Chapter 1

Introduction

1.1 Background

In 1949, a new fundamental principle of land ownership was established by People's Republic of China. The principle is that only two kinds of forest ownership are admitted, which are state and collective forest ownerships. 'Collective forest' in China refers legally to "the production and management of forest resources by village/township collective economic organizations or other entities who are engaged in cultivation, protection and utilization of forest resources on rural collective land" (Miao et al., 2004).

Because collective ownerships are complex and abstracted, management of collective forest is a big issue in China. With change of structure of society and economic from 1949 till now, policy-makers have been keeping exploring and launched a series of forest policies to achieve the win-win objective which is improvement of people's economic well-being and environmental conservation and economics development.

With less and less profit from traditional agricultural productions and needs of environmental protection, forest products especially Non-Timber Forest Products (NTFPs) change into more and more important sources of income in China. Development of forest productions is paid more attention. Especially in the west of Yunnan province, it is a highland area with large areas under forest cover (52.9%).

Having many steep mountains, deforestation would lead to low soil fertility and serious soil erosion. Meanwhile, it is one poorest area of China. The average per capita net annual income in rural areas in Yunnan province was 3369 yuan[2]. Ethnic minorities living in the mountainous areas have lower levels of income (Statistical Bureau of Yunnan province, 2010). Therefore, people living in this area really need explore potential of forest resource to improve their economic well-beings.

In 2003, Chinese government launch a new policy called the Reform of the Collective Forest Use Rights (RCFUR) in rural area. The policy tried to decentralize use rights of collective forests which were used to be managed by village committee to individual farmers. With RCFUR, farmers can develop forest production activities by themselves such as timber extraction, firewood collection or planting economic trees, or rent out these forest lands they has. The policy expects that farmers will have more channels to earn money through giving more rights to them. Meanwhile, farmers' awareness to protect environment also are expected to be motivate since forests change into important sources of income.

1.2 Rational

Implementing the new reform (RCFUR) provide farmers more alternatives on forest use, such as production by oneself or rent out/in. In order to achieve the win-win objective, which is increase farmers' well being and forest conservation, it is interested to find out what kinds of activities should be done in collective forests? How farmers can use forest efficiently? Can the reform really improve the economic well being of poor farmers in China? How will it affect to the household resource use

[2] Yuan is the name of Chinese money, currently the exchange rate between USD and Yuan is 100 USD = 628.90 Yuan (Updated on Oct 2nd 2012).

in the future? Analyzing a case study, the research will answer these questions. Linear programming will be used to model farmers' productive activities. Several strategies and scenarios of forest use will be tested to see their impacts.

Researches on reforms of forest tenure are many, but few of them analyse farmers' strategies facing the new policy, especially planning farmers' activities by using linear programming. Linear programming is a useful tool to model activities and gives out an optimal result. Results of the research may provide government and farmers recommendations. One side, they can be used to suggest farmers how to use their resources. On the other side, results of different strategies and scenarios will be useful for policy-makers to make their decisions on forest or related policies.

1.3 Literature review

1.3.1 Significance of forest tenure

Bromley and Cernea (1989) Feder and Feeny (1991) wrote, "Many environmental problems such as soil degradation and forest depletion are a result of incomplete, inconsistent or poorly enforced property rights." According to a number of authors, property rights are often classified as private (held by an individual or group of individuals), public (held by the state), and common (held by a group of users).However, it is still argued which is the best way for forest management.

Not only in ecological terms but also in economic terms, forests play an important role – it provides 10% or more of GDP for some of the poorest countries, and 5% of GDP for many more developing countries (Steele and Kragt, 2006).

However, Nguyen Quang Tan 2009 found that forest protection and management is not necessarily automatically effective through legal title but requires strong local institutions amongst other factors.

1.3.2. The changes of land tenure in China from 1949-present

Types of forestry management organization in China have changed many times since 1949 (Song et al, 1997). After establish of People's Republic of China in 1949, the first Land Reform Law of 1950 called for the expropriation of land held by the landlords and transferred property to the land-poor and landless (Song et al, 1997). In addition, at the beginning of the mid-1950s, after encouragement of the central government, reforestation of barren lands and wastelands was carried out in most area, especially in the North (Wang, 2004). However, forest management and forestation, like other sectors of society, were damaged by the policy changes of what was to be known as the 'Big Leap Forward' campaign (1959 - 1961) and People's Communes system (1958 - 1978). Massive destruction of forests and low efficiency of forestry production happened in this period. The Cultural Revolution (1966 – 1978) is a period when reforestation forest management systems were declining (Zhang, 1989). In the Cultural Revolution, public struggle was seriously disruptive to the normal running of the Ministry of Forestry. (Wang, 2004). After Deng Xiao Ping who was leader of the Communist Party of China in 1980s took power in late 1978, a great economic reform called the Reform and Open was introduced. In order to match the reform, an agricultural contract system – the Household Tenure system (HT system) – was introduced which gave forestry responsibility to individuals and rural cooperatives by early 1984 (Song, 1997). But, it didn't achieve expected success.

Learned lessons, in 2003, the central government launched the Reform of Collective Forest system, which adjust and improve HT system.

1.3.3. Linear programming model and application in forest management

Mathematical programming has been used in agricultural economics for more than 30 years. The question of changes in economic structure applies especially to technologies of production, market opportunities, and prices. Public policies can influence all of these. Policy options can be analyzed with the model (Hazller and Norton, 1986). Hazller also wrote that "programming models can be used to analyze the consequences of direct changes in economic structure, such as those that would arise from the introduction of new crop varieties or from land reform that changes the size distribution of farms". A simple model is (Hazller and Norton, 1986):

Objective function:

$$Max \quad Z = \sum_{j=1}^{n} c_j X_j$$

Such that

$$\sum_{j=1}^{n} a_{ij} X_j \le b_i \quad , \qquad \text{all i = 1 to m,}$$

$$X_j \ge 0, \quad \text{all j =1 to n}$$

Xj = the level of the jth farm activity

cj = the forecasted gross margin of a unit of the jth activity (e.g., dollars per acre).

aij = the quantity of the ith resource (e.g., acres of land or days of labour) required to produce one unit of the jth activity. Let m denote the number of resources; then i = 1 to m.

bij = the amount of the ith resource available (e.g. acres of land or days of labour).

Mudhara used a five-year LP model to compare the profitability of household for new and old technologies: the model evaluates compatibility of new technologies to a level of resources available to the households over time. Decisions on allocation of expenditure to different goods (including farm goods for own consumption and leisure) and allocation of fixed and variable inputs to different production activities in the short run can be incorporated. Single or multiple objectives can be incorporated in the model. (Mudhara et al, 2003)

LP was used successfully to test the effects of policies. Frito, Dolisca and Jushua (2008) investigated alternative solutions to the problem of deforestation of Haiti using linear programming (LP) models. They built a LP function to simulate optimal farmer's selection, and then ran several scenarios under different policies to see how incomes of farmers change. (Frito, Dolisca, and Jushua, 2008)

In China, Li successfully applied a linear programming method to optimize the construction of land-use structure taking the regional economic benefit maximization as the goal, and social and ecological benefits as constraints (Li, 2010). Zhang used a multi-purpose linear programming to optimal a plan of forest type structure of the ecological and public welfare forest. (Zhang, 2002)

1.4 Research objective

1. To review changes of forest policies in China from 1949-2010 and analyze the advantages and disadvantages of those policies.

2. To identify villagers main productive activities in the study area and analyse costs and benefits of productive activities.

3. To assess the impact of the Reform of Collective Forest Use Rights on farmers' land use and income generating activities in different possible conditions.

1.5 Structure of the thesis

The following section of this chapter illustrates the study area of the thesis, including natural, economical and social conditions. The 60 year history of forest tenure policies in china especially in the study area as well as more detail of the reform of collective forest tenure was reviewed in Chapter 2. Chapter 3 explains the research methods used for data collection and analysis. The research results are presented and explained in Chapter 4. Chapter 5 discusses on the research findings and approaches while it provides conclusions and recommendations.