



LUND UNIVERSITY

**China's Mountain Regions: How to Maintain an Environmentally
Sustainable Development While Improving Livelihoods?
---A Case Study of Yuanyang County, Yunnan Province, Southwest Part of China**



**A thesis submitted in fulfillment of the requirement for the
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Abstract

It has been recognized that mountain regions' integrated development is always lagging behind due to its geographical, economic, social and political constraints. The sustainable development in those areas needs strong and urgent external interventions. 70% of the land area in China belongs to mountain regions where 26% of the total rural population is living. However the most severe rural poverty is remaining in mountainous areas even if the rapid economic growth has contributed an amazing poverty reduction in China since 1978. Southwestern China, as the most culturally and biologically diverse and also the poorest region, could typically illustrate mountain regions' sustainable development in recent years, where the obvious contradiction between the rich ecological system and unsustainable livelihood system is really worthy to rethink and reanalysis.

Through analyzing the socio-ecological system of terraced paddy landscape in case study area of Yuanyang County, the paper revealed some reasons for the local people's low livelihoods and argued some of the current Chinese national policies that just focused on the nature conservation without too much inclination for people's livelihoods improvement, which will in turn affect both the natural environment and the social stability from a long-term view. The connections between the current situation of the local people's livelihood and selected policies ('Grain for Green Project' and 'Land Policy') were discussed. Those policies could lead to the further income inequality that would be a risk for local poverty reduction in the future. Policy-makers should pay more attentions to the peasants' livelihoods and their related rights. The paper advised a more people-centered policy-making that internally should respect indigenous people's traditional rules and externally should seek rational compensation mechanisms. A new payment environmental services mode is put forward that should be more targeted and have more inclinations to poor people for long term livelihood improvement.

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Abbreviations:

CAS – China Academy of Science

ICIMOD – International Centre for Integrated Mountain Development

UNDP – United Nations Development Program

OECD – Organization for Economic Co-operation and Development

UNU – United Nations University

UNESCO – United Nations Educational Scientific and Cultural Organization

DFID – Department for International Development

ADB – Asian Development Bank

IFAD – International Fund for Agricultural Development

PNAS – Proceedings of the National Academy of Sciences of the United States of America

IDS (UK) – Institute of Development Studies

WSSD - The World Summit on Sustainable Development

1. Introduction

Mountain regions have been regarded as the most fragile, remote and marginal ecological systems on the earth. 24% of the global land surface areas are occupied by the mountains and 12% of the world's population is living there, in which most of them are economically vulnerable people (ICIMOD, 2007). Because mountain regions are weak in infrastructure foundation, there is not an obvious investment return. Therefore, in many cases, mountainous areas' development is experiencing a minor and passive mode that is dependent on the external aids or strong governmental interventions (Klaus, 1983). Some scholars believed that under the agricultural society, the differences of people's living standard between mountain areas and plains were not so big, but under the period of globalization, disadvantages of mountain areas emerged and led to a regional imbalance (Klaus, 1983, Chen 2007). Besides, natural disasters such as earthquakes, flash floods and the risk of climate change are all drivers that increasingly threaten the capacity of mountainous sustainability and in turn influence mountain communities and even lowland populations (ICIMOD, 2002). China has a very large and complex mountains area accounting for about 70% of the land area, where 19% of China's population (or 26% of rural population) belongs to mountainous population (Chen 2007, World Bank 2009). United Nations firstly brought mountain issues as the "next big advance" at 'International Year of Mountains' [IYM 2002] that is to ensure the well-being of mountainous population and lowland communities through promoting the natural conservation and the sustainable development. WSSD implemented Agenda 21 at Johannesburg in 2002 for further improving the livings of mountain people and protecting mountain environments (ICIMOD, 2002).

According to UNDP's "Human Development Report 2009/2010", in China the most severe poverty is happening in mountain areas where socio-economic development lags far behind (UNDP, 2010). Since early the 1980s, with an 8-fold increase of per capita gross domestic product (GDP) and an 50-fold growth of per capita income in China, the rural poor has decreased from over 25,000 million to 2,900 million in 2003 (Chen, 2007) and continued falling down to 737 million in 2006 (OECD,2009). Simultaneously, the population who was living in absolute poverty (measured by the threshold of US\$1 per day) has reduced from 652 million to 135 million within the period of 1981 to 2004 (UNDP 2010; *ibid*; the National Bureau of Statistic 2008). Such a remarkable achievement has contributed greatly for poverty alleviation to the world. However, China is still a predominantly rural country with around 800 million peasants, which as noted is the most vulnerable sector in most of developing countries (Wen, 2008). China still has more than 254 million people who are living with a consumption level of less than US\$1.25 per day in 2005. China is the second largest concentration of poor people in the world after India (World Bank, 2009). In China, territorial allocation of the poor population is very unbalanced. Almost all absolute rural poor is living in western part of China, especially eight ethnic provinces and autonomous regions¹ (The State Ethnic Affairs Commission, 2006). Not only poverty distribution, rural per capita income is highly different between the West and the East, which is mainly driven by the availability of non-agricultural jobs and agricultural productivity (OECD, 2009).

Sustainable development is the development strategy of China, in which the poverty alleviation is one of the important objectives (CAS, 2009). Economic development could reduce poverty, but under internal constraints of mountains regions, poverty alleviation still has to rely on some political supports

¹ Eight ethnic provinces and autonomous regions include 5 autonomous regions of Inner Mongolia Autonomous Region, Guangxi Zhuang Autonomous Region, Tibet Autonomous Region, Ningxia Hui Autonomous Region, Xinjiang Uygur Autonomous Region and Yunnan, Guizhou, Qinghai Province.

based on a total coordination among the population, natural resources, environment, economic and social development situation. Before 1999, the development of urban areas and the Eastern seaboard is prior to other places in China. Mountain regions as the marginal place could hardly be considered and written into the national development strategies. Until 1999, China's western development strategies firstly emphasized a comprehensive development over the western mountains from a national level. However, due to the deep income gap between the east and the west, and the historical direction of unbalanced development, the results of sustainable development in mountain regions of China is not so remarkable and effective. However, mountain regions' sustainable development as a big task has been paid more attentions to by Chinese Communist. Especially after the happening of the unstable violence in the ethnic minority district of Western China, it has threatened the security of the Chinese society (HIRC, 2007).

Without doubt, China's rural development has benefited from the global economy after implementing the opening up policy from 1978. A consideration of how many profits have been really taken by rural poor in mountain regions was being discussed radically both by relevant academic agencies and the governmental departments. Some investigational results demonstrated that the challenges such as lack of additional options of livelihood, a growing population, the vulnerable ecosystem, the environmental degradation and the lack of rural industrialization have restricted those mountain regions' sustainable development, and could further widen the income gap (Wen 2008, Chen, 2007, Kumar, UNDP 2010). The root of poverty reduction for mountain poor is through enhancing their livelihoods options (UNU, 2002). The livelihoods of mountainous people should receive more serious considerations from academia and policy makers (Tokyo Declaration, 2002).

Mountain environments are rich in biodiversity and their populations are diverse in terms of cultures and traditions. Mountains have the ecological, aesthetic and socioeconomic significance both could play natural views and people living place (ICIMOD, 2002). 10% of the world's population's livelihoods and well-beings rely directly on mountainous resources (UNU, 2002). China is one of the most environmentally and culturally diverse countries in the world (OECD, 2009). Mountain areas are the national repository of biotic and energy resources, that play an important role in establishing China's ecological modernization and involving in the global competition (Chen, 2007). Besides, Chinese ethnic cultures as well as mountainous cultures are also high valuable. However, those ecological and cultural values have never been marketable yet or been valued in monetary terms. It means China's vast plain areas are still enjoying the ecological and cultural services provided by mountains areas for free. The worse is that the corresponding economic welfare from rich areas can hardly be enjoyed by mountain populations so far (Fang, 2009). Till now, China had not a national regulation or law that can be operated on ecological compensation from the national level (The State Ministry of Land and Resource, 2010). Ecological compensation in China is still partial, slight, and weak, and very difficult to make up the poverty status for mountainous poor. In many cases of the world, mountain regions' sustainable development emphasized the visible long-term conservation in terms of high compensation for agriculture and ecological services (Xu 2007, Reford & Sanderson 2000). On one hand the compensation could effectively protect the mountainous resources; on the other hand it helps to raise people's income and promote poverty reduction. Mountain regions cannot develop sustainably without the supports from plains, urban areas and sound policy making (ICIMOD, 2002).

For mountains regions' sustainable development, we have to deal with development issues under its complex ecological and agricultural systems, besides people's livelihoods are also need to be

sustainably developed. It is the interactivity between social and ecological system, between human and nature (Kemp, Martens 2007). In many mountain regions of China, the conservation of ecological system has been addressed after too many cases of environmental degradations and natural disasters since the later 1990s, meanwhile many projects about ecological restoration also were operated (Xu. *et al.* 2007). But compared with livelihood improvement happening in other parts of China, mountain rural people is still suffering from low livelihoods and income inequality. Definitely, natural and practical issues have led to difficulties and vulnerabilities for sustainable mountain development, but relevant polices' formulating and running also need to be counted.

Due to specificities in mountain regions, the specific and targeted policy needs to be taken. ICIMOD (2002) pointed out that it is still lack of specific policies and activities for sustainable mountains development internationally and nationally. It also addressed that relevant scattered policies haven't effectively influenced the national strategies to incline enough concerning to mountainous issues. Therefore, mountain people's livelihoods in many countries of the world are still lagging behind their development processes (ICIMOD, 2002). For China's rural policies, many of them adopted by the Chinese government like "Building a New Socialist Countryside" (NSC) or "Three Rural" (or Sannong) have definitely promoted the rural development, but no special targeted for mountain regions, and the livelihood improvement for mountainous population are all mixed in general rural policies. Some national environmental conservation policies, even though touched the local livelihoods, but just have a short-term effectiveness without considering mountain people's long-term benefits (Liu et al. 2008). Besides, lack of ongoing financial and technical support, unclear use and property rights in terms of land tenures, lack of the public trust in polices also limited mountain areas' rural development and the livelihoods improvement (Xu, *et al.* 2007).

Southwestern China, Yunnan Province, one of the most biologically and ethnologically areas in China, even on the earth, represents the most typical example for China's mountain regions' sustainable development. A more detailed case study of Yuanyang County, Southern Yunnan Province, will further demonstrate the reality of local income poverty and related issues, challenges and opportunities for sustainable mountain development in the context of traditionally terraced agriculture and the landscape conservation. For this case, despite of various efforts have been carried out by the local government for mountain regions' sustainable development, there are still no effective results that are able to enhance the local people's livelihoods, especially in long-term scale. The paper was intended to figure out why those happened. I stated the lack of supportive policies will continue keep the poverty status and induce further income inequality in this mountain region. The selected policies of 'Grain for Green' program and China's 'Land Policy' will be mainly discussed from both their advantages and disadvantages on people's livelihoods improvement. The integrity of sustainable development is suggested that should focus on people and a governance should have some inclinations to people's livelihood.

2. Setting

Yunnan Province, a multi-ethnic mountainous area, located in the Yunnan-Guizhou Plateau, the Southwest part of China, where 94% of the total area is mountains. It borders with Myanmar, Laos and Vietnam (Fig. 1). Mountainous population accounts for 74% of the total. 25 ethnic minority groups out of 55 in China are living in Yunnan. At present, Yunnan remains one of the poorest areas in China that the poverty alleviation and rural development is very significant (FAO, 2007). In 2007, rural per capita income in Yunnan is 514 Yuan/year, only achieved half of the China's poverty standard, lower than the

average level² (Chinese Statistic Bureau, 2009). In fact, many mountain rural people just have adequate food and clothing without a stability of cash income. Till now, some villages in mountain regions are still inaccessible by road, electricity, and facing the issue of drinking water safety (Song, 2007).

Yuanyang County is located in the south part of Yunnan Province, the southern section of Ailao mountains system and the south bank of the Red River (Fig. 1). There is a drop of 2800 meters from the highest elevation of 2939.6 meters to the minimum of 144 meters within the county, which belongs to low latitude and high altitude areas. The county’s territory is 2189.88 square kilometers, in which spreads over rolling mountains, overlapping peaks, and steep ravines, without obvious plains at all. More than 80% of the mountain slopes in Yuanyang County is larger than 25 degrees (Wang, 1999). The topography slopes from the northwest to the southeast, formed as a “V”-shaped in the terrain. The mountain slopes are covered with yellow or brown colored clayey soils that are shaped during repeated tectonic movements (Yuanyang County Annals, 1990).



Figure 1: Location Map of Yunnan in China and Yuanyang County

Most China’s agricultural practices were undergoing a rapid transition (FAO, 2006). However, in Yuanyang County, traditional agriculture is still the main supportive livelihood system for local farmers. There are 13,190 ha and with a buffer zone of 14,810 ha of terraced fields for rice cultivation along Ailao mountains, which are composed by the forest at the hilltop, villages below the forest, the terraced fields below the villages and the Red River below the terraced fields (pic.2 & detailed explanation see part 8) (UNESCO, 2008). Traditional cultivation methods and agricultural tools are still utilized that were passed down (Shimpei, 2007). Traditional methods and knowledge conducted in daily life have effectively protected the local landscape, such as rational making use of the water resources for irrigation. Those cultural and knowledgeable elements are essential to local people (UNESCO, 2008).

² Chinese absolute standard: 668 Yuan/year of absolute poverty & 924 Yuan/year of low –income population standard] (Chinese Statistic Bureau, 2004)



Picture 1: Yuanyang Terraced Paddy Landscape in winter, which is full of water, taken by Guo Na, 2010.2



Picture 2: Yuanyang Terraced Paddy Landscape in summer, taken by Guo Na, 2009.8

Many Chinese scholars believed the terraced paddy agriculture has a history of more than 700 years (Shi 2009, Wang 1999, Ma 2009, Zheng 2004), although it lacks detailed information. The certainty is that the terraced agriculture influences local people's livelihoods deeply and extensively. The ethnic groups of Hani, Yi and Yao cultivated terraced paddy fields historically, in which Hani people³ is the main power who practiced irrigated agriculture for more than a thousand years (Wang 1999 & Ma 1983). Hani terraces (mainly in Yuanyang County) have been rewarded as the cultural landscape⁴ in China and it is applying the world cultural landscape heritage from UNESCO (2008). Although Chinese society has undergone great changes, little influences have been imposed to Yuanyang mountain regions where you cannot see obvious remarks of industrialization, and the pressure of urbanization is quite low as well. The local society still keeps traditional agriculture and life style by local ethnic groups (UNESCO, 2008).

3 Problem Statement

Investigations about terraced paddy fields in Yuanyang County have been widely conducted. However, most of them were focused on Hani people's traditional culture, ethnological studies, tourism development or alpine vegetation (Shi 2009, Wang 1999, Zheng 2004, Jiao 1999, Zhang 2006, Xu *et al.* 1999). Many research results from Chinese scholars are positive which addressed to praise the harmony of the terraced landscape, and the development of local ecological tourism. A few of foreign exporters did some similar researches about local ethnic groups' culture or folklore, almost in use of anthropological research methods (Bouchey & Pascal 1996). In recent years, with the further academic cooperation between Yunnan and foreign countries, within the field of social science research, some scholars from China paid more attention to ecological culture⁵ and agricultural culture studies on Hani terraces. At the same time, scholars from Japan had some research results on analysis of agricultural technologies, terraced farmlands allocation, as well as some discussions about China's rural policies (Shimpei 2006). Based on my research reviews, there are not much specific researches focused on local people's livelihoods analysis or the effectiveness of the rural policies. But issues of livelihood have been addressed by many scholars and some governmental officers (Shi 2009, Ma 2009)

Indigenous people in southern Yunnan have adapted ecological system of terraced fields for their subsistence and developed a series of indigenous knowledge and cultures to manage this landscape over a long time, but today under the new context of China's economic development and the world globalization, suffering from shocks and pressures such as climate change, environment degradation or urban temptation, whether this socio-ecological system still can be maintained? The system of terraces, villages, forests and water was regarded as harmonious and environmentally friendly. However, people's living standard within this system is still lagging far behind. Rural development in mountainous areas of Yunnan Province is facing unprecedented challenges that originated from income poverty. Due to limited industrialization, local people's basic livelihood is still dependent on traditional terraced rice cultivation. An incredibly high labor input has to be paid for agricultural practices. For example, the harvested rice has to be carried up to the village on farmers' shoulders round after round,

³ The Hani people (the Akha in Thailand who are the same group historically) originated from the Red River region of Yunnan, but originally they emigrated from the Tibetan Plateau (Xu *et al.* 1999, 2005).

⁴ A cultural landscape is defined as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values." (American Society of Landscape Architects, 2005)

⁵ Ecological culture is a combined concept that includes ecological knowledge, people's knowledge on the interrelations between their living life and environment, the role what human being is playing in the nature. Ecological culture is the interaction between culture and nature, or culture's adaptation to nature (Guo, 2003).

once 50-65 kg (Shimpei, 2006). Average yield (t/ha) of terraced paddy fields is only 0.8~2.0 on upland (above 1,500 m in altitude) and 1.2~3.0 on middle slopes (1,300 m~1,500 m) respectively, just half or even fewer than rice cultivation in plains (Shimpei 2006, Wang 1999). Because of low yield, net income from rice cultivation is only around 150 Yuan/mu (16mu=1ha).

Why in Yuanyang County, such a relatively environmentally friendly regions, people's livelihoods are lagging behind? In addition to geographical and environmental factors of mountain regions, to what degree current policies could affect people's livelihoods behind. The thesis will raise some discussions about this issue from another angle of sustainable development: how to improve people's livelihood without this development creating environmental degradation.

4 Research Questions

The research was intended to evaluate both direct and indirect correlation between the governmental policies on rural development and people's livelihood in mountain areas. The reality of mountain rural people's livelihood will be revealed in order to give a vision of income poverty and inequality situation in China. A case study of Yuanyang County aims to provide some research results about effectiveness of rural policies implemented locally that might be supposed to enhance people's livelihood for a long-term.

4.1 The Main Research Question

Under the implementation of both short-term and long-term rural development strategies and policies from the state level to the local level, what is the current situation of mountains people's livelihood in Yuanyang County? Why are the local people's livelihoods still lagging behind?

4.2 Specific Research Questions

1. Whether the system of Hani terrace is sustainable?
2. How do Hani traditional cultures and institutions contribute the conservation of terraced landscape? Can they be related to policy-making?
3. What are both positively and negatively practical effects of 'Grain for Green' project and 'Land Allocation Policy' on rural people's livelihood in Yuanyang County?
4. What mechanism can be proposed to enhance local people's livelihood while maintaining sustainably environmental development?

5. Methods and Materials

5.1 Literature Review

A literature review was conducted on the existing literature of research papers, governmental documents of policies, historical records, electronic databases and websites resources. The topics of literature cover the areas from mountain development, sustainable livelihood, and poverty alleviation, China's agricultural reforms, rural development reforms, mountains regions' issues in China and conservation area's management. The literature review is very important to enable me to have a clear concept and adequate information regarding my research field from the academic and the governmental perspectives. Reports and useful website literature published by authoritative organizations like the United Nations (UN), the United Nations Development Program (UNDP), the International Union for Conservation of Nature (IUCN), the International Centre for Integrated Mountain Development (ICIMOD), the World Bank and Organization for Economic Co-operation and Development (OECD).

During the process of my literature review, I mainly focused on their points of view, discussions and methodological approaches on my thesis topic. A literature review about China's rural policies will be displayed subsequently in the paper.

5.2 Fieldwork

This thesis writes on the findings and reflections based on twice fieldworks that were conducted during August of 2008 and March of 2009 in 3 townships⁶ of 4 village committees⁷ and several natural villages of Yuanyang County. The targeted people are around 30 that include governmental officers from different levels and farmers. Firsthand materials were collected from the fieldwork in terms of individual interviews, group meetings, and non-participation observations. Data was collected through talking with local farmers and officers, walking along the community, and self-observation, etc. (Bishnu, 2003). In particular, several semi-structured interviews were carried out for collecting data from interviewees; and non-participant observations were used for capturing useful data of local people's living life and their agricultural activities. The use of those methods is to obtain data to get a better understanding about local issues.

5.3 Semi-Structured Interviews

This thesis is a qualitative study in which the semi-structured interviews approach was used. The interview process is flexible (Bryman, 2008). The interviews were conducted with the staff from the county government, the township government, the village committees and some local farmers. Five interviews (details at Appendix 1) mainly from governmental level and other interviews for mountain rural people were carried out along the fields by visiting the villages, terraced paddy fields and walking following some irrigational ditches or channels. In-depth interviews were done for key farmers, such as two water manager of the water channel in Malizhai Village and Panzhihua Village, three householders of different living levels from Qingkou Village etc. Subjects of the interviews are based on my research questions and interests that included: (1) the general background and the current situation of local mountain people's livelihood; (2) poverty situation and interviewees' attitudes and feelings regarding it; (3) governmental officers' strategies and plans for local mountain areas' sustainable development; (4) the situation of policy implementation and effects; (5) indigenous regulations for nature conservation; (6) the implementation and effects of the special policies; (7) peasants' attitudes on terraced agriculture and conservation.

5.4 Non-Participant Observation

The non-participant observation approach was utilized during the fieldwork. Because my research is carried out in mountain rural areas, where the majority people are ethnic minority groups with different life styles, communication methods and different beliefs compared with me from the city, and of course, terraced agriculture is also inevitably strange for me. I need to get close to observe their real life in order to really understand their agricultural activities, social life and some of their indigenous cultures. Non-participant observation approach is a good way to get closer and contact with people (Bryman, 2008). It would be easier for me to seize the local problems when I carefully looked into their social life or even partly participated into their activities. Because of the real interview context, it would make me more sensitive and flexible about their living environment, means and activities. During my fieldwork, the content of observations covered local farmers' agricultural practices and social activities in related to terraces, such as water manager's checking work for irrigation channel, farmers' plowing and how

⁶ Panzhihua Township, Niujiashai Township, Xinjie Township

⁷ Malizhai, Niujiashai, Panzhihua, Huancaoling Village Committee

local farmers distributed the irrigational water to different pieces of terraced paddy fields. Besides observations, some personal experiences such as a termed transect walk along the terraced paddy fields enriched my understandings of the local ecological system and also enhanced the impression of the relationship between the local ethnic minorities and the terraced landscape, which is very helpful. Within the activity of non-participant observation, notes were taken.

5.5 Limitations and Issues during the Fieldwork

Local rural people's language and communication means are different as city, even though I can understand some dialects of Yuannan Province, but local ethnic minorities have their own languages such as Hani, Yi that are totally different as mandarin. So when they spoken ethnic languages I cannot understand at all. Furthermore, due to bad educational level before, most of mid-age farmers had no leaning experiences for mandarin, at the same time ethnic languages flowed very well within the county, nearly everyone can speak or understand it. Therefore, for mid-age or elderly farmers, they do not need to learn Han people's language. But for me, even I am from Yunnan Province, I also felt difficult to interview farmers who are above mid-age because of language obstacle. (There are no obstacles to talk with young people since all of them can speak mandarin) Despite some farmers can speak mandarin, because of limited words they controlled and different forms of their expressions, you still had to guess what they were exactly talking about. I met several such problems when I just arrived to Yuanyang County for my initial interviews with local farmers. In order to solve this problem, at the following fieldworks, I usually got to the local government firstly to talk and interview with the local officers. Usually, those officers received more educations and don't have language obstacles. Then I asked them to help me find a local farmer as my interpreter, such a person could be the leader from the villager groups (a natural village is composed by several villager groups), who will accompany with me during my fieldwork in this village. But still, I tried to ask questions by myself without translation, that's because if my interpreter talked with my interviewees in indigenous language, I cannot understand either. The problem is maybe the interpreter would not translate the exactly meaning of questions what I wanted to ask to interviewee. However, sometimes I had to rely on an indigenous language speaking people.

The other issue what I met during my fieldwork is the interference from the governmental perspectives to local interviewees. Because the fieldwork was arranged by Yunnan Academy of Social Sciences (YASS) that was my workplace before, my previous supervisor in YASS helped me to connect with Yuanyang County government. So one officer from the county government actually accompanied with me during the second fieldwork, it was very convenient for me to carry out work in mountain regions because I was not familiar with the local complicated situation both ecological environment and the transportation, especially at village level. He could help me to contact the local officers and people who I would like to interview. However, his existence did influence the interviewee's perspectives because he is from the county government, seems more powerful than local people that interviewees sometimes will unconsciously ask for his opinions. To overcome this difficulty, I tried to avoid his participation in the process of interviews with local farmers even the group meetings.

Remote traffic and bad road quality in Yuanyang County were most serious limitations for my fieldwork. Because of mountain areas' bad traffic situation, it quite cost time from one place to the other. I had to give up some very interesting villages to visit. Most of my fieldwork sites excluding Qingkou tourism village were hard to reach, but that also increased my understandings about the local really conditions in-depth, especially when touched the topic of poverty reduction.

6. Theoretical framework

6.1 Evolving of Poverty

Poverty is a complicated concept, it is “*the extent to which an individual does without resources*” (Payne, 1996), which could involve economic, social, psychological, historical and cultural contents. “*Poverty is the failure of basic capabilities to reach certain minimally acceptable levels*” (Sen, 1992), which revealed more complex needs of social activities and human’s ideology. Different observations and perspectives often have different interpretations and understandings of poverty. From a more narrow economic sense, poverty refers to poor economy, called as absolute poverty as well, which believes the poor situation is brought about by the lack of income that cannot keep the basic livelihood needs (Chambers, 1995). However, income poverty is a relative concept adjusted by the poverty line made by people (Saunders, 2004). With the development of the society and knowledge system, the definition of poverty has developed to a multi-level sense, which is composed by integrated aspects of economy, society, capacity, vulnerability, culture etc. The most important, to meet or satisfy the needs of people is examined as an important indicator. Because the basic needs could be defined relatively, poverty reflects communities’ thinking in the context of special norms and attitudes (Saunders, 2004). To measure the poverty, income and consumption is no longer the only standard, whereas a multi-dimensional poverty analysis is taken, and welfare materials are added into. Environmental sustainability is also tightly connected with poverty, because most adverse environmental issues impact on livelihoods of poor people severely and the rich often as the main causes of environmental degradation no matter in developed or developing countries. Sustainability could contribute a sustainable reduction in the number of poor (DFID, 2000). We are advised to find the practical and potential causes of poverty that could be the un-sustainability of environment, society and economy. Poverty alleviation is one of the fundamentals of sustainable development while they are closely connected (Kemp & Martens, 2007). In this thesis, poverty stands for income poverty without secure welfare and rights.

6.2 Sustainability & Poverty

Sustainability science, as a new form of science, could complement the traditional science, which reflects the governance or aspirations from governments and societies (Kemp & Martens, 2007). The Brundtland Report defined sustainable as ‘*development that meets the needs of the present without compromising the ability of future generations to meet their own needs*’ (UN, 1987). It also illustrated that the complex issue of environmental deterioration should be integrated with the complicated issue of human development and poverty alleviation. Environmental sustainability cannot be achieved if the problem of poverty cannot be solved or addressed globally or locally. Sustainable economic growth and social development is the twin pillars for pro-poor of poverty reduction (ADB, 1995). Sustainability science is an emerging field of research to deal with interactions between natural and social systems (Kates. et al, 2000). Sustainability science requires to meet the needs of both present and future generations while substantially reducing poverty and protecting the natural and social systems (PNAS, 2007). It also could handle some problems in complexity, uncertainty, and other legitimate multiple viewpoints (Kemp & Martens, 2007).

Sustainability has the content of a requirement to use the resources today but not reduce the number or decline the quality of a given stock in the future, while the stock includes resources, tress, energy, water,

soil quality as so on (Markandya and Pearce, 1988). The main sustainability thinking focus on the idea of three dimensions: environmental, social and economic sustainability. The World Conservation Union's (IUCN) report addressed the balance between each dimension that they adopted an interlocking circles model to demonstrate the integrity of them (Adams, 2006). Sustainable development was regarded as a "normative orientation" of Western society (Kemp & Martens, 2007). It is multi-conceptual and subjective that is being argued whether it is suitable for developing world. Kemp (2007) pointed out sustainability science is the complementarily of traditional science that is useful but not a panacea. With more experiences of the operation of sustainability, it has involved into many developing countries' development plans and strategies, as a science to guide its direction.

Poverty sometimes is subjectively defined by people in terms of different kinds of poverty lines and contents. With more and more rich contents of poverty, people questioned whether the poverty reduction can be achieved and how, by what means? Sustainable development as a complex concept and also a subjective goal could help to manage something such as the subjective standard of poverty. Some studies addressed that the subjectivity of sustainability science, because we have to consider the future generation, but to what levels or standards should be established to achieve the satisfaction of the future generation is determined by ourselves (Jasper, 2008). Sustainability science could not be objective but it touches the concept of multi-disciplinary. We need to weight different domains from social, economic, human and ecological through a complex and dynamic operational process when we try to solve sustainability-related issues.

If poverty reduction can be achieved by sustainable development in theoretical, the conceptual approach of sustainable livelihoods is suitable to hold up sustainability and could be operated as one of goals for poverty reduction in practical. When talking about livelihood, sustainability refers to "the ability to maintain productivity in face of stress or shocks" (Conway and Barbier, 1988). Here sustainability is regarded as a function to preserve and maintain livelihoods by different means of utilization various assets and capabilities. Sustainability should be more people-centre, which can be understood as the ability of people to maintain productivity even when facing unpredictable stresses and shocks (Conway & Barbier, 1998).

6.3 The Goal of Sustainable Livelihoods (SL) & Poverty Reduction

The most direct explanation of livelihood is 'a life means (mode)' or 'a living', or people's way of life (IFAD). 'Livelihoods' refer to enough food and cash to meet basic needs (Chambers, 1988). While poverty reduction also pursues those 'livelihoods' under the basic definition of poverty. Chambers and Conway (1991) pointed out: "a livelihood includes the capabilities, assets (financial, physical, human, natural resource and social) and activities required for a means of living" (Carney, 1998). Here assets including both material and social resources, or both tangible and intangible ones. Regularly, the existence of poverty is indeed due to the lack of those assets. Poor may not access to those assets because of physical constraints like too remote or resource poor (ADB). Some researchers also concluded that 'livelihood' aims to generate adequate resources both cash and non-cash, which is a set of economic activities by utilizing human and material resources (Jeganathan, 2008). Ellis (2000)'s definition of livelihood added "the access" to resources, materials, and services into the content (Ellis, 2000). Besides material and economic supplies, 'livelihood' is also about "management of social relationships, the personal and group identity, and the interrelation of those tasks to the other" (Wallma, 1984). Wallma's livelihood is regarded as an umbrella concept, especially for anthropologists, which implies that people's social life should be considered and then investigated as well. This is an important

analytical feature of livelihoods (UNDP, 2006). Livelihoods can also include creativities, new opportunities, people's attempts, willingness, and capabilities to cope with shocks, risks and stresses, such as natural disasters, epidemics such as HIV/AIDS, financial crisis or conflicts and competition both in national and international (UNDP, 2006). Those intensive definitions of livelihoods also reflect the multi-goals of poverty reduction, in which the development of human and social capital increases the possibility of poverty reduction.

A livelihood is sustainable when it *'can cope with and recover from stresses and shock'*; *'Can maintain or build on available capabilities and assets'* and *'Does not undermine the natural resource base'* (Chambers, 1992). SL is the long-term goal for poverty reduction that takes the development from different levels, scale, sectors into consideration. Poverty reduction here is not only for sake of individual economic benefits but also sustainable and integrated growth of different capitals. The promotion of poverty reduction needs to rely on sustainable economic growth by generating incomes, employment, formal labor force etc.; to rely on sustainable environmental management and protection that for preventing environmental degradation that could continue to worsen or accelerate the poverty or in turn has to prevent ignorance of poverty that could make greater deterioration of environments;

SL is regarded as a conceptual framework, can be used to assess and analyze sustainability, capability, security and resilience of livelihoods in different scales under the different contexts (Ian, 1998). SL brings many issues together with a core focus on people, especially poor people, rather than just resources or other outputs. It emphasis on livelihoods *'systems holistically'* and provides *'a focus for thinking about systematic change'*. At the same time, SL tries to work out integrated *'solutions'* under the complicated and flexibly political and economic environment (Jeganathan, 2008).

6.4 Good Governance and Poverty Reduction

The success of poverty reduction no matter the goal of sustainable economic growth or social development all requires good governance. Sustainable development is a new orientation and aspiration of governments and societies (Kemp & Martens, 2007). The good governance in short term must strengthen the pro-poor policies both in economic and social development. In long-term, should empower the poor in decision-making with a perfect participatory system and also develop institutional or civil society power at the local level through delivering public services and establishing the sound rules of law (ADB). Weak governance is not good at policy settings and without enough service delivery. Overall it could impact on the poor (VDGs, 2002).

7. Brief Overview of Rural Polices in China

Agriculture is the pillar industry in mountain regions although it has no competitive capacity compared to the agriculture in plains. Chinese agricultural and rural reforms began at the early 1980s with the implementation of the **Household Contract Responsibility System [HRS]** (Liu, 2008). From then on, household land management as the key landholding method reconstructed the rural farmer system after collective economic period. Land and other means of productions were contracted to farmers. Under the contract authority, contract farmers can make independent business decisions. From 1990s, the 15-years land contracts were extended for another 30 years; for other types of lands such as wasteland, forest lands, desert and slopes, the land contract can be set even longer to 50 years. The long-term of guarantee land-use rights could ensure the long-term stability of rural lands (Liu 2008, World Bank 2009). The land contracting responsibility system still influences the relationship between lands and farmers in-depth. In cooperative period, due to equalitarianism, some farmers could not be proactive at

agricultural activities. HRS solved this problem and enhanced the enthusiasm of farmers in at certain extent. Therefore the agricultural production had a rapid development after implementation of HRS. HRS also promoted some farmers to get rich firstly in some areas by their hard work. It broken the ‘iron rice bowl’ and make it possible for farmers gradually to be well-off. However, it cannot completely solve the problems of a great prosperity for all farmers, and facilitated the rich-poor divide to some extent. Besides, land ownership was defined unclearly.

The rural industrialization originated after 1985, along with market liberalization for agricultural products that make market development gradually for rural areas. Meanwhile, **Township and Village Enterprises (TVEs)**⁸ widely emerged in rural China, which effectively raised peasants’ income. The strategy of rural industrialization not only promoted and changed ways of living for rural people, but also reconstructed the rural economy (Kumar). TVEs were regarded as an effective way for employment generation as well as agricultural, economic and social development for rural areas. Entering 1990s, the central government strengthened the macro-regulation on agriculture and rural industrial structure that is in order to make rural industrialization more adaptive to the market condition (Liu, 2008). However, TVEs are restricted by regions and the background of the existing industry. TVEs in the Pearl River Delta developed very quickly because this region is close to Hong Kong. Actually those industries are dependent on investments from outside mainland China. So some external elements like financial crisis, funds operating and management power are all essential and significant for TVEs’ development.

In 2002, the central government get started to cut all rural informal fees and decrease agricultural taxes charges on farmers year by year that was dependent on different provinces. At the end of 2006, all **agricultural taxes and fees** (except tobacco) have been fully eliminated. Such a 2,600 years history of taxing on farmers in China finally was phased out that effectively reduced the burdens on peasants and helped increase their cash savings, while more than 33.6 billion Yuan agriculture taxes have been canceled (World Bank 2009, Liu, 2008). At the same period, the central government also focused on social and human capital building, by increasing investment on rural education (**remove tuition fees of the compulsory education**), social security system establishment (aimed to spread the new cooperative medical cared pilot projects over the rural areas by the end of 2008), and rural infrastructure. They were a series of transitions that returned benefits from urban industrialization back to rural people’s welfares. These farmer-friendly polices helped lease the burden on peasants and increased their generation of incomes; the elimination of agricultural tax was the outcome of China’s market reform, especially after entering into WTO. It facilitated to further strengthen the foundation role of agriculture and enhanced agricultural competitiveness in the international market; the most important is that those policies helped to alleviate the rural social conflicts induced by the differences between urban and rural.

The concept of “**Three rural (Sangnong) issues**”⁹ was brought forward by Dr. Wen Tiejun in 1996. Under the following years, with China’s rapidly economic growth and urbanization, issues were put on the desk by the central government. Pressures from quickly dropping arable lands from around 0.12 billion ha in 1996 to 0.11 billion ha at the end of 2006; insufficient water resources in north part of China; decreasing price of agricultural products that limited benefits taken by peasants and in turn

⁸ TVEs as “*various types of enterprises set up with investment mainly form rural collective economic organizations or peasants at township and towns, villages and is responsible for supporting agriculture*” the law on Township and village enterprises

⁹ Sangnong includes agriculture, rural comities and farmers (OECD, 2009)

weaken their enthusiasm to produce; and also income gap was widen between the rural and the urban, between the east and the west, that reached the highest level in 2007 (Liu, 2008). To solve these pressures, the Chinese Communist launched a series of governmental documents on raising farmers' income in 2003, promoting integrated productivity of agriculture in 2005, and **“Building a New Socialist Countryside” (NSC)** in 2006; establishing rural infrastructure in 2008. Amongst, NSC as a framework covered the development contents and concepts of agricultural productivity, land use, rural income, local governance reforms and public-services delivery (OECD, 2009).

Besides the above macro agricultural polices from the state level, ecological construction projects and conservations also influence sustainable development in mountains regions. Due to serious environmental issues and natural disasters happened in Western China, the central government initiated several environmental rehabilitation programs, from re-vegetation projects to conquer desertification (Xu, et al. 2007). Specially, the **National Forest Protection Program [NFPP]** (2000-2010) for protecting forestry resources and watersheds through launching logging bans and developing reforestation along the Yangtze River and Yellow River (Yin, 2010, Xu *et al.* 2007); **the Wildlife Conservation and Nature Reserve Program [WCNR]** (2001-2050) for conserving wildlife resources and increasing biodiversity; **the Sloping Land Conversion Program [SLCP]** (2001-2010) or same as **The Grain for Green Projects [GFG]** (1998-2010), this is the largest ecological restoration project in the world that the Chinese government was ambitious to rapidly change the landscape from farmlands to forests and grassland on mountain slopes for preventing soil erosion and biodiversity (Cao 2008, Uchida *et al.* 2005, Xu. *et al.*, 2007)

Those ecological restoration projects largely improved the ecological environment in China, especial western China. In the past 10 years, the overall deterioration of the environment in Western China was ended and the vegetation cover increased substantially and obviously. Besides, some of those projects involved government compensation into that could raise income of agricultural households and good for poverty reduction. Farmers could change livelihood means from the pure agricultural production to others like forestry, cash plants cultivation or even rural tourism. However, there are still a series of unresolved problems and difficulties regarding those projects, such as the defects of government compensation mechanism; lack of financial support; lack of monitoring mechanisms (the projects were not effectively monitored or managed after the implementation); lack of the active participation of rural households etc.

8. Results and Analysis

8.1 Is Hani Terraces in Yuanyang County Sustainable?

Yuanyang County belongs to mountains monsoon climate type, showing as integrated tropical, subtropical and temperature climate. This form of mountainous climate could influence relevant vegetation species, animal species and corresponding agricultural types and farming systems. A fantastic, three-dimensional socio-ecological system of Hani Terraced Landscape was created by ethnic groups based on that complex natural environment and the stereoscopic climate (Fig. 2). The system is: (1) At hilltop with cooler temperature (mostly above 1800m in altitude), keeping water-conservation forests in order to provide drinking water for humans and livestock and also to supply sufficient irrigation water for terraced rice cultivation (Shimpei, 2007); (2) at temperature mid-mountain areas (1500-1800m in altitude), establishing villages as human settlement, which facilitates people's life in water management as well as agricultural activities since the village is below the water resources and

above the farmlands. Furthermore, within this area temperature is suitable for human living; (3) below the villages, at temperature and relatively hot mountainous slopes (700-1800m in altitude), farmers constructed numerous terraced paddy fields, with a high concentration at 1200-1800 m. People usually call this system as a trinity living space or an agro-ecological pattern of forests-villages-terraces, which is a masterpiece in transferring natural ecology into agricultural civilization (Ma, 2009). The irrigation system is a year-round pattern, for keeping fields flooded during the dry season like winter, even when no crops grown that is in order to “prevent soil becoming too hard”, because soil quality and soil humidity will directly influence the yield of rice (Shimpei, 2006). The significant feature of this system could be concluded: under the good management of forests by local people, forests are able to provide water for rice cultivation and then in turn, terraced fields can feed people (Wang, 1999). Hani terraces has been regarded as a high integration between man and nature, it is an ecological circulatory system (Shi, 2009).

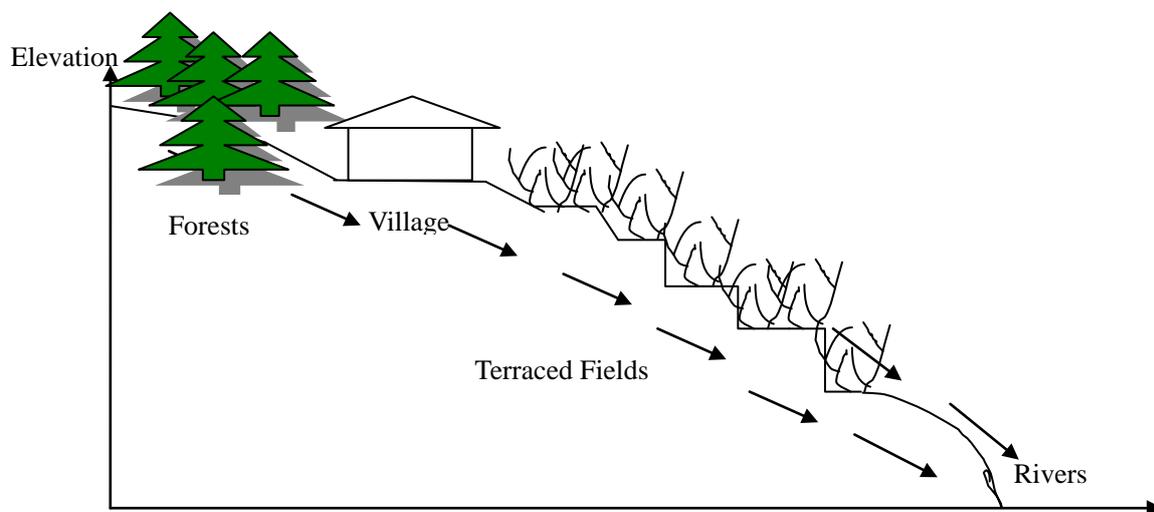


Figure 2: The Spatial Structure of Hani Terraces

Goods and energy produced from this system basically have no output. Farmers plant rice, and then eat nearly all; Forests or surrounding plants provide firewood for households’ consumption without more practical functions, especially after hunting and logging bans. That is to say, it is a relatively closed system (Wang, 1999). Agricultural production of terraced paddy fields is largely dependent on external factors such as rainfall. When I firstly contacted Yuanyang Hani terraces, I believed it should be a paradigm of sustainability that has a good relationship between the nature and human beings. However, after fieldworks by visiting villages and hearing the stories of the people, I have to query this claim. It could be regarded as environmentally sustainable and socially sustainable under the special context. The Hani agro-ecological system is spectacular but the Hani people of this region are still very poor (Shi, 2009). When people who are living in this system couldn’t have a related good livelihood, can we still call the system sustainable?

Besides terraced paddy fields in China, other Asian countries also have terraced paddy fields, while their historical experiences about landscape conservation, land-use change and environmental degradation could provide us references for better comprehending the main issues of Hani terraced landscape conservation at present and issues what will face in the future. For details could be seen in Appendix 3.

8.2 The Role of Customary Institution

Traditional views of ethnic minorities have been increasingly recognized as an important cultural resource with significant implications for environmental management and livelihoods improvement (Bennington, 1999). The customary institution and the indigenous culture play a significant role for natural resources conservation and management within ethnic minority areas. The relationship between natural resources and Hani people has been developed for centuries within religious, cultural, political, economic and natural aspects (Xu, *et al.* 1999). In Yuanyang County, Hani people believe the existence of various gods who are in charge of water sources in forests. Hani people expressed a respectful or awed feeling to forests and gradually bring them into their livelihood practices (Zheng, 2004). They referred some forests as 'scared groves' where no one can do hunting, logging or even freely entering into. This kind of beliefs has integrated into their customs or institutions more or less.

The traditional knowledge for terraces management is an indispensable element to keep and sustain the survival of the Hani terraced landscape which also helps to enhance local people's awareness of natural resource conservation and management (Wang, 1999). These customary institutions can guide and structure villagers' identity, attitudes, social relationships and even technology (Xu, *et al.* 1999). Historically, Hani people migrated from northern China (Ma, 1983). Hani groups' development is established on adapting from one environment (north) to another environment (southwest). This adaptation process and their social development have formed some self-survival and ecological values inside themselves. Traditional culture and customary institutions are not only the historical phenomenon but also the accumulation of a society's development. Even if Hani society is not so competitive in today's context, its spiritual wealth and ideological nature are still advanced (Shi, 2009). The effectiveness of customary institutions would enhance the resilience of a society to external influences (Xu, *et al.* 1999). Although some cultural practices, religious rituals were changed during the long process of history, especially in China's Cultural Revolution, the survival ones are still valuable and should be strengthened and integrated into the policy making process.

8.3 Population and Limited Arable Lands

Yuanyang County was listed as the state poverty county for a long time. For better understanding the cause of poverty, I collected the data of changes of arable lands and population to get the trend of per capita land area. All those data is gotten from the county government, but they are limited. However, the overall trend could be seen clearly that doesn't affect the analysis of the results. From Fig. 3 we can see it had a population of around 0.165 million with arable lands of about 0.26 million mu (16 mu= 1 hectare) in 1955, while in 2008, population has increased to 0.386 million and arable lands was 0.32 million mu (About 0.17 million mu paddy fields and 0.15 million mu dry lands). That is to say, during 33 years, the growth of population is 0.221 million but arable lands are just 0.06 million mu. After 1985, there was no obvious increase in arable lands, but the population has grown gradually and finally exceeded the amount of arable lands. That is to say, the per capita land area is less than 1 mu and includes both paddy fields and dry lands. The large increase in population with a slow arable lands' growth is the root cause of the poverty in Yuanyang County (Shi, 2009). The contrast of growth between population and arable lands is not just a problem locally, but a tricky problem in most of China's rural areas (Wen, 2009).

The above result of less per capita arable lands has also been approved through my fieldworks in some townships and villages. For example, the highest record of per capita arable lands (arable lands is

composed by parts of paddy fields and very little dry lands) is from Panzhihua village, which is 0.8~0.9 mu per capita paddy fields and averagely 0.2 mu dry lands, while the lowest is just 0.2 mu paddy fields in Pugaolaozhai village (Guo, 2010)¹⁰.

This situation of a small quantity of per capita arable lands emerged after 1985 accompanied with China's land reforms (1978). Despite there was the growth in agricultural productivity of paddy after land reforms, but average yield of terraced paddy is far less than yield from plain agriculture, which is only half or even fewer (Wang, 1999). However, compared with other kinds of mountainous agriculture, the yield of terraced paddy is twice. The high yield in mountainous areas is very important that means feeding more people (Wang, 1999). That's explained why historically local people would like to reclaim terraced fields with such a hardworking but not conducted other simple mountainous agriculture. However, due to the growth of population, the per capita arable lands got less and less that could just supply limited rice for rural people, not even mention to enhance income from terraced agriculture.

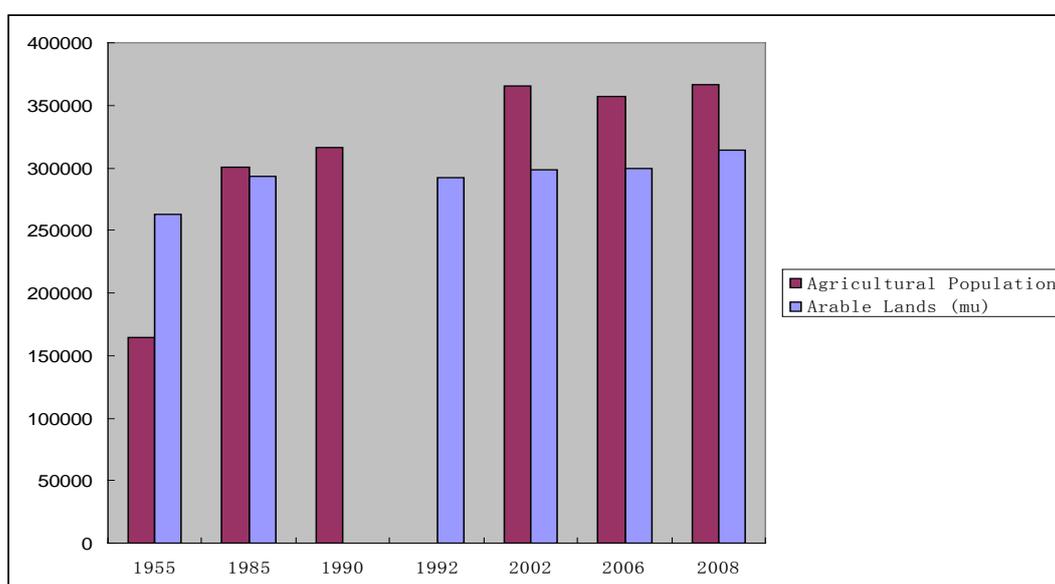


Figure 3: the growth trend of population and arable lands in Yuanyang County
(Data collected from Yuanyang Government 2010)

8.4 Livelihood Analysis in Economic Domain

According to rural policy reviews of China by OECD, the most vulnerable rural areas are those places that the agriculture is the key livelihoods' resources, which often generates the highest ratio of poverty (OECD, 2009). In Yuanyang County, terraced mountainous agriculture, no matter paddy lands or dry lands, is still the major livelihood resources for mountain rural people. Mountainous agriculture is hardly competitive with the normal agriculture in plain areas. Low agricultural productivity, low work efficiency, weak agricultural infrastructure, inconvenient transportations, and heavy labor force input are caused reasons. In order to discuss the poverty situation in Yuanyang County for better understanding background causes that could be problems of policies making in related to livelihood improvement, mountain people's livelihood in county's level will be described from three aspects or indicators of cash income, welfare, and people's attitudes about occupation.

¹⁰ (Guo, 2010) means data collected from interviews during the thesis fieldwork

8.4.1 Cash Income

Cash income situation is a visible and direct indicator to show the livelihood situation for rural people. That is also one of the most important indexes to define the poverty, one of the most direct ways. Based on my data collection, per capita income from three townships and two typical villages in Yuanyang County was cited that were used to compare with the international poverty line of US\$1.25/day and US\$2/day¹¹ (US\$1=6.825 Yuan), to show the poverty reality in Yuanyang County. All the data is of 2007 or 2008 since those years' data were verified by relevant branches and had paper records, although I also got data of 2009, they lacked of credible records. Nearly all interviewee told me, there's no big change between 2007 and 2008.

Shown from the figure 4, average per capita income in county level was 1,272 Yuan in 2007 for agricultural population. This number is just around one third of the international poverty standard of US\$1.25/day. Overall, no number was below the standard of international poverty line. Specially and severally explained, Pangzhihua Township had the highest per capita income, because agriculture is more advanced than other townships in Yuanyang County. It is implied that the agriculture income is insignificant that would take up a large income for local mountainous people. It is worthy to point out, in Pangzhihua Township do not just cultivate rice, but also other cash plants like tea, soybeans and Amomum tsao-ko¹² because of the related mild topography and related low altitude. It is the most developed township in agriculture in Yuanyang County (Guo, 2010). Qingkou Village is also a typical village in Yuanyang County, the figure shown that it owned a higher per capita cash income than others, because it was the first tourism village established. Tourism income has made up a small part for local people's livelihood already (Ma, 2009). However, it still didn't achieve the off-poverty line. The worst situation was Malizhai Village that was one of the poorest areas in Yuanyang County, when I visited there even I was shocked. Malizhai village is located at mountains with an altitude all above 1000m, natural and geographical conditions are not so idea. Terraced agriculture is the only effective income source for most of the villagers. They just have a per capita income of 896 Yuan in 2008 compared with the average level of 1,272 Yuan for Yuanyang County in 2007.

All those data wanted to present no matter superior agriculture situation or other livelihood income sources like tourism to contribute people's livelihood, poor situation was still existed and very serious. Here we compared people's cash income with monetary international poverty line. I concluded local people are income poor. Income poverty has become one of the most serious poor types in China's rural areas, where almost all people have enough food and a place to live, but they lack cash income that also determined they lack savings and the ability to deal with the financial risks (Ma, 2009). Cash income is the most important means of livelihood, but in Yuanyang County people have little money control to improve their standard of living.

¹¹ If taking the standard of US\$1.25/day, it is calculated with a result of 3,114 Yuan/year; If taking the criteria of US\$2/day, the result is 4,982 Yuan/year.

¹² A kind of spice could be cultivated under the forests in Yuanyang County.

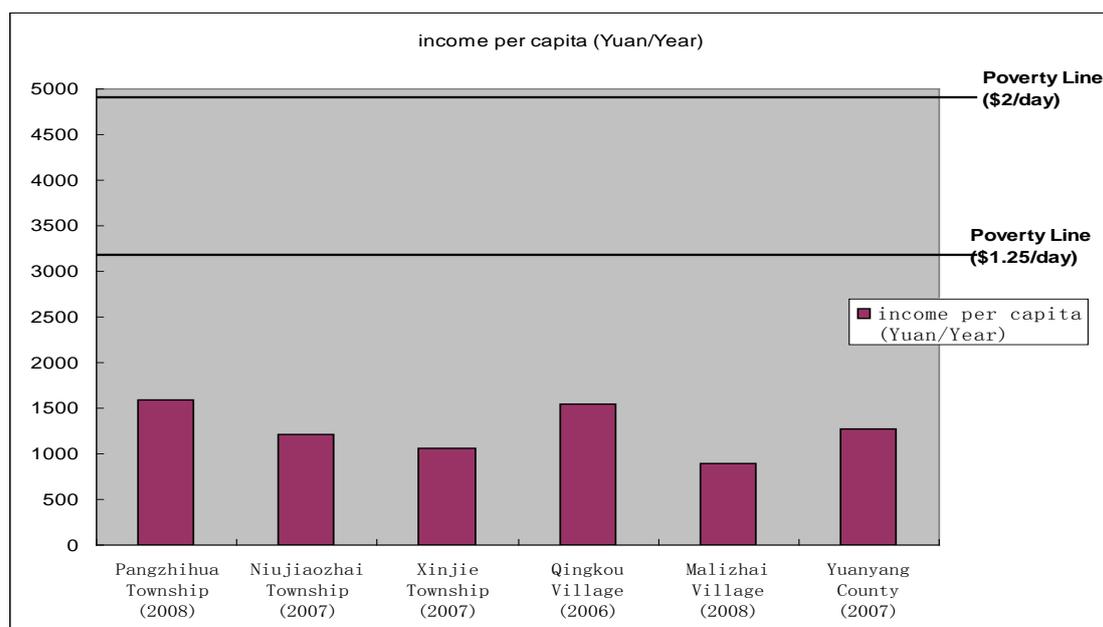


Figure 4: Income per capita of some townships, villages in Yuanyang County
(Data collected from interviews during the fieldwork in Yuanyang County, March, 2010)

Exchange of Nonmonetary Assets

“Due to the lack of cash income, the exchange of nonmonetary assets still exists in the local people’s daily life”, the local governor told me. In order to further prove this saying, to reveal the reality of the lack of cash income, I did a special research based on some individual face to face interview about the farmers who may have such experiences.

In Yuanyang County, nearly every important irrigational channel has a water manager who is usually female. The water manager usually is selected by neighboring villages that the irrigational channel passes through. The water manager takes responsibilities of repairing, dredging, managing and checking the channel and ensuring sufficient water it is available during the irrigational season. A payment for the water manager will be collected from every household who is using irrigational water from the channel. Even right now, under China’s amazing economic development environment, payment for the water manager is still in terms of grains but not cash. I interviewed a water manager from Pangzhihua village, who showed me a booklet that recorded the amount of water consumed by each household and the amount of rice they are supposed to pay for him as salary. I checked this booklet which recorded the past 13 years’ payments. Nearly every 2-3 years the amount of payment will be increased a little bit but one thing has never changed is the payment term (grains). I asked the water manager which term is more desirable for him, he told me “absolutely, cash”. However, “We do not have a lot of cash income and the cash have to be used at other more important things like establishing a new house, marriage, or funerals, but not as the payment for water manager”, the water manager told me. In fact besides this case, the output of labor force in local rural areas often paid back in nonmonetary assets such as grains, a treat of meal or others.

In Yuanyang County, the exists of the exchange of nonmonetary assets is not just because it is established by the local people through a long social practice, but also they still lack of enough available cash, which implied the serious situation of low cash income as well as less cash savings locally.

Case from Qingkou Village

For deeply digging the reasons of low income, I wanted to find out status of income situation in different economic level's households from the same village. To understand what are their main sources of income and what are their family status that would affect their income. A research based on above thinking was carried out in Qingkou Village in terms of several questions. Qingkou Village is a tourism Hani village, which began tourism development since 2000. There are 865 people and 178 households right now in the village (Ma, 2009). I visited this village twice before, have a general framework about this village. Because this research is not a quantitative one but qualitative, I didn't visit numerable households, just focus on the most typical ones.

I generally classified three levels of economic capital, if their status can be identified as good, middle and bad. This is just a general idea what I wanted to get the basic information. I asked the local officers from the Qingkou village committee firstly about their conceptions on it, whether they can identify different level's households and whether they could pick up three different typical ones for me that I could do the further research. They said they could choose different ones based on different households net income, and the household's net income should be the simplest way for define the status of economic capital. For the local officer, it seemed not a hard work for them to help choose the typical households because they are quite familiar with the local situation. However, in case of their personal perspective, I also asked the local farmers whether the household that was picked up are fit for the economic terms what I appointed. The results are the same for me.

So I visited the following three households respectively based on several questions:

- 1- What is net income for the household last year?
- 2- What kinds of income sources do you have? Which one is the most important?
- 3- What is the family structure of the household?
- 4- Do you have special income sources or difficulties to increase the economic capital?

The results were integrated as the following table (Table 1).

Table 1: Economic situation in different levels of Qingkou Village

Status of economic capital	Net income (Yuan/Year)	Source of income	Family Situation	Remark
Good	10,000	-Governmental compensation from the Grain for Green project. (Some contracting lands have been converted to eco-forests). -Leased the rest contracting lands to others (Land Circulation) -Livestock rearing -off-farm jobs (occasionally)	Head of household: male, 40 years old Two sons, one is a soldier. The other one is working in the city. A daughter, age 3.	-Own a car. -A new house is under construction. It will be a hotel for tourism reception.
Middle	4000	-Livestock rearing	Head of household: male,	-The householder also

		-Migrant workers, part time job -sale parts of agricultural crops	38 years old Wife, a daughter and a son both in the elementary school	works in the city. He just comes back in the busy farming season.
Bad	No stable cash income	-Basically, no stable cash income -Limited farmlands -Livestock rearing, but very limiting	Head of household: female, around 60 years Her husband and son were dead. A 6 years old grandson. Three daughters have been married.	-Get some consolation money from the government every year.

From the results we can see, the gap of cash income of each household among different economic status is big, from no stable to 10,000/year. Firstly, the household located in the different economic status has obviously different income resources that are the main reason for the difference of their cash income. For the good economic household, the governmental compensation from GFG program and the rent from land circulation accounted for a large part of its cash income. However, if the household's income just relied on the traditional agriculture and limited livestock rearing, the economic situation would be influenced. Such as the middle and bad economic level's household, they all relied on agriculture and livestock rearing for a large part. Secondly, income from off-farm jobs also could increase the economic situation for households. Here family structure will affect how many labor forces can do the off-farm jobs. Because the local household is still living with a traditionally agriculture lifestyle, fields are their backbone. So if household have surplus labor forces that could engage in off-farm job. Specially, I want to analyze the middle and bad economic level's households, because such kind of households accounts the majority of the village. We can see, those households are dependent on agriculture a lot for their income. They are lack of livelihoods' options compared with the good economic level's household. Except the extremely situation like the last household, they really lack of the labor force to take charge of farm or off-farm activities.

The conclusion from this case is, the lack of livelihoods options is one of the main reasons for the low income formation. Besides the households' original economic capital generation, social status is also insignificant factor.

8.4.2 Welfare

China's social security system and welfare system are still dualistic, from which the urban population can enjoy more benefits than rural population. For instance, there is a rural cooperative medical system for agricultural population. In Yuanyang County, around 92% of peasants have participated in. Each of them was required to pay a premium of 20 Yuan/year and then the state and the provincial government provided a subsidy of 20 Yuan/year for them (different payment and subsidy at different places) (Health Bureau of Yuanyang County, 2010). Some small illnesses have been included into the system that farmers don't need to pay or just need to pay partly, such as the most common treatment of childbearing, but for most serious illnesses, farmers still have to pay all. Many peasants cannot afford such a high hospital charge and sometimes they have to borrow money to visit the doctor. Due to the big population in China, the social security and welfare system varied between urban and rural areas, which are also very complicated that many rural people cannot understand. But overall, for mountain rural people in Yunnan Province, in addition to the elimination of all agricultural tax, the elimination of tuition,

textbooks fee and limited subsidy for students' living fee during the time period of the compulsory education¹³, basically no special and practical welfare can be enjoyed by rural people. China's rural welfare systems are still not perfect and cannot guarantee farmers interests.

8.4.3 Occupation Attitudes

For people's occupational attitudes, I nearly asked every interviewee what kinds of jobs do they want to do and how do they satisfy with their farming work. Synthetically, because of low income from agriculture, the choices of off-farm jobs were very popular in Yuanyang County. Mid-age farmers were content with their farming work, but not satisfied about the agricultural income. They don't count on the income from rice production of terraced fields too much, since they understand the limited possibility of increasing production. So they pinned their hopes on their children to have a better livelihood by accepting higher education. For young generation, their direct or realistic hope is to find a stable off-farm job in urban cities. Most of them want to be migrant workers, waiters, businessmen, teachers, civil servants, and a small part of them wish to engage with the tourism industry (Guo, 2010). Although most of them can finish the nine years compulsory education, very few expressed any wish to get higher education professions.

8.5 Ecological Tourism as the Main Optional Livelihood

The county government is conducting the ecological tourism that surrounds natural view of terraces and the local ethnic people's cultures. The idea is to develop the potential tourism market of terraced paddy fields, through tourists' consumption and related tourism activities to enlarge the income of local people. The position of this tourism is ecological that is in order to protect the local ecological system and also the conservation of the terraced system. As the data supplied from Yuanyang County government, there were 420 thousand person trip visited Yuanyang terraces in 2007 and during 2008, the number of tourists has increased 35.81% with a huge increase of tourism income (Yuanyang County government, 2010). We can see that the local tourism benefits are gradually showing more and more prospects.

The plan of the tourism development is to create a series of eco-cultural tourism villages of Hani, based on terraced landscape, to promote the rapid development of rural economy as well as to improve the environment. As this tourism development plan, in 2009, focusing on the thinking of the "two townships and six villages committees construction", Yuanyang county will construct 25 natural villages, in improving their infrastructures, restoring Hani traditional buildings style, and making the village clean and tidy. Beautiful rural scenery, rich human culture and natural culture will be the main attracts for tourists. While this plan has made an estimated investment of 39 million Yuan and 2,497 household of 12,539 people could be benefited directly. Meanwhile, the tourism development planned to provide at least 40 employee opportunities for local people which would help their cash income (report from Yuanyang County government, 2009).

However, based on my field work, the development of the whole ecological tourism just focused on limited parts of terraces, which only covered several villages within two townships. That is to say, not every local villager can share tourism benefits, so it is still hard to effectively increase the most of local rural people's livelihood. The county government also realized this problem, when I asked such question at the group meeting with the county governmental officers, they told me: right now, the most important task is to develop the rural economy and increase farmers' income even only one farmer or one household. Tourism

¹³ School-age children and adolescents are supposed to compulsorily finish the 9 years compulsory education in China (6 years elementary school and 3 years junior high school) without tuition fee.

industry is the third industry that could promote the rapid development of rural economy. Yuanyang County government is working to adjust the industrial structure and the product structure. They wanted to rely on their plentiful ethnic, cultural and historical resources to enhance the influence of ecological tourism. But there's no detailed plan or implementations at present for expanding the boundaries of the ecological tourism in order to benefit more rural people's livelihoods.

9. Policies Discussion

9.1 “Grain for Green” Program (GFG)

Due to abundant grain output in China from 1998, the sufficient grain stock made it possible for the central government to launch the program of “Grain for Green” (Liu & Wu, 2010). The project aimed to change the land-use in terms of vegetation cover and species from farmlands to forests and grasslands (Verburg, Chen & Veldkamp, 2000). This conservation set-aside programs was the largest one in the world, which planned to spend US\$40 billion to convert 147 million ha of farmlands into forests and grasslands and 173 million ha of wastelands (grasslands) into forest over 25 provinces of Western China from 1999 to 2010 (Tao, Xu 2004 & Cao *et al.*, 2008, Xu. *et al.* 2006). For the purposes of ecological restoration for sustaining environmental benefits, the central government provided a compensation of eight years for participant households if they converted lands by planting ecological forests and five years for economic forests and two years for grasslands. Before 2004, all subsidy was given in terms of grains, after 2004 a cash allowance instead of. By the end of 2008, 8.216 million ha of croplands had been converted to forestlands and more than 26.8 million households have involved into the GFG programme (Liu & Wu, 2010). Environmentally, GFG purposed to improve the ecological environment and reduced soil erosion and desertification (Emi, et al. 2003).

One of GHG program's objectives was poverty alleviation because subsidies from the government were higher than the income from agricultural production on croplands. Meanwhile, GFG required less labor force (Liu & Wu, 2010). Although it positively increased the income of participant households, income inequality would be raised up between households who benefited from the program or not, between who received more subsidies and received less.

Since 2002, the implementation of GFG policy resulted in new forests planting of 0.108 million mu in Yuanyang County, which effectively improved the problem of deforestation in the past and also protected the terraces in turn. The rate of forest cover was increased from 23.8% to 26.7%. By far, there were 19,285 households received the subsidies of 1.48 hundred million Yuan for 8 years (Shi, 2009). Under this calculation, each household could share an average of 9,232 Yuan of compensation within 8 years from the program (1,154 Yuan/year) in Yuanyang County. As we all known from the livelihood analysis, the county's average income was just 1,272 Yuan/year in 2007, those compensations from GHG project was able to increase the local people's income to a large extent. However, things are not like this as what we've seen on the surface.

In a short run, during the program time period, the compensation did benefit rural households, especially for mountains households and farmers who cultivated the marginal lands on the slopes, because their plots' net revenue might not as high as the governmental payment (Emi, et al. 2003, Zhao et al. 2009). Farmers from mid-high elevation are more willing to convert their farmlands to forest lands than farmers from low elevation, since the national subsidy is higher than grain output (Zhao et al.

2009). At least until now, the implementation of GFG project has contributed more welfare for most participating households, and farmers' net income per capita also was increased (Xu, et al. 2006). Such kinds of cases have been reported from Western China (Xu *et al.* 2003, Zhao et al. 2009). But in long term, if the current program's payments expire, there will be in a risk that farmers would reconvert forestlands or grasslands back to croplands. Otherwise, impacts on farmers' livelihoods would cut down their income level again (Emi, et al. 2003). Right now, although the central government has not announced whether or not the project will continue on the national scale, for some special regions, like the area of Yangtze Gorges, subsidies for economic forests have been extended from 5 years to 8 years, and for ecological forests from 8 years to 12 years (The State Forestry Bureau, 2006).

Most returning forests in Yuanyang County were species of ecological forests that meant not too many economic benefits those forests could produce (Forestry Bureau of Yuanyang County, 2010). The end of the program implies that the participant households need to find an alternative livelihood source, but the actual situation is the lack of livelihood opportunities for those people. From some interviews during the fieldwork, I found nearly all farmers had no plans or worried about the end of the program. They said they will not reconvert their plots back to farmlands because the yield of terraced fields is too low, but they might do hunting or logging again if there are sufficient forests resources. So the end of the program even could threaten environment again.

Some scholars believed that the ecological benefits from GFG program are more important than economic benefits. Here economic benefits include economic forests planting and cash plants cultivation. They advocated establishing an ecological compensation system that could transfer ecological benefits into economic benefits, which will enhance people's livelihood obviously (Xu & Cao 2003, Emi *et al.* 2003). The government should consider the difficulties and realities of mountainous farmers and more preferential policies for risks of their livelihood after GFG program need to be planned. Long-term impacts of GFG on farmer's livelihoods need to be paid more attentions. GFG project should not be temporary but as a long-term task of national development, and involved into the national regular budget. The government should take the responsibility.

9.2 Land Allocation and Land Rights

China's land reforms started since 1950 with numerous policies and local institutions, which affected the ownership of lands both agricultural and forest (Xu, *et al.* 1999). Before 1978, agricultural lands in Yuanyang County belonged to peoples' communes. Planning economy and very limited free market were features at that time, when rural people were "working members" and received payments in terms of grains or cash for their labor input on common farmlands (Zhu & Roy, 2007). During the period of China's Cultural Revolution (1966-1976), the government just focused on political issues and barely paid attentions to land management that caused a large loss of forests as well as serious slope farmlands erosion (Xu, *et al.* 1999). In the late 1970s, the Household Responsibility System (HRS) was introduced that restructured the land rights by contracting out agricultural lands to individual farmer for a period of time. Farmlands were allocated per capita based on family size in terms of quality, such as soil quality and yield (Xu, et al. 1999; Zhu & Roy, 2007). There were 2~3 times of land allocation in Yuanyang County. The biggest one was around 1983. At that time, all farmlands were distributed into paddy fields and dry lands and then allocated to person per head. The following subtle readjustments were carried out in different time based on the actual situation of the different areas. Those readjustments mainly dealt with the problems of surplus lands for new born persons as well as some residual issues, but all of

them finished before 1992. After no new lands allocation or adjustments happened (Guo, 2010).

Although the contract period has been extended from 10 years to 30/50 years, based on Chinese land policy, no matter whether new-births or deaths of a family, it cannot change the original land areas. Only children have the right to inherit parents lands (Zhu & Roy, 2007). For those households with less per capita lands or from poor areas, lands are their main means of livelihoods, their most basic assets as well as the welfare guarantee. They might have undergone major demographic changes in the past 20 years, that is to say, their family size was growing, but the land was the same. The result must be even less per capita land area and even lower per capita income from lands. Therefore, land policy has the most intensive influences for them. Mountain rural people from Yuanyang must be counted in.

In China, the definition of land rights for farmers is referred to “land-use rights” or “land-contracting or –operating rights” (Zhu & Roy, 2007). Many scholars believed that China’s land rights are insecure without privatization. Secure land rights should be marketable and long-term ownership should be gained (Zhu & Roy, 2007; Xu, *et al.* 1999). They argued if farmers lack the secure and private land rights, it would limit their enthusiasm for long-term investment on lands by raising the agricultural production or by making other means of land-uses. The long-term ownership of land rights also could lead to a higher efficiency of farming activities. Furthermore, if farmers voluntarily give up lands or are no longer dependent on lands for survival, they should have rights to deal with their lands through the market mechanism.

Yuanyang County regulated that if farmers changed land-use by themselves or didn’t cultivate terraces for two consecutive years without the governmental authorization, their land-use rights of terraced fields would be taken back by special agencies from the government (Honghe NPC Committee, 2002). That is to say, farmers actually don’t possess the land ownership that finally is under the administration of the government. Farmers who own land-use rights had no other choices about terraced fields but terraced rice cultivation.

Besides the above analysis, I concluded two special issues related to land rights and land allocation policies what the County is facing:

(1) Ineffectively allocation measures: A household at mountain areas of Yuanyang County usually owns 2~4 pieces of plots at different places, both terraced paddy fields and dry lands. Those plots usually are far away each other that lead to a higher labor input for travelling and cultivating across those plots. Nearly all peasants complained about the labor force input are too high to receive the equivalent income. This was caused by old allocation measure that just focused on land quality without considering labor force input and others. **(2) Small scale agricultural operations:** As we all known, terraced agriculture in Yuanyang County is low in effectiveness even though the cost is also low. Surface reason is that both the yield of terraced rice and the price for local agricultural products is too low; further reason could be the small-scale land of each household has limited the agricultural operations. Usually, a farmer only owns 0.8 mu arable lands, which is just enough for their basic food needs. If people want to rely on such a few lands to get rich, it is not possible.

A way to solve the above problems is to put lands together and operate centralized management. That is to say, to allow farmers freely exchanging, trading or leasing lands according to the market principles. The central government also noticed about it and adopted Land Circulation Policy or Land Use Rights Transfer System in 2008. According to this policy, farmers are allowed to subcontract, lease, exchange,

or utilize the form of cooperative stock to transfer the use-rights of land to other farmers by a contractual management (An, 2007). That is to say if conditions permit, it is possible to develop the professional, big and family farms with cooperative or large-scale agriculture business to concentrate lands. This policy could liberate some peasants from the land and transfer them to the secondary and tertiary industries. It also could effectively handle the imbalance between limited lands area and the incoming population. If the fragmented plots can be adjusted between farmers, more efficient agricultural operations in Yuanyang County will appear. However based on the fieldwork, cases of “Land Circulation” are very rare in Yuanyang. I thought the main reason is the lack of alternative livelihoods options. If farmers could find other means of living without relying on cultivated lands, the policy would be more actively and extended. Actually this policy has been utilized very widely in other rural areas of China, especially intensive agricultural areas, which is in order to carry out large-scale agriculture or to obtain a greater production by better agricultural technology and management.

Different voices argued the West mode of ‘Land Privatization’, ‘Marketization’ as well as large-scale agricultural operations that are not suitable for China. As the majority of China’s population-farmers, man-land relationship is still quite tight. Based on Wen (2009) research results from developing countries with a population of more than 1 million, large-scale agricultural operations will lead to a large number of farmers leave the land and then swarm into the city, which will increase the urbanization process. China already had a 600 million urban population as the world’s biggest. If the scale of urbanization continues to expand, it will cause environmental and ecological disasters that are not sustainable and immeasurable (Wen, 2009). So, the current land allocation status can at least provide the basics of survival needs.

9.3

10. Conclusions and Recommendations

10.1 Conclusions

Based on my local policies review, there weren’t integrated and systematic policies or laws on sustainable mountain regions’ development or specially focused on people’s livelihoods improvement. Hani terraces have been categorized as cultural landscape under the national law of protection of cultural properties. Therefore, many local policies and regulations focused on the protection of terraced landscape, the protection of traditional culture and the development of eco-tourism. However, I didn’t find out very relevant policies, plans or strategies on enhancing local people’s livelihood. Of course, tourism income could benefit local people’s livelihoods, but only a small part of terraced paddy landscapes was selected as tourism attractions for further development. The rest terraces still continue the originally traditional path and play their agricultural functions. The concept of the protection and conservation of terraces has won lots of supports from local people. The local government also set up a special department-the bureau of terraces protection for coordinating and managing matters related to terraces. Besides, other forms of regulations were framing administrative objectives through the utilization of traditional rules that were inherited from Hani ancestors.

Paddy terrace agriculture in Yuanyang County along the Ailao Mountains has been sustained by Hani people for thousand years. It is an amazing pattern that the local ethnic groups gradually adapted and reclaimed mountain slops in use of their traditional knowledge, technologies and customary cultures (Shimpei 2007; Wang 1999). Hani people have kept harmonious relations with their natural

surroundings for centuries. However, I insisted that the system of terraced paddy fields is not sustainable. Physically, the terraces are vulnerable to natural disasters like collapse during the heavy rainfall; the rice yield sometimes is unstable under the abnormal climate situation and changed based on different altitude. Socially and emotionally, people are still living with a very low livelihood, especially from economic domain.

In order to answer the main research question, local rural people's livelihoods were analyzed in terms of some indicators of economic capital. Results shown that the amount of average cash income is different among different villages depending on their economic resources, in which tourism and cash plants cultivation, off-farm income and the governmental compensatory payments as main resources could contribute the growth of cash income for farmers. Under various efforts for improving rural people's livelihoods, rural per capita net income in the county has achieved 1,272 Yuan but still just basically solved the food and closing needs, no matter at average county level, township level or village level. It is just one third of the international poverty standard of US\$1.25/day for agricultural population. The income poverty is still a very obvious reason that negatively affects the local rural people's livelihood level.

Yuanyang's population density is higher than Yunnan Province's average level. The growth of population since 1985 increased faster than the area of arable lands, which led to the arable land per capita fall down along with the increasing population. The development of local traditional terraced agriculture could have reached the bottleneck that substantially relies on a heavy labor input and externally natural factors. First of all, there are no more cultivated lands can be reclaimed. Especially after GFG program, a large number of mountain slopes have been returned to forests. Secondly, at mountain regions, most cultivated lands only have small benefits no matter from grain selling or from other crops' planting, not much improved in income. Thirdly, under the pressure of rapid population growth, intensive manpower for terraced farming is low in labor productivity. Yuanyang's terraced agriculture has less competitive capacity. Local farmers are not sure of how to increase food production. Therefore they intended to rely on off-farm jobs to gain more cash income for maintaining a normal or better living standard. Most young people in Yuanyang County wanted to engage in off-farm activities. Terraced agriculture just covers only small part of cash income for rural people in Yuanyang County. Cash income is useful for mountain rural people compared with equivalent values' resources, like private ownership of a forest (UNU, 2002).

China's poor original standards are still too low with an absolute poverty line of 786 Yuan (US\$115) per capita net income a year (2008). If taking this standard, there are 10 million absolutely poor people in mountain regions that just accounts for a small part of the total Chinese population (Chen, 2007). That is to say, even if the problem of mountain poverty is resolved, it's just 10 million people's outcome but didn't benefit most mountainous poor and can hardly start a whole mountain's sustainable development strategy. As Yuanyang's case, the average income per capita has exceeded China's poverty standards, but still didn't reach the anti-poverty objective. In 2009 the State Council Leading Group Office of Poverty Alleviation & Development announced to increase the poverty line to 1,067 Yuan with a big budget of poverty relief (China's poverty relief office, 2009). We still didn't see special focus on mountains regions.

In such mountains areas, which is the most important, the ecological resource conservation, the economic development or the social stability? From sustainability science's points of view, they are all

indispensable. Right now in Yuanyang, terraces and ecological environment has received considerable attentions and got the supports from different scales, but for rural people their livelihoods were not sufficiently improved with few visible changes. It is hard to find a balance between sustainable natural capital management and poverty reduction. Special and supporting policies with inclination concerns for people are needed. The government cannot focus on only conservation in terraces, but must also consider the livelihood of the people living there, and the quality of life for people. Conserving landscapes cannot focus only on biodiversity conservation of rural landscapes but also need to consider agricultural production, or alternative incomes and the quality of life for people in the region (Xu, et al. 2007). The national intervention in terms of policies offered some positive effects: the GFG program effectively increased the vegetation cover and ecological restoration in mountains areas; China's land reform has raised the local rural people's economic income a lot compared to the planned economy period. Income of households could be improved significantly during the time period of government's compensation, but if the subsidies are terminated after the program and farmers are not allowed to utilize their retired lands for economic purposes, they could suffer a loss.

In a long run, the current policy for mountainous regions, no matter the development of the GFG program or the Land policy for land allocation and land rights will all cause a big issue of further income inequality. For farmers who enjoy more lands or got more subsidies from the policy will take larger benefits and that in turn resulted in a rich-poor divide in the rural areas (this is already happening in lots of other rural areas). At present, farmers in Yuanyang County are generally poor, so the difference between rich and poor is not so obvious. However, as time goes by, more and more serious land distribution issues, livelihoods issues and inequality could be triggered. The Matthew effect described such the phenomenon in Yuanyang County that "the rich get richer and the poor get poorer". Those who possess power and economic or social capital can leverage those resources to gain more power or capita (Sloman & Dunham, 2004). Under the background of rapid development in China, inequality has already emerged and became increasingly severe, which will directly influence the stability of the rural society, especially areas like Yuanyang County, fragile economy, ethnic minority concentrated and mountainous border region. China's economic growth make an amazing reduction of poverty, but the situation of income distribution could deteriorate the incidence of poverty.

10.2 Recommendations

A People-centered development mode was advised for local people's sustainable livelihood improvement, which is also one of the principles of SL. People-centered policy-making internally should respect indigenous people's traditional rules and externally should seek rational compensation mechanism. People-centered development aims to give people more power based on the communities and create more incentives for their rights and responsibilities related to sustainability, which purposes to meet their own needs above all. It calls for people's participation and sustainability is also the key considerations. Sustainability concept is multiple that need the participation of various actors, even the whole society (Kemp & Martens, 2007). Currently, the most important strategy for farmers' needs in Yuanyang County is to improve their livelihoods in a sustainable way. In ethnic minorities' areas, local indigenous traditional rules should be respected and some valuable elements could be incorporated into policy-making, which also keeps the principle of more people considerations.

The best way to improve local people's livelihood while maintain an environmentally sustainable development is to establish an ecological compensation mechanism with the further development or

protection of the existing nature conservation projects. The mode of Payment for environmental services (PES) can be planned and operated for local sustainable mountain development. As we know humans always play the role of beneficiaries from environmental services (ES)¹⁴, however they could be casualties as well because outcomes of ES could impact on human well-being like deforestation (Zilberman, et al. 2006). PES is an innovative management tools to supply incentives to ES providers such as land users and receive payments from beneficiaries, which potentially contribute the poverty reduction with pro-poor effects since poor people often play ES providers (Wunder, 2008). Besides monetary side benefits, PES also provide non-monetary benefits both for non-participants poor as well as landless and unemployed poor. For instance, PES could create labor-markets such as logging workers, forest guards etc. to poor people to have more opportunities for their livelihoods improvement. Human and social capital also can be increased through the operation of collective groups in related to PES projects. To some extent, China's GFG project belongs to PES system, but in a specific more Chinese way. The current GFG program has shown some negative impacts on people's livelihoods as analyzed, a more people-centered, new GFG mechanism and rules are urging suggested that also can be called as a new PES which has more inclination to vulnerable people at mountain regions.

The new PES should focus on the long-term livelihoods improvement, no matter whether in terms of ecological service purposes or special mountainous lands' subsidies. The other key point is that the compensations must be able to get into farmers' pocket. Related to special compensation, Wen (2009) pointed out a super-national treatment given to farmers who are cultivating grains. The special treatments include enhancing and protecting the rights of property, land tenure, economic, social and political benefits. He also recommended raising and improving the level of organization based on the community level, not the large-scale private agricultural operations, but more through organizational management to perfect competitiveness for rural poor (Wen, 2009).

Chen (2007) recommended creating a more relaxed policy on mountain development. The current funds and other different kinds of supports for mountain rural development only play an emergency role. No matter canceling the agricultural tax, GFG program or the abolition of education expenses, they are helpful measures but not the fundamental ones. To raise rural people's income and solve poverty issues, only depending on the redistribution of the national economic benefits is not enough. The central government must plan and implement the extensively and comprehensively integrated policy, which highlight specificities of mountain regions (Chen, 2007). At present, there are no specific mountain development policies or preferential treatments in China. All relevant policies and institutions were scattered with the general rural policies, forestry policy, agricultural policies, and poverty reduction policies without a strong target. A greater inclination from governmental policies is needed.

China's New Rural Construction addressed farmers as the main subject that plays the fundamental role in the national strategic adjustment and long-term stable development (Zhou, 2008). Any kind of development assistance must be responsive to the people. Farmers should be allowed to participate in the decisions process that conforms to the principle of people-centered development, which will also increase their senses of ownership and responsibility (UNU, 2002). Ownership of mountain resources including cultivated lands could better define the relationship between stakeholders and mountain resources. Therefore, it will motivate the stakeholders' responsibilities and let them accept their rights

¹⁴ A series of ecological or physical services from natural ecosystems take effects through providing natural productions (food, water); regulating and control natural phenomenon (climate, disease); supporting natural movement (nutrient cycles); generating cultures, recreations (recreational benefits) to both human society and nature

for better agricultural and ecological management and economic activities (UNU, 2002). To place people and their priorities at the centre of development is indispensable (Haidar, 2009). We should focus on poverty reduction interventions through empowering the poor, supporting their access to assets, and developing an enabling policies and institutional environment.

The higher the average income of a country, the more possibilities it will bring about, such as higher average life expectancy, higher literacy, or higher value of the 'human development index' etc. (Anand & Sen, 2000). The local government should pay more attention to the issue of income poverty and take local peasants' livelihood and rights into consideration. The future project and policy-making should be connected with the mountains poor's livelihoods without environmental degradation, that is to provide them development support in terms of capitals, technologies, human resources, educations and trainings, and to rationally use and manage mountainous resources for gaining a better ecological and economic benefit. Besides, ecological tourism is also a good way to enhance the options of local people's livelihoods. But the local government should consider how to extend the tourism effects on farmers, how to let tourism really benefit local farmers, not just effect superficially.

11. Future Research

This research is broad and lacks in depth investigations based on communities. It is worthy to carry out further in-depth research for sustainability study in the future. It might be interesting to take further tracking survey or studies at GFG program, because 2010 is the last year of governmental compensation for Yuanyang. How it will affect local rural people' livelihood in the future without subsidies would be valuable to dig in; what the differences of households' livelihoods before the program and after would be interesting to think about. Another area that deserves more attention is a deeper review and analysis of China's rural policies and its position, issues in the new context of China's quickly economic development. Also, it would be interesting to find how and through what means to strengthen mountains people capacity-building in eco-agriculture and national resources management. The cost and benefit research about PES, ecological compensation mechanisms and other compensation mechanisms is another angle to solve the poverty problems. Integrated assessment could be carried out in related to sustainability science, because it may help better control the directions, issues and connections that can make change happening.

References

Books

- Bryman, A. (2008), *Social Research Methods*, Oxford University Press, Britain
- Ma, Y. (1983), *A Brief Introduction to Yunnan's History*, Yunnan People's Press, Kunming, China (in Chinese)
- Ma Zhongwei (2009), *The Village in Terraces—Investigation of Qingkou Village, Yuanyang County of Yunnan Province*, Minorities Press, Beijing, China (in Chinese)
- National Bureau of Statistics of P.R. China (2009), *China Statistical Yearbook 2009*, Beijing, China Statistics Press
- Payne R. (1996), *A Framework for Understanding Poverty*. Aha Process Inc. Highlands, Texas
- Wang Qinghua (1999), *On the Culture of Terraced Field*, Yunnan University Press, China (in Chinese)

Papers & Reports

- Adams W.M. (2006) The future of sustainability: re-thinking environment and development in the twenty-first century, *Report of the IUCN renowned thinkers meeting*. Retrieved from www.iucn.org
- ADB strategies (1992-1995) *Fighting poverty in Asia and the Pacific: the poverty reduction strategy*, strategies report from Asian Development Bank.
Retrieved from http://www.adb.org/Documents/Policies/Poverty_Reduction/Poverty_Policy.pdf
- AN haigang (2007) Consideration on the problems of rural land circulation, *Resources and Industries*, Vol.9, pp.47-49 (In Chinese)
- Banskota Kamal (2006), *Enhancing Economic Opportunities for The mountain poor, Policy Priorities for Sustainable Mountain Development*, papers collection for ICIMOD regional policy workshop.
- Brudtland, H. (1987) *Our common future*, Oxford: Oxford University Press, for the World Commission on Environment and Development
- Bishnu B. Bhandari (2003) *Participatory Rural Appraisal (PAR)*, report from Institute for Global Environmental Strategies (IGES)
- Cao Shixiong, Li Chen, Yu Xinxiao (2009) Impact of China's Grain for Green Project on the landscape of vulnerable arid and semi-arid agricultural regions: a case study in northern Shangxi Province, *Applied Ecology*, Vol. 46, pp.536-543
- Cao S., Chen L. & Liu Z. (2009), *An investigation of Chinese attitudes toward the environment: case study using the Grain for Green Project*, *Ambio (by Royal Swedish Academy of Sciences)* Vol.38, pp.55-64
- CAS sustainable development strategy study group (2009) *China sustainable development strategy report 2009—China's approach towards a low carbon future*, Science and Technology Press, Beijing
- Chambers R. (1995) *Poverty and livelihoods: whose reality counts?* *Environment and Urbanization*, Vol.7: 173
- Chambers R. & Conway G.R. (1991), *Sustainable rural livelihoods: practical concepts for the 21 century* IDS discussion paper 296
- Charles A. Birnbaum (2005) *Protecting Cultural Landscapes, planning, treatment and management of historic lanscpaes*, *Report from American Society of Landscape Architects (ASLA)*, Retrieved from <http://www.nps.gov/hps/tps/briefs/brief36.htm>
- Chen Guojie (2007) *Some considerations on strategy of development of mountain regions of China*, *Strategy and Policy Decision Research*, Vol.22:2, p.126-131 (in Chinese)
- Colam Rasul & Madhav Karki (2007) *A pro-poor policy agenda for sustainable agricultural development in the Hindu Kush-Himalayan Region*, *ICIMOD talking pointes*, Vol.2
- CPRC (2009) *Escaping poverty traps, The chronic poverty report 2008-09 from Chronic poverty research*

- centre. Retrieved from: http://www.chronicpoverty.org/uploads/publication_files/CPR2_ReportFull.pdf
- DFID (2000) Achieving sustainability poverty elimination and environment, Strategies for achieving the international development targets, *report from DFID*.
Retrieved from: <http://www.dfid.gov.uk/Documents/publications/tspenvironment.pdf>
- Emi Uchida, Jintao Xu, Scott Rozelle (2003) “Grain for Green” Policy in China: cost-effectiveness and sustainability of a conservation set-aside program, *conference paper for the American Agricultural Economics Association Annual Meeting*, Montreal, Canada.
- Emi Uchida, Xu Jintao, Xu Zhigang, Rozelle Scott (2007) Are the poor benefiting from China’s land conservation program? *Environment and Development Economics*, Vol.12, pp.593-620
- Fang Yiping (2009) Strategic influences and national orientations for development of China’s mountainous regions, *Decision-making and Consultation*, Vol.2, pp.14-18 (in Chinese)
- FAO, D.J. Pratt and L.Preston (1996) The economics of mountain resource flows, considering mountain economics based on the results of an electronic conference, investing in Mountains.
- Frank Ellis and Stephen Biggs (2001) Evolving themes in rural development 1950s-2000s, *Development Policy Review*, Vol.19(4), pp.437-448,
Retrieved from http://www6.ufrgs.br/pgdr/arquivos/ipode_49.pdf
- Guo J. (2003) Ecological environment and cultural adaptation of the Yuannan Tibetans, *Ethno-national Studies*, Vol.1 (in Chinese)
- HRIC (2007) China: Minority Exclusion, Marginalization and Rising Tensions, Minority Rights Group International 2007, *British Library*.
- Ian Scoones (1998) Sustainable rural livelihoods a framework for analysis, Institute of Development Studies (IDS) *working paper 72* Retrieved from www.uvg.edu.gt/instituto/centros/cea/Scoones72.pdf
- Libor Jansk’y (2000) UNU (The United Nations University) and Sustainable Mountain Development
- Jasper Crosskurth, Jan Rotmans (2005) The SCENE model: getting a grip on sustainable development in policy making, *Environmental Development and Sustainability*, Vol.7, pp.135-151
- Kemp, R., Parto, S., & Gibson, R. (2005) Governance for sustainable development; moving from theory to practice, *International Journal of Sustainable Development*, Vol.8 (1-2) pp.13-30
- Kene Kemp & Pim Martens (2007) Sustainable development: how to manage something that is subjective and never can be achieved? *Sustainability: Science, Practice, & Policy*, Vol.3. issue 2, pp.5-14
- Klaus J. Lampe (1983) Rural development in mountainous areas why progress is so difficult, *Mountain Research and Development*, Vol.3, No.3, pp.125-129
- Leon Sloman, David W. Dunham (2004), The Matthew Effect: Evolutionary Implications, *Evolutionary Psychology*, Vol.2 pp.92-104
- Liu Can & Wu Bin (2010) ‘Grain for Green Programme’ in China: policy making and implementation? Briefing series—issue 60 from China Policy Institute of Nottingham University,
Retrieved from www.nottingham.ac.uk/cpi/documents/briefings/briefing-60-reforestation.pdf
- Liu J. , Chen J. , Fang S. & Li Q. (2008) Chinese agricultural policies in thirty years and analysis on the effects, *China Population, Resources and Environment*, Vol. 18(5), pp.1-6
- Newman, p. & Kenworthy, J. (1993) Sustainability and cities, Overcoming automobile dependence. Washington, DC: Is-Land Press
- NPC Committee of Honghe Hani and Yi Autonomous Prefecture (2002), Interim Measures for Hani Terraces Management, retrieved from <http://www.hhtt.cn/artshow.asp?id=778>
- Ministry of Environmental Protection (2008) Outline of the national protection plan for ecologically fragile areas, available at www.mep.gov.cn
- Millennium Ecosystem Assessment (2005), Living Beyond Out Means, Natural Assets and Human Well-Being, *the board of Millennium Assessment*.

- Qin Jianming, Chen Cheng (2005) "Returning cropland to forests" in China; its historical development and policy changes, *Agrotechnical Economics*, 2005(1), pp. 58-63
- Robert K. Merton (1968) The Matthew Effect in Science, *Science*, 159(3810) p.56-63
- Sanjeev Kumar, Rural development through rural industrialization: exploring the Chinese experiences, study outcome from the Asian Scholar,
Retrieved from www.asianscholarship.org/asf/ejournal/articles/Sanjeev%20Kumar2.pdf
- Saunders P. (2004), Towards a credible poverty framework: from income poverty to deprivation, *SPRC discussion Paper*, No. 131
- Song Y., Andreas W., Luo R., Li J., Ji Y. (2007) Rangeland resources and livelihoods in the Dimaluo Valley, Gongshan County, Yuannan, China, reports from CBIK-BIRMAN project funded by the ford foundation.
Retrieved from <http://www.cbik.ac.cn/Files/Download/Song%20et%20al%20nd.pdf>
- Shimpei A. (2007) Agricultural technologies of terraced rice cultivation in the Ailao mountains, Yunnan, China, *Asian and African Areas Studies*, 6(2): pp. 173-196
- Shi Junchao (2009) Remarks on the application for world cultural heritage of the Hani paddy-rice terraces, *Academic Exploration*, Vol.3, pp.19-23 (in Chinese)
- Sudhir Anand & Amarya Sen (2000), Human Development and Economic Sustainability, *World Development*, Vol. 28, No. 12, pp.2029-2049
- Tao. P., Xu. J. (2004) Grain for Green Project, grain policy and sustainable development, *Social Science of China*, Vol.6, pp.25-40 (in Chinese)
- Tomohiro Ichinose, *et al.* (2007) Land-use change and irrigations systems in the agricultural landscape of terraced paddy fields in Awaji Island, central Japan, *Landscape Ecology*, 3: pp.171-177
- Uchida, E., Xu. J. & Rozelle (2005) Grain for Green: cost –effectiveness and sustainability of China's conservation set-aside program, *Land Economics*, 81(18), 247-264.
- UNU project on sustainable mountain and forest development, UNU contribution to the Agenda 21, Chapter 13: Managing Fragile Ecosystems: Sustainable Mountain Development
Retrieved from www.unu.edu/env/mountains
- UNITAR ,Conference documents from United Nations Institute for Training and Research (2007) Series on the management and conservation of world heritage sites, participants' pre-workshop case studies,
Retrieved from www2.unitar.org/hiroshima/programmes/whs07/materials/WHS07_Participants%20pre-case_studies.pdf
- Verbrug. P.H., Chen, Y& Veldkamp. T. (2000) Spatial explorations of land use change and grain production in China. *Agriculture, Ecosystem and Environment* 82, pp.333-354
- VDGs (2002) Localizing MDGs for poverty reduction in Viet Nam: Ensuring good governance for poverty reduction, Strategies for achieving the Viet Nam Development Goals.
- Wen Tiejun (2008), Four Stories in One: Environmental Protection and Rural Reconstruction in China, positions 16:3, *Duke University Press*
- Wen Tiejun, (2009) the issue of China is the issue of farmers, *internet interview*
Retrieved from www.snzg.cn (in Chinese)
- Wen Tiejun (2009) Why China cannot implement the privatization of rural land, *Theory Guide*, Vol.2 (in Chinese)
- World Bank (2009) From poor areas to poor people: China's evolving poverty reduction agenda-An assessment of poverty and inequality in China, Poverty Reduction and Economic Management Department, East Asia and Pacific Region.
- Xu Jianchu, David R. Melick, (2007), Rethinking the Effectiveness of Public Protected Areas in Southwestern China, *Biology*, Vol.21, No.2, p.318-328
- Xu Jianchu, Jefferson Fox, Lu Xing, Nancy Podger, Stephen Leisz, Ai Xihui (1999) Effects of Swidden

- Cultivation, State Policies, and Customary Institutions on Land Cover in a Hani village, Yunnan, China. *Mountain Research and Development*, Vol.19, No.2, pp.123-132
- Xu, J., and Y. Cao. (2002) "Efficiency and sustainability of converting cropland to forest and grassland in western region, draft" Center for Chinese Agricultural Policies, *Chinese Academy of Sciences*
- Xu Zhigang, Xu Jintao, Deng Xiangzheng, Huang Jikun (2006) Grain for Green versus Grain: Conflict between Food Security and Conservation Set-Aside in China, *World Development* Vol.34, No.1, pp.130-148
- Yin Ruisheng, Liu Can, Lu Jinzhi (2010) An Estimation of the Effects of China's Priority Forestry Programs on Farmers' Income, *Environmental Management*, Vol.45: p. 526-540
- Zhang X.Y. (2006) Yuanyang's Aesthetic and Bountiful Hani Terraces, *China Today*, Vol.55 issue 2, pp.64-68
- Zhao X., LV X., Dai J. (2010), Impact assessment of the "Grain for Green Project" and discussion on the development models in the mountain-gorge regions, *Earth Science*, Vol.4 (1) pp.105-116
- Zheng Xiaoyun (2004) Ethnic water culture and agricultural civilization in the reaches of Red River, *Yunnan Social Sciences*, Vol.6, pp. 103-107 (in Chinese)
- Zhi L, Shao AY (2001), Practical Conditions of Converting Cropland to Forest and Grassland, *Forestry Economics*, (3) p.43-46
- Zhou Junyu (2008) Development of disadvantaged position of the farmer in the construction of the new socialist countryside in China, *Ecological Economy*, Vol.4:pp.250-246
- Zhu Keliang & Roy Prosterman (2007), Securing land rights for Chinese Farmers, a leap forward for stability and growth, Development Policy Analysis from the Center for Global Liberty and Prosperity.
- Zilberman D., Lipper L. & McCarthy N. (2006), Putting Payments for Environmental Services in the Context of Economic Development, Agricultural and Development Economics Division, *EAS working paper from FAO*
- 2002 Tokyo Declaration for the International Year of Mountains (2002) UNU International Symposium on the Conservation of Mountain Ecosystem,
Retrieved from <http://www.unu.edu/mountains2002/index.htm>

Appendix1: Fieldwork Records

Meeting 1 (February, 21, 2010): group meeting with Yuanyang County Government

Key Interviewee: Mrs. Lu, vice governor of Yuanyang County

The meeting was held by the government of Yuanyang County. Several directors from various agencies of the government also attended, which includes agricultural bureau, water resources bureau, tourism administration bureau, terraces management bureau, forestry bureau and the government office. It is an introduction to the general situation of Yuanyang County's economy, agricultural, social and cultural development and several issues of terraces' development, management and conservation. Specially, under the context of the serious drought in most areas of Yunnan province, the officers seemed to be very worried about the local agricultural production, the upcoming water using disputes, and the livelihood of farmers who always rely on terraced agricultural income. The work for application of world heritage of Yuanyang terraces also was presented.

The first part of the meeting was carried out in terms of presentation by the local officers. They expressed both the governmental development strategies and their own opinions on the topic covered. The rest time many open-ended questions were raised by us, while I mainly focused on my thesis topic that I wanted to know the main economic resource for farmers' income and the primary issues related to people's livelihood. I also wanted to simply assess whether the local government understands the concept of sustainable livelihood and whether they have applied it into the real scheme of decision-making. All staff from the government was very satisfied and proud of Hani and other ethnic minorities' ecological culture. They believed the traditional culture, religious or spiritual values helps protecting the local natural capital a lot.

Some prepared interview questions and answers:

-What are main outcomes affected by the local natural system?

Yield of rice, quality of rice, soil erosion

-What kinds of conservation measures have been applied on the local natural system?

1. Documents: compulsive law for terraces management and protection, implemented by the local government and upper-tier government. A relatively integrated byelaw is under framing and will be published later 2010.

2. Overall design and plan at governmental level: the upper-level government has the special bureau for terraces' management and protection, and in the government of Yuanyang County, they also have established a department with those functions. These functional departments are in charge of the design and plan for terraces management, in terms of agriculture, tourism, forests, water etc.

-What are main works of those functional departments?

Working on texts for application of the world cultural heritage (texts will be published in this August);

Drafting institutions or measures for terraces management and protection; supervising and managing;

For instance, it is forbidden to build up buildings around the terraces; tourism management; environment of terraces.

Meeting 2 (February, 22, 2010): group meeting with officers from Panzhihua Township of Yuanyang County

Key Interviewee: Mr. Li, vice head of Panzhihua Township

Pangzhihua Township is 79.73 square kilometers, smaller than other townships in Yuanyang County. It has a population of 18,000, living in six village committees of 31 natural villages. The area of arable lands is 17,534 mu (paddy fields: 8625 mu & dry lands: 8909 mu), but only 0.98 mu per capita. The forest area is 36,744 mu with the coverage rate of 31.6%. Pangzhihua has around 4000 households with three ethnic groups of Hani, Yi and Zhuang. Pangzhihua is still a poor mountainous area that the overall GDP is 53.5 million Yuan, but income per capita is just 1593 Yuan in 2008, and farmers own crop per capita of 322 kilograms.

I asked him what are the main advantages and disadvantages for improving local farmers' livelihood and rural development. There are two main advantages as he said. Firstly, tourism resources: nearly ten thousand mu magnificent terraces are from here that makes up the key tourism area of Yuanyang County. Especially Laohuzui terrace, it attracts many Chinese and foreign tourists. Secondly, rich ethnic cultures: diverse ethnic festivals, handicrafts, embroidery, etc. Those ethnic characteristics could help to increase local farmers' cash income besides traditional agriculture. Major disadvantages restrict the rural development of Pangzhihua including the low quality of the population, underdeveloped infrastructure and weak industry.

The officer seems have no idea to enhance people's livelihood, especially cash income. He told me the farmers cannot just rely on the terraced agriculture because it doesn't help improve their livelihood at all. He told me although terraces tourism did some good sides for local development, it hasn't shown really practical effects on farmers' livelihood. They didn't get many benefits from tourism income, most of them inflowing into the company's pocket. Only advantage from tourism is promoting the local infrastructure. For the concept of sustainable livelihood, he doesn't know it, but in his mind, it should be environmentally friendly and he wished terraces can be protected and sustained. He believed farmers have done very well for terraces management, but their life is still tough.

Meeting 3 (February, 23, 2010): group meeting with officers from Niujiiaozhai village committee of Niujiiaozhai Township of Yuanyang County

Key interviewees: Mr. Li, director of Niujiiaozhai village committee, Mr. Zhou, vice director of Niujiiaozhai Village Committee, Mr. Bai, Farmer, Water Manager of Tou Ditch

This time, we interviewed the lowest level of officer from the village committee of Niujiiaozhai, where the government of the township is located in this village. Firstly is also the introduction about this township and village's general situation. Niujiiaozhai Township has 8 village committees of 89 natural villages. The total population is 31,920 composed by 7058 households in 5 national groups of Hani, Yi, Dai, Zhuang and Han. There's no flat ground within this area but all mountains with a highest elevation of 2683 meters and a lowest of 800 meters. There are 26,451 mu arable terraced lands, in which paddy fields are 17,628 mu and dry lands are 8,823 mu. Forest area is 6,101 hectare with the coverage rate of 42.8%. Niujiiaozhai has a relatively developed agriculture in Yuanyang County, major crops including rice, hybrid corn, soybeans, peanuts and tea. GDP in 2007 has achieved 83.253 million Yuan, of which the first industry including agriculture is 56.53 million and the third industry of tourism or other services contributed nearly 11 million Yuan. Net rural income per capita is 1,212 Yuan in 2007. Crops and meat supply can satisfy the self-sufficiency.

Because of well-developed agriculture compared to other places in Yuanyang County, corresponding

agricultural infrastructure like water ditches or channels for irrigation is developed and managed very well. A farmer, who is also a water manager of an irrigation ditch, he told us his daily work on water management and what issues, difficulties, benefits in front of him.

Officers interviewed are all proud of the situation of agriculture, because agricultural production from this township is the top three in Yuanyang County, and it provides crops to market more than other places. They satisfied their agricultural activities in the reason of good management of corresponding agricultural facilities like irrigation channels. But they still dissatisfied about the income (livelihood) at present. They complained about terraced agriculture because they input too much especially labour force, but without equivalent rewards. They still have no idea to improve people's livelihood, and they are worried about the poverty situation as well. Because of limited income by agriculture, less people, especially young generation doesn't prefer agriculture any more, but a job in city. Officers believed that the lack of labour force will be a big issue for agricultural development in the future but it may not influence rural people's livelihood, because a stable job earns more than agricultural activities.

Meeting 4 (February, 26, 2010): group meeting with officers from Malizhai village committee of Xinjie Township

Key interviewees: Mr. Li, director of Malizhai village committee

Malizai village committee has four natural villages, 916 households, 4,963 people. It is the biggest Hani people's village committee in Yuanyang County. It has 3,283 mu arable areas, in which 2,233 mu paddy fields. All area of Malizhai is above the elevation of 1300 meters of mountains. It is the poorest village committee in Yuanyang County, income per capita is just 896 yuan/year. Rice, corn and soya beans are main crops, but can just sustain the basic food needs. Nearly all cash income of this village is dependent on migrant labor. So the lack of labour force in the busy farming season has influenced the local agriculture more or less.

The officer is not very optimistic about the rural development in Malizhai. Two main reasons: first, no other economic income in this area other than agriculture. It is far from the main area of tourism sight-seeing, although terraces are very beautiful here, Malizhai cannot benefit too much from tourism industry. Second, people's educational level is low. It's not just the issue in Malizhai, whereas a common issue in Yuanyang County.

Meeting 5 (February, 29, 2010): group meeting with farmers from Qingkou Village of Xinjie Township
Key interviewees: Mr. Bai, farmer from Qingkou Village, Mr. Meng, Director of agro-technical station of Xinjie Township

Qingkou Village is one of the most famous folklore and ecological tourism places in Yuanyang County, both for Hani ethnic culture and terraces. Qingkou has an area of five ha. 178 households and 865 people (2004). Because it is near Xinjie Township and traffic is convenient, it becomes a tour brand. The whole village has been rebuilt in Hani ethnic style from 2000.

Besides the situation of tourism for promoting people's livelihood, I asked the question about labour force allocation in the village. There are around 700 people of labour force, and almost all is working for cultivation. The main style emigration is marriage, besides it, education and emigrant working are included. Under the tourism development in Qingkou, around 20 people are working for tour service in

terms of grocers, arts and crafts stores. Mr. Bai seemed satisfied about the tourism development. He said the new culture from outside is spreading into the village which influenced many aspects of their traditional lifestyle and culture. But he doesn't satisfy about the tourism income distribution, "most of the money is getting into the company's pocket".

Even though tourism is developed very quickly, agriculture is still the main livelihood for Qingkou. There are 857 mu arable lands, in which 453 mu paddy fields and 404 mu dry lands, with nearly 1 mu arable lands per capita. Mr. Meng from agro-technical station also introduced, traditional agriculture-based economy has developed steadily in these years, but very slowly. Terraces are still the pillar of the local livelihood. The majority of farmers still have to participate in the production of terraced fields. From 2001 till now, agricultural production doesn't change, both in areas of arable lands and output of crops.

Appendix 2: Land Use Pattern In Yuanyang County

The land use pattern in Yuanyang is shown at the following table in varieties of altitude, which also displays the vegetation type, rice type and yield in different elevations.

Land Use pattern in Yuanyang County

Altitude (Meters)	Main vegetation types	Rice Types	Harvest patterns	Yield (rice)	Land Use
Below 1300	Agricultural crops, Mixed coniferous and broad-leaved forest Less grassy slopes	Mainly hybrid, less Red rice and sticky rice	Hybrid can be harvested twice a year	Hybrid: about 600~900 kg/mu	Residence, Arable land, cash crops, cash trees
1300~1750	Agricultural crops, Broad-leaved both evergreen and deciduous forest	Mainly Red rice, less hybrid and sticky rice	Once a year	Hybrid: about 400~600 kg/mu Red Rice: about 200~650 kg/mu	Residence, arable land, cash crops, cash trees
Over 1750	Broad-leaved forest, Some bamboo forest	Less Red rice	Once a year, hard to cultivate	Red rice: about 150~400 kg/mu	Arable land, cash trees

(Data collected from Wang 1999 & thesis fieldworks,2010)

Appendix 3 Terraced paddy fields in Japan and Philippine

Japan has numerous terraced paddy fields in the past, but paddy fields has decreased dramatically and changed to be dry fields, grasslands and other urban lands from 1970, when the Japanese government started to promote a crop change project from rice to other grains. Because of this project, the proportion of grasslands and other crops which were cultivated in dry fields are increased with a reduction of paddy fields. The change in the landscape of terraced paddy fields was brought by introduction of modern agricultural techniques, materials, urban culture and agricultural management (Tomohiro 2007 & Hasegawa 1998). The most serious factors for Japanese peasants to abandon terraced fields are the aging population and the shortage of labor force (Tomohiro, 2007). Cordillera terraces in Philippine have been listed by UNESCO as “Cultural Landscape Heritage” since 1995 and also rapidly was put at the list of “world heritage in danger” in 2005 because of environmental degradation and lack of management. The directly reason is the low livelihood for local people that they have to abandon terraces for sake of other living means (UNESCO, 2007).

In summary, Japan’s reasons of landscape-changes are different as Philippine. For Hani terraced paddy fields, the agricultural productivity is low that can hardly benefit local people’s livelihood. Livelihoods’ issues in Yuanyang are similar as Philippine, but till now, local labor force for agricultural practices is sufficient, even if not, back-fence helps often occur. So abandonments of terraces in Yuanyang are still rare. But aging people problem in Japan may happen in Yuanyang as well in the future, because low income from agricultural production has made young generation leave to find other livelihoods means. Nearly all labor force for terraced agriculture is above middle-aged people.