AN ANALYSIS OF FARMERS' NET INCOMES FROM UNDERPLANTING DEVELOPMENT

Case Studies from Hunan and Guangxi Provinces of China

by

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Abstract

Following the Collective Forest Tenure, the development of underplanted forest products (UFPs) is one of the forest-related policies intended to enhance the efficiency of forest land use, improve local farmers' livelihoods, and at the same time protect forest resources. This study is aimed at understanding what might affect farmers' incomes from UFPs, the difficulties and barriers farmers face in developing UFPs, and the influence of the UFP policy. To achieve this objective, one quantitative questionnaire study and two qualitative interview studies with local households and local forest authority directors were conducted in Jingzhou County, Hunan Province and in Sanjiang County, Guangxi Province in China. Education and market situation were important for UFP development. A lack of related knowledge and market information was the major barrier to cultivating UFPs. The influence of the policy to encourage UFPs was negligible. According to the participants, the main difference between households cultivating UFPs and those that were not was related to improved market access and information. Interviewees felt that cooperation and support from the government and from UFP processors would enhance their interests in the cultivation of UFPs.

Preface

This study was conducted in collaboration with Dr. John Innes, Jinlong Liu and Harry Nelson. Under their supervision, I conducted most of the research design, data, fieldwork, data analysis and thesis writing.

This research was approved by the University of British Columbia Behavioural Research Ethics Board (Certificate number H12-00750).

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List of Abbreviations

AC	Advanced Cooperation
CFTR	Collective Forest Tenure Reform
CIFOR	Center for International Forestry Research
EC	Elementary Cooperation
FAO	Food and Agriculture Organization of the United Nations
HRS	Household Responsibility System
LRC	Land Reform Campaign
NFPP	Natural Forest Protection Program
NTFP	Non-Timber Forest Product
NWFP	Non-Wood Forest Product
PC	People's Communes
PRC	People's Republic of China
SFA	State Forestry Administration of China
SNFRI	Seventh National Forestry Resources Inventory
UFP	Underplanted Forest Products

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To my parents

Chapter 1: Introduction

In 2003, the Collective Forest Tenure Reform was undertaken in Fujian and Jiangxi provinces as pilot projects for tenure reform in China (Wei and Zhang 2009). By 2008, this reform had expanded throughout China (Central Government of China 2008). Clarification of the rights to use the land is a central part of this reform (Qin et al. 2011). With the advance of the collective forest tenure reforms, tenure rights, disposition rights, and usufructuary rights (Wang 2010) have been given back to forest farmers in the majority of rural areas in China (Zhang and Li 2012). However, as there is a cutting quota in China, farmers need to apply for a forest harvesting permit from the local forestry authority, which is complex and expensive. As a result, this policy restricts the incomes that farmers can gain from timber (Zhang et al. 2010). Several forest-related reforms have been aimed at increasing farmers' incomes, one of which is the development of underplanted forest products (UFPs).

Forest products are composed of timber and non-timber products (NTFPs). NTFPs include everything that can come from a forest except timber; most UFPs are NTFPs. NTFPs have a high level of use by rural people and also provide cash income (Belcher 2005). The State Forestry Administration of China (SFA) encouraged farmers to utilize the forest land beneath trees to raise poultry or plant low-growing plants such as medicinal herbs, saplings, fungi, and flowers. In this way, farmers can make money from their forest land without harvesting the trees. Such planting can also help mitigate the shortage of farming land. Research focused on the development of NTFPs around

the world has shown that this is a useful method to reduce rural poverty (Gauli and Hauser 2011), increase incomes (Timko et al. 2010) and protect the biodiversity of forests (Gauli and Hauser 2011, Saha and Sundriyal 2012). Despite the volume of research undertaken to date, the relationship between the development of underplanting and farmers' incomes in China has not been addressed. The primary questions for my study were: how do UFPs affect farmers' incomes, what issues or difficulties do farmers face and what can be done to solve these problems?

In my study, I chose two counties in China as study areas: Jingzhou County in Hunan Province and Sanjiang County in Guangxi Province. My study had three objectives: (i) evaluating the factors that could affect farmers' incomes from underplanting, (ii) examining what difficulties farmers are facing and how to solve them and (iii) examining how forest-related policies have affected the development of underplanting.

The relationship between several factors (education, forest size, number of people older than 45 in the households, education, capacity and market) and net incomes were analyzed. Qualitative research methods were used to examine the issues and difficulties that farmers are facing and the issues in the forest-related policies.

In this thesis, Chapter 1 is divided into five parts. The first two parts provide a brief introduction to collective forests and forest tenure reforms in China. I then discuss farmers' incomes in the next two parts; I examine their incomes from forestry, and the development of UFPs. In the last part, I list the study's objectives. Chapter 2 presents

the approach taken and the methodology used. I explain the results related to each objective in Chapter 3. A discussion of the findings of this study is provided in Chapter 4.

1.1 Collective forests

In China, according to the Seventh National Forestry Resources Inventory (SNFRI) (2004-2008), there are 195 million hectares of forest land with 181 million hectares of forest cover (SFA 2011a). The area of collective forest is 109 million hectares, 60% of the total forest area[1]. Collective forests occur throughout China, but are especially common in southern China. The Southern Collective Forest Region includes ten provinces[2]. In these areas, collective forest land makes up more than 90% of the total area of forest land (Liu et al. 2006a). There are more than 61 million hectares of plantations, with 84% of them located on collective land (Liu et al. 2006a, Miao and West 2004).

1.2 Forest tenure reform

1.2.1 History of forest tenure reform

Land ownership in China since 1956 has either been with the state or with collectives. The tenures associated with forest resources are more complex, with four types being present: state-owned, collective-owned, private-owned and mixed ownership (Liu 2001).

[1] Except Hongkong, Macao and Taiwan.
[2] These ten provinces are: Anhui, Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hunan, Hubei, Jiangxi and Zhejiang.

The forest in China is generally divided into two parts: the north and the south. In the north, most forests have been owned by the state since the founding of the People's Republic of China (PRC) in 1949, and those forests are managed by state-owned enterprises or state-owned forest farms (Wang and Delang 2011). The state-owned forests were mostly in the following provinces: Heilongjiang, Jilin, Inner Mongolia (Neimenggu), Xinjiang, Xizang (Tibet), Gansu, Shanxi, Sichuan and Yunnan (Wang and Delang, 2011). In the south, the population density is greater than the north and people have a longer history of forest use (Wang and Delang 2011). Consequently, most of the forest tenures were not owned by the state, and ownership has changed many times since the liberation of China. The southern provinces include: Anhui, Hubei, Zhejiang, Hunan, Jiangxi, Fujian, Guizhou, Guangxi, Guangdong and Hainan (Miao and West, 2004).

Forest tenure reforms have been carried out in four different periods in China since the founding of PRC in 1949 (Zhang 2009).

When the PRC was founded, 90% of Chinese were living in rural areas, where 28 to 50% of the land was owned by 6 to 10% of the population, primarily the richest landlords and peasants (Wang and Delang 2011). This led the Government Administration Council of the Central People's Government of China to launch the Land Reform Campaign (LRC) in June 1950, with the objective of redistributing the land (Ho 2006).

The first period of forest-related tenure reform was from 1950 to 1955. In most areas of China, the LRC started in 1950 and confiscated all forest land owned by landlords, parts of forests owned by rich peasants, and the commonly-owned forests (Zhang 2009). The forest resources located near villages were then redistributed equally to rural households by geographical location, with the trees being owned privately (Zheng et al. 2009, Shen et al. 2009, Liu 2001).The former landlords received the same share as other households, although in some cases during the LRC the landlords were imprisoned or executed (Wang and Delang 2011). Most natural forest and remote forests were controlled by the government as the peoples' representative. Some other forest areas, mainly forests near villages but difficult for farmers to manage, such as forests on steep slopes or hilltops, were owned by the collective (Wang and Delang 2011). The LRC finished at the end of 1952, with 300 million farmers having received 46.67 million ha of forest land (Liu et al. 2006a).

Table 1.1 Tenure management from 1950 to 1955

	Forest type	Land ownership	Usage right
State-owned Forest	natural forest	state	state or local government
Collective forest	near village, hard to manage	collective	village leader and households
Private forest	near village, easy to manage	private	households

Source from: Wang and Delang[3], and Liu[4]

After 1953, the central government encouraged individuals to pool their land and other means of production so that the land could be managed collectively as a group and agricultural productivity improved (Liu et al. 2006a). Farmers were paid on the basis of the share they contributed to the common resource pool and their work performance in the group (Liu 2001). This usually happened at a village level (with usually about 30 households in a group). Each group was referred to as an Elementary Cooperative (EC) (Liu et al. 2006a, Liu 2001). The property rights for forest resources did not change during the EC period (1953-1955); the land still belonged to private individuals (Ho 2006, Liu 2001). Although Chairman Mao encouraged farmers to join ECs, the proportion joining was less than 60% (Liu 2001).

[3] Chinese Forest Policies in the Age of Ideology (1949-1977), *International Forestry Revi*ew, 13(4):416-430.2011

[4] Tenure and Management of Non-state Forests in China since 1950s: A History Review, *Environmental History*, 6(2):239-262.2001

The second period or reform occurred from 1956 to 1980. The government expanded each EC to a much larger scale. Linked ECs became Advanced Cooperatives (ACs) (usually consisting of dozens of ECs). With the formation of an AC, both property and tenure rights shifted from private to collective ownership (Liu 2010). By the end of 1956, 96 percent of households had joined ACs. From then on, all forest land in villages, together with labourers and capital, were taken over by the commune (Liu 2001, Wang and Delang 2012). At the start of 1953, an average EC consisted of 16.4 households; by December 1956, there were on average 155 households per AC (Wang and Delang 2012). In 1958, a policy was passed by the Central Committee of the Communist Party of China, which encouraged farmers to join People's Communes (PCs). The PCs were formed by merging ACs (Liu 2001, Zheng et al. 2009). By the end of 1958, 90 percent of households had joined 23,400 communes across China with, on average, 4,800 households in each commune (Liu 2001). Through this, the communes took all the benefits from timber and non-timber products, and the farmers become government employees who were paid a fixed salary for working in the commune (Wang and Delang 2012). Property rights were more centralized, being transferred from the ACs to the communes (Liu 2001). This re-distribution of income, together with the centralized ownership, caused serious agricultural failures and a famine from 1959 to 1961 (Lin 1990). This resulted in the government readjusting ownership-related policy in the early 1960s. Forest ownership remained collective, but the forest tenure and management rights were devolved to different levels, including communes, production brigades (the equivalent of the former advanced cooperative (AC)), and production teams (the equivalent of the former elementary cooperative (EC)) (Liu 2001). For large areas and

evenly distributed forests, production teams were responsible for managing the forests. Where forests were distributed unevenly, especially where they were difficult to divide, the production brigade collectively managed the forest. In hill and plains areas, most forests were divided into production teams, although a certain number, usually around 5% to 20% of the forest area, were divided and allocated to households to manage (Liu et al. 2006a). Rights of use belonged to the production teams and these dominated forest management until the early 1980s (Liu 2001, Liu et al. 2006a). Orchards, non-timber forest products and plantations that had previously belonged to communes were returned to households (Liu 2001). In May 1963, the State Council promulgated the "Regulations on Forests Protection", which clearly indicated that the ownership of trees should be protected, no matter whether they belonged to the collective or to individuals, and regardless of which production unit held ownership (Liu et al. 2006a). This was the first time that trees planted by households around their house or in their family plots were recognized as the property of households (Liu 2001).

The Cultural Revolution, which occurred from 1966 to 1976, and other policies led to a high frequency of forest and tree ownership in some areas[5]. The plantations, orchards and non-timber forest products that belonged to households were seen as something that could destroy socialism, so they were all re-collectivized, with ownership once again being by production teams or production brigades (Liu 2001). Liu (2001) has provided an example about the ownership of fruit trees in Chuxiong County, Yunnan

[5] In most areas, the Culture Revolution did not affect the forest tenure as the political struggle was the core of this revolution.

province: “Ownership of fruit trees was transferred from households to advanced cooperatives in 1956 and further to communes in 1958; communes back to households in 1961; households to production teams in 1969; production teams to households in 1971; households to production teams in 1977; and production teams to households in the late 1970s”. People living in forest areas not surprisingly lack confidence in their security of tenure, and this has led to a reduced interest in investing in reforestation (Qin et al. 2011, Liu et al. 2007, Liu 2007a).

After Mao’s death in 1976, it was possible to change the commune system. At the end of 1978, a small number of production teams began to contract agricultural land and output production quotas with households, and this resulted in much higher yields (Lin 1992). This type of farming arrangement was accepted by the central authorities and started to be expanded officially in 1981. By the end of 1983, 98% of the production teams had adopted this approach, which was called the “Household Responsibility System” (HRS) (Lin 1992). The HRS aimed to change the organization of ownership and production, and was followed by changes to the entire administration system in China: production teams changed to natural villages, production brigades became the administrative villages and communes become townships (see Table 1.2).

Table 1.2 Changes in the names of different types of cooperation since 1953

Scale[6]\Time	1953-1958[7]	1959-1981	1981-now
10-20 households	Elementary cooperation	Production team	Natural village
150-200 households	Advanced cooperation	Production brigades	Administrative village
5000 households	Commune	Commune	Township

In March 1981 the State Council of the PRC issued a 'Resolution on Issues Concerning Forest Protection and Development' which marked the start of the third period of forest reform (Delang and Wang 2012, Liu 2001). This reform lasted for about three years and comprised three parts: "fixing" ownership of forests, forest management roles, and the HRS for forest management, and is sometimes known as the "three fixes" (Liu 2009). Forest tenures were stabilized during this period, with existing forest boundaries being confirmed. Wasteland was allocated to households, and called 'family plots' (*Ziliu Shan*). The collective forests were contracted to farmer households under the HRS system, with these forests being called 'responsibility hills' (*Zeren Shan*) (Liu 2001). The result of this reform was the establishment of three main patterns of forest tenure and management arrangements: family plots, responsibility hills and collectively-managed hills (Table 1.3). In the case of family plots (*Ziliu Shan*), the tenure rights were issued as a certificate with the area of land having confirmed boundaries. They were given to

[6] The scale ranges largely due to the different population densities across China.
[7] The Elememtary Cooperation, Advanced Cooperation and Commune did not exist at the same time, Elementary Cooperation existed from 1953-1955; Advanced Cooperation existed from 1955-1956; Commune existed from 1957-1984.

family households or involved the allocation of unmanaged mountain land to households in villages, with the trees planted by a household on family plots being considered as privately held (Liu 2001). Family plots were designed to meet households' firewood and timber demands. Although the principle of collective property remained in the family plots, the households had the right to use the forest land, own the trees, usufruct rights and could keep the profits made from timber (Zheng et al. 2009). An administrative village, as the owner of the land, could take control of family plots from households if they did not plant trees (Liu 2001). In the case of responsibility hills (*Zeren Shan*), the forest tenure rights contracted previously unallocated forest land to different households (Liu 2001). As with family plots, the land itself still belonged to the collective. Households had the right to use the forest land, but shared the ownership of trees, usufruct rights, disposition rights and benefits with the collective (Shen et al. 2009, Zheng et al. 2009). Any sharing of benefits depended on the contract with the collective (Liu 2001). However, following rapid deforestation in the 1980s, the central authorities banned the allocation of new forest land to households, and in some areas the local governments even repossessed land from households (Shen et al. 2009, Liu et al. 2006a). In the case of the collectively-managed hills (*Tongguan Shan*), the collectives held all the rights to the forest land.

Table 1.3 Three types of forest management systems in collective forest since 1980s

Types[8]	Usage rights	Usufruct
Family plots (*Ziliu Shan*)	Households	Households
Responsibility hills (*Zeren Shan*)	Households[9]	Households and collective
Collective management hills (*Tongguan Shan*)	Collective	Collective

As a result of the long history of land tenure reforms, there are now only two types of land property rights in China, state-owned and collective-owned (Liu 2001). Rural land is owned by the collective at the village level (Wang et al. 2011). Property rights however have become separated from tenure rights. Since 1981, individual households have been entitled to make more decisions (Liu 2001). In 1984, the Forest Law was ratified and permitted collaboration between households and new types of market-oriented forest management (Delang and Wang 2012). By 1986, about 70% of the collective forest land had been transferred to the private sector (Zhang et al. 2012), including farmer cooperatives and foreign investors, through contracting, auctions and leasehold arrangements (Liu 2007b).

The fourth period of tenure reform began in the early 2000s, and was called the Collective Forest Tenure Reform (CFTR). In the 1980s and 1990s, the unstable policies related to forest land, together with a number of ambiguities left by earlier tenure reforms and the lack of legal protection, resulted in farmers losing any incentives to

[8] These three types did not always exist in a same place. In some places, only one or two types existed.
[9] Households contract with village administrations for the rights to use land.

manage the forest effectively (Liu et al. 2006b). In the early 2000s, the latest forest reform was implemented in four pilot provinces—Fujian, Jiangxi, Zhejiang and Liaoning, and was followed by Yunnan, Anhui and Hebei Provinces (Shen et al. 2009, Guo 2011). In 2008, the reform was expanded throughout the country, resulting in the assignment of an estimated 33 million ha of collective forest land to individual households (Shen et al. 2009). This reform was an extension of the changes established in 1981, as the tenure system itself did not change (Zhang 2009).The property rights for the land remained with the state or collective. Instead, the focus of the reform was on tenure rights.

There were four important parts to this tenure reform. The first consisted of clarification of the tenure rights, with rural households having clear rights to their forest land for 70 years (Central Government of China 2008). After all boundaries were demarcated and any disputes settled, a certificate of forest tenure was given to each household. In addition, the boundary settlements are protected by law.

Secondly, the reform provided an allowance for management flexibility (Central Government of China 2008). For ecological forests, namely forests growing in important ecological areas or in ecologically fragile areas, households could develop underplanting or forest tourism, provided that these activities did not damage the ecological functions of the forest. Households had complete responsibility for commercial forests.

Thirdly, the reform implemented disposition rights, meaning that a household has the right to transfer management rights to the forest land and ownership of the trees to others (Central Government of China 2008). Finally, usufructuary rights were protected. Households can keep the revenue from their forest land. If the government places a levy on commercial forest land, compensation should be given to households. The same applies to ecological forest land (Central Government of China 2008).

The SNFRI (2004-2008) indicated that the proportion of forest land area under individual tenures increased from 20% in 2003 to 32% in 2008 (SFA 2011a). Although the forest tenure reform had not been finished by 2008, the trend in forest land use rights was already clear.

This tenure reform has affected different places differently. In some villages, such as Xikou and Liaoxi Villages in Zhejiang Province, more than 90% of the collectively managed hills had been allocated to households by 1990, so this new reform just simply extended the use rights of households for another 50 years (Shen et al. 2009). In comparison, in many villages in Fujian province, only a small portion of collective forest land was distributed to different households, as instead of fragmenting the forest, local farmers preferred to elect a village committee to manage their forest. The households involved in the arrangement then share the land and benefits based on the number of shares they hold (Shen et al. 2009).

Although this reform has only just been completed for the whole country, some research about the impacts on households has already been done. For example, Xie et al. (2013) have indicated that this forest tenure reform could improve local peoples' incomes and livelihoods.

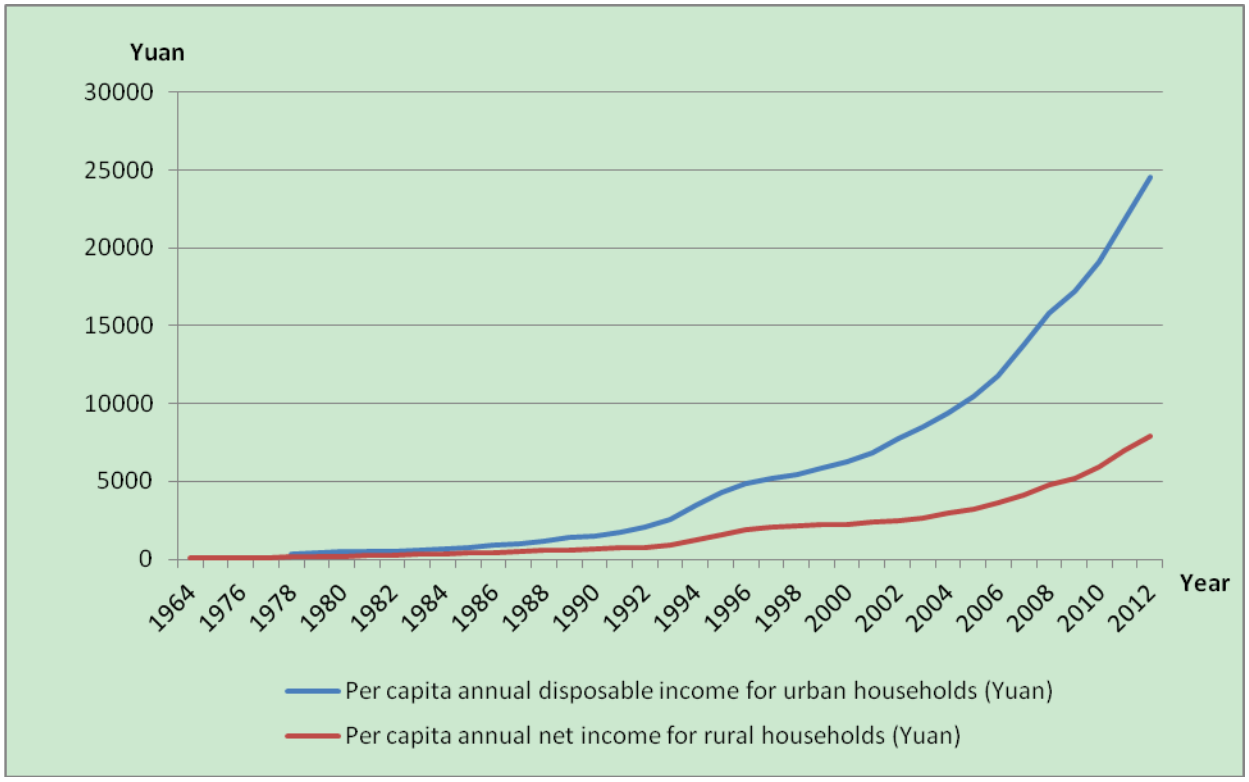
The four periods of reform established the current forest tenure system in China. Frequent policy changes have created much uncertainty, and this has been reflected in the management of forest land. Improved security of tenure is therefore an essential incentive if farmers are to improve their management of forest resources. Maintaining stable forest-related policies and encouraging local people into the policy-making process would benefit forest management in China.

1.3 Farmers' incomes

1.3.1 Farmers' incomes from all sources

By the end of 2012, there were 657 million people living in rural areas in China, comprising 47.4 percent of the total population (China Data Online 2011a).

Figure 1.1 Net income comparision between rural and urban households[10]



Source: China Data Online 2011

The per capita annual net incomes (including all sources) for rural households in 2011 was 6977.3 Yuan (about US$1,107[11]); compared to 21,809.8 Yuan ($3,461) in urban areas. Rural net annual incomes were only 32 percent of urban incomes (China Data Online 2011b).

[10] Per capita annual disposable income for urban households is the total income minus income tax, social security charges. Per capita annual net income for rural households is the total income from various sources, including both cash income and income in kind (Xinhua Net 2007)

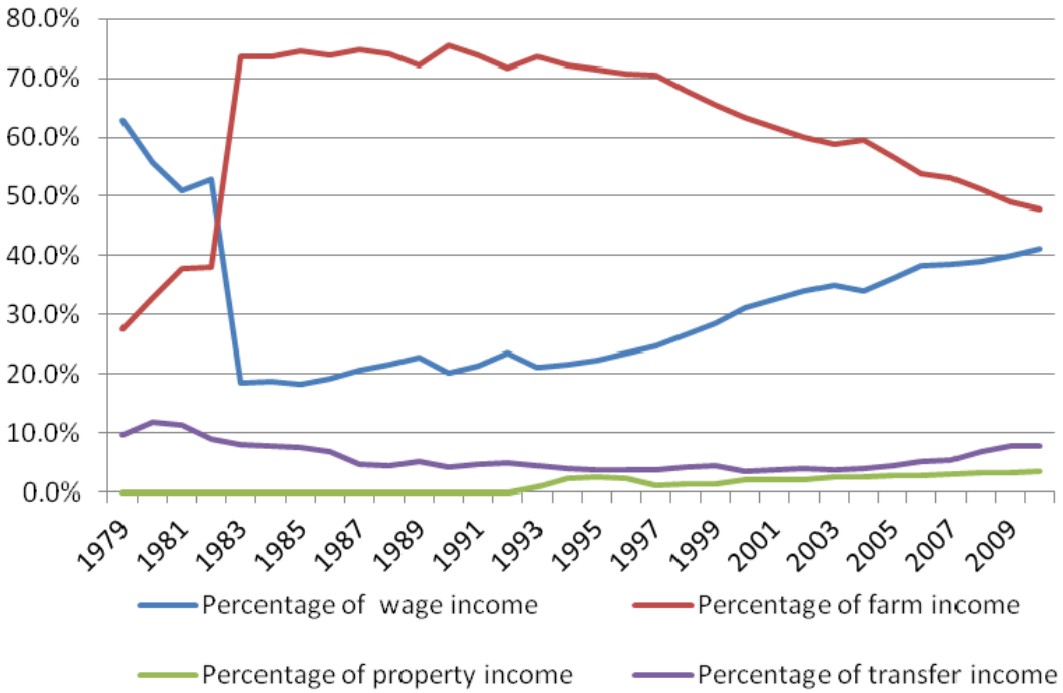
[11] Exchange rate on 30/12/2011 US$1=￥6.3009 Yuan

After the agricultural land tenure reform in 1978, rural land tenures were returned to individual families, stimulating farmers' enthusiasm for production and leading to a rapid increase in the net incomes of rural households (Wang and Delang 2012). However, with time, the income gap between urban and rural households has progressively widened (Khan and Riskin 2005).

1.3.2 Income structure

Farmers' incomes consist of four parts: wage income, farm income, property income, and transfer income. Wage income refers to the income derived from work. Farm income is the income from farming, including agriculture, forestry, fisheries and grazing. Property income refers to the income from property and assets, such as interest and rent collected. Transfer income consists of the benefits received from the government.

Figure 1.2 Structure of the net income of rural households



Data Source: China Rural Statistic Yearbook (graph developed by author)

From the above figure, it is clear that transfer and property income make up less than 10 percent of the total income. Wage and farm income make up more than 80%, indicating the importance of these two income sources for farmers living in rural areas.

Before 1979, farmers' wage income came from the PCs; usually the wage earned depended on hours worked (Liu 2010). After agricultural land tenure rights were returned to farmers in 1978, farmers were able to keep any products remaining after they had fulfilled government requirements (Zhang and Li 2012). As a result, the percentage of wage income decreased quickly between 1979 and 1984, and per capita

incomes in real terms increased by 150% (Deng et al. 2010). Since then, farm income has surpassed wage income, and has become the major source of farmers' income.

A change in the overall trend has occurred since 1990, with farmers seeking jobs elsewhere (Zhang and Li 2012). Farmers' income from wages grew steadily from 20.2 percent of total income in 1990 to 41 percent in 2010, while farm income decreased from 75 percent of total income in 1990 to 47 percent in 2010 (China Data Online 2011b). This trend still exists; regardless of location, wage income is now the major source of income in rural households.

1.3.3 Income from forestry

As recorded up to 2006, the national average income for farmers from forestry has always been less than 2 percent of their total income. The average percentage in the southern collective forests area has been a little higher than other parts of China, but the average is still lower than 2 percent (Liu et al. 2006). In recent years, a number of case studies of farmers' incomes from forestry have been conducted in some key forest counties (e.g., Deng and Jiang (2010) in Liuyang City in Hunan Province, Tang and Tang (2012) in 128 villages in Zhejiang Province, and Lin (2010) in Shunchang County in Fujian Province). From this research, it is apparent that the income gained by farmers from forestry in these key forest counties was around 30 percent of total household income or even higher.

In practice, a range of rules have restricted farmers from earning money from forests, including the logging ban on protected forests, the harvesting quota for commercial forest, the limitations on the use of ecological forest, the high fees compared to agriculture, and the long return associated with timber products.

The existing harvesting quota strictly limits harvest amounts, which affects farmers' willingness to participate in forest management. The Forest Law in China requires that the amount of timber that is harvested must be lower than the increment. The SFA draws up a timber harvesting plan every year that details permitted harvesting quotas. These are based on national survey statistics and the harvesting volume of the previous year (Miao and West 2004). The quota is then distributed to different geographic areas. According to the Forest Law, a harvesting permit is required to harvest trees, meaning that it is not possible to harvest trees whenever a farmer so wishes, even with full ownership of the trees. In addition, the right to harvest depends on the harvesting quota in the region; the application for a harvesting permit does not guarantee the right to harvest. In some villages, insufficient harvesting permits have led to a black market in harvest permits (Miao and West 2004).

In some places, the distribution of the harvesting quota is not based on the local resources but on relationships with powerful institutions (Lv et al. 2006). This could potentially lead to corruption, as it is much harder for farmers lacking social relationships with those in power to get a timber harvesting quota (Lv et al. 2006).

The logging ban is another rule that limits farmers' potential income from forests. The logging ban is the most important component of the Natural Forest Protection Program (NFPP). It was experimented with for two years before being officially launched in 2000 (Miao and West 2004). The program was developed after the Yellow River dried out for 267 days in 1997 and the serious flooding in the Yangtze, Songhua and Nen Rivers in 1998 (Liu et al. 2006, Mullan et al. 2009). The program involves a complete logging ban in the catchments of the upper Yangtze River and the mid-to-upper Yellow River. The program also involved reduced logging activities in state-owned forests (Miao and West 2004). However, the logging ban has been extended to 26.8 million hectares of collective forests (Miao and West 2004), which has negatively affected farmers' incomes (Liu et al. 2006, Wang et al. 2008, Mullan et al. 2009).

The NFPP program resulted in a decrease in farmers' incomes for two major reasons. Farmers lost income from individual and collective forests, and they lost wages gained from temporary work in state-owned and collectively-owned forest companies (Liu et al. 2006). Many forests were included in the NFPP in the southern collective forests area. For example, in Guizhou and Hubei provinces, more than 80 percent of the NFPP area overlaps with the area of collective forests. In Guizhou province, the NFPP area covers 60 percent of the collective forests (Miao and West 2004). Although the Forest Law has guaranteed owners' rights to their forest, the guarantee is meaningless as the owners lose their rights to manage their forests if the forests are included in the NFPP. This loss occurred without any consultation during the period of program design (Miao and West 2004). The NFPP did not give appropriate compensation to collective forest owners for

their economic losses (Miao and West 2004). The logging ban included in the NFPP was also in conflict with CFTR policy, which guarantees the tenure rights of farmers. As a result, the implementation of the CFTR in the area covered by the NFPP is still lacking (Wang et al. 2008). In areas covered by the NFPP, even if farmers have tenure rights to collective forest land under the CFTR, they still cannot use those forests to derive benefits (Wang et al. 2008).

The forest area selected in the NFPP is only a part of the total area of ecological forests. In addition to the NFPP forest, ecological forests also include shelter forests and forests in significant ecosystems, such as those along rivers, along roads and on the edges of mountains (Xu and Wang 2004). Being similar to the NFPP, the policy for these other ecological forests is very similar – from limited logging bans to complete logging bans, depending on the level of risk to the forests.The tenure rights to ecological forests located within collective forest land have been given to households; however, due to the logging ban, farmers cannot obtain any income from timber, and they receive very little compensation for their economic losses (Xu and Wang 2004).

Heavy taxes, charges and fees are another reason why farmers' incomes from forests have been reduced. There are three different sources of charges: taxes collected by the tax authorities for the general budget, charges collected by the forestry authority and earmarked for forestry grants, and fees collected by local authorities (Lu et al. 2002). For agriculture, the central government canceled all taxes and fees in 2006, and farmers can also get subsidies for farming (State Administration of Taxation 2006). In

contrast, taxes, charges and fees for forestry were sometimes higher than 50 percent of the product value before 2009 (Miao and West 2004, Lu et al. 2002). Today, taxes, charges and fees are still high even though they were reduced substantially in 2003. Current taxes include a Value Added Tax, which is 13 percent for raw logs and 17 percent for processed products, Supplementary Education Tax, which ranges from 1 percent to 3 percent of the Value Added Tax, and Urban Maintenance and Construction Tax which charges between 1 and 7 percent of the Value Added Tax (Lu et al. 2002). The Maintenance and Upgrading Charge, Forestry Protection and Construction Charge and Forest Quarantine Charge have been canceled, and only the Afforestation Charge remains. This was reduced from 20 percent of revenue from log and bamboo cane sales to 10 percent (SFA 2009, Lu et al. 2002). However, the taxes and charges can still be as high as 30 percent of the total product value in some places. This high burden has a negative impact on forestry investment by farmers.

Generally speaking, the heavy financial burden and complex rules limit investment in forestry by individuals. At the same time, wage incomes from working elsewhere are becoming more and more important for rural households, weakening the potential for forestry to be a major source of income for households.

1.4 Non-timber forest products

1.4.1 Definition

Since non-timber forest products (NTFPs) were first discussed in the late 1980s, there has been a growing awareness of the importance of NTFPs to rural livelihoods, income generation and forest conservation (Shackleton et al. 2011).

The definition of NTFPs has been debated since the term was coined by de Beer and McDermott in 1989 (Belcher 2003). They defined NTFPs as “all biological materials other than timber which are extracted from forests for human use” (De Beer and McDermott 1989). There are many other terms that are used more or less as synonyms with NTFPs due to different interests and objectives, such as ‘non-wood forest products (NWFPs)’, ‘wild products’, ‘non-wood goods and services’, ‘other forest products’, ‘secondary forest products’, ‘biodiversity products’, ‘natural products’, and ‘minor forest products’ (Belcher 2003). The Food and Agriculture Organization of the United Nations (FAO 1999) uses the term NWFPs, arguing that "Non-wood forest products consist of goods of biological origin other than wood, derived from forests, other wooded land and trees outside forests". NTFPs include any product other than timber that is produced in forests (CIFOR 2011). Belcher (2005) described NTFPs as “Roots, fruits and (sometimes) fish and game or ‘bushmeat’ used for foods, through a range of medicinal plants, resins and essential oils valuable for their chemical components, to fibres such as bamboos, rattans and other palms used for weaving and structural applications” Many farmers in China are developing underplanted products, with most products being NTFPs, except bamboo and fruits. Bamboo forest is defined in China as a special kind

of forest, and is not considered underplanting, but bamboo shoots are included as an underplanted forest product. Land used for fruit production is assigned as cropland rather than forest (Hogarth et al. 2013).

1.4.2 An overview of NTFPs

NTFPs are used all over the world, especially by people in rural areas. Uses include firewood, edible fruits, medicinal plants and weaving fibres (Shackleton et al. 2007). Historically, NTFPs were used and traded as global commodities in the colonial period, but their importance diminished after World War II as exports of tropical timber increased and many forest products were replaced by petroleum-based products, such as gums, fibers and resins (Sills et al. 2011). In the late 1980s, a series of studies demonstrated the importance of NTFPs to rural people's livelihoods in India, the Amazon and Indonesia, amongst other places (Sills et al. 2011). At the same time, increasing global concern about deforestation and poverty alleviation and the new concept of "sustainable development" created an explosion of interest in NTFPs (Belcher et al. 2005). The commercialization of NTFPs in forested areas has been promoted by researchers, nongovernmental organizations, multi-lateral agencies and, more recently, by governments as a win-win strategy to conserve forests while improving local dwellers' livelihoods (Belcher et al. 2005). However, there has also been criticism of NTFPs. Some anthropologists have argued that linking indigenous peoples to international markets will only bring harm and danger to local people and will also draw attention away from deforestation (Sills et al. 2011). In addition, insufficient data are available to demonstrate the sustainability of NTFP harvesting (Sills et al. 2011).

Moreover, NTFP programs that were designed to both promote conservation and alleviate poverty are increasingly critiqued for failing to achieve either objective (Hughes and Flintan 2001). Between these positions, there is a vast middle ground of NTFPs based on cultural traditions, local and regional markets, value of diversity and a continuum of often invisible forest management (Sills et al. 2011).

1.4.3 The Chinese context of underplanted forest products

Underplanted forest production refers to the use of forests and other tree-covered spaces to develop understory planting, understory farming, forest tourism and the collection of and processing of forest products (SFA 2009). It focuses on the utilization and management of the forest floor to pursue short-term income. Low-income people tend to prefer short-term income and want to avoid risk, but tree growing is a long-term and high risk investment (Sunderlin et al. 2005). Hogarth et al. (2013) mentioned in their study that “cultivating economic forest products is relatively more attractive to the rural poor compared to timber due to the low barriers to entry, fewer policy constraints and regulations, and the ability to generate annual income from their limited forest land (unlike the long harvest cycle for timber trees).”

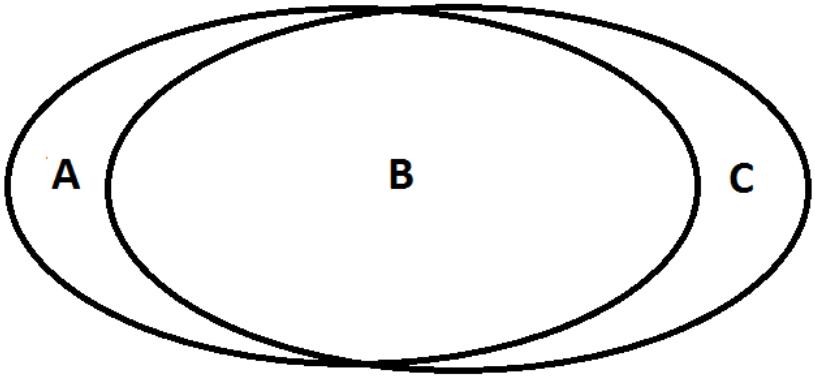
According to the SFA, almost 58 million households are participating in the development of underplanted forest products (UFPs). In 2011, the estimated value of the products from underplanting was 208 billion Yuan: 119 billion Yuan from understory planting, 59.7 billion Yuan from understory farming, 9.79 billion Yuan from forest tourism, and 19.7 billion Yuan from the collection and processing of forest products. In the key forest

tenure reform counties, annual per capita net income was 6435 Yuan, and about 1203 Yuan of this was from forestry, representing 18.7% of the total net incomes. The income from the UFPs was 367 Yuan, accounting for 30.5% of the net incomes from forestry (SFA 2011b).

Most UFPs are NTFPs, such as seedlings, nuts, fungi and herbs used for medicines. However, there are some differences between UFPs and NTFPs: UFPs rely on the use and management of the forest floor, including forest tourism and poultry. The fruits from trees belong to NTFPs, but in China, fruits are agriculture products, not UFPs. The relationship between NTFPs and UFPs can be seen in Figure 1.4. Since UPFs were promoted by the SFA in 2009 as an extension of the CFTR, they have been the subject of a limited amount of research. In contrast, there has been much research conducted on NTFPs.

Research has demonstrated that NTFPs contribute significantly to rural livelihoods and households' incomes in many developing countries (Gauli and Hauser 2009, Heubach et al. 2011, Timko et al. 2010). However, there are also many doubts about the potential of NTFPs. There has been a marked lack of research on the relationship between UFPs and farmers' incomes in China, the subject of this thesis. Due to the lack of research on UFPs but the large amount of information about NTFPs, I chose to use some of the research results from NTFPs to help understand patterns of UFP development.

Figure 1.3 The relationship between UFPs and NTFPs



A: forest tourism, poultry-raising on forest land
B: goods of biological origin other than wood, derived from forests (except fruits)
C: fruit from fruit trees
A+B=UFPs; B+C=NTFPs

1.5 Research objectives and questions

The forest tenure reform in China is a part of the decentralization of forest management that has been occurring throughout the world for the last three decades (Agrawal et al. 2008, Ribot et al. 2006). Since the forest tenure reforms, farmers can decide how to manage their forest land. The SFA is encouraging farmers to develop UFPs in the knowledge that they could improve their livelihoods without involving deforestation. Although there is some research about NTFPs in China, little research have been done since this new policy was introduced. The primary purpose of this study was therefore to provide further insights on the development of UFPs from the farmers' perspective. This study also aimed at developing an understanding of the barriers preventing farmers from developing UFPs and suggesting future directions based on local peoples' wants and needs. The research objectives of this study can by summarized as follows:

Objective I. Evaluate the factors that can affect the incomes of farmers adopting the UFPs.

Objective II. Examine the difficulties that farmers are facing and how they might solve them.

Objective III. Explore the policy effects for UFPs.

Chapter 2: Methodology

2.1 Methodological approach

The objectives of this research were to evaluate what can affect the incomes that farmers gain from underplanting, to examine the difficulties that farmers face, and to determine how these might be resolved.

A cross-sectional design – data were collected at one point in time – was used; data were collected on relevant variables from respondents on a single occasion. All data were collected within a 3-month period. The study took the form of a questionnaire survey that was administered to forest farmers and interviews with local villagers and government officials.

The unit of analysis adopted in this study was the household. I considered this to be appropriate as households are the basic farming unit in most rural areas of China.

2.2 Study site

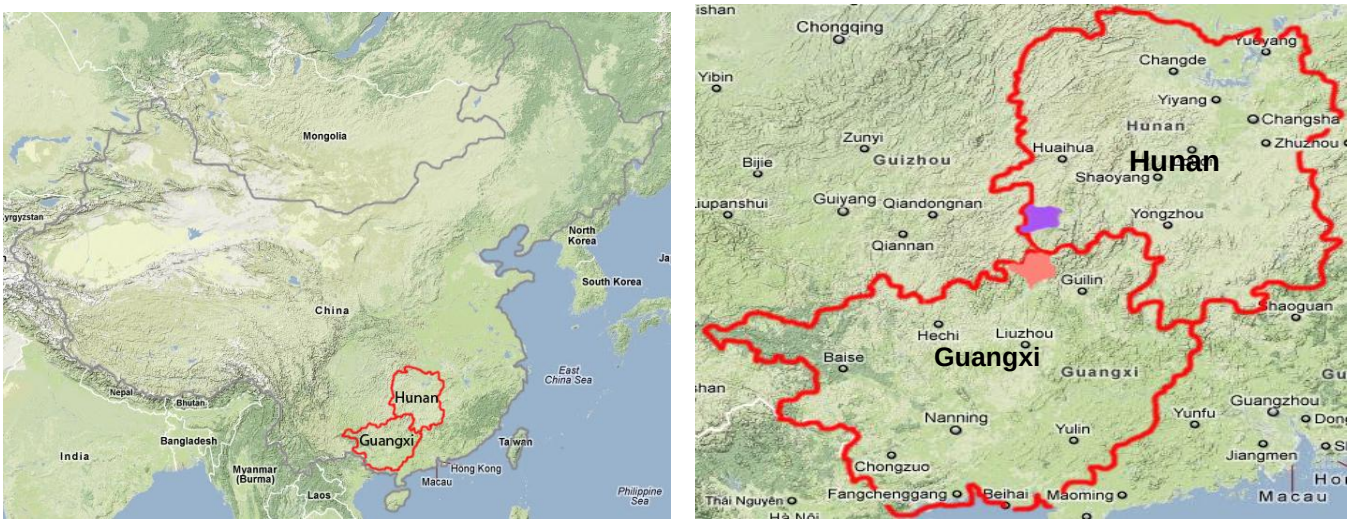
Underplanted forest products (UFPs) occur throughout China and this study focused on how they affect farmers' incomes, especially for people who rely on forests. Two counties were chosen for this study, Jingzhou County in Hunan Province and Sanjiang County in Guangxi Province. The forest cover is around 70% in these counties (Sina News 2008, Guangxi News 2013). Abundant forest resources provide the basis for the development of UFPs. Although forest resources in these areas are rich, farmers are still very poor and they can only get a small income from forests. In 2004 (before the

start of the most recent forest tenure reforms), the annual per capita net income of rural households in Jingzhou County was 2647 Yuan[12]; in Sanjiang County, it was 1616 Yuan (China Data Centre, 2012). In both cases, these incomes were lower than the national average of 2936 Yuan (China Data Centre, 2012). Data obtained from the China Data Centre indicate that the average increase in annual income in Jingzhou is 7.04%, again lower than the national rate of 12.4%; the rate in Sanjiang is 14.1% (China Data Centre, 2012). Although average incomes in both counties increased from 2004 to 2010, with Sanjiang reaching 3981 Yuan and Jingzhou reaching 3562 Yuan, the Annual Per Capita Net Income of Rural Households in 2010 was still lower than the national level of 5951 Yuan.

Both study regions were used to reach Objectives I and II. Sampling was non-random and purposive. Different types of UFP development models were evident in these regions, although they were not an exhaustive representation of all UFP models.

[12] Exchange rate on 20/10/2013 US$ 1=￥6.4307, data from Bank of China. http://www.boc.cn/sourcedb/lswhpj/

Figure 2.1 Two study areas in China



Maps adapted from Google Map

2.3 Data collection

Field work was undertaken from June to August in 2012. A questionnaire survey and a semi-structured, open-ended interview-based survey with local villagers and governors were conducted during this period. Key informants were identified with the help of the local forestry administration in each county.

The methods used in the data collection are summarized in Table 2.1.

Table 2.1 Research objectives, research questions and adopted methods

Objectives	Research questions	Methods adopted
Objective I	What is the cost of UFPs? What is the market situation? What is the level of farmers' education? What is the relationship between farmers and farmer professional cooperative? What is the financial situation? What technical assistance is available?	Questionnaire
Objective II	What difficulties are farmers facing?	Interview
Objective III	How are the forest reforms affecting the development of underplanting?	Interview and document review

2.3.1 Interviews for Objective I

The questionnaire started with demographic questions, including: gender, marital status, education level and number of family members. The next questions were about land ownership, forest size, and land size for UFPs before and after tenure reform.

Objective I：Evaluating what could affect the incomes that farmers derive from underplanting.

For objective I, questions focused on: incomes from UFPs, the cost of UFPs, the market situation, the education level, the forest size and the financial situation. All these factors were abstracted from the interviews. Additional information was gained from the results of other research, including that done by Shackleton et al. (2007) in South Africa examining the role of dry woodlands and forests in rural livelihoods, the study by Kar and Jacobson (2012) on NTFP contributions to household incomes and market

constraints in Bangladesh, and the 61 cases examined by Belcher et al. (2005) on commercial NTFP production in Africa, Asia, and Latin America.

The first question (Q. 1) was about household incomes. A household income is the sum of the cash income from UFPs, timber, wages and the monetary equivalent income from various activities (e.g., poultry and crop production, wild food collection) (Heubach et al., 2011). I defined the incomes from UFPs to include: fungi, poultry, medicinal herbs, forage, honey, fruit, nuts and seeds and others. The total household income was accounted for on annual basis; it reflects the income that respondents derived in 2011. The monetary equivalent incomes of activities were estimated by each participant.

Questions about costs (Q. 2) covered: the cost of buying raw materials, disease control costs, the cost of fertilization or forage, transportation costs and other costs. Adding all these costs together provided the total cost for UFPs.

The annual net incomes from UFPs were obtained from the first two questions.

The third series of questions (Q. 3) were about market access. Five statements were prepared to evaluate farmers' opinions on market access (Table 2.2). The respondents chose their degree of agreement on a 5-interval scale: " strongly disagree" (1), "disagree" (2), "neutral" (3), "agree" (4), "strongly agree" (5). The higher their degree of agreement, the better the market situation. Participants were asked one question about market distance; they chose a distance from "0-100 km" to "more than 500 km".

Table 2.2 Statement numbers and statement for Q.2

Statement#	Statement
S-1	You have a clear idea about what the buyers want to buy
S-2	You get enough information about how the market changes immediately
S-3	It is easy for you to bargain the price with the buyers
S-4	You have stable customers
S-5	The transportation for products is convenient

The fourth series of questions (Q.4) covered the situation of farmer professional cooperatives. There were 10 sub-questions in this part. These focused on understanding why participants chose to join the cooperative or why not, what their position was and how the cooperative made decisions, how much the entry fees were and what the participation rate was.

The fifth series of questions (Q.5) evaluated the financial situation of participants. Q.5-1 asked whether participants needed to borrow money. Only people who answered yes answered the following questions related to the difficulties of borrowing money. The participants chose the degree of how hard it was to borrow money, using a 5-interval scale (“very easy”, “easy”, “neutral”, “hard” and “very hard”).

The questionnaire was initially written in English and subsequently translated into Chinese by myself. I pre-tested the questionnaire twice before administering it to the study sample. During the pre-test, I found it was impossible to randomly select samples, as the percentage of households who work with UFPs was very small. I did the first pre-

test in Zhongli Village, Sanjiang County, Guangxi Province where fewer than 5 percent of households gave me feedback, as others were not working with UFPs. As I did not have a list of households working with UFPs, I changed my data collection method from random selection to snowball sampling, which is a technique better suited to a population that is hard to locate (Babbie 2010).

I first contacted the local forest station. Through it, I contacted the leaders of each village, and then the village leaders introduced me to a few households that were working with UPFs. I contacted these households by phone with a preliminary enquiry to determine whether they had any interest in the survey. If so, I made an appointment with them and then went to their home to conduct the survey.

As some people were illiterate, rather than asking respondents to read a questionnaire and enter their own answers, I asked the questions orally and wrote the answers.

2.3.2 Key Informant interviews and document review

Semi-structured, open-ended interviews were conducted with forest administration directors and farmers during the fieldwork. The interview findings were used to achieve Objectives II and III. The interviews were in two forms. One was conducted with farmers to understand their underplanting management practices and the difficulties that they were facing (Objective II); the other form was conducted with forest administration directors in charge of forest tenure reform in Jingzhou and Sanjiang Counties. These

latter interviews were designed to provide an understanding of how policies related to the forest reforms were affecting the development of underplanting in rural areas.

The interviewees were selected with the help of village leaders in both counties based on their pre-existing relationships with the local forestry stations. As indicated earlier, there are no lists of households working with UFPs. Consequently, the village leaders could only suggest an incomplete list of households with the names of a few people that they knew were developing UFPs. I used these lists to make contact with selected individuals. Interviewees were therefore selected non-randomly and purposively, so that a variety of UFPs would be represented. Finally, 8 participants were selected with a diversity of experiences about UFPs and 17 participants who were not working with UFPs were selected to determine their willingness to participate. The 8 participants with UFP experience covered various types of UFPs including saplings, tourism, herbal medicine, and fungi. A 30 to 60 minute face-to-face interview was conducted with each participant. In order to verify interviewees' perspectives about UFPs, the following questions were asked:

- Why did you choose/not choose to develop UFPs?
- How did you conduct your underplanting management practice
- What are the problems/barriers you are facing in the development of UFPs?
- Does forest tenure reform affect your livelihood or incomes? How does it affect you?

To understand the relationship between forest tenure reform and its impacts on the development of UFPs, face-to-face interviews with forest administration directors in

charge of forest tenure reform in the two counties were also conducted. Each interview lasted 2 to 3 hours.

Several documentary sources, including journal papers and government reports, were collected to support the interview survey. These documents provided supplementary information on the background situation, tenure reform, taxes and fees in China.

Chapter 3: Results

3.1 Characteristics of respondents

In total, 38 questionnaires were collected from Jingzhou and Sanjiang Counties. There were 10 female and 28 male respondents to the questionnaire. All were from different households. The average age of respondents was 55.6 years. The average education time was 9 years. Thirty-six of 38 respondents owned forest land tenures, and the tenures were valid for 70 years. Two did not have forest land due to unclear forest tenure rights. The average area of forest land held by households was 40.9 mu[13]. In these 38 households, 12 had increased the area of their timber land; the average area before the reform was 20.5 mu, and after it was 20.8 mu. After the reform, 11 of 38 households enlarged their underplanted area. One had increased the area of medicinal herbs under cultivation, and 10 had increased the area with saplings.

3.2 Results for Objective I

The purpose of Objective I was to evaluate which factors could affect the incomes that farmers derive from underplanting. The relationships between education, market situation, forest size, number of labourers older than 45, finance and farmers' net incomes were analyzed.

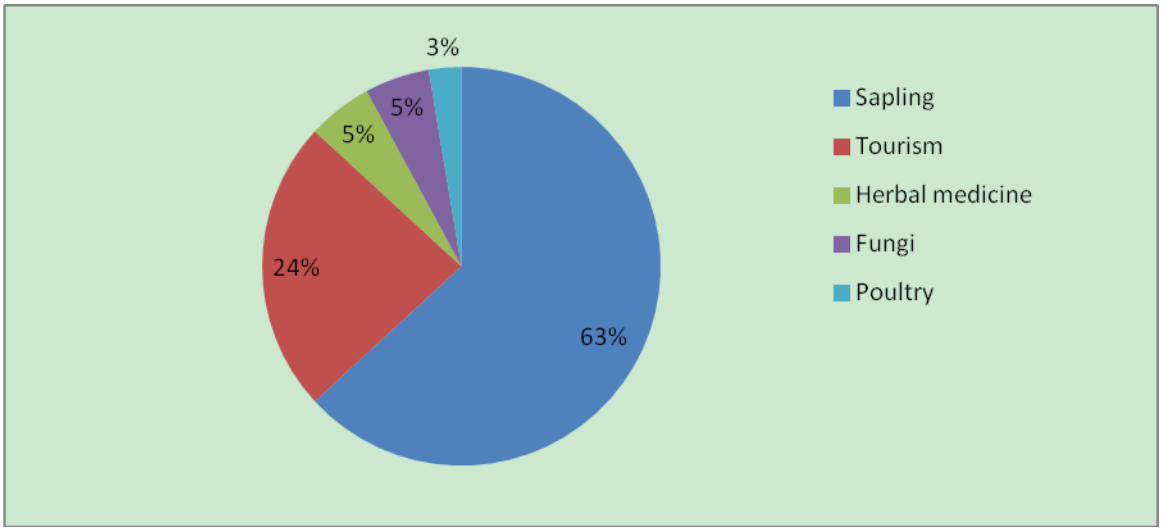
3.2.1 Costs of under-planting

The average annual net income of the 38 households in the sample was 41,000 Yuan. The average annual net income derived from underplanting was 4540 Yuan.

[13] 1mu=0.0667 hectare

As shown in Figure 3.1, only two households had an income derived from cultivating fungi. Two households were deriving income from planting herbal medicines. Nine derived income from forest tourism and 24 households had income from planting saplings. All of the households raised poultry in the forest, but only one derived an income from this. Thirty-three households had had income from timber in the past 5 years; the average rotation length was 19.3 years. The main tree species was Chinese fir (*Cunninghamia lanceolata*). In addition to these sources of income, 32 households had income from other sources, especially from off-farm work. Nine households needed to pay a business tax, representing 5% of their operating income. As these households have developed forest tourism in the form of restaurants and inns in their own houses, they need to pay a sales tax. However, tax evasion is common, so the amount of tax paid is less than 5%. Other households, including those producing fungi, saplings, herbal medicines and poultry, did not need to pay any taxes. The one gaining income from raising poultry was receiving a subsidy from the government to raise poultry successfully.

Figure 3.1 Percentage of UFP types



3.2.2 The market situation

Most farmers believed that they knew what the buyers wanted and that it was easy for them to bargain the price with customers. Most thought that the transportation options open to them were convenient. For 32, the distance to market was around 0-100 km, while for 6 households, the market distance was around 101-200 km. Most were lacking information about market changes and also lacked stable customers. Table 3.1 shows the market situation.

Table 3.1 The market situation

Description	Numbers of households				
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Know what the buyers want	0	3	7	17	11
Know the market change	5	12	11	8	2
Easy to bargain the price	1	1	12	16	8
Have stable customers	4	11	8	8	7
Transportation is convenient	1	1	9	17	10

3.2.3 Farmer's professional cooperatives

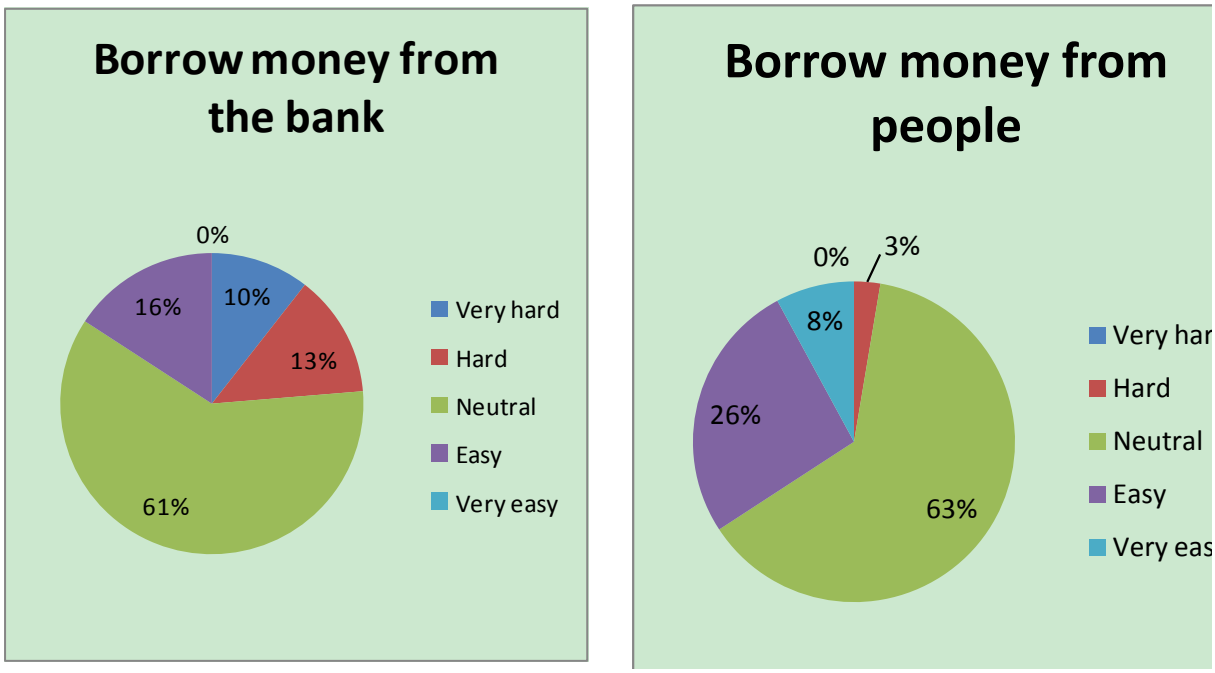
A farmer's professional cooperative is usually a voluntary association based on the same or similar agriculture products in one village or a few nearby villages. It aims to provide information on purchasing, markets, processes, transport, storage, technology and other services to its members. Twenty-nine percent of households (11 of 38) had joined different farmer professional cooperatives based on their products. One poultry-raising household joined a cooperative with the intention of getting assistance with poultry-raising techniques. One sapling-planting household joined a cooperative to find buyers. Another set up an economic cooperative in the form of a private company to be able to bid for contracts. Seven households involved with forest tourism had joined a cooperative to develop the forest resources in their village.

3.2.4 Financial situation

Forty-five percent (17 of 38) of households lacked money when they developed the UFPs. As shown in Figure 3.2, 9 households believed that borrowing money from a

bank was hard or very hard, whereas 6 thought that it was easy. Only one household thought that borrowing money from other people was hard, with 13 considering it easy or very easy.

Figure 3.2 Comparison between borrowing money from the bank and from people



3.2.5 Technical assistance

Only two households had received technical assistance when developing UFPs. The technical assistance lasted less than 5 days, but was considered by both participants as "very good and useful".

3.3 Results for Objective II

With Objective II, I attempted to understand why households would cultivate or reject UFPs. For households cultivating UFPs, how did they conduct their management

practices? What were the barriers to cultivating UFPs, and were forest-related policies having an impact on the decision-making process?

3.3.1 General profile of interviewees

Twenty-five interviews were conducted. Of the participants interviewed, 8 had already conducted UFP activities on their forest land. Various activities were being undertaken in the households, including planting saplings, developing forest tourism, planting herbal medicines and growing fungi. Three households had more than 10 years of experience with UFPs, 3 had more than five years of experience, and 2 had started developing UFPs after the forest tenure reform (one or two years). The other 17 households were not conducting UFP activities. However, all 17 participants indicated that they had had experience in collecting UFPs in the past ten years. Participants had very little knowledge of any policy encouraging farmers to develop UFPs; in fact, none had heard of such a policy.

3.3.2 Development paths for UFPs

Amongst the 8 households with UFPs, 4 different paths leading to the development of UFPs were described. The first path involved those who initiated the development of UFPs, relying on themselves and becoming the leader in their field. They subsequently persuaded others to join in. Three of the 8 households were like this. One household had been planting saplings for more than 15 years and had set up their own sapling nursery to be able to bid for contracts which could increase the competitive position of the nursery. The farmer had built the market alone. In the past, he had been village

head for ten years, so he had a very good relationship with local government. Under his guidance, many other households had begun to plant saplings in his village (Dongfeng Village, Sanjiang County). He also hired people to work for him during busy farming seasons. More than 100 farmers had worked in his nursery during the peak season in 2010. When asked whether he had stable customers and knew about market changes, he gave a positive answer.

Another individual, a leader in the cultivation of a fungus commonly known as China Root or *Fu Ling* (*Wolfiporia extensa* (Peck) Ginns (formerly known as *Poria cocos* F.A. Wolf)) in Jingzhou County, had been working in this area for more than 20 years. He had researched the biology of the fungus, and cultured productive fungal spores. With his support, many farmers around Jingzhou County had chosen to plant fungi after cutting down trees, as this kind of fungus grows on tree stumps. He sold fungal spores and provided free technical assistance to people who bought spores from him. He was also one of the initiators of the Farmer Poria Cocos Professional Cooperation, which aims to provide technology, storage and market information for small-scale households.

The third was an individual entrepreneur owning a *Wolfiporia extensa* processing and export factory. He planted fungi 15 years ago, and developed the market alone. He hired farmers to work for him, including transport, processing and packaging. He also had contracts with some households involving a pledge to purchase the fungi. However, he did not take processed fungi from farmers directly; as the lack of quality control meant that he would be unable to satisfy export standards.

The second path involved starting UFP development with government support. Three of the 8 households were in this situation. One household chose to plant a herbal medicine, *Isatis tinctoria* (Isatis roots, in Chinese: *Ban Lan Gen*), which is a traditional Chinese medicine recognized under a government-company poverty alleviation program. In this program, the government supported farmers to work with a local medical company to plant herbs and provided the money for seeds. The company provided technical assistance to the farmers and promised to purchase the herbs. At the time my study was being conducted, the program had only just begun and only 3 households in Qingjiang Village, Sanjiang County, were cooperating with the medical company to see whether they could plant the herbs successfully. If they could, they planned to expand the planting area.

Two households in Danzhou Village, Sanjiang County, had developed forest tourism with the support of the local government. When a new village leader was appointed, he encouraged local households to develop forest tourism. The village government signed a contact with a travel agent, which stimulated the development of forest tourism in Danzhou Village. As a result, more than 80 households had launched forest tourism projects by 2010, representing 40% of the households in the village. The average income in Danzhou Village had reached 6000 Yuan per person annually by 2010 (data from Danzhou Village government), much higher than the surrounding villages.

The third path involves the assistance of commercial enterprises. The household that had planted Chinese medicine (*Isatis* root) with the help of the government had also

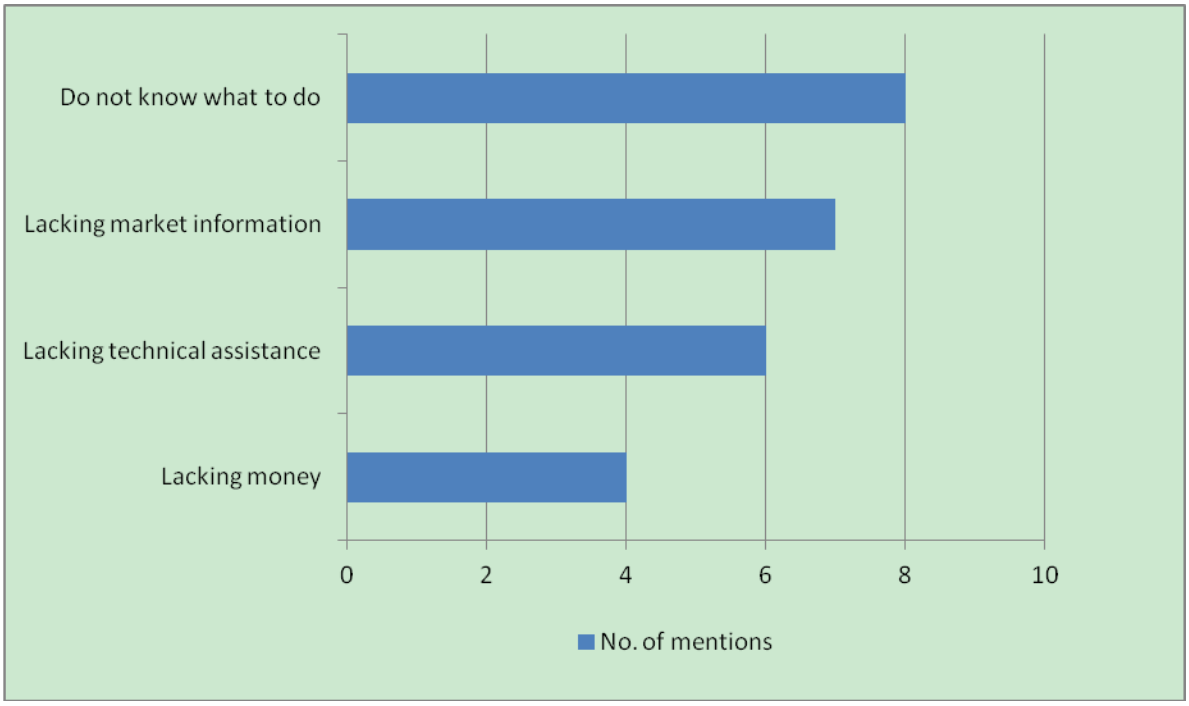
received assistance from enterprises. As mentioned before, the households that contracted with the *Wolfiporia extensa* entrepreneur received a pledge to purchase their products, which provided them with a stable market.

The fourth path was following the direction created by the leaders in their village. It usually involved small-scale enterprises and lacked expert knowledge. Two of 8 were in this situation. One household was cultivating *Wolfiporia extensa* with the help of the leader selling fungal spores mentioned in the first path. The farmer received technical assistance from the leader and had planted this kind of fungi for 5 years. Another household had planted saplings for more than fifteen years under the influence of a pioneer in his village. Saplings can only be grown on forest land where there is limited crown cover, so only those places where new trees had been planted (usually less than three years old) were available for sapling planting. He had planted saplings on two or three mu every year in his own forest land, or had rented other peoples' available land.

3.3.3 Perceived barriers to the development of UFPs

In the interviews with 17 local households who had not developed UFPs, the interviewees stated their reasons for not developing UFPs. The most significant (mentioned eight times) reason was that they lack information about what to do. Seven interviewees indicated that they were worried about the market. Another stated reason was that they lacked the technological knowledge to develop UFPs (mentioned by six interviewees). Four interviewees stated that they lacked the money needed to develop UFPs.

Figure 3.3 Reasons given by participants not to develop UFPs (n=17)[14]

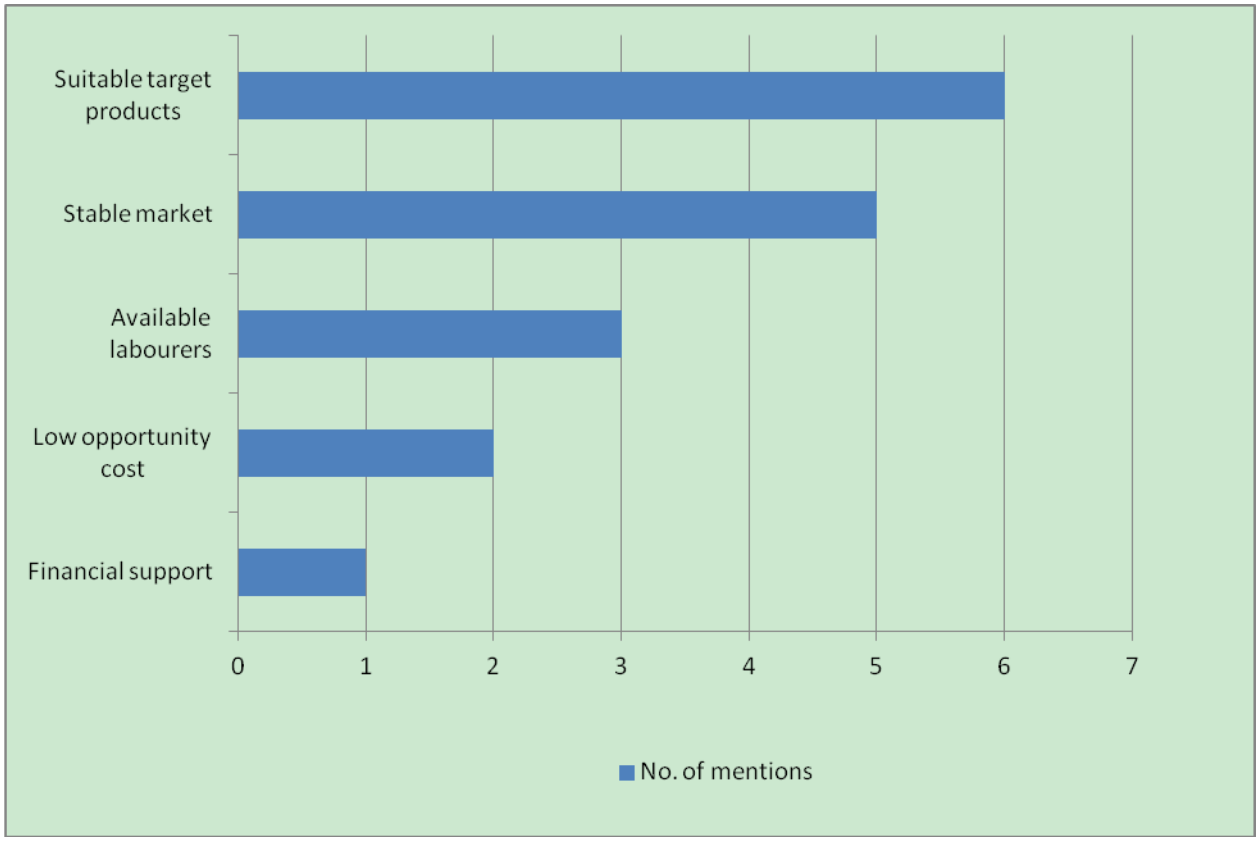


3.3.4 Decisive factors for the development of UFPs

The 17 participants indicated that they were willing to develop UFPs in the future, but the decisive factors for them differed (Figure 3.4). One interviewee's interest was rooted in financial support. Two others indicated that their greatest concern was whether the opportunity cost was sufficiently low. Another three interviewees indicated that they would consider whether they had the available labourers in their family. Five would only adopt UFPs if they could have a stable market, including stable prices and buyers. One interviewee indicated that if they needed to accompany their children to school, which is located in the county, then they would prefer to work in the county instead of developing UFPs in the village. The most significant decisive factor mentioned was a target product.

[14] Number of mentions, allowing for multiple responses

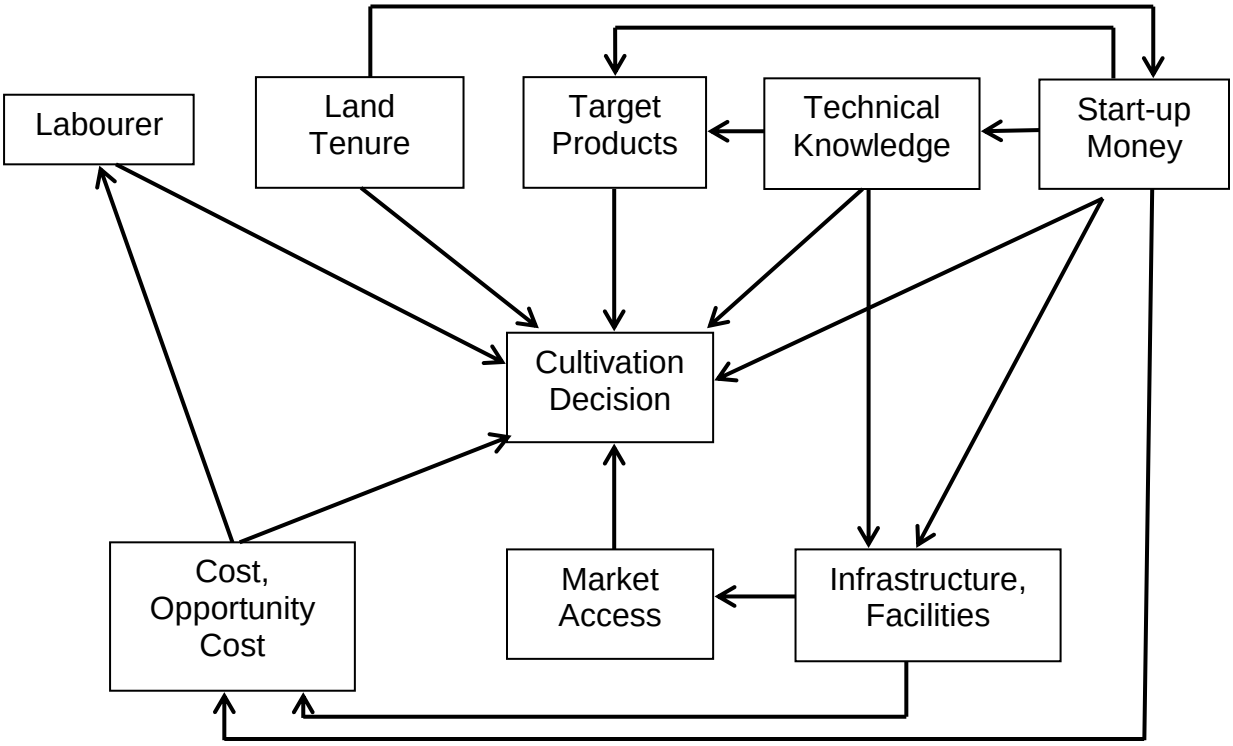
Figure 3.4 Factors affecting UFP decision-making (n=17).



3.3.5 Conditions for cultivating UFPs

The conditions for cultivating UFPs that emerged from interviews and questionnaires are linked (Figure 3.5).

Figure 3.5 Framework model of conditions for UFP cultivation



The security of tenure associated with land ownership could affect the start-up money and UFP cultivation. Forest land tenure was one way to obtain loans. Bank mortgage loans based on forest land tenure have been piloted in a few places, but due to the high risk and other problems they have not been widely extended. However, using forest land tenure as security for mortgages has happened more commonly with private capital as it is one of the few mortgages that farmers can access. The person who set up his factory mentioned that he had more than one experience of mortgaging his forest land to get financial support from the private sector. However, for other small-scale forest management households, mortgaging forest land tenure to obtain start-up money is still problematic.

The ownership also affected farmers' motivation to develop UFPs, which is why many households increased the land area of UFP cultivation after the forest tenure reform. With the "three fixes" forest tenure reform carried out in these two counties in 1981, most forest farmers received clear forest tenure rights. Consequently, the effects of the new CFTR are not significant. All the interviewees indicated that the CFTR made little difference to their forest land, and most simply received a new certificate. However, this does not mean that land tenure is unimportant – it is actually a precondition for the development of UFPs.

Targeting production was a critical element, and a lack of information about what to cultivate was a common problem among households, partly determining the economic return from UFPs. There were many reasons given for not developing UFPs. The most prominent was "Do not know what to do". The most significant factor mentioned was "having an available program". The available information about markets determined the business ideas being created for UFPs. Technical skills and professional knowledge determined the possibility of developing UFPs.

Technical knowledge was needed for target products, cultivation decisions and market access. Having technical knowledge was important for value-added products and better economic returns. Without technical knowledge, farmers were only able to produce primary UFPs. The only person capable of developing a significant value-added product (fungi) was the entrepreneur that was interviewed. Start-up money affected the technical knowledge, facilities, costs and cultivation decisions. Having enough start-up

money was necessary to meet basic costs, such as the costs of raw materials, disease control and fertilization, and to ensure adequate facilities. As most farmers only produced primary UFPs, the start-up money involved was usually small. However, this limited the pursuit of value-added products. Having well-maintained facilities could increase the economic returns by increasing the efficiency and the value of the products. The facilities and infrastructure could affect the costs, market access and cultivation decisions. However, much infrastructure, such as roads, was hard for individuals to improve, and really the responsibility of local government.

Market access was one of the most crucial aspects that could strongly and directly affect farmers' decision-making. Farmers prefer to follow the elite in their village, with an important reason being that the elite had market information. This could increase farmers' confidence in selling their products. In my interviews with people who had not developed UFPs, seven of 17 interviewees mentioned the most important barrier was a lack of market information. Five of these 17 people indicated that they would only adopt UFPs if they had a stable market.

Costs and opportunity costs needed to be met and could also influence final decision-making by affecting the labourer situation. Most people cultivated UFPs as a supplementary income for their households, so they would prefer to do so when there were surplus labourers available in their homes.

3.4 Political barriers to the development of UFPs

The assessment of the effectiveness of UFP policies was based on interviews with two administration directors in the two counties. There was a policy to encourage UFPs and there were four other related policies that had affected the development of UFPs.

3.4.1 The policy for encouraging UFPs

Both interviewees stated that their forest administration had received the referral from the Chinese State Forestry Administration encouraging the development of UFPs. However, they had met many difficulties during the development of UFPs; these are described below.

Firstly, they lacked data and materials about UFPs in their respective counties as they had never collected data on UFPs. Secondly, it was hard to collect data since the development of UFPs was an individual act, and for many households it was not a consistent or stable activity. Thirdly, there were no detailed requirements or referrals prescribing how to conduct this policy. The forest administration at the county level had no knowledge of how to go about it. Fourthly, this policy was merely an instruction. No additional technical assistance or financial capital was provided by higher levels of the forestry administration.

3.4.2 The effects of tenure reform

Having tenure rights to forest land is the foundation of UFPs. The forest administration director in Jingzhou County indicated that the forest tenure reform had been conducted

too quickly, which might adversely affect the potential impacts of the reform. Some government officials undertook the forest tenure reform in their own name, and their objective was to finish as soon as possible so that they could claim an “administration achievement” during their term of office. In Huaihua City (Jingzhou County belongs to Huaihua City), the forestry administration in each county promised to finish the forest tenure reform in an impossibly limited time. They did this by increasing the speed of the reform at the expense of quality. Some forest tenure certificates were subsequently withdrawn by the local court due to illegalities in the process, such as issuing certificates without clear boundaries or without the signature of the owner. This resulted in unstable forest tenures, discouraging farmers from investing in UFPs. Another problem was that it was very hard to solve historical land disputes. Some disputes had lasted for a long time and no side wanted to make any concession. The local forest authority tried to accommodate both sides, with poor results. This is why two households stated that they had unclear tenure rights.

3.4.3 The effects of administrative reform

Another problem mentioned by the forest administration director in Sanjiang County was associated with the reform of the forest administration. There were insufficient funds to operate the forestry authority, yet they had been asked to reduce charges. As a result, it was hard to reduce taxes and fees for forest products. For UFPs, taxes and fees were only applicable to processed products. Some of these taxes and fees were passed on to the farmers.

3.5 Employment opportunities

Eight-six percent of the participants (50 of 58: both questionnaire participants and interviewees) indicated that they or other family members had experience with jobs related to UFPs, such as collection or cultivation, storage, processing and transport. All of these jobs were temporary, without any work insurance or other benefits.

Jingzhou County had the biggest *Wolfiporia extensa* market in China. The business volume sometimes reached 100 tonnes per day (Huaihua News 2012). *Wolfiporia extensa* from other provinces, such as Yunnan and Guizhou, were also processed in this market. During busy days, there were more than 30,000 people processing the *Wolfiporia extensa* by pealing the fruiting bodies and then cutting them into small pieces. The salary was around 10 to 15 Yuan per hour. Although the pay was low, many people still chose to work here as there was little risk involved and they could easily take care of their children who go to school in the county.

Chapter 4: Discussion

This study aimed to understand what could affect farmers' incomes from UFPs, together with the challenges and issues facing the development of UFPs in two sample counties. To achieve this goal, a three-part study was undertaken, including a quantitative analysis of how UFPs have affected farmers' incomes and two qualitative analyses about the issues surrounding UFPs. One focused on issues from the farmers' perspective, the other focused on issues arising from forest-related policies. The results of each of the parts are discussed separately below.

4.1 Contribution of UFPs to household incomes

All of the households participating in the questionnaire study cultivated UFPs for commercial purposes. The net incomes from UFPs contributed 11.07% to the total net incomes of these households. For them, UFPs were a supplementary resource rather than a subsistence resource. The contribution of UFPs to their total net incomes is therefore relatively low. Belcher et al. (2005) found similar results in their cases from Africa, Asia and Latin America; they stated "NTFP contributes only a portion of household incomes, and in the majority of cases, it is a small proportion". Similar results were found by Gauli and Hauser (2011). They indicated that in Nepal, NTFPs made up 15% to 21% of the total incomes of poor households, whereas for rich households, it was around 10%. The contribution from NTFPs to households' incomes is uneven geographically and socially (Neumann and Hirsch 2000). For example, Olsen (1997) indicated that the income from medical herb collection is higher in the north than in the central area of Nepal (see also Neumann and Hirsch 2000).

The average net income for all of the households participating in the questionnaire study was much higher than the local average. For these households, a large proportion of the income was from off-farm sources, not from the UFPs. Higher-income households had high-level income sources, especially off-farm sources (Hogarth et al. 2013). Belcher et al. (2005) found that families did not cultivate NTFPs, instead collecting them as supplements (they called them “supplementary cases”); they had higher incomes than the average for the locality, as they were doing more off-farm work. However, households that cultivated NTFPs (they called these “integrated cases”) tended to have average incomes for their locality, as they focused more on farm work. In my study, the incomes of those households that cultivated UFPs (similar to their “integrated cases”) were obviously higher than the average for the locality. My results are therefore compatible with their analysis. Although households cultivated UFPs, they still did other off-farm work; and that is where their main income came from. In this study, 32 of 38 households had off-farm income.

There have been considerable debates over whether NTFPs can really benefit the collectors. The narrative about the potential of NTFPs to alleviate poverty has changed from optimism to pessimism over the past 20 years (Sills et al. 2011). Southgate et al. (1996) argued that for many households, NTFPs can barely cover the opportunity costs of their collection. Even for high-value products, the major benefits usually accrue to the wealthier members or local elites who control the market (Sunderland et al. 2011). I partly agree with this point. In my study, the average income for questionnaire respondents’ households was 41,000 Yuan, much higher than the local average. This

indicates that these households represent the wealthier members in their village. From the interviews with people who cultivated UFPs, it was evident that some of them were the elites or leaders in their villages and had valuable market information or technical knowledge that was critical for market access. They had a better chance than other farmers to get an economic return from UFPs, but many of the other households following the elite's lead also got benefits from UFP cultivation.

Within each household, the older members preferred to cultivate UFPs, and the young preferred off-farm work, which usually generated greater payments. The average age of the questionnaire participants whose household had already cultivated UFPs was 54.2 years. The older and less educated people had difficulty competing effectively in the job market, while comparably the entry barrier for NTFPs was low (Shackleton et al. 2011). Most young people prefer working in cities to farming in their own villages and this trend has increased over time due to the young receiving a better education than before (de Brauw et al. 2002). The following reasons were mentioned during my interviews. Off-farm work was the first opportunity for the young to see outside their villages and to learn some useful knowledge. Secondly, they could earn more money than they would from farming. A third reason was that in comparison to developing UFPs, working in cities incurred less financial risk, as the city work was not dependent on the weather. For older people, the opportunity costs of UFPs were much lower than for the younger family members as they found it difficult to find a job in the cities since they lacked the necessary knowledge and generally learnt more slowly than the young. For some old people living in the villages, they could take care of their grandchildren while also

cultivating UFPs as a supplementary source of income for their households. Taking the planting of saplings as an example, in Jingzhou and Sanjiang Counties, the planting season is usually around November and the harvesting season is the following April. So the busiest seasons account for two months, with the farmers being free to pursue other activities in the remaining 10 months. Generally, families preferred to ask the young to go outside for work while older members remained in the village to develop UFPs.

From my questionnaire, in 2011, there were 20 households planting saplings, but in 2012, 24 households were cultivating saplings. And 6 of 24 (25%) households increased the area of planting between 2011 and 2012. After the forest tenure reform, farmers were more interested in tree planting, leading to an increase in the demand for saplings. However, the average net income from tourism was 19.8% higher than the income from saplings. Forest tourism requires special resources that most villages do not have. Seven of the nine households that had developed forest tourism were in Danzhou Village (Sanjiang County), which is a small island surrounded by trees. The other two households were located in the Fei Montain area (Jingzhou County), which has religious value and is also a forest protection area. These locations have a significant advantage for developing forest tourism, and it is hard for other villages to copy them.

UFPs were not a stable source of income for households. All 25 interviewees indicated that they had experience of collecting UFPs in the past, but many did not choose to cultivate UFPs. Various reasons were given for this. Firstly, the market price for UFPs

was unstable, and it was impossible for small-scale households to predict the market trends. These price changes could even result in financial losses for households. As they lack financial capital, the ability to take on risk was low and farmers were reluctant to expose themselves to that risk. Cultivation practices result in patchy and unpredictable production. Moreover, market prices and economic returns are unstable.

4.2 Markets and commercialization

The results from the questionnaires indicated that the market situation was an important factor affecting farmers' income from UFPs. The ability of each household to take risks was low, due to their low income and incomplete social insurance. As a result, they were particularly concerned about the market situation. If they were unsure that they would find buyers, they preferred not to invest in UFPs.

Commercialization of UFPs was expected to increase their value, improve livelihoods, increase households' incomes, and bring more employment opportunities. To some extent, UFP commercialization was therefore similar to many agricultural products. The average income in participating households was much higher than the local average, indicating that better-off households were more likely to be involved with the commercialization of UFPs. Ruiz-Perez et al. (2004) indicated that in China, better-off households got the largest share of increased earnings from bamboo, while the poor got the least. Belcher and Schreckenberg (2007) obtained a similar finding in their research about the commercialization of NTFPs. They found that a knowledge of business practices was needed for successful trading, but that the poor usually lacked this. Local

‘elites’ with more capital to invest, more management knowledge and experience, more technical skills, more ability to take risks, and better networks were much more commercially competitive (Belcher and Schreckenberg 2007). In addition, Belcher and Schreckenberg (2007) indicated that intensified forest resources management required sufficient capital to support the slow-maturing products and also that there was a need for “some confidence that there will be a market for the product when it is harvested”. Poor households did not have these assets, and were unable to make such long-term financial commitments.

This may also explain the four different development paths discussed in the previous chapter. Local ‘elites’ led the development of UFPs through their own efforts. Typically, these local ‘elites’ were innovative, hard-working, and better educated people with technical and managerial skills. These ‘elites’ could always be the leaders of UFP development in their areas. The participants of this study were not evenly distributed in each village; instead they were concentrated in a few villages. Farmers prefer to have a leader who can lead and teach them how to develop UFPs. In my study, I found that if a village had such a leader, then there would be more people who would like to develop UFPs. This situation was obvious for the people planting saplings and *Wolfiporia extensa* in Sanjing County. In other cases, these local ‘elites’ were the village cadre, meaning that he or she had a better social network than others. This situation was common with cases involving forest tourism and raising poultry, as they needed better networking ability to find buyers or get government support. The most important part of other paths, namely the government and company supporting programs, was that

farmers would have help in finding a market or would be provided with stable purchase contracts. UFP development led by the government usually took the form of a government program initiated to reduce poverty. Development led by companies usually involved farmers providing raw products to those companies. For example, in Qingjiang Village, Sanjiang County, some farmers had a contract with a pharmacy company that stated that the company would purchase the products from them. Although the better-off households gained the most earnings, poor households were also receiving benefits through directly engaging in the cultivation activities or indirectly, such as being employed in UFP-related jobs.

Understanding the market information gap between small householders and buyers is crucial for NTFPs (Kar and Jacobson 2012). Similar NTFP market constraints have been found in several research studies, including poor transportation facilities, lack of capital support, lack of market information, lack of a nearby marketplace and middlemen linkages, and lack of awareness and training (Belcher 2005, Kar and Jacobson 2012, Ruiz-Pérez et al. 2004). Compared with these studies, in my interviews, nobody thought that transportation was a problem, primarily due to a 'Village-to-village Connection Road Program (*Cuncuntong Program*)', which has focused on road and infrastructure development in China. However, farmers still lacked access to markets, primarily due to a lack of market information, especially about market changes. The local 'elites' and middlemen played a critical role in providing the market information to the producers (Belcher and Schreckenberg 2007). Belcher and Schreckenberg (2007) have also indicated that middlemen play a critical role in "organising transport and quality control,

advancing credit, consolidating volumes for export or national processing and shouldering risk", something that is frequently forgotten.

4.3 Education and related knowledge

The results from the questionnaires also indicated that education is also an important factor for farmers' net income from UFPs. Education influences the respondents' market knowledge and social networks. Not surprisingly, similar results have been found by Ruiz-Perez and Byron (1999), and Kar and Jacobson (2012). People with higher education had more knowledge, especially about the biological aspects of poultry and planting. Moreover, people who were more educated had more knowledge about the market and market changes. In addition, people who were more educated usually had more opportunities to work in local government (village level), so they had better social networks.

Information, especially about the kind of UFPs that farmers can cultivate on their forest land, is crucial but has largely been ignored in previous research. Participants in this study were concentrated in a few villages, as in these villages the local elites or government and companies had already provided the farmers with some cultivation choices. However, this has always been missed by NTFP-related researchers, perhaps because much NTFP-related research has focused on wild collection rather than cultivation. However cultivation can provide a more stable supply of products than wild collection. Also, cultivation on securely tenured land can avoid over-exploitation of the resource.

4.4 Technical assistance in the UFP activities

In the answers to the questionnaire survey, only two households had received technical assistance. However, in the interviews with farmers who had not developed UFPs, 6 of 17 interviewees mentioned that a lack of technical assistance was the reason for not adopting UFPs. These findings are not contradictory. Farmers with UFP activities were generally working with primary products, with low added value and low technical requirements. The development of UFPs indicates that low levels of technical investment were preferred by farmers. This implies low barriers to entry, such as sapling planting; 22 of 38 households are participating in this activity. Highly technical projects, such as fungi cultivation, were less preferred. Poultry raising was common, but most households (28 of 38) raised poultry for their own consumption. Products such as saplings required little technical knowledge; they could be planted just like agricultural products, and required no technical assistance. Only 2 of the 38 participants had accepted technical assistance, and this amounted to less than five days assistance. None of the participants were capturing added value in their products. Even with forest tourism, the farmers were selling primary products and basic services: providing farmers' inns and farmers' meals to customers. The lack of knowledge was resulting in low production, low value-added products and a lack of competition that could stimulate more investment.

Some UFPs do not need much processing, such as saplings, nuts, and some fungi. However, Belcher (2007) indicated that 'many NTFPs are today being used as ingredients in very sophisticated industries'. For such products, production techniques

are critical if value is to be added in the original country and if the quality standards of international clients are to be met (Belcher and Schreckenberg 2007). In the interview with the individual entrepreneur who had a *Wolfiporia extensa* processing and export company, he mentioned that he never bought processed products from farmers; the products would not satisfy export standards as small households lacked the specialized drying techniques necessary for the processing of the final product. He therefore preferred to process the fungi in his own factory.

Processing and commercialization increased the value of products, but most individual households lacked the facilities to deal with products in this way. Moreover, some households did not have enough money or did not want to invest in the facilities for UFPs.

4.5 Forest land size

From the questionnaire, ten households increased their forest size through planting trees on barren mountains. However, forest area did not significantly affect the size of UFPs. The average size of sapling, fungi and herbal medicine planting for most households in this study was around one to three mu.

4.6 Employment

In Jingzhou County, the *Wolfiporia extensa* market has provided thousands of jobs. Most UFP-related jobs are like this: low-paid, easy to get started, time flexible, and with no social insurance or other benefits. Even though the pay for these jobs was low, less

than 10 Yuan per hour, they could still attract many labourers for several reasons. Firstly, the requirements for this kind of job are low; and no special technique or knowledge is required. It is quick and easy for farmers to get started. Secondly, as farmers are paid hourly, the time requirements are flexible and farmers can organize their time, especially during the busiest stages of the farming season. Thirdly, this kind of processing job is welcomed by women, as they can take care of their children who go to a school in the county. Fourthly, these jobs provide cash incomes. In comparison, farmers cultivating UFPs have to bear the risks associated with unpredictable prices and unstable buyers. However, this related income is usually calculated as work income, so it does constitute part of the income from UPFs.

4.7 Forest land tenure

This Collective Forest Tenure Reform in Jingzhou and Sanjing counties did not change the forest tenures much. An earlier forest land tenure reform carried out in 1981, called the ‘three fixes’, transferred communally-owned forest land to households (Delang and Wang 2012). Since then, in these two counties, the new owners have exercised their rights to exclude other users (Delang and Wang 2012). Exclusion rights for NTFPs are very important, as significant over-harvesting almost always happens in open-access forest land (Sunderland et al. 2011). The new forest tenure reform has strengthened property rights through law for 70 years and the owners receive certificates from the county government. In my study, 10 of 38 households had expanded their timber land area after the new forest tenure reform so that they could make long-term investments. Secure property rights can ensure that the owners reap the benefits of management,

and can promote long-term investments (Mirjam et al. 2012). Strengthening and checking land tenures should be continuous, as illegal processes exist in land tenure certification, as mentioned in the interview with forest administration directors in Jingzhou County.

UFPs contribute a small percentage of the total income of farmers, even for those with forest tenure rights. It is not just a matter of transferring rights, but a question of whether appropriate incentives and support have been offered that will result in successful outcomes.

4.8 Policies to encourage UFPs

Interventions over NTFPs have always been based on local projects, and as a result have frequently been overlooked in national environmental policies (Belcher and Schreckenberg 2007). NTFPs are often ignored by regulations and by management plans as they are generally considered to be ‘minor forest products’ (Belcher and Schreckenberg 2007). In China, timber has been seen as the most important resource derived from forests, and it has been associated with multiple regulations. However, the only policy concerning UFP development was related to NTFPs. Long-term neglect of NTFPs has led to their value being underestimated, wrongly attributed to other sectors or entirely omitted; and also to a lack of empirical knowledge about the contributions that NTFPs make to the incomes of households (Hogarth et al. 2013). The interviews with forestry administration directors in the two counties revealed that they did not have a clear definition of UFPs, and that they felt the line between some agricultural products

and UFPs was indistinct. This lack of clarity created problems when carrying out the UFP development policy, as the administrators were unsure what should even be included as UFPs. Without detailed requirements on how to conduct the policy, and lacking technical and financial capital assistance, the policy became merely another instruction from a centralized bureaucracy—all the questionnaire participants and interviewees indicated that they had never heard of the UFP development policy. A good forest policy should include 8 characteristics: accountable[15], transparent[16], responsive[17], equitable and inclusive[18], effective and efficient[19], following the rule of law[20], participatory[21] and consensus oriented[22] (Mirjam et al. 2012). Compared with these requirements, the UFP development policy was poor, being unclear and ineffective, and lacking in efficiency and participation. The absence of technical and financial capital assistance severely compromised the policy. As with many other forest

[15] *Accountable*—meaning that all actors involved in forest governance are held responsible by those affected by their decision

[16] *Transparent*—meaning that forest policies and regulations are clear to all who will be affected by them, and that information about them is freely available to all stakeholders in an accessible and understandable form

[17] *Responsive*—meaning that it meets the livelihood needs of forest-dependent people

[18] *Equitable and inclusive*—meaning that it stops marginalising the forest-dependent poor and enables them to maintain and improve their well-being based on equitable shares of forest benefits

[19] *Effective and efficient*—meaning that it promotes efficient use of forest resources for both conservation and sustainable use, and puts effective arrangements in place to include the various stakeholders

[20] *Following the rule of law*—meaning that it applies forest laws and regulations impartially, without excluding forest—dependent people from access to, or trade in, forest resources.

[21] *Participatory*—meaning that all relevant stakeholders are directly or indirectly involved inforest decision—making processes that affect them

[22] *Consensus oriented*—meaning that it is based on a shared and negotiated vision of the societal role of forests and the role of each stakeholder in terms of rights, responsibilities and use

policies in China, the UFP development policy failed to allow the forest farmers directly affected by the policy to be involved in the decision-making processes. As a result, the policy will not satisfy forest farmers' real demands — the removal of barriers to the access to markets. As Mirjam et al. (2012) (Chapter 6.3, p.105) have indicated "Enabling policies would be required to remove market barriers, reduce the regulatory burden on them and find new financial mechanisms and incentives. Stimulating producer' associations and strategic business partnerships would be another way of enhancing the participation of small producers in profitable forest market."

One solution is that government might take on the role as program leader. UFPs can work as supplementary sources of farmers' income, but the farmers need some guidance. Although some leaders are encouraging other farmers to develop UFPs, volunteer-based guidance is insufficient. Infrastructure should be strengthened and technical help should be provided by government or the private sector. Infrastructure, such as access to the internet, is limited in these villages, so it is hard for the villagers to understand the markets for their products, and they have to rely on local elites who can get some market information. Technical help is also very necessary, but currently there is little such assistance available. Moreover, the government should improve UFP development policies. The current policy has little value for local households, as they cannot get any benefits from it. This policy will only bring benefits to local people when more subsidies and technical help are provided by the government.

Chapter 5: Conclusion

Cultivating UFPs provides a potentially lucrative development path for forest-related households, and also has the potential to combine conservation with improving livelihoods. Indeed, these goals have been successfully achieved in many places. As a new policy encouraging UFP cultivation has been issued by the State Forest Administration of China, UFPs have garnered the interest of researchers. The policy to encourage UFPs is associated with the Collective Forest Tenure Reform and is aimed at improving land-use efficiency and increasing the income of forest-related households. Although UFPs have generated considerable interest, there has been little research focused on local farmers' perspectives and the effectiveness of this reform.

The primary aim of this study was to understand how UFPs affect farmers' net income, the challenges facing UFP cultivation and the effects of related polices. This research focused on local forest users and gathered information on the difficulties they face. It also gathered information on the reasons for cultivating (or not) UFPs, and how familiar farmers were with the related policies.

To achieve these objectives, different research methods were used. For the first objective – evaluating the factors that can affect the incomes of farmers adopting UFPs, a questionnaire survey was conducted. For the second and third objectives—the difficulties that farmers face and the effects of related policies, a semi-structured survey was conducted.

5.1 Objective I

The results obtained using qualitative research indicated that the market situation for UFPs and the education level significantly affected the income that households gained from the cultivation of UFPs. This suggests a need for market access and education opportunities. The average income of the participants in the questionnaire was much higher than the local average, but it was not from the UFPs. Most of their net incomes were from off-farm sources, and the net income from UFPs was just a supplement to their livelihoods. Usually, in a family, it was the older members who were likely to be conducting underplanting activities. Although the old had a lot of experience with farm work, they lacked new knowledge about techniques and market information. This suggests that more channels should be utilized to get the technical and market information to farmers, such as the internet and TV. Communications need to focus on raising the awareness of farmers about the importance of technical and market information on the cultivation of UFPs. Low income households should have an opportunity to participate in the cultivation of UFPs. More importantly, farmers need to have a chance to express their needs. As poverty alleviation is one of the aims of forest tenure reform and UFP development and poor households are important actors in these reforms, it is necessary to find a method to inspire farmers from poor households to participate in UFPs.

5.2 Objective II

Objective II aimed to explain what affects farmers' decisions to cultivate UFPs, the barriers to UFP activities and the different development paths. To achieve this objective,

25 interviews were conducted. Eight of the interviewees worked with UFPs, the others did not. The results are shown in Figure 3-5. Many factors affect cultivation decisions, including: availability of labour, land ownership, target products, technical knowledge, start-up money, infrastructure and facilities, market access, and costs (including opportunity costs). Of these, the lack of target products was the most notable. This was due to a serious lack of information in the villages. Market access, technical knowledge and insufficient financial capital were other barriers to UFP development.

The solution to these barriers lies in the four pathways described in Section 3.3.2. In my opinion, two kinds of paths should be encouraged. The first one is the pathway involving leadership from village elites. This path provided reliable information about the target products, market situation and techniques through familiar and trustworthy people known to local farmers. If the local elite were in the village, it was easy to encourage others to join in. The second pathway involved getting help from government or companies. The advantage of these pathways is that target products are provided. Moreover, sufficient market information and the necessary technical assistance were also provided. However, other pathways also exist, and there is a need to encourage farmers to adopt UFPs. This suggests a need for more financial capital, and also more information about target products and markets. Infrastructure and better education are needed to ensure that this happens.

5.3 Objective III

The UFP policy had little effect on the behaviour of farmers. None of the questionnaire respondents or interviewees knew about this policy. Furthermore, while the forest directors in Sanjiang County and Jingzhou County knew about the policy, they did not know how to conduct it because NTFPs have long been ignored and there was a lack of specific support. A clear definition of UFPs is needed, and there should be a clear distinction made between some agricultural products and UFPs. Otherwise, there will be confusion over the government department responsible for them. The policy does not deal with the real needs of forest-related farmers. It cannot remove any of the barriers facing farmers who want to cultivate UFPs. This suggests that farmers should be involved in the policy-making process, and that support, such as financial capital and technical assistance, should be provided.

Although most households received 70-year forest tenures after the reform, there is still a lack of clarity about land tenure, with some historical problems proving difficult to resolve. During the process of forest tenure reform, in some places problems were created by the speed of the reform, and local forest authorities need to ensure that each household has an effective tenure. The forest tenure is the basis for other related policies. Insufficient funding for local forestry authorities is another problem, as this can result in taxes and fees being passed on to farmers.

This study has provided an insight into the development of UFPs from farmers' perspectives in two case areas. It has contributed to a better understanding of the role

that UFPs play in farmers' incomes from and the barriers that farmers face in implementing UFPs.

5.4 Research limitations and future work

Due to time and financial restrictions, it was impossible for me to stay longer in the study area. This resulted in insufficient time to find more households that cultivate UFPs or to develop an in-depth understanding about their livelihoods. Furthermore, before the fieldwork, I was misled by information from a Chinese website that suggested that the cultivation of UFPs was very common and that it would be possible to do a randomly selected questionnaire survey. When I undertook the pre-test, I found it was impossible to randomly select respondents as so few people in the villages were cultivating UFPs. As a result, I had to change my survey method.

Case studies have a lot of limitations, especially the ability to make generalizations from them. The results should therefore be treated with care. During my fieldwork, I tried to find different kinds of UFP cultivation to strengthen the conclusions of my study. As the study target households were hard to locate, I had to seek help from the local forest administration. Through them, I was able to reach target households, but it was possible that the households they introduced to me were not typical, and they may have been those who cultivated UFPs particularly well. I may have missed some households that were facing greater barriers. Another problem is that the sample size was too small to represent the population in the study area. However, I hope that the findings of my

study will provide some useful information for future studies. If possible, it would have been useful to revisit the site and present the results to the local households.

While UFP development is in an initial phase, the effectiveness of the new policy is still unclear. Farmers are encountering new experiences and developing new paths for UFP cultivation, and these await future research.

This study focused on the farmers' perspectives, but did not deal with the issue from the perspective of companies or even the whole business chain from upstream to downstream. Moreover, UFP development in China is only one part of the global pattern of NTFP development. The debates about the effect of NTFPs have been continuous since the 1980s. Much research on NTFPs has been focused on tropical areas. Maybe more research should be done in the temperate zone, and this might yield some different results.

5.5 Research experience

This project has provided me with some very useful; experiences that will help me and potentially others undertake further research in China. In this section, I have described some of the major lessons learned.

5.5.1 Building networks

Before undertaking field work in rural areas in China, network building with related local authorities is important, especially at the county level. As each county-level authority

has a strong connection with village-level authorities, and it is easy for county-level authorities to collect basic information, this is an important step in any project. In my study, it was difficult to locate potential participants. However, the county forestry authorities provided me with information on which villages had people developing UFPs, and through these clues I was able to contact potential participants. It is best to have pre-existing contacts with county-level authorities. If these do not exist, then the contact information for the county-level authorities can be found on their website. It is usually essential to call them or to visit them in person with proof of identity and an explanation of the proposed research. Email is not commonly used, as internet is not always available in some counties.

5.5.2 Data collection

For data collection, it is important to get support from the local government, especially at the village level. Firstly, village leaders are usually very familiar with the situation in their village. Besides having the information that researchers want, they can also provide an overview of the general situation. Secondly, having the help of village leaders makes it much easier for researchers to be trusted by members of local households. Building trust between researchers and participants is essential for the success of a project such as this. I found that some sources of information available on the internet were unreliable, indicating the importance of gaining prior knowledge about the area being investigated.

When collecting data, it is better to chat with farmers about their family situation at the beginning of the interview, even though this may not be relevant to the research, as it leads to a better atmosphere for the following interview. In the interviews, participants may be reluctant to answer some questions, such as their level of income. It is best to ask about such matters indirectly. For example, if I want to know how much net income a family received in the previous year, I will separate the question into different components, including how much agricultural production they had last year, what was the market price for the products, whether some family members had jobs, what was the average salary, and did they have any other source incomes. Through this, I can calculate their net income in the last year.

Farmers will be very busy in some seasons, and avoiding such times is important for successful fieldwork. The busiest seasons depend on the climate and on the products, and this needs to be taken into account when planning fieldwork.

5.5.3 Questionnaire design

In my questionnaire survey, I found that the response rate for questionnaires sent to villagers was very low. Few villagers had the patience to fill out the questionnaire forms for the following reasons. Firstly, the education level of local farmers is usually low, and they do not understand some of the questions. Secondly, they think such surveys have no value for them, and they therefore have no interest in them. A better way to get useful answers is a face-to-face questionnaire survey, which means researchers read and explain the questions to participants and at the same time explain why the

researchers want to do this survey and the potential relationship with local farmers. Questionnaires designed for rural farmers in China need to be as simply as possible.

5.5.4 Language problems

Language is another problem for doing field work in China. Even though Mandarin is the official language, different places have different dialects, and some dialects are very difficult to understand. Some villagers can only speak the local dialect, especially the older generation. From my experience, a good way to address this problem is to ask for help from local teachers or students. As it is a requirement to speak Mandarin in class, most teachers and students can communicate in mandarin fluently, and they could also be great translators during a researchers' fieldwork.

5.5.5 Immediate feedback

After researchers' get some results, it is important to share these results with local people. For my study, it would have been difficult to go back to all the original participants, but I was able to share the results with the local forestry authorities. Such feedback helps build a good relationship between researchers and participants, and is likely to benefit further research in the area.

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Appendices

Questionnaire Form

Household structure

1. This question is about the background information of each household member.

Please use the follow code to fill out this form.

Variable	Household members					
	M1	M2	M3	M4	M5	M6
Kinship						
Gender						
Age						
Marital Status						
Education Level						

Household kinship code	Gender code	Marital status code	Education level code
01: Householder 02: Spouse 03:Son/daughter 04: Other relative 05: Not a relative	01: Male 02: Female	01: Single 02: Married 03: Widower 04: Separated 05: Partner 06: Divorced	01: Not attended school 02: Part of primary school 03: Completed primary school 04: Part of junior high school 05: Completed junior high school 06: Part of senior high school 07: Completed senior high school 08: University 09: other (please specify)

Land ownership

In this item you will be asked about the land tenure situation.

2. The use right of the forest land belongs to you? Yes__ or No__ If yes, which is the size___ mu; it belongs to you from_____ (MM/Year) to _____ (MM/Year).

3. If your answer is No, then please fill out the following section.

Concept	Size (Before forest tenure reform) (mu)	Size (After forest tenure reform) (mu)
The forest land is leased		
The forest land is shared		
The forest land was given		
Others (please specify)		
Total (mu)		

Forest land use

4. This question asks about the different usage of your forest land. Please fill out the following section.

Forest land use Categories	Size (Before forest tenure reform)	Size(After forest tenure reform)
Timber		
Fungi		
Keeping poultry		
Chinese Herb Medicine		
Forage		
Keeping bees		
Fruits		
Nuts and seeds		
Flowers		
Others (please specify)		

Income from forest

5. The following questions ask about the income from the forest land. Please fill out the following section.

Type of forest land use		Income from it before FTR	Income from after FTR
Timber forest products	Timber		
	Others (please specify)		
Non-timber forest products	Fungi		
	Poultry		
	Herb medicine		
	Forage		
	Honey		
	Fruits		
	Nuts and seeds		
	Flowers		
	Tourism		
	others:		

Cost

6. The following questions ask about your cost spend on forest land. Please fill out the following form.

Type of forest land use		Cost for buying raw materials (seeds, baby poultry)	Cost for disease control	Cost for fertilization/forage	Cost for transportation	other cost (please note what is the cost)
Timber forest products	Timber					
	Others (please specify)					
Non-timber forest products	Fungi					
	Poultry					
	Herb medicine					
	Forage					
	Honey					
	Fruits					
	Nuts and seeds					
	Flowers					
	Tourism					
	Others (please specify)					

7. If you don't develop UFPs, what do you do? How much money can you earn from it?

___

Projects and programs of technical assistance

8. Have you ever participated in a project or program of technical assistance? Yes___ No ___

If Yes, please fill out the following section.

Project / program	Start year	End year	Executing Institution	Evaluation				
				Very good	Good	Regular	Bad	Very Bad

Cooperative economic organization

9. Is there any cooperative forest products economic organization in your village? Yes___ No___

10. Have you ever joined a cooperative forest products economic organization? Yes___; It is named_____ No___

If your answer is yes, then answer the next question. If not, skip to question number 19.

11. Are you part of a cooperative forest products economic organization now? No___ Yes___; what does this organization do?

Please choose: _____

1. Technique guidance
2. Finding buyers
3. Disease and pest control
4. Transportation help
5. Provide market information
6. Hire counselors
7. Others_____

12. Why did you choose to join this cooperative forest products economic organization?

Please choose: _____

1. Helping me to find buyers
2. Helping to reduce the transportation cost
3. Providing market information
4. Useful technique guidance
5. I can get subsidy from the government
6. Helping me to save time and energy
7. Others_____

13. Who set up this organization?

1. government
2. company
3. local leader
4. ourselves
5. others_____

14. How does this organization make a decision?

1. we make it by ourselves
2. a few managers make decisions
3. government officers make decision
4. the company makes decisions
5. others

15. Do you need to pay an entry fee for this organization? Yes___ No ___
If Yes, how much do you need to pay? ____

16. How many meetings do you have in this cooperative economic organization per month? ____
The rate of your attendance is about _____%

17. How long have you joined it?
1. less than one year 2. 1--2 years 3. 2--3 years 3. 3--5 years 4. More than 5 years

18. What's your occupation in this organization?
1. leader 2. member

Policy

19. Do you need to pay tax and other fees for the production of non-timber forest products?
Yes___ No___
If Yes, please fill out the following form.

Names of the fees and tax	Cost/year

20. Do you get some subsidy from the government?
Yes ___ No ___

If Yes, please fill out the following form.

Names of the subsidy	Get/year

Capacity

21. Do you need to loan money? Yes ___ No ___
If your answer is yes, then answer the next question. If not, skip to question number 19.

22. Where can you get the money and how hard is it. Please fill out the form.

Category	Very easy	Easy	Ok	Hard	Very hard
Bank					
Cooperative economic organization					
Other people					

Market

The following questions (No.23—No.29) ask for your opinion on market access. For each question, please indicate whether you agree, or disagree and 5 means strongly disagree.

23. You have a clear idea about what the buyers want to buy.

strong agree 1 2 3 4 5 strongly disagree

24. You get enough information about how the market changes immediately.

strong agree 1 2 3 4 5 strongly disagree

25. It is easy for you to bargain the price with the buyers.

strong agree 1 2 3 4 5 strongly disagree

26. You have stable customers.

strong 1 2 3 4 5 strongly disagree

agree

27. The transportation for selling products is convenient.

strong agree	1	2	3	4	5	strongly disagree