster Mushroom	<i>Hohenbuehelia Serotina/ Panellus Serotinus</i>	70-80	1	2	3	4	5	6	7	8	9	10	11	12	86%	79%	79%	19
小黄蘑	Golden Pholiota	<i>Pholiota Adiposa</i>	70	1	2	3	4	5	6	7	8	9	10	11	12	7%	7%		
松茸	Matsutake Mushroom	<i>Tricholoma Mtsutaka</i>	520	1	2	3	4	5	6	7	8	9	10	11	12				
山木耳 (种植)	Tree Ear(planted)	<i>Auricularia Auricula</i>	80-100	1	2	3	4	5	6	7	8	9	10	11	12				
野生木耳	Tree Ear(wild)	<i>Auricularia Auricula</i>	120	1	2	3	4	5	6	7	8	9	10	11	12				
蕨菜	Pteridium aquitinum	<i>Pteridium aquilinum var.latiusculum</i>	60	1	2	3	4	5	6	7	8	9	10	11	12	71%	71%	64%	1.7 (fresh) / 45 (dry)
明叶菜	Kikyou leaf	<i>Platycodon grandiflorum (Jacq.) A. DC.</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%		
刺老芽	Aralia mandshrica	<i>Aralia elata (Miq) Seem</i>		1	2	3	4	5	6	7	8	9	10	11	12	43%	43%	36%	4.6
薇菜	Osmunda cinnamomea	<i>Osmunda cinnamomea L.var.asiatica Fernald</i>	80	1	2	3	4	5	6	7	8	9	10	11	12	100%	86%	86%	45
沙参	Coastal glehnia root	<i>Glehnia littoralis F.Schmidt ex Miq.</i>	60	1	2	3	4	5	6	7	8	9	10	11	12				
松子	Korean Pine seed	<i>Pinus koraiensis Sieb. et Zucc</i>	80	1	2	3	4	5	6	7	8	9	10	11	12				
山核桃	Pecan seed	<i>Carya illinoensis wangenh.K.Kocn.</i>	32-36	1	2	3	4	5	6	7	8	9	10	11	12	57%	50%	29%	0.8
普通榛子	Hazel seed	<i>Corylus heterophylla</i>	20	1	2	3	4	5	6	7	8	9	10	11	12	29%	21%	7%	3
毛榛子	Fussy hazel seed	<i>exBess.Corylus heterophylla Fisch</i>	36-50	1	2	3	4	5	6	7	8	9	10	11	12	36%	29%	7%	3
椴树蜜	TuanLinden/TuanLime honey	<i>T.tuan SzczyL</i>	20-40	1	2	3	4	5	6	7	8	9	10	11	12	36%	21%	21%	10
杂花蜜	Mixed honey			1	2	3	4	5	6	7	8	9	10	11	12	36%	21%	21%	10
林蛙	Siberian frog	<i>Rana Temporaria Chensinensis David</i>	20	1	2	3	4	5	6	7	8	9	10	11	12				
野生枸杞	Barbary Wolfberry Fruit	<i>Fructus Lyeii</i>	60	1	2	3	4	5	6	7	8	9	10	11	12				
五味子 (种植/野生)	Chinese Magnolia-vine seed	<i>Sehisanra chinensis(Turcz.)Baill</i>	50-300	1	2	3	4	5	6	7	8	9	10	11	12				
刺五加	Siberian Ginseng seed	<i>Acanthopanax senticosus</i>	70-100	1	2	3	4	5	6	7	8	9	10	11	12				
山茱萸	Asiatic Cornelian Cherry Fruit	<i>Cornus officinalis Sieb. Et Zucc.</i>	100	1	2	3	4	5	6	7	8	9	10	11	12				
人参 (种植)	Ginseng(planted)	<i>Panax ginseng C. A. Mey.</i>	80-600	1	2	3	4	5	6	7	8	9	10	11	12				
榆黄蘑	Golden Oyster Mushroom	<i>Pleurotus Citrinopileatus</i>		1	2	3	4	5	6	7	8	9	10	11	12	14%	14%		
粘蘑	Slippery jack	<i>Suillus luteus / Boletus luteus</i>		1	2	3	4	5	6	7	8	9	10	11	12				
菌蘑	Mushroom: Bacteria Ru			1	2	3	4	5	6	7	8	9	10	11	12	14%	14%		
灰蘑	Grey Knight / Dirty Tricholoma	<i>Tricholoma terreum</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%	7%	10
枪头菜	Cang Zhu	<i>Atractylodes lancea (Thunb.) DC.</i>		1	2	3	4	5	6	7	8	9	10	11	12				
小根蒜	Longstamen Onion Bulb	<i>P. E. bulbos Allii Macrostemi</i>		1	2	3	4	5	6	7	8	9	10	11	12	21%	21%		
蒲公英	Dandelion	<i>Taraxacum Officinale</i>		1	2	3	4	5	6	7	8	9	10	11	12	29%	29%		
马蹄叶		<i>Ligulariasibirica Cass</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%		
驴蹄叶		<i>Caltha membranacea</i>		1	2	3	4	5	6	7	8	9	10	11	12				
青广东	Ostrich Fern	<i>Matteuccia struthiopteris</i>		1	2	3	4	5	6	7	8	9	10	11	12	43%	43%		1
猴腿菜(猴腿蹄盖蕨)	Lady Fern	<i>Athyrium multidentatum (Doll.) Ching</i>		1	2	3	4	5	6	7	8	9	10	11	12	43%	43%		
四叶菜	Taizishen / Heterophyly Falsestarwort Root	<i>Radix Pseudostellariaea</i>		1	2	3	4	5	6	7	8	9	10	11	12				
细辛	Wild ginger	<i>Asarum</i>		1	2	3	4	5	6	7	8	9	10	11	12				
山地瓜 (羊乳)	Bonnet bellflower	<i>Codonopsis lanceolata</i>		1	2	3	4	5	6	7	8	9	10	11	12				
苦菜	Sowthistle	<i>Sonchus oleraceus</i>		1	2	3	4	5	6	7	8	9	10	11	12				
黄花草	Dwarf Day Lily	<i>Hemercallis minor</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%	7%	10
老山芹	Giant Hogweed	<i>Heracleum moellendorffii</i>		1	2	3	4	5	6	7	8	9	10	11	12	36%	36%		
山白菜	Flora:Wartburg Star	<i>Aster tongolensis</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%		
柳蒿菜		<i>Artemisia selengertsis</i>		1	2	3	4	5	6	7	8	9	10	11	12	21%	21%		
山菠菜		<i>Prunella asiatica</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%		
山梨	Ussurian Pear	<i>Pyrus ussuriensis</i>		1	2	3	4	5	6	7	8	9	10	11	12	14%	14%	14%	1
山葡萄	Amur Grape	<i>Vitis amurensis</i>		1	2	3	4	5	6	7	8	9	10	11	12	7%	7%	7%	2
蚂蚁	Black Ant P.E.	<i>Polyrhachis vicina Roger</i>	60-200	1	2	3	4	5	6	7	8	9	10	11	12				

### APPENDIX 3: Hunchun NTFP Framework

#	Chinese Name	English Name	Market Demand	Environmental Neg. Impact	Economic viability (¥/kg)			Income Distribution	Time	Stakeholder Support			Value Proposition
					Retail Intl	Retail Hunchun	Wholesale			Govt	Villagers	Middle-man	
1	榛蘑	Honey Mushroom	H: (China)	4		80	60	5	6 mths grow, 1 harvest / yr	3	3	3	Undifferentiated
2	冬蘑	Late Fall Oyster Mushroom	M: (China, Korea, Japan)	4		75	56	5	6 mths grow, 1 harvest / yr	3	3	3	Undifferentiated
3	松茸	Matsutake Mushroom (fresh)	H (Korea, Japan)	4	200-300 / piece		1200	5	6 mths grow, 1 harvest / yr	5	4	4	Highly Prized by Japanese / Koreans
3.2	松茸	Matsutake Mushroom (dried)	M (China)	4		520-770	520-770	5	6 mths grow, 1 harvest / yr	5	4	4	Undifferentiated
4	山木耳 (种植)	Tree Ear(planted)	M (China, US)	1		60-140	70-90	5	6 mths grow, 1 harvest / yr	5	3	3	Undifferentiated
5	蕨菜	Pteridium aquitinum	M: (China, Korea, Russia)	4		60-70	50	5	15-30 days/yr, 1 harvest / yr	2	4	4	Undifferentiated
6	明叶菜	Kikyou leaf	M: (China)	4		NA	NA	5		3	3	2	Niche Medicinal
7	刺老芽	Aralia mandshrica		4		16-40	16-40	5		3	3	3	Niche Medicinal
8	薇菜	Osmunda cinnamomea	H: (Korea, Japan, Russia)	4		90	50-80	5	15-30 days/yr, 1 harvest / yr	2	4	4	Undifferentiated
9	松子	Korean Pine seed	H: (China)	4		80	NA	3	September 1 harvest / yr	2	3	3	Northeast China specialty
10	山核桃	Pecan seed		4		32-36	NA	3	September 1 harvest / yr	3	1	1	Northeast China specialty
11	普通榛子	Hazel seed		4		20	NA	3	September 1 harvest / yr	3	1	1	Northeast China specialty
12	毛榛子	Fussy hazel seed		4		36-50	NA	3	September 1 harvest / yr	3	1	1	Northeast China specialty
13	椴树蜜	TuanLinden/TuanLime honey	H: (China, US)	1		20-40	20-40	4	Annually - (July) 20kg/box/yr	4	4	4	Northeast China specialty
14	杂花蜜	Mixed honey	M: (China)	1		24	24	4		4	4	4	Undifferentiated
15	五味子 (种植)	Sehisandra chinensis(Turcz.)Baill (planted)	H: (China, Korea, Japan, US)	1		40-70	40-70	5		3	4	3	Northeast China specialty
15.2	五味子 (野生)	Sehisandra chinensis(Turcz.)Baill (wild)		4		100-300	100-300	5	September 1 harvest / yr	3	2	3	Northeast China specialty
16	人参 (种植)	Ginseng (planted)	H (China, Korea, Japan, US)	5		10-600 / piece	10-600 / piece	1	6 mths grow, 15 yrs fallow	5	2	3	Northeast China specialty
17	林蛙	Rana Temporaria Chensinensis David (Siberian frog)	H (China)	5		20 / piece	NA	1	September 1 harvest / yr during mating	5	2	3	Northeast China specialty
18	山葡萄	Vitis Amurensis	M	1		20	4	5		4	4	3	Northeast Specialty

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**APPENDIX 4:**  
**Sample Contract -**  
**Honey**

Sample Contract of Bee Products in China  
Source: Food and Agriculture Organization of the United Nations<sup>46</sup>

**Bee Product Purchasing Contract**  
**China**

by

Party A: Name of the Company

Party B: Beekeeping Cooperative

Party A and Party B have witnessed the major progress in bee product production and experienced favorable results through their mutual cooperation in 2003. To further promote the cooperation in 2004, the two parties, after the full consultation and under the principle of “mutual benefits, mutual assistance and joint development”, have agreed the following terms of this contract:

**I. Product Description, Quantity and Quality**

1. Party B shall deliver to Party A each year 150 tons of honey, 15 tons of royal jelly and 2 tons of bee pollen, all in good quality and valued at around \_\_\_\_\_ yuan. The product description and delivery timetable are listed below:
  - a. Rape honey from 10th to 25th April (starting from the second honey harvest);
  - b. Black locust honey from 1st to 25th May;
  - c. Linden honey from 1st to 25th July;
  - d. Chaste honey from 15th July to 15th August;
  - e. Bee pollen, mainly lotus and tea pollen;
  - f. Fresh royal jelly, to be delivered according to schedule prescribed by Party A.
2. Honey shall be pure and free from antibiotics, bad smell and foreign matters. It shall have a concentration of over 38 °Bé and meet all the requirements prescribed in the new industrial standard.
3. Royal jelly shall be fresh, pure and free from discoloring, bad smell and any additives. It shall meet all the physical and chemical requirements prescribed in the new industrial standard. Royal jelly shall be kept frozen in the collection centers.
4. Bee pollen shall preferably be free from foreign matters, soil or sand, and discoloring. It shall meet all the requirements prescribed in the new industrial standard. Purity shall reach 95% or over.
5. Party A shall adopt a policy of “high price for good quality” for bee products delivered by Party B to encourage the production of high quality, contamination-free bee products. A baseline price is set based on 38 °Bé honey and the price goes up by RMB 0.1 yuan when honey concentration increases by every 1 °Bé. Another 10% premium based on real-time market price is offered to Party B as an incentive for the good quality products. During the contracted



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period, 5 % will be paid immediately upon delivery while the rest 5% will serve as quality guarantee and only be paid in lump sum at the end of the year upon expiration of the contract.

## **II. Quality Control and Payment**

1. At the beginning of the year, Party B shall report to Party A relevant production information including the migration routes. Upon arriving at a new nectar source, Party B shall make an assessment of the flowering plants, size of the bee colony, weather conditions and yield of various bee products for the current flowering period and report to Party A in a timely manner so that Party A can make necessary preparation for purchasing.
2. Party B is responsible for the collection, preliminary examination and numbering of all bee products as well as their transportation to the purchasing stations designated by Party A. The cost for short-distance transportation to the collection centers shall be paid by Party B, and the cost for transportation from the collection centers to the purchasing stations designated by Party A shall be paid by Party A. If somebody is hired to escort the shipment for special reasons, he shall be paid by Party A.
3. For all bee products, Party B must use unused, toxic-free and contamination-free plastic pails (containers) of standard size. Plastic pails for honey shall be provided by Party A, or purchased by Party B locally, the cost of which will be paid by Party A. Containers and anti-contamination plastic bags for royal jelly and the packages for bee pollen shall be provided by Party B itself. To ensure quality control, Party A shall provide Party B standard measuring tools, which shall be returned to Party A upon expiration of the contract. Party B is responsible for financial compensation for any possible damage to these measuring tools.
4. Party B shall be paid by either on-the-spot payment or promissory note, depending on Party B's choice. If Party B chooses to collect the payment later, Party A shall provide a receipt and pay interest at 0.4% of monthly interest rate starting from the issuance of this receipt. To provide financial support to Party B in the early stage of the contracted period, Party A shall provide Party B with \_\_\_\_\_ yuan as temporary working capital before 21 March, which shall be deducted from the final payment.

## **III. Rights and Obligations for Both Parties**

1. Party B's bee farm shall be renamed as “\_\_\_\_\_” and adopt standard names, labels and signs. Appliances and tools used by Party B shall go through necessary transformation and modification according to Party A's requirements, and the cost shall be paid by Party A.
2. Party B must show due respect to the corporate image when using the “\_\_\_\_\_” brand and refrain from selling fake or inferior products, doing anything that may bring shame to the corporate image or engaging in illegal

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activities in the name of Party A.

3. Should the above-mentioned acts occur, Party B shall compensate Party A in the amount \_\_\_\_\_ yuan for the damage to the corporate image and take all the consequent legal and financial responsibilities.
4. Party B must deliver bee products in full amount as prescribed in this contract with the exception of failure caused by conditions beyond its control. Before meeting the targets laid down in this contract, Party B shall not sell qualified products to any third party, nor deliver to Party A products produced by other non-contracted parties. In case of default, Party B shall pay Party A \_\_\_\_\_ yuan as default penalty.

This contract shall become effective upon signature by both parties and shall be strictly followed by both parties. Other matters not covered in this contract shall be resolved through friendly consultation between both parties or by the people's court decision.

This contract is made in two originals with each party keeping one original.

Signature:

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Party A: Name of the company

Signature:

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Party B: Beekeeping Cooperative

Date:

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**APPENDIX 5:**  
**China Organic**  
**Certification:**  
**Honey**

Honey: China Organic Certification Standards<sup>47</sup>

[Full Requirements available in the National Standard of the People's Republic of China ICS 65.020.01]

- Conversion Period:
  - Beekeeping and beekeeping products may be certified as organic only after a conversion period of at least 12 months.
- Sitting of the Apiaries:
  - Apiaries should be established in organic production areas or natural (wild) areas where no prohibited materials are applied within the last three years.
  - There should be enough natural nectar, honeydew and pollen plants within the radius range of 3 kilometers from the hives and close to clean water sources.
  - Hives shall stay far away from away from conventional crops in blossom and potential pollution sources, for example, urban areas, roads, waste sites, chemical factories, and pesticide factories. Moreover, the distance between hives and production areas of GMOs shall be at least 3 km apart.
- Feeding:
  - At the end of the production season, adequate honey and pollen shall be kept in hives for bees to survive the winter.
  - In seasons when no production happens, bees shall be provided with adequate organic foods which are produced in the same organic production unit.
  - In cases when bees are suffering from hunger, artificial feeding with organic syrups or sugar molasses is allowed. If organic substitutes are not available, artificial feeding with conventional syrups or molasses is allowed only after the certification body has authorized it.
  - Artificial feeding may be carried out only between the last honey harvest and 15 days before the start of the next nectar or honeydew flow period.
- Veterinary Treatment:
  - Phytotherapeutic & homeopathic products can be used in preference to allopathic products that are chemically synthesized when diseases and pests strike

- In cases when these products are not available, the following can be used to control disease:
  - Sodium hydroxide, lactic acid, formic acid, sulfur, bacillus thuringiensis, and steam /flames to disinfect
- Use of antibiotics or chemically synthesized medicinal products for prevention and treatment purposes **is prohibited**, with the exception when the whole swarm faces the risks of being destroyed. Hives treated with these medicinal products shall be removed from the organic production immediately and undergo a new conversion period. The bee products of the same year shall not be certified as organic.
- Preventive treatment with chemically synthesized medicinal products is prohibited.
- Beekeeping Products Harvesting and Treatment:
  - The use of chemical synthetic expellants is prohibited to drive away swarms in the process of honey extraction.
  - Impurities in honey shall be deposited through gravity.
  - Only physical methods are allowed to prevent pests in the process of honey harvesting.
  - Such chemically synthetic materials as cyanide are prohibited as fumigation agents.
- Storage:
  - The use of chemically synthetic products (e.g. naphthalene) is prohibited in pest control, such as beeswax moths, in the process of storing honeys and beekeeping products.

## APPENDIX 6: China Wine Standards

### Wine: China Country Standards<sup>48</sup>

[Full Requirements available in the National Standard of the People's Republic of China ICS 67.160.10 / GB15037-2005]

The Standard specifies the terms and definitions, product classification, requirements, analytical methods, inspection rules, and labeling, packaging, transportation and storage necessities for wines.

- Physical and Chemical Standards

Item		Requirement
Alcohol content <sup>a</sup> (20 °C)/% (volume %) ≥	Wines	7.0
Total sugar <sup>d</sup> (calculated by	Still wines	Dry wines <sup>b</sup> ≤ 4.0
		Semi-dry wines <sup>c</sup> 4.1-12.0

glucose) /(g/L)		Semi-sweet wines	12.1-45.0
		Sweet wines ≥	45.1
	Sparkling wines	Natural sparkling wines ≤	12.0 (a difference f 3.0 is allowed)
		Absolute dry sparkling wines	12.1-17.0 (a difference f 3.0 is allowed)
		Dry sparkling wines	17.1-32.0 (a difference f 3.0 is allowed)
		Semi-dry sparkling wines	32.1-50.0
	Sweet sparkling wines ≥	50.1	
Sugar-free extract (g/L) ≥	White wines		16.0
	Rose wines		17.0
	Red wines		18.0
Volatile Acid (measured by acetic) / (g/L) ≤			1.0
Citric acid / (g/L) ≤	Dry, semi-dry and semi-sweet wines		1.0
	Sweet wines		2.0
Carbon dioxide (20 °C) / MPa	Low sparkling wines	< 250mL/bottle	0.05-0.29
		≥ 250mL/bottle	0.05-0.34
	Sparkling wines	< 250mL/bottle ≥	0.30
		≥ 250mL/bottle ≥	0.34
Total sulfur dioxide / (mg/L) ≤	Dry wines		200
	Other types of wines		250
Iron / (mg/L) ≤	8.0		
Copper / (mg/L) ≤	1.0		
Methanol / (mg/L) ≤	White and rose wines		150
	Red wines		300
Lead (Pb) / (mg/L) ≤	0.2		
Benzoic acid or sodium formate (calculated by benzoic acid) / (mg/L) ≤			50
Sorbic acid or potassium sorbate (calculated by sorbic acid) / (mg/L) ≤			200
Note: no requirement is imposed on total acid, which is measured to its actual value (calculated by tartaric acid, g/L)			
a. The indicated value and actually measured value of alcohol should not exceed +/-1.0% (volume percentage).			
b. When the difference between total sugar and total acid (calculated by tartaric acid) is less than or equal to 2.0g/L, the maximal sugar content is 9.0g/L.			
c. When the difference between total sugar and total acid (calculated by tartaric acid) is less than or equal to 2.0g/L, the maximal sugar content is 18.0g/L.			
d. The requirements on the sugar content of low sparkling wines should be the same as those of still wines.			

**APPENDIX 7:  
China Organic  
Certification:  
Mushroom**

**Mushroom: China Organic Certification Standards<sup>49</sup>**

[Full Requirements available in the National Standard of the People's Republic of China ICS 65.020.01]

• Sites and Environment:

- Cultivated in open fields of mushroom production that are adjacent to conventional fields, buffer zone of more than 30 meters wide shall be set up to prevent contamination from prohibited materials. Quality of water sources shall comply with the requirements of

- Origin:
  - Certified organic mushroom shall have clearly traceable origins.
- Pests and Pathogens Control:
  - During non-cultivation period, low-concentration chloride solution for disinfection of the production areas is allowed to spray to wash up the sites.
- Wild Plant Collection:
  - Collection areas shall have clear boundary, and stay in a state of stable and sustainable production.
  - Collection areas are free from any prohibited materials for at least three years before collection.
  - Collection shall not affect the stability of natural habitats or threaten the maintenance of plant species in the collection areas. Collection quantity shall not be in excess of sustainable output of the ecosystem.
  - Management plan for sustainable production in organic collection areas shall be developed and submitted.
- General Principles of Transportation, Storage and Packaging
  - In the process of transportation and loading and unloading of products, clearly recognizable organic certification seal and statements
  - Organic products shall be separately stored as far as possible. If they shall be stored together with conventional products, special areas shall be designated inside the warehouse for organic products.
  - Packaging materials shall be in compliance with national hygiene requirements and other regulations concerned.

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## APPENDIX 8: Potential Business Partners

Prod.	Location	Company name	Company Address	Phone	Description
Honey	Jilin Province	赵氏蜂蜜园 (Zhaoshi Honey Park)	吉林省安图县沙河乡	赵金刚 (经理) 0433-5692629 13596526626	<ul style="list-style-type: none"> <li>- Currently collects honey from villagers or local honey associations (groups of villagers) outside of Hunchun</li> <li>- Processes and packages honey</li> <li>- Honey is the major product, also sells royal jelly and beeswax</li> <li>- Sells majority of honey to Yanji, some to local Hunchun markets, and very low volume in Beijing and Qingdao</li> <li>- Interested in sourcing more honey from local villagers</li> </ul>
Honey	Jilin Province	延边宝利祥蜂业有限公司 (YanBian baolixiang beekeeping co) <a href="http://www.blx-bee.com/">http://www.blx-bee.com/</a>	吉林省敦化市北环路 137 号 邮编：133700	0433—6331123	<ul style="list-style-type: none"> <li>- Production, processing, and delivery all follow green and organic standards</li> <li>- "Baoli" brand honey is certified organic</li> <li>- Export to U.K., Japan, Hong Kong, Singapore, Malaysia</li> <li>- Processing capacity is 12,000 tons per year</li> <li>- Income from export is ~\$1.6m USD per year</li> </ul>
Honey	Jilin Province	珲春毛氏养蜂场 (Hunchun Maoshi Bee Farm)	吉林省延吉市延吉市双阳街	NA	<ul style="list-style-type: none"> <li>- Honey, royal jelly, beeswax</li> </ul>
Honey	Jilin Province	长春市天一蜂业有限公司 (Tianyi Beekeeping Co) <a href="http://www.tianyify.com/">http://www.tianyify.com/</a>	吉林省长春市南关区 金城街 919	0431-84523388/ 84523399 400-609-0008	<ul style="list-style-type: none"> <li>- Established beekeeping business in ChangBai Shan in 2002</li> <li>- Conducts regular inspection of bee farm and educates beekeepers on organic practices</li> <li>- Has 8 organic-certified and 7 green-certified products</li> </ul>



Honey	Liaoning Province	桑地蜜蜂公司 (Sangdi Honeybee) <a href="http://www.sangdi.com/">http://www.sangdi.com/</a>	大连鲁迅路 74 号安达大厦 A2203 室	0411-82731582	<ul style="list-style-type: none"> <li>- Dutch government and Sangdi Honeybee Co., Ltd invested 1,000 million RMB to establish the organic beekeeping industry</li> <li>- Produces and markets 6,000 MT of honey annually, as well as beeswax, royal jelly, pollen, propolis and the other honeybee products. It also sells beekeeping equipment</li> </ul>
Honey	Jiangxi Province	汪氏蜜蜂园有限公司 (Wang Si Honey Company) <a href="http://www.wsbee.com/">http://www.wsbee.com/</a>	江西省南昌市新建县长堽外商投资工业区工业大道 198 号	0791-3706100	<ul style="list-style-type: none"> <li>- Sells 160 honey-related products throughout China and exports to Europe and Southeast Asia</li> <li>- Products are available in supermarkets as well as their own honey specialty stores (has a retail store in Hunchun)</li> </ul>
Honey	Shanghai	上海冠生园蜂制品有限公司 (Shanghai Guan Sheng Yuan Honey Co.) <a href="http://www.gsygroup.com/cn/company/detail.asp?newsid=40">http://www.gsygroup.com/cn/company/detail.asp?newsid=40</a>	上海市新闻路 1418 号	021-62727878	<ul style="list-style-type: none"> <li>- Leader in bottled honey sales in China, has 50% market share in Shanghai</li> <li>- 冠生园 is a "China Famous Brand"</li> </ul>
Honey	Beijing	北京百花蜂产品科技发展有限公司 (Beijing Baihua Bee Co) <a href="http://www.bjbaihua.com/">http://www.bjbaihua.com/</a>	北京市大兴区同济中路 7 号	67869021	<ul style="list-style-type: none"> <li>- Manages raw material, product, and brand</li> <li>- Sells 140 products in 23 cities in China</li> <li>- Promotes beekeeping business in the suburbs of Beijing with the "leading enterprises + beekeeping cooperative + farmer + standardized production" model</li> <li>- 百花牌 is a "Beijing Famous Brand"</li> </ul>
Honey	Beijing	北京东方颐园蜂产品有限公司 (Yishouyuan (Beijing) Bee Products Co.) <a href="http://www.ysybee.com/cn/index.asp">http://www.ysybee.com/cn/index.asp</a>	北京市朝阳区北辰东路 8 号北辰时代大厦 13 层	010-84921717	<ul style="list-style-type: none"> <li>- 颐园牌 is one of top 10 most influential brands in China</li> <li>- CHTC organic-certified bee farm in Yunnan and organic-certified facility in Beijing</li> </ul>

Honey	Hebei Province	河北省吴桥县蜂产品 (Wuqiao Honey Products Company)	河北省吴桥县城京福路 84 号	NA	- NA
Mushroom	Hunchun	珲春旻顺现代农业开发有限公司 (Minshun Ltd.Co.)	吉林省珲春市珲春边境经济合作区 1 号小区		- Exports "organic" mushrooms - Has mushroom cultivation facility in 密江乡、哈达门乡、杨泡乡、春化镇
Mushroom	Hunchun	珲春市锡霍特野生特产批发直销行 <a href="http://www.xihuoteyeshan Shen.cn/athena/companyprofile/langyulinlin.html">http://www.xihuoteyeshan Shen.cn/athena/companyprofile/langyulinlin.html</a>	吉林省珲春市河南街 53	0433-2560048	- Processes and exports mushroom, ginseng, deer products - Sells primarily to Yanji, Hunchun, North Korea and Russia
Mushroom	Jilin Province	大富松茸收购	吉林省延吉市松茸一条街	NA	- Distributes matsutake mushrooms to various cities in China and exports to Korea and Japan
Mushroom	Jilin Province	延吉柳京物产有限公司 Yanji Liujing Wuchan co <a href="http://www.ybliujing.com.cn/">http://www.ybliujing.com.cn/</a>	吉林省延吉市河南街光华路 1599-10 号	13904430302	- Acquires and exports ~10tons of fresh and frozen matsutake mushrooms to Korea per year and ~20 tons to Japan
Mushroom	Jilin Province	延边周延吉市鸿运松茸进出口贸易公司 <a href="http://yinhongping.cn.makepolo.com/">http://yinhongping.cn.makepolo.com/</a>	吉林省延边朝鲜族自治州延吉市前进路 8-5-3	13844350888 0433-6190888	- Sends villages to collect matsutake mushrooms in the mountain - Specializes in exporting matsutake mushrooms
Mushroom	Jilin Province	吉林省延边宏杰有限公司	吉林省延吉市延吉市西市场	0433-2565092	- Acquires, processes, and packages mushrooms
North-east specialty(in cl. mushroom)	Jilin Province	长白山天然土特产批发公司	吉林省延吉市长白路 32 号	NA	- Acquires and distributes various northeast Chinese specialties, including ginseng, Siberian frog ovaries, wild honey, and matsutake mushrooms to other cities in China, Japan, Korea

Grape	Hunchun	康华 (Kanghua)	琿春	13304472219	- NA
Grape	Hunchun	冠醇	吉林省琿春市地 稅局對面	13154333399	<ul style="list-style-type: none"> <li>- Local store-front business that sells wines / alcohol of various different varieties</li> <li>- Currently sells Schisandra berry wine for 20¥/ KG</li> <li>- Ages wine for 1 year</li> </ul>
Grape	Jilin Province	通化天池山葡萄酒有 限公司 <a href="http://www.tianchishan.com/news/">http://www.tianchishan.com/news/</a>	吉林省通化柳河 鎮前進路 148 号	0435-7330628 / 7336818 / 7336828	<ul style="list-style-type: none"> <li>- Owns 150 acres of vineyards</li> <li>- Produces Amur grape ice wine, red wine, Amur grape juice</li> </ul>
Grape	Jilin Province	吉林雪兰山葡萄酒业 有限责任公司 <a href="http://www.xuelanshan.com/Brief.asp">http://www.xuelanshan.com/Brief.asp</a>	吉林省通化市柳 河县吉林柳河长 青路 88 号	0435-7326585	<ul style="list-style-type: none"> <li>- Exports wine to Korea, southeast Asia, and Hong Kong</li> <li>- Produces Schisandra berry wines, blueberry wines, and ice wines</li> </ul>
Grape	Jilin Province	吉林省清木园山葡萄 技术开发有限公司 (Jilin Qingmuyuan Amur Grape Technology Development Co) <a href="http://en.lhqmy.com">http://en.lhqmy.com</a>	吉林省柳河县柳 河镇站前路 586 号	0435-7333811	<ul style="list-style-type: none"> <li>- Integrates planting, production and processing of Amur grapes</li> <li>- The company's concentrated Amur grape juice, Amur grape wine and Amur grape drinks have been listed as national-level quality products by the Food Industrial Association and been awarded Famous-Brand Products of Jilin Province</li> <li>- Exports concentrated Amur grape juice to Japan, South Korea and other countries</li> </ul>
Grape	Jilin Province	通化紫隆山葡萄酒厂 <a href="http://www.zlsptj.com">www.zlsptj.com</a>	吉林省柳河三源 浦镇工业园区	13843512888 13766166969	<ul style="list-style-type: none"> <li>- Produces ice wine, red wine, grape juice</li> <li>- Sells products throughout China</li> </ul>
Grape	Jilin Province	吉林源之王葡萄酒业 有限公司	NA	0435-7335577 13844551919	- Produces wine and sells to various cities in China

Schisandra Berry	Jilin Province	通化广田经济技术开发有限公司	吉林省 通化市 东昌路 4 号	0435-3325500	- Has expertise in Schisandra berry cultivation – specializes in organic fertilizer for Schisandra berries
Schisandra Berry	Hunchun	珲春市裕丰农业发展有限责任公司	珲春晖村市	0433-88937635	- Specializes in the cultivation and processing of Schisandra berries, blueberries, and ginseng
Schisandra Berry	Hunchun	珲春绿岛药业有限公司	吉林省珲春边境经济合作区	0433-6911518 0433-6911508	- Chinese medicine manufacturer that owns medicinal herb plants in ChangBai Shan  - Produces many herb extracts, including Schisandra berries
Frogs	Hunchun	李富诚品生物开发有限公司	吉林省珲春市春城路 465 號	13620711777	- Currently focuses on Siberian frogs and ginseng products  - Could be a potential partner for distribution
Export	Hunchun	珲春市宝鑫经贸有限公司 (Bao Xin Trade Co) <a href="http://www.hcbxjm.com/">http://www.hcbxjm.com/</a>	吉林省珲春市新安街	15943389797	- Has trade relationships with Japan, North Korea, South Korea, Russia  - Exports Hunchun Macheon sub-rice, soybean oil, northeast corn, household appliances, building materials, and imports seafood
Export	Beijing	中国土产畜产进出口总公司 (China Tuhsu Super Food Import & Export Corporation) <a href="http://www.tuhsu.com.cn/english/about/about.php">http://www.tuhsu.com.cn/english/about/about.php</a>	No.208, An Ding Men Wai Street,, Beijing,	10-64208200	- Engages in the production and distribution of three varieties of products: native Chinese produce such as wood, spices, honey; animal by-products such as feathers, cashmere, and leather; and tea products  - China Sundries and Flowers Import & Export Corp., a subsidiary of TUHSU, focuses on creating safe, nutritious and healthy Sundry organic foods and currently focuses on honey fungus (including matsutake mushroom from Yunnan)

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- <sup>1</sup> RARE PRIDE CAMPAIGN PROJECT PLAN CHINA HUNCHUN MANCHURIAN TIGER
- <sup>2</sup> RARE PRIDE CAMPAIGN PROJECT PLAN CHINA HUNCHUN MANCHURIAN TIGER
- <sup>3</sup> [http://www.panthera.org/documents/TigerRising\\_AH.pdf](http://www.panthera.org/documents/TigerRising_AH.pdf)
- <sup>4</sup> <http://www.cifor.cgiar.org/Publications/Corporate/FactSheet/ntfp.htm>
- <sup>5</sup> [http://www.fao.org/sard/common/ecg/1357/en/hwc\\_final.pdf](http://www.fao.org/sard/common/ecg/1357/en/hwc_final.pdf)
- <sup>6</sup> <http://www.fao.org/docrep/w7715e/w7715e07.htm>
- <sup>7</sup> <http://www.grassroots.org.in/catalogue/grassroots-occasional%20paper1-ntfp.pdf>
- <sup>8</sup> <http://www.fao.org/docrep/005/y4496e/y4496e41.htm>
- <sup>9</sup> <http://www.rainforest-alliance.org/forestry/documents/ntfp-addendum-generic-guidelines.pdf>
- <sup>10</sup> Packaged Facts: Trends in the US Market for Sugar, sugar Substitutes, and Sweeteners pg. 57
- <sup>11</sup> <http://www.newsguide.us/lifestyle/beauty/Global-Honey-Market-to-Reach-1-9-Million-Tons-by-2015-According-to-New-Report-by-Global-Industry-Analysts-Inc/>
- <sup>12</sup> [http://prosperityinitiative.org/images/stories/pdf/honey\\_small\\_scale\\_report\\_pi-cap.pdf](http://prosperityinitiative.org/images/stories/pdf/honey_small_scale_report_pi-cap.pdf)
- <sup>13</sup> [http://eng.dgbas.gov.tw/public/data/dgbas03/bs2/yearbook\\_eng/y107I.pdf](http://eng.dgbas.gov.tw/public/data/dgbas03/bs2/yearbook_eng/y107I.pdf) Statistical Yearbook of The Republic of China
- <sup>14</sup> <http://www.telegraph.co.uk/news/worldnews/northamerica/usa/4043733/US-officials-crack-down-on-Chinese-honey-laundering.html>
- <sup>15</sup> [http://prosperityinitiative.org/images/stories/pdf/honey\\_small\\_scale\\_report\\_pi-cap.pdf](http://prosperityinitiative.org/images/stories/pdf/honey_small_scale_report_pi-cap.pdf)
- <sup>16</sup> <http://economictimes.indiatimes.com/features/the-sunday-et/deline-india/Honey-dips-into-pot-of-gold/articleshow/5570594.cms>
- <sup>17</sup> <http://en.invest.china.cn/english/features/48095.htm>
- <sup>18</sup> <http://abcnews.go.com/International/story?id=2963266&page=1>
- <sup>19</sup> <http://www.wines-info.com/en/html/2010/2/20100226023017228.html>
- <sup>20</sup> [http://gain.fas.usda.gov/Recent%20GAIN%20Publications/National%20Wine%20Market\\_Shanghai%20ATO\\_China%20-%20Peoples%20Republic%20of\\_8-19-2009.pdf](http://gain.fas.usda.gov/Recent%20GAIN%20Publications/National%20Wine%20Market_Shanghai%20ATO_China%20-%20Peoples%20Republic%20of_8-19-2009.pdf)
- <sup>21</sup> <http://www.wines-info.com/en/html/2009/8/20090815095544228.html>
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- <sup>23</sup> <http://www.ice.gov.it/paes/asia/cina/upload/174/Chinese%20wine%20report%202010.pdf>
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- <sup>25</sup> [www.ift.org](http://www.ift.org)
- <sup>26</sup> [http://www.indiana.edu/~iascp/bali/papers/Jun\\_he.pdf](http://www.indiana.edu/~iascp/bali/papers/Jun_he.pdf)
- <sup>27</sup> Japan Mushroom Market
- <sup>28</sup> [http://www.indiana.edu/~iascp/bali/papers/Jun\\_he.pdf](http://www.indiana.edu/~iascp/bali/papers/Jun_he.pdf)
- <sup>29</sup> [http://www.danielwinkler.com/matsutake\\_conservation\\_in\\_sw\\_china.htm](http://www.danielwinkler.com/matsutake_conservation_in_sw_china.htm)
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<sup>44</sup> KCTC Beef and Dairy Cattle Analysis Jan 07.pdf

<sup>45</sup> “4-in-1” Biogas System in Northern China

<sup>46</sup> [http://www.fao.org/uploads/media/3\\_Sample\\_contract\\_of\\_bee\\_product\\_in\\_China.pdf](http://www.fao.org/uploads/media/3_Sample_contract_of_bee_product_in_China.pdf)

<sup>47</sup> [http://www.unctad.org/trade\\_env/itf-organic/meetings/misc/Chinaorganicstandard.pdf](http://www.unctad.org/trade_env/itf-organic/meetings/misc/Chinaorganicstandard.pdf)

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